**UNIVERSIDAD NACIONAL DE INGENIERÍA**

**FACULTAD DE INGENIERÍA CIVIL**

# TESIS

# "DETERMINACIÓN DE LOS COEFICIENTES DE VARIACIÓN DE CONSUMO PARA SU APLICACIÓN EN DISEÑOS DE ABASTECIMIENTO DE AGUA EN LIMA METROPOLITANA"

## TOMO II
## (ANEXOS I)

**PARA OBTENER EL TÍTULO PROFESIONAL DE INGENIERO CIVIL**


**ELABORADO POR**

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**LIMA – PERÚ**

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# Anexo 1: Tratamiento de datos

````
---
title: "Tratamiento de datos"
author: "Víctor Raúl León Medina"
date: "25/01/2024"
output: html_document
---

# Limpieza de consola

```{r}
ls()
rm(list=ls())
graphics.off()
```

# Instalación de librerías

```{r}
library(ggplot2)
library(cowplot)
library(readxl)
library(patchwork)
```

# Identificación del directorio de trabajo

```{r}
getwd()
```

# PRETRATAMIENTO DE DATOS

## Selección de datos horarios

```{r}
SectoresPreTH=read_excel("D:/ANEXOS/Anexo 1. Tratamiento de datos/SectoresPreTH.xlsx")
# View(SectoresPreTH)
```

## Asignación de formato fecha horaria

```{r}
SectoresPreTH$FECHA_HR=as.Date(SectoresPreTH$FECHA_HR)
head(SectoresPreTH)
str(SectoresPreTH)
```

## Generación de gráficos a escala horaria

```{r}
PreTS0002H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0002))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0003H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0003))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0007H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0007))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0008H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0008))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0010H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0010))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0011H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0011))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0012H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0012))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0013H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0013))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0014H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0014))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0015H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0015))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0016H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0016))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0017H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0017))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0018H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0018))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0019H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0019))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0028H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0028))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0029H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0029))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0033H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0033))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0035H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0035))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0036H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0036))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0039H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0039))+geom_line(color="blue3",lwd=0.001)+
````
````

```
                                                theme(axis.title.x=element_blank())
PreTS0042H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0042))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0043H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0043))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0047H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0047))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0048H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0048))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0049H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0049))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0054H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0054))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0056H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0056))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0057H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0057))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0063H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0063))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0065H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0065))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0066H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0066))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0067H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0067))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0068H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0068))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0069H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0069))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0071H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0071))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0073H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0073))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0080H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0080))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0081H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0081))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0082H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0082))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0083H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0083))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0092H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0092))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0095H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0095))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0096H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0096))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0116H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0116))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0200H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0200))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0202H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0202))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0204H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0204))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0205H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0205))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0206H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0206))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0213H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0213))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0300H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0300))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0301H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0301))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0302H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0302))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0304H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0304))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0305H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0305))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0306H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0306))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0309H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0309))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0311H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0311))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0312H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0312))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0316H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0316))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0317H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0317))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0318H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0318))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0319H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0319))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
PreTS0320H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0320))+geom_line(color="blue3",lwd=0.001)+
                                                theme(axis.title.x=element_blank())
```

```
PreTS0322H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0322))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0324H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0324))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0325H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0325))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0326H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0326))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0328H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0328))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0329H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0329))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PreTS0330H=ggplot(SectoresPreTH,aes(x=FECHA_HR,y=S0330))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
```

## Selección de datos diarios

```{r}
SectoresPreTD=read_excel("D:/ANEXOS/Anexo 1. Tratamiento de datos/SectoresPreTD.xlsx")
# View(SectoresPreTD)
```

## Asignación de formato fecha diaria

```{r}
SectoresPreTD$FECHA_DI=as.Date(SectoresPreTD$FECHA_DI)
head(SectoresPreTD)
str(SectoresPreTD)
```

## Generación de gráficos a escala diaria

```{r}
PreTS0002D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0002))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0003D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0003))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0007D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0007))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0008D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0008))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0010D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0010))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0011D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0011))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0012D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0012))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0013D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0013))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0014D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0014))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0015D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0015))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0016D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0016))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0017D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0017))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0018D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0018))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0019D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0019))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0028D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0028))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0029D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0029))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0033D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0033))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0035D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0035))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0036D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0036))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0039D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0039))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0042D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0042))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0043D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0043))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0047D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0047))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0048D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0048))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0049D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0049))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0054D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0054))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0056D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0056))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0057D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0057))+geom_line(color="blue3",lwd=0.001)+
```

```
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0063D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0063))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0065D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0065))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0066D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0066))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0067D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0067))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0068D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0068))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0069D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0069))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0071D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0071))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0073D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0073))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0080D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0080))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0081D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0081))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0082D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0082))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0083D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0083))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0092D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0092))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0095D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0095))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0096D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0096))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0116D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0116))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0200D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0200))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0202D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0202))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0204D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0204))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0205D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0205))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0206D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0206))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0213D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0213))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0300D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0300))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0301D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0301))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0302D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0302))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0304D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0304))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0305D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0305))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0306D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0306))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0309D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0309))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0311D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0311))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0312D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0312))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0316D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0316))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0317D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0317))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0318D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0318))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0319D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0319))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0320D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0320))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0322D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0322))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0324D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0324))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0325D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0325))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0326D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0326))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0328D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0328))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0329D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0329))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PreTS0330D=ggplot(SectoresPreTD,aes(x=FECHA_DI,y=S0330))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
```

## Ploteo de gráficos a escala horaria y diaria

```{r}
(PreTS0002H|PreTS0002D)/(PreTS0003H|PreTS0003D)/(PreTS0007H|PreTS0007D)/
(PreTS0008H|PreTS0008D)/(PreTS0010H|PreTS0010D)
```

```{r}
(PreTS0011H|PreTS0011D)/(PreTS0012H|PreTS0012D)/(PreTS0013H|PreTS0013D)/
(PreTS0014H|PreTS0014D)/(PreTS0015H|PreTS0015D)
```

```{r}
(PreTS0016H|PreTS0016D)/(PreTS0017H|PreTS0017D)/(PreTS0018H|PreTS0018D)/
(PreTS0019H|PreTS0019D)/(PreTS0028H|PreTS0028D)
```

```{r}
(PreTS0029H|PreTS0029D)/(PreTS0033H|PreTS0033D)/(PreTS0035H|PreTS0035D)/
(PreTS0036H|PreTS0036D)/(PreTS0039H|PreTS0039D)
```

```{r}
(PreTS0042H|PreTS0042D)/(PreTS0043H|PreTS0043D)/(PreTS0047H|PreTS0047D)/
(PreTS0048H|PreTS0048D)/(PreTS0049H|PreTS0049D)
```

```{r}
(PreTS0054H|PreTS0054D)/(PreTS0056H|PreTS0056D)/(PreTS0057H|PreTS0057D)/
(PreTS0063H|PreTS0063D)/(PreTS0065H|PreTS0065D)
```

```{r}
(PreTS0066H|PreTS0066D)/(PreTS0067H|PreTS0067D)/(PreTS0068H|PreTS0068D)/
(PreTS0069H|PreTS0069D)/(PreTS0071H|PreTS0071D)
```

```{r}
(PreTS0073H|PreTS0073D)/(PreTS0080H|PreTS0080D)/(PreTS0081H|PreTS0081D)/
(PreTS0082H|PreTS0082D)/(PreTS0083H|PreTS0083D)
```

```{r}
(PreTS0092H|PreTS0092D)/(PreTS0095H|PreTS0095D)/(PreTS0096H|PreTS0096D)/
(PreTS0116H|PreTS0116D)/(PreTS0200H|PreTS0200D)
```

```{r}
(PreTS0202H|PreTS0202D)/(PreTS0204H|PreTS0204D)/(PreTS0205H|PreTS0205D)/
(PreTS0206H|PreTS0206D)/(PreTS0213H|PreTS0213D)
```

```{r}
(PreTS0300H|PreTS0300D)/(PreTS0301H|PreTS0301D)/(PreTS0302H|PreTS0302D)/
(PreTS0304H|PreTS0304D)/(PreTS0305H|PreTS0305D)
```

```{r}
(PreTS0306H|PreTS0306D)/(PreTS0309H|PreTS0309D)/(PreTS0311H|PreTS0311D)/
(PreTS0312H|PreTS0312D)/(PreTS0316H|PreTS0316D)
```

```{r}
(PreTS0317H|PreTS0317D)/(PreTS0318H|PreTS0318D)/(PreTS0319H|PreTS0319D)/
(PreTS0320H|PreTS0320D)/(PreTS0322H|PreTS0322D)
```

```{r}
(PreTS0324H|PreTS0324D)/(PreTS0325H|PreTS0325D)/(PreTS0326H|PreTS0326D)/
(PreTS0328H|PreTS0328D)/(PreTS0329H|PreTS0329D)
```

```{r}
(PreTS0325H|PreTS0325D)/(PreTS0326H|PreTS0326D)/(PreTS0328H|PreTS0328D)/
(PreTS0329H|PreTS0329D)/(PreTS0330H|PreTS0330D)
```

# POSTRATAMIENTO DE DATOS

## Selección de datos horarios

```{r}
SectoresPosTH=read_excel("D:/ANEXOS/Anexo 1. Tratamiento de datos/SectoresPosTH.xlsx")
# View(SectoresPosTH)
```

## Asignación de formato fecha horaria

```{r}
```

```
SectoresPosTH$FECHA_HR=as.Date(SectoresPosTH$FECHA_HR)
head(SectoresPosTH)
str(SectoresPosTH)
```

## Generación de gráficos a escala horaria

```{r}
PosTS0002H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0002))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0003H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0003))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0007H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0007))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0008H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0008))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0010H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0010))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0011H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0011))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0012H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0012))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0013H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0013))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0014H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0014))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0015H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0015))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0016H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0016))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0017H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0017))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0018H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0018))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0019H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0019))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0028H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0028))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0029H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0029))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0033H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0033))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0035H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0035))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0036H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0036))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0039H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0039))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0042H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0042))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0043H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0043))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0047H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0047))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0048H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0048))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0049H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0049))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0054H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0054))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0056H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0056))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0057H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0057))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0063H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0063))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0065H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0065))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0066H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0066))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0067H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0067))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0068H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0068))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0069H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0069))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0071H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0071))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0073H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0073))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0080H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0080))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0081H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0081))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0082H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0082))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0083H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0083))+geom_line(color="blue3",lwd=0.001)+
  theme(axis.title.x=element_blank())
PosTS0092H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0092))+geom_line(color="blue3",lwd=0.001)+
```

```
theme(axis.title.x=element_blank())
PosTS0095H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0095))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0096H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0096))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0116H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0116))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0200H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0200))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0202H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0202))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0204H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0204))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0205H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0205))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0206H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0206))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0213H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0213))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0300H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0300))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0301H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0301))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0302H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0302))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0304H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0304))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0305H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0305))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0306H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0306))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0309H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0309))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0311H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0311))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0312H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0312))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0316H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0316))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0317H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0317))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0318H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0318))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0319H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0319))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0320H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0320))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0322H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0322))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0324H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0324))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0325H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0325))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0326H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0326))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0328H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0328))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0329H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0329))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
PosTS0330H=ggplot(SectoresPosTH,aes(x=FECHA_HR,y=S0330))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
```

```

## Selección de datos diarios

```{r}
SectoresPosTD=read_excel("D:/ANEXOS/Anexo 1. Tratamiento de datos/SectoresPosTD.xlsx")
# View(SectoresPosTD)
```

## Asignación de formato fecha diaria

```{r}
SectoresPosTD$FECHA_DI=as.Date(SectoresPosTD$FECHA_DI)
head(SectoresPosTD)
str(SectoresPosTD)
```

## Generación de gráficos a escala diaria

```{r}
PosTS0002D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0002))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0003D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0003))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0007D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0007))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0008D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0008))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
```
```

```
PosTS0010D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0010))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0011D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0011))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0012D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0012))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0013D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0013))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0014D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0014))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0015D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0015))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0016D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0016))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0017D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0017))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0018D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0018))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0019D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0019))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0028D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0028))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0029D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0029))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0033D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0033))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0035D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0035))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0036D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0036))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0039D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0039))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0042D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0042))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0043D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0043))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0047D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0047))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0048D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0048))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0049D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0049))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0054D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0054))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0056D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0056))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0057D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0057))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0063D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0063))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0065D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0065))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0066D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0066))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0067D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0067))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0068D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0068))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0069D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0069))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0071D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0071))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0073D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0073))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0080D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0080))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0081D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0081))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0082D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0082))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0083D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0083))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0092D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0092))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0095D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0095))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0096D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0096))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0116D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0116))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0200D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0200))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0202D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0202))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0204D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0204))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0205D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0205))+geom_line(color="blue3",lwd=0.001)+
        theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0206D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0206))+geom_line(color="blue3",lwd=0.001)+
```

```
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0213D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0213))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0300D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0300))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0301D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0301))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0302D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0302))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0304D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0304))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0305D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0305))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0306D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0306))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0309D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0309))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0311D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0311))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0312D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0312))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0316D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0316))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0317D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0317))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0318D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0318))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0319D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0319))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0320D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0320))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0322D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0322))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0324D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0324))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0325D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0325))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0326D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0326))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0328D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0328))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0329D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0329))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
PosTS0330D=ggplot(SectoresPosTD,aes(x=FECHA_DI,y=S0330))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())+theme(axis.title.y=element_blank())
```
```

## Ploteo de gráficos a escala horaria y diaria

```{r}
(PosTS0002H|PosTS0002D)/(PosTS0003H|PosTS0003D)/(PosTS0007H|PosTS0007D)/
(PosTS0008H|PosTS0008D)/(PosTS0010H|PosTS0010D)
```

```{r}
(PosTS0011H|PosTS0011D)/(PosTS0012H|PosTS0012D)/(PosTS0013H|PosTS0013D)/
(PosTS0014H|PosTS0014D)/(PosTS0015H|PosTS0015D)
```

```{r}
(PosTS0016H|PosTS0016D)/(PosTS0017H|PosTS0017D)/(PosTS0018H|PosTS0018D)/
(PosTS0019H|PosTS0019D)/(PosTS0028H|PosTS0028D)
```

```{r}
(PosTS0029H|PosTS0029D)/(PosTS0033H|PosTS0033D)/(PosTS0035H|PosTS0035D)/
(PosTS0036H|PosTS0036D)/(PosTS0039H|PosTS0039D)
```

```{r}
(PosTS0042H|PosTS0042D)/(PosTS0043H|PosTS0043D)/(PosTS0047H|PosTS0047D)/
(PosTS0048H|PosTS0048D)/(PosTS0049H|PosTS0049D)
```

```{r}
(PosTS0054H|PosTS0054D)/(PosTS0056H|PosTS0056D)/(PosTS0057H|PosTS0057D)/
(PosTS0063H|PosTS0063D)/(PosTS0065H|PosTS0065D)
```

```{r}
(PosTS0066H|PosTS0066D)/(PosTS0067H|PosTS0067D)/(PosTS0068H|PosTS0068D)/
(PosTS0069H|PosTS0069D)/(PosTS0071H|PosTS0071D)
```

```{r}
(PosTS0073H|PosTS0073D)/(PosTS0080H|PosTS0080D)/(PosTS0081H|PosTS0081D)/
(PosTS0082H|PosTS0082D)/(PosTS0083H|PosTS0083D)
```
```

```{r}
(PosTS0092H|PosTS0092D)/(PosTS0095H|PosTS0095D)/(PosTS0096H|PosTS0096D)/
(PosTS0116H|PosTS0116D)/(PosTS0200H|PosTS0200D)
```

```{r}
(PosTS0202H|PosTS0202D)/(PosTS0204H|PosTS0204D)/(PosTS0205H|PosTS0205D)/
(PosTS0206H|PosTS0206D)/(PosTS0213H|PosTS0213D)
```

```{r}
(PosTS0300H|PosTS0300D)/(PosTS0301H|PosTS0301D)/(PosTS0302H|PosTS0302D)/
(PosTS0304H|PosTS0304D)/(PosTS0305H|PosTS0305D)
```

```{r}
(PosTS0306H|PosTS0306D)/(PosTS0309H|PosTS0309D)/(PosTS0311H|PosTS0311D)/
(PosTS0312H|PosTS0312D)/(PosTS0316H|PosTS0316D)
```

```{r}
(PosTS0317H|PosTS0317D)/(PosTS0318H|PosTS0318D)/(PosTS0319H|PosTS0319D)/
(PosTS0320H|PosTS0320D)/(PosTS0322H|PosTS0322D)
```

```{r}
(PosTS0324H|PosTS0324D)/(PosTS0325H|PosTS0325D)/(PosTS0326H|PosTS0326D)/
(PosTS0328H|PosTS0328D)/(PosTS0329H|PosTS0329D)
```

```{r}
(PosTS0325H|PosTS0325D)/(PosTS0326H|PosTS0326D)/(PosTS0328H|PosTS0328D)/
(PosTS0329H|PosTS0329D)/(PosTS0330H|PosTS0330D)
```

# Anexo 2: Periodos de análisis

```
---
title: "Periodos de análsis"
author: "Víctor Raúl León Medina"
date: "25/01/2024"
output: html_document
---

# Limpieza de consola

```{r}
ls()
rm(list=ls())
graphics.off()
```

# Instalación de librerías

```{r}
library(readxl)
library(ggplot2)
```

# Identificación del directorio de trabajo

```{r}
getwd()
```

# PERIODOS DE ANÁLISIS SIN TRATAMIENTO DE DATOS

## Selección de datos horarios

```{r}
SectoresPreTH=read_excel("D:/ANEXOS/Anexo 2. Periodos de análisis/SectoresPreTH.xlsx")
# View(SectoresPreTH)
```

## Asignación de formato fecha horaria

```{r}
SectoresPreTH$FECHA_HR=as.Date(SectoresPreTH$FECHA_HR)
head(SectoresPreTH)
str(SectoresPreTH)
```

## Ploteo de gráficos a escala horaria

```{r}
ggplot(SectoresPreTH,aes(x=FECHA_HR))+
geom_line(aes(y=S0002,color="S0002"))+
geom_line(aes(y=S0003,color="S0003"))+
geom_line(aes(y=S0007,color="S0007"))+
geom_line(aes(y=S0008,color="S0008"))+
geom_line(aes(y=S0010,color="S0010"))+
geom_line(aes(y=S0011,color="S0011"))+
geom_line(aes(y=S0012,color="S0012"))+
geom_line(aes(y=S0013,color="S0013"))+
geom_line(aes(y=S0014,color="S0014"))+
geom_line(aes(y=S0015,color="S0015"))+
geom_line(aes(y=S0016,color="S0016"))+
geom_line(aes(y=S0017,color="S0017"))+
geom_line(aes(y=S0018,color="S0018"))+
geom_line(aes(y=S0019,color="S0019"))+
geom_line(aes(y=S0028,color="S0028"))+
geom_line(aes(y=S0029,color="S0029"))+
geom_line(aes(y=S0033,color="S0033"))+
geom_line(aes(y=S0035,color="S0035"))+
geom_line(aes(y=S0036,color="S0036"))+
geom_line(aes(y=S0039,color="S0039"))+
geom_line(aes(y=S0042,color="S0042"))+
geom_line(aes(y=S0043,color="S0043"))+
geom_line(aes(y=S0047,color="S0047"))+
geom_line(aes(y=S0048,color="S0048"))+
geom_line(aes(y=S0049,color="S0049"))+
geom_line(aes(y=S0054,color="S0054"))+
geom_line(aes(y=S0056,color="S0056"))+
geom_line(aes(y=S0057,color="S0057"))+
geom_line(aes(y=S0063,color="S0063"))+
geom_line(aes(y=S0065,color="S0065"))+
geom_line(aes(y=S0066,color="S0066"))+
geom_line(aes(y=S0067,color="S0067"))+
geom_line(aes(y=S0068,color="S0068"))+
geom_line(aes(y=S0069,color="S0069"))+
geom_line(aes(y=S0071,color="S0071"))+
geom_line(aes(y=S0073,color="S0073"))+
geom_line(aes(y=S0080,color="S0080"))+
geom_line(aes(y=S0081,color="S0081"))+
geom_line(aes(y=S0082,color="S0082"))+
geom_line(aes(y=S0083,color="S0083"))+
```
```

```
geom_line(aes(y=S0092,color="S0092"))+
geom_line(aes(y=S0095,color="S0095"))+
geom_line(aes(y=S0096,color="S0096"))+
geom_line(aes(y=S0116,color="S0116"))+
geom_line(aes(y=S0200,color="S0200"))+
geom_line(aes(y=S0202,color="S0202"))+
geom_line(aes(y=S0204,color="S0204"))+
geom_line(aes(y=S0205,color="S0205"))+
geom_line(aes(y=S0206,color="S0206"))+
geom_line(aes(y=S0213,color="S0213"))+
geom_line(aes(y=S0300,color="S0300"))+
geom_line(aes(y=S0301,color="S0301"))+
geom_line(aes(y=S0302,color="S0302"))+
geom_line(aes(y=S0304,color="S0304"))+
geom_line(aes(y=S0305,color="S0305"))+
geom_line(aes(y=S0306,color="S0306"))+
geom_line(aes(y=S0309,color="S0309"))+
geom_line(aes(y=S0311,color="S0311"))+
geom_line(aes(y=S0312,color="S0312"))+
geom_line(aes(y=S0316,color="S0316"))+
geom_line(aes(y=S0317,color="S0317"))+
geom_line(aes(y=S0318,color="S0318"))+
geom_line(aes(y=S0319,color="S0319"))+
geom_line(aes(y=S0320,color="S0320"))+
geom_line(aes(y=S0322,color="S0322"))+
geom_line(aes(y=S0324,color="S0324"))+
geom_line(aes(y=S0325,color="S0325"))+
geom_line(aes(y=S0326,color="S0326"))+
geom_line(aes(y=S0328,color="S0328"))+
geom_line(aes(y=S0329,color="S0329"))+
geom_line(aes(y=S0330,color="S0330"))+
scale_colour_manual(values=c("#CDC0B0","#66CDAA","#C1CDCD","#0000FF","#FF4040",
"#53868B","#76EE00","#CD5B45","#8B8878","#00CDCD",
"#698B22","#8B1C62","#CDCD00","#00C5CD","#008B45",
"#FF3E96","#FFFF00","#87CEFA","#CD3700","#FFA500",
"#5F9EA0","#FF4040","#CDC673","#E066FF","#C0FF3E",
"#FF0000","#4876FF","#2E8B57","#36648B","#FFFF00",
"#00868B","#8B3626","#6A5ACD","#27408B","#006400",
"#008B00","#8B6914","#556B2F","#CDC8B1","#FF8C00",
"#6A5ACD","#00FF7F","#00F5FF","#FFD700","#0000FF",
"#8B2323","#404040","#CD0000","#87CEFF","#2F4F4F",
"#551A8B","#FF4500","#FF83FA","#3D3D3D","#66CDAA",
"#CDB79E","#8B6508","#CAFF70","#8B0000","#CD919E",
"#87CEFA","#FF34B3","#B8860B","#00008B","#8B2323",
"#008B00","#00BFFF","#00FF7F","#737373","#D2B48C",
"#473C8B"))+
geom_vline(xintercept=as.Date("2013-01-01"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2013-01-01"), y=0,label="01/01/13"),
size=2.49,angle=0,vjust=-35.30,hjust=-0.08)+
geom_vline(xintercept=as.Date("2020-03-16"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2020-03-16"), y=0,label="16/03/20"),
size=2.49,angle=0,vjust=-35.30,hjust=-0.08)+
geom_vline(xintercept=as.Date("2022-10-28"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2022-10-28"), y=0,label="28/10/22"),
size=2.49,angle=0,vjust=-35.30,hjust=-0.08)+
guides(color=guide_legend(title="Sectores",title.position="top",nrow=6,ncol=12))+
ylim(c(0,450))+
theme(plot.margin=margin(0,0.2,0,0,"cm"),
legend.key.size=unit(0.2,"cm"), #alto de cuadrados de referencia
legend.key.width=unit(0.5,"cm"), #ancho de cuadrados de referencia
legend.position="bottom",
legend.direction="horizontal",
legend.title=element_text(size=8,face="bold"),
legend.text=element_text(size=7))+
labs(x="Tiempo (horas)",y="Caudal (l/s)")+
theme(axis.title.x=element_text(size=9),axis.title.y=element_text(size=9))
```

## Selección de datos diarios

```{r}
SectoresPreTD=read_excel("D:/ANEXOS/Anexo 2. Periodos de análisis/SectoresPreTD.xlsx")
# View(SectoresPreTD)
```

## Asignación de formato fecha diaria

```{r}
SectoresPreTD$FECHA_DI=as.Date(SectoresPreTD$FECHA_DI)
head(SectoresPreTD)
str(SectoresPreTD)
```

## Ploteo de gráficos a escala diaria

```{r}
ggplot(SectoresPreTD,aes(x=FECHA_DI))+
geom_line(aes(y=S0002,color="S0002"))+
geom_line(aes(y=S0003,color="S0003"))+
```

```
geom_line(aes(y=S0007,color="S0007"))+
geom_line(aes(y=S0008,color="S0008"))+
geom_line(aes(y=S0010,color="S0010"))+
geom_line(aes(y=S0011,color="S0011"))+
geom_line(aes(y=S0012,color="S0012"))+
geom_line(aes(y=S0013,color="S0013"))+
geom_line(aes(y=S0014,color="S0014"))+
geom_line(aes(y=S0015,color="S0015"))+
geom_line(aes(y=S0016,color="S0016"))+
geom_line(aes(y=S0017,color="S0017"))+
geom_line(aes(y=S0018,color="S0018"))+
geom_line(aes(y=S0019,color="S0019"))+
geom_line(aes(y=S0028,color="S0028"))+
geom_line(aes(y=S0029,color="S0029"))+
geom_line(aes(y=S0033,color="S0033"))+
geom_line(aes(y=S0035,color="S0035"))+
geom_line(aes(y=S0036,color="S0036"))+
geom_line(aes(y=S0039,color="S0039"))+
geom_line(aes(y=S0042,color="S0042"))+
geom_line(aes(y=S0043,color="S0043"))+
geom_line(aes(y=S0047,color="S0047"))+
geom_line(aes(y=S0048,color="S0048"))+
geom_line(aes(y=S0049,color="S0049"))+
geom_line(aes(y=S0054,color="S0054"))+
geom_line(aes(y=S0056,color="S0056"))+
geom_line(aes(y=S0057,color="S0057"))+
geom_line(aes(y=S0063,color="S0063"))+
geom_line(aes(y=S0065,color="S0065"))+
geom_line(aes(y=S0066,color="S0066"))+
geom_line(aes(y=S0067,color="S0067"))+
geom_line(aes(y=S0068,color="S0068"))+
geom_line(aes(y=S0069,color="S0069"))+
geom_line(aes(y=S0071,color="S0071"))+
geom_line(aes(y=S0073,color="S0073"))+
geom_line(aes(y=S0080,color="S0080"))+
geom_line(aes(y=S0081,color="S0081"))+
geom_line(aes(y=S0082,color="S0082"))+
geom_line(aes(y=S0083,color="S0083"))+
geom_line(aes(y=S0092,color="S0092"))+
geom_line(aes(y=S0095,color="S0095"))+
geom_line(aes(y=S0096,color="S0096"))+
geom_line(aes(y=S0116,color="S0116"))+
geom_line(aes(y=S0200,color="S0200"))+
geom_line(aes(y=S0202,color="S0202"))+
geom_line(aes(y=S0204,color="S0204"))+
geom_line(aes(y=S0205,color="S0205"))+
geom_line(aes(y=S0206,color="S0206"))+
geom_line(aes(y=S0213,color="S0213"))+
geom_line(aes(y=S0300,color="S0300"))+
geom_line(aes(y=S0301,color="S0301"))+
geom_line(aes(y=S0302,color="S0302"))+
geom_line(aes(y=S0304,color="S0304"))+
geom_line(aes(y=S0305,color="S0305"))+
geom_line(aes(y=S0306,color="S0306"))+
geom_line(aes(y=S0309,color="S0309"))+
geom_line(aes(y=S0311,color="S0311"))+
geom_line(aes(y=S0312,color="S0312"))+
geom_line(aes(y=S0316,color="S0316"))+
geom_line(aes(y=S0317,color="S0317"))+
geom_line(aes(y=S0318,color="S0318"))+
geom_line(aes(y=S0319,color="S0319"))+
geom_line(aes(y=S0320,color="S0320"))+
geom_line(aes(y=S0322,color="S0322"))+
geom_line(aes(y=S0324,color="S0324"))+
geom_line(aes(y=S0325,color="S0325"))+
geom_line(aes(y=S0326,color="S0326"))+
geom_line(aes(y=S0328,color="S0328"))+
geom_line(aes(y=S0329,color="S0329"))+
geom_line(aes(y=S0330,color="S0330"))+
scale_colour_manual(values=c("#CDC0B0","#66CDAA","#C1CDCD","#0000FF","#FF4040",
"#53868B","#76EE00","#CD5B45","#8B8878","#00CDCD",
"#698B22","#8B1C62","#CDCD00","#00C5CD","#008B45",
"#FF3E96","#FFFF00","#87CEFA","#CD3700","#FFA500",
"#5F9EA0","#FF4040","#CDC673","#E066FF","#C0FF3E",
"#FF0000","#4876FF","#2E8B57","#36648B","#FFFF00",
"#00868B","#8B3626","#6A5ACD","#27408B","#006400",
"#008B00","#8B6914","#556B2F","#CDC8B1","#FF8C00",
"#6A5ACD","#00FF7F","#00F5FF","#FFD700","#0000FF",
"#8B2323","#404040","#CD0000","#87CEFF","#2F4F4F",
"#551A8B","#FF4500","#FF83FA","#3D3D3D","#66CDAA",
"#CDB79E","#8B6508","#CAFF70","#8B0000","#CD919E",
"#87CEFA","#FF34B3","#B8860B","#00008B","#8B2323",
"#008B00","#00BFFF","#00FF7F","#737373","#D2B48C",
"#473C8B"))+
geom_vline(xintercept=as.Date("2013-01-01"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2013-01-01"), y=0,label="01/01/13"),
size=2.49,angle=0,vjust=-35.00,hjust=-0.08)+
geom_vline(xintercept=as.Date("2020-03-16"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2020-03-16"), y=0,label="16/03/20"),
```

```
size=2.49,angle=0,vjust=-35.00,hjust=-0.08)+
geom_vline(xintercept=as.Date("2022-10-28"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2022-10-28"), y=0,label="28/10/22"),
size=2.49,angle=0,vjust=-35.00,hjust=-0.08)+
guides(color=guide_legend(title="Sectores",title.position="top",nrow=6,ncol=12))+
ylim(c(0,330))+
theme(plot.margin=margin(0,0.2,0,0,"cm"),
legend.key.size=unit(0.2,"cm"), #alto de cuadrados de referencia
legend.key.width=unit(0.5,"cm"), #ancho de cuadrados de referencia
legend.position="bottom",
legend.direction="horizontal",
legend.title=element_text(size=8,face="bold"),
legend.text=element_text(size=7))+
labs(x="Tiempo (días)",y="Caudal (l/s)")+
theme(axis.title.x=element_text(size=9),axis.title.y=element_text(size=9))
```

# PERIODOS DE ANÁLISIS CON TRATAMIENTO DE DATOS

## Selección de datos horarios

```{r}
SectoresPosTH=read_excel("D:/ANEXOS/Anexo 2. Periodos de análisis/SectoresPosTH.xlsx")
# View(SectoresPosTH)
```

## Asignación de formato fecha horaria

```{r}
SectoresPosTH$FECHA_HR=as.Date(SectoresPosTH$FECHA_HR)
head(SectoresPosTH)
str(SectoresPosTH)
```

## Ploteo de gráficos a escala horaria

```{r}
ggplot(SectoresPosTH,aes(x=FECHA_HR))+
geom_line(aes(y=S0002,color="S0002"))+
geom_line(aes(y=S0003,color="S0003"))+
geom_line(aes(y=S0007,color="S0007"))+
geom_line(aes(y=S0008,color="S0008"))+
geom_line(aes(y=S0010,color="S0010"))+
geom_line(aes(y=S0011,color="S0011"))+
geom_line(aes(y=S0012,color="S0012"))+
geom_line(aes(y=S0013,color="S0013"))+
geom_line(aes(y=S0014,color="S0014"))+
geom_line(aes(y=S0015,color="S0015"))+
geom_line(aes(y=S0016,color="S0016"))+
geom_line(aes(y=S0017,color="S0017"))+
geom_line(aes(y=S0018,color="S0018"))+
geom_line(aes(y=S0019,color="S0019"))+
geom_line(aes(y=S0028,color="S0028"))+
geom_line(aes(y=S0029,color="S0029"))+
geom_line(aes(y=S0033,color="S0033"))+
geom_line(aes(y=S0035,color="S0035"))+
geom_line(aes(y=S0036,color="S0036"))+
geom_line(aes(y=S0039,color="S0039"))+
geom_line(aes(y=S0042,color="S0042"))+
geom_line(aes(y=S0043,color="S0043"))+
geom_line(aes(y=S0047,color="S0047"))+
geom_line(aes(y=S0048,color="S0048"))+
geom_line(aes(y=S0049,color="S0049"))+
geom_line(aes(y=S0054,color="S0054"))+
geom_line(aes(y=S0056,color="S0056"))+
geom_line(aes(y=S0057,color="S0057"))+
geom_line(aes(y=S0063,color="S0063"))+
geom_line(aes(y=S0065,color="S0065"))+
geom_line(aes(y=S0066,color="S0066"))+
geom_line(aes(y=S0067,color="S0067"))+
geom_line(aes(y=S0068,color="S0068"))+
geom_line(aes(y=S0069,color="S0069"))+
geom_line(aes(y=S0071,color="S0071"))+
geom_line(aes(y=S0073,color="S0073"))+
geom_line(aes(y=S0080,color="S0080"))+
geom_line(aes(y=S0081,color="S0081"))+
geom_line(aes(y=S0082,color="S0082"))+
geom_line(aes(y=S0083,color="S0083"))+
geom_line(aes(y=S0092,color="S0092"))+
geom_line(aes(y=S0095,color="S0095"))+
geom_line(aes(y=S0096,color="S0096"))+
geom_line(aes(y=S0116,color="S0116"))+
geom_line(aes(y=S0200,color="S0200"))+
geom_line(aes(y=S0202,color="S0202"))+
geom_line(aes(y=S0204,color="S0204"))+
geom_line(aes(y=S0205,color="S0205"))+
geom_line(aes(y=S0206,color="S0206"))+
geom_line(aes(y=S0213,color="S0213"))+
geom_line(aes(y=S0300,color="S0300"))+
```

```
geom_line(aes(y=S0301,color="S0301"))+
geom_line(aes(y=S0302,color="S0302"))+
geom_line(aes(y=S0304,color="S0304"))+
geom_line(aes(y=S0305,color="S0305"))+
geom_line(aes(y=S0306,color="S0306"))+
geom_line(aes(y=S0309,color="S0309"))+
geom_line(aes(y=S0311,color="S0311"))+
geom_line(aes(y=S0312,color="S0312"))+
geom_line(aes(y=S0316,color="S0316"))+
geom_line(aes(y=S0317,color="S0317"))+
geom_line(aes(y=S0318,color="S0318"))+
geom_line(aes(y=S0319,color="S0319"))+
geom_line(aes(y=S0320,color="S0320"))+
geom_line(aes(y=S0322,color="S0322"))+
geom_line(aes(y=S0324,color="S0324"))+
geom_line(aes(y=S0325,color="S0325"))+
geom_line(aes(y=S0326,color="S0326"))+
geom_line(aes(y=S0328,color="S0328"))+
geom_line(aes(y=S0329,color="S0329"))+
geom_line(aes(y=S0330,color="S0330"))+
scale_colour_manual(values=c("#CDC0B0","#66CDAA","#C1CDCD","#0000FF","#FF4040",
"#53868B","#76EE00","#CD5B45","#8B8878","#00CDCD",
"#698B22","#8B1C62","#CDCD00","#00C5CD","#008B45",
"#FF3E96","#FFFF00","#87CEFA","#CD3700","#FFA500",
"#5F9EA0","#FF4040","#CDC673","#E066FF","#C0FF3E",
"#FF0000","#4876FF","#2E8B57","#36648B","#FFFF00",
"#00868B","#8B3626","#6A5ACD","#27408B","#006400",
"#008B00","#8B6914","#556B2F","#CDC8B1","#FF8C00",
"#6A5ACD","#00FF7F","#00F5FF","#FFD700","#0000FF",
"#8B2323","#404040","#CD0000","#87CEFF","#2F4F4F",
"#551A8B","#FF4500","#FF83FA","#3D3D3D","#66CDAA",
"#CDB79E","#8B6508","#CAFF70","#8B0000","#CD919E",
"#87CEFA","#FF34B3","#B8860B","#00008B","#8B2323",
"#008B00","#00BFFF","#00FF7F","#737373","#D2B48C",
"#473C8B"))+
geom_vline(xintercept=as.Date("2013-01-01"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2013-01-01"), y=0,label="01/01/13"),
size=2.49,angle=0,vjust=-35.30,hjust=-0.08)+
geom_vline(xintercept=as.Date("2020-03-16"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2020-03-16"), y=0,label="16/03/20"),
size=2.49,angle=0,vjust=-35.30,hjust=-0.08)+
geom_vline(xintercept=as.Date("2022-10-28"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2022-10-28"), y=0,label="28/10/22"),
size=2.49,angle=0,vjust=-35.30,hjust=-0.08)+
guides(color=guide_legend(title="Sectores",title.position="top",nrow=6,ncol=12))+
ylim(c(0,450))+
theme(plot.margin=margin(0,0.2,0,0,"cm"),
legend.key.size=unit(0.2,"cm"), #alto de cuadrados de referencia
legend.key.width=unit(0.5,"cm"), #ancho de cuadrados de referencia
legend.position="bottom",
legend.direction="horizontal",
legend.title=element_text(size=8,face="bold"),
legend.text=element_text(size=7))+
labs(x="Tiempo (horas)",y="Caudal (l/s)")+
theme(axis.title.x=element_text(size=9),axis.title.y=element_text(size=9))
```

## Selección de datos diarios

```{r}
SectoresPosTD=read_excel("D:/ANEXOS/Anexo 2. Periodos de análisis/SectoresPosTD.xlsx")
# View(SectoresPosTD)
```

## Asignación de formato fecha diaria

```{r}
SectoresPosTD$FECHA_DI=as.Date(SectoresPosTD$FECHA_DI)
head(SectoresPosTD)
str(SectoresPosTD)
```

## Ploteo de gráficos a escala diaria

```{r}
ggplot(SectoresPosTD,aes(x=FECHA_DI))+
geom_line(aes(y=S0002,color="S0002"))+
geom_line(aes(y=S0003,color="S0003"))+
geom_line(aes(y=S0007,color="S0007"))+
geom_line(aes(y=S0008,color="S0008"))+
geom_line(aes(y=S0010,color="S0010"))+
geom_line(aes(y=S0011,color="S0011"))+
geom_line(aes(y=S0012,color="S0012"))+
geom_line(aes(y=S0013,color="S0013"))+
geom_line(aes(y=S0014,color="S0014"))+
geom_line(aes(y=S0015,color="S0015"))+
geom_line(aes(y=S0016,color="S0016"))+
geom_line(aes(y=S0017,color="S0017"))+
geom_line(aes(y=S0018,color="S0018"))+
```

```
geom_line(aes(y=S0019,color="S0019"))+
geom_line(aes(y=S0028,color="S0028"))+
geom_line(aes(y=S0029,color="S0029"))+
geom_line(aes(y=S0033,color="S0033"))+
geom_line(aes(y=S0035,color="S0035"))+
geom_line(aes(y=S0036,color="S0036"))+
geom_line(aes(y=S0039,color="S0039"))+
geom_line(aes(y=S0042,color="S0042"))+
geom_line(aes(y=S0043,color="S0043"))+
geom_line(aes(y=S0047,color="S0047"))+
geom_line(aes(y=S0048,color="S0048"))+
geom_line(aes(y=S0049,color="S0049"))+
geom_line(aes(y=S0054,color="S0054"))+
geom_line(aes(y=S0056,color="S0056"))+
geom_line(aes(y=S0057,color="S0057"))+
geom_line(aes(y=S0063,color="S0063"))+
geom_line(aes(y=S0065,color="S0065"))+
geom_line(aes(y=S0066,color="S0066"))+
geom_line(aes(y=S0067,color="S0067"))+
geom_line(aes(y=S0068,color="S0068"))+
geom_line(aes(y=S0069,color="S0069"))+
geom_line(aes(y=S0071,color="S0071"))+
geom_line(aes(y=S0073,color="S0073"))+
geom_line(aes(y=S0080,color="S0080"))+
geom_line(aes(y=S0081,color="S0081"))+
geom_line(aes(y=S0082,color="S0082"))+
geom_line(aes(y=S0083,color="S0083"))+
geom_line(aes(y=S0092,color="S0092"))+
geom_line(aes(y=S0095,color="S0095"))+
geom_line(aes(y=S0096,color="S0096"))+
geom_line(aes(y=S0116,color="S0116"))+
geom_line(aes(y=S0200,color="S0200"))+
geom_line(aes(y=S0202,color="S0202"))+
geom_line(aes(y=S0204,color="S0204"))+
geom_line(aes(y=S0205,color="S0205"))+
geom_line(aes(y=S0206,color="S0206"))+
geom_line(aes(y=S0213,color="S0213"))+
geom_line(aes(y=S0300,color="S0300"))+
geom_line(aes(y=S0301,color="S0301"))+
geom_line(aes(y=S0302,color="S0302"))+
geom_line(aes(y=S0304,color="S0304"))+
geom_line(aes(y=S0305,color="S0305"))+
geom_line(aes(y=S0306,color="S0306"))+
geom_line(aes(y=S0309,color="S0309"))+
geom_line(aes(y=S0311,color="S0311"))+
geom_line(aes(y=S0312,color="S0312"))+
geom_line(aes(y=S0316,color="S0316"))+
geom_line(aes(y=S0317,color="S0317"))+
geom_line(aes(y=S0318,color="S0318"))+
geom_line(aes(y=S0319,color="S0319"))+
geom_line(aes(y=S0320,color="S0320"))+
geom_line(aes(y=S0322,color="S0322"))+
geom_line(aes(y=S0324,color="S0324"))+
geom_line(aes(y=S0325,color="S0325"))+
geom_line(aes(y=S0326,color="S0326"))+
geom_line(aes(y=S0328,color="S0328"))+
geom_line(aes(y=S0329,color="S0329"))+
geom_line(aes(y=S0330,color="S0330"))+
scale_colour_manual(values=c("#CDC0B0","#66CDAA","#C1CDCD","#0000FF","#FF4040",
"#53868B","#76EE00","#CD5B45","#8B8878","#00CDCD",
"#698B22","#8B1C62","#CDCD00","#00C5CD","#008B45",
"#FF3E96","#FFFF00","#87CEFA","#CD3700","#FFA500",
"#5F9EA0","#FF4040","#CDC673","#E066FF","#C0FF3E",
"#FF0000","#4876FF","#2E8B57","#36648B","#FFFF00",
"#00868B","#8B3626","#6A5ACD","#27408B","#006400",
"#008B00","#8B6914","#556B2F","#CDC8B1","#FF8C00",
"#6A5ACD","#00FF7F","#00F5FF","#FFD700","#0000FF",
"#8B2323","#404040","#CD0000","#87CEFF","#2F4F4F",
"#551A8B","#FF4500","#FF83FA","#3D3D3D","#66CDAA",
"#CDB79E","#8B6508","#CAFF70","#8B0000","#CD919E",
"#87CEFA","#FF34B3","#B8860B","#00008B","#8B2323",
"#008B00","#00BFFF","#00FF7F","#737373","#D2B48C",
"#473C8B"))+
geom_vline(xintercept=as.Date("2013-01-01"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2013-01-01"), y=0,label="01/01/13"),
size=2.49,angle=0,vjust=-35.0,hjust=-0.08)+
geom_vline(xintercept=as.Date("2020-03-16"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2020-03-16"), y=0,label="16/03/20"),
size=2.49,angle=0,vjust=-35.0,hjust=-0.08)+
geom_vline(xintercept=as.Date("2022-10-28"),lwd=1,color="black",linetype=1)+
geom_text(mapping=aes(x=as.Date("2022-10-28"), y=0,label="28/10/22"),
size=2.49,angle=0,vjust=-35.0,hjust=-0.08)+
guides(color=guide_legend(title="Sectores",title.position="top",nrow=6,ncol=12))+
ylim(c(0,330))+
theme(plot.margin=margin(0,0.2,0,0,"cm"),
legend.key.size=unit(0.2,"cm"), #alto de cuadrados de referencia
legend.key.width=unit(0.5,"cm"), #ancho de cuadrados de referencia
legend.position="bottom",
legend.direction="horizontal",
```

```
legend.title=element_text(size=8,face="bold"),
legend.text=element_text(size=7))+
labs(x="Tiempo (días)",y="Caudal (l/s)")+
theme(axis.title.x=element_text(size=9),axis.title.y=element_text(size=9))
```

# Anexo 3: Procesamiento de datos

## Anexo 3.1: Estrato agrupado consolidado 1

```
---
title: "K1_Kmínd_EAC1_EE"
author: "Víctor Raúl León Medina"
date: "21/01/2024"
output: html_document
---

# Limpieza de consola

```{r}
ls()
rm(list=ls())
graphics.off()
```

# Instalación de librerías

```{r}
library(ggplot2)
library(patchwork)
```

# Identificación del directorio de trabajo

```{r}
getwd()
```

# DETERMINACIÓN DEL COEFICIENTE DE VARIACIÓN DIARIA (K1)
# Y MÍNIMA DIARIA (Kmínd) DEL ESTRATO AGRUPADO CONSOLIDADO 1

## Estación remota S0003 (2020-2022)

### Selección de la base de datos

```{r}
S0003D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0003D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0003D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0003D20=S0003D[1:366,20]
S0003D20EECOVID19=S0003D[76:366,20]
```

```{r}
plot(Fecha20,S0003D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0003 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0003D20EECOVID19),lwd="3",col="red")
abline(h=max(S0003D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0003D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0003=max(S0003D20EECOVID19)
Qp20_S0003=mean(S0003D20EECOVID19)
K1_20_S0003=Qmax20_S0003/Qp20_S0003
print(paste("K1 =",K1_20_S0003))

# Cálculo del coeficiente Kmínd
Qmind20_S0003=min(S0003D20EECOVID19)
Kmínd20_S0003=Qmind20_S0003/Qp20_S0003
print(paste("Kmínd =",Kmínd20_S0003))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0003D21=S0003D[1:365,22]
```

```{r}
plot(Fecha21,S0003D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0003 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```
```

```
abline(h=mean(S0003D21),lwd="3",col="red")
abline(h=max(S0003D21),lwd="3",col="black",lty=2)
abline(h=min(S0003D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0003=max(S0003D21)
Qp21_S0003=mean(S0003D21)
K1_21_S0003=Qmax21_S0003/Qp21_S0003
print(paste("K1 =",K1_21_S0003))

# Cálculo del coeficiente Kmínd
Qmind21_S0003=min(S0003D21)
Kmínd21_S0003=Qmind21_S0003/Qp21_S0003
print(paste("Kmínd =",Kmínd21_S0003))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0003D22=S0003D[1:365,24]
S0003D22EECOVID19=S0003D[1:299,24]
```

```{r}
plot(Fecha22,S0003D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0003 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0003D22EECOVID19),lwd="3",col="red")
abline(h=max(S0003D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0003D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0003=max(S0003D22EECOVID19)
Qp22_S0003=mean(S0003D22EECOVID19)
K1_22_S0003=Qmax22_S0003/Qp22_S0003
print(paste("K1 =",K1_22_S0003))

# Cálculo del coeficiente Kmínd
Qmind22_S0003=min(S0003D22EECOVID19)
Kmínd22_S0003=Qmind22_S0003/Qp22_S0003
print(paste("Kmínd =",Kmínd22_S0003))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0003,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0003,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0003,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0003,": Si"))
print(paste("K1_21 =",K1_21_S0003,": Si"))
print(paste("K1_22 =",K1_22_S0003,": Si"))
```

```{r}
K1S0003m=c(K1_20_S0003,K1_21_S0003,K1_22_S0003)
K1S0003=mean(K1S0003m)
summary(K1S0003m)
K1S0003m
print(paste("K1_S0003 =",K1S0003))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0003,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0003,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0003,": Si"))
```

```{r}
KmíndS0003m=c(Kmínd20_S0003,Kmínd21_S0003,Kmínd22_S0003)
KmíndS0003=mean(KmíndS0003m)
summary(KmíndS0003m)
KmíndS0003m
print(paste("Kmínd_S0003 =",KmíndS0003))
```

```
```

## Estación remota S0007 (2020-2022)

### Selección de la base de datos

```{r}
S0007D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0007D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0007D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0007D20=S0007D[1:366,20]
S0007D20EECOVID19=S0007D[76:366,20]
```

```{r}
plot(Fecha20,S0007D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0007 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0007D20EECOVID19),lwd="3",col="red")
abline(h=max(S0007D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0007D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0007=max(S0007D20EECOVID19)
Qp20_S0007=mean(S0007D20EECOVID19)
K1_20_S0007=Qmax20_S0007/Qp20_S0007
print(paste("K1 =",K1_20_S0007))

# Cálculo del coeficiente Kmínd
Qmind20_S0007=min(S0007D20EECOVID19)
Kmínd20_S0007=Qmind20_S0007/Qp20_S0007
print(paste("Kmínd =",Kmínd20_S0007))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0007D21=S0007D[1:365,22]
```

```{r}
plot(Fecha21,S0007D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0007 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0007D21),lwd="3",col="red")
abline(h=max(S0007D21),lwd="3",col="black",lty=2)
abline(h=min(S0007D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0007=max(S0007D21)
Qp21_S0007=mean(S0007D21)
K1_21_S0007=Qmax21_S0007/Qp21_S0007
print(paste("K1 =",K1_21_S0007))

# Cálculo del coeficiente Kmínd
Qmind21_S0007=min(S0007D21)
Kmínd21_S0007=Qmind21_S0007/Qp21_S0007
print(paste("Kmínd =",Kmínd21_S0007))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0007D22=S0007D[1:365,24]
S0007D22EECOVID19=S0007D[1:300,24]
```

```{r}
plot(Fecha22,S0007D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0007 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0007D22EECOVID19),lwd="3",col="red")
abline(h=max(S0007D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0007D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0007=max(S0007D22EECOVID19)
Qp22_S0007=mean(S0007D22EECOVID19)
K1_22_S0007=Qmax22_S0007/Qp22_S0007
print(paste("K1 =",K1_22_S0007))

# Cálculo del coeficiente Kmínd
Qmind22_S0007=min(S0007D22EECOVID19)
Kmínd22_S0007=Qmind22_S0007/Qp22_S0007
print(paste("Kmínd =",Kmínd22_S0007))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0007,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0007,"l/s",": No"))
print(paste("Qp_22 =",Qp22_S0007,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0007,": Si"))
print(paste("K1_21 =",K1_21_S0007,": No"))
print(paste("K1_22 =",K1_22_S0007,": Si"))
```

```{r}
K1S0007m=c(K1_20_S0007,K1_22_S0007)
K1S0007=mean(K1S0007m)
summary(K1S0007m)
K1S0007m
print(paste("K1_S0007 =",K1S0007))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0007,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0007,": No"))
print(paste("Kmínd_22 =",Kmínd22_S0007,": Si"))
```

```{r}
KmíndS0007m=c(Kmínd20_S0007,Kmínd22_S0007)
KmíndS0007=mean(KmíndS0007m)
summary(KmíndS0007m)
KmíndS0007m
print(paste("Kmínd_S0007 =",KmíndS0007))
```

## Estación remota S0008 (2020-2022)

### Selección de la base de datos

```{r}
S0008D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0008D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0008D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0008D20=S0008D[1:366,20]
S0008D20EECOVID19=S0008D[76:366,20]
```

```{r}
plot(Fecha20,S0008D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0008 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
```

```
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0008D20EECOVID19),lwd="3",col="red")
abline(h=max(S0008D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0008D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0008=max(S0008D20EECOVID19)
Qp20_S0008=mean(S0008D20EECOVID19)
K1_20_S0008=Qmax20_S0008/Qp20_S0008
print(paste("K1 =",K1_20_S0008))

# Cálculo del coeficiente Kmínd
Qmind20_S0008=min(S0008D20EECOVID19)
Kmínd20_S0008=Qmind20_S0008/Qp20_S0008
print(paste("Kmínd =",Kmínd20_S0008))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0008D21=S0008D[1:365,22]
```

```{r}
plot(Fecha21,S0008D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0008 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0008D21),lwd="3",col="red")
abline(h=max(S0008D21),lwd="3",col="black",lty=2)
abline(h=min(S0008D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0008=max(S0008D21)
Qp21_S0008=mean(S0008D21)
K1_21_S0008=Qmax21_S0008/Qp21_S0008
print(paste("K1 =",K1_21_S0008))

# Cálculo del coeficiente Kmínd
Qmind21_S0008=min(S0008D21)
Kmínd21_S0008=Qmind21_S0008/Qp21_S0008
print(paste("Kmínd =",Kmínd21_S0008))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0008D22=S0008D[1:365,24]
S0008D22EECOVID19=S0008D[1:300,24]
```

```{r}
plot(Fecha22,S0008D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0008 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0008D22EECOVID19),lwd="3",col="red")
abline(h=max(S0008D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0008D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0008=max(S0008D22EECOVID19)
Qp22_S0008=mean(S0008D22EECOVID19)
K1_22_S0008=Qmax22_S0008/Qp22_S0008
print(paste("K1 =",K1_22_S0008))

# Cálculo del coeficiente Kmínd
Qmind22_S0008=min(S0008D22EECOVID19)
Kmínd22_S0008=Qmind22_S0008/Qp22_S0008
print(paste("Kmínd =",Kmínd22_S0008))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0008,"l/s",": No"))
print(paste("Qp_21 =",Qp21_S0008,"l/s",": No"))
print(paste("Qp_22 =",Qp22_S0008,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0008,": No"))
print(paste("K1_21 =",K1_21_S0008,": No"))
print(paste("K1_22 =",K1_22_S0008,": Si"))
```

```{r}
K1S0008m=c(K1_22_S0008)
K1S0008=mean(K1S0008m)
summary(K1S0008m)
K1S0008m
print(paste("K1_S0008 =",K1S0008))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0008,": No"))
print(paste("Kmínd_21 =",Kmínd21_S0008,": No"))
print(paste("Kmínd_22 =",Kmínd22_S0008,": Si"))
```

```{r}
KmíndS0008m=c(Kmínd22_S0008)
KmíndS0008=mean(KmíndS0008m)
summary(KmíndS0008m)
KmíndS0008m
print(paste("Kmínd_S0008 =",KmíndS0008))
```

## Estación remota S0010 (2020-2022)

### Selección de la base de datos

```{r}
S0010D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0010D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0010D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0010D20=S0010D[1:366,20]
S0010D20EECOVID19=S0010D[76:366,20]
```

```{r}
plot(Fecha20,S0010D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0010 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0010D20EECOVID19),lwd="3",col="red")
abline(h=max(S0010D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0010D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0010=max(S0010D20EECOVID19)
Qp20_S0010=mean(S0010D20EECOVID19)
K1_20_S0010=Qmax20_S0010/Qp20_S0010
print(paste("K1 =",K1_20_S0010))

# Cálculo del coeficiente Kmínd
Qmind20_S0010=min(S0010D20EECOVID19)
Kmínd20_S0010=Qmind20_S0010/Qp20_S0010
print(paste("Kmínd =",Kmínd20_S0010))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
```

```
S0010D21=S0010D[1:365,22]
```
```

```{r}
plot(Fecha21,S0010D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0010 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0010D21),lwd="3",col="red")
abline(h=max(S0010D21),lwd="3",col="black",lty=2)
abline(h=min(S0010D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0010=max(S0010D21)
Qp21_S0010=mean(S0010D21)
K1_21_S0010=Qmax21_S0010/Qp21_S0010
print(paste("K1 =",K1_21_S0010))

# Cálculo del coeficiente Kmínd
Qmind21_S0010=min(S0010D21)
Kmínd21_S0010=Qmind21_S0010/Qp21_S0010
print(paste("Kmínd =",Kmínd21_S0010))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0010D22=S0010D[1:365,24]
S0010D22EECOVID19=S0010D[1:300,24]
```

```{r}
plot(Fecha22,S0010D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0010 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0010D22EECOVID19),lwd="3",col="red")
abline(h=max(S0010D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0010D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0010=max(S0010D22EECOVID19)
Qp22_S0010=mean(S0010D22EECOVID19)
K1_22_S0010=Qmax22_S0010/Qp22_S0010
print(paste("K1 =",K1_22_S0010))

# Cálculo del coeficiente Kmínd
Qmind22_S0010=min(S0010D22EECOVID19)
Kmínd22_S0010=Qmind22_S0010/Qp22_S0010
print(paste("Kmínd =",Kmínd22_S0010))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0010,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0010,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0010,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0010,": Si"))
print(paste("K1_21 =",K1_21_S0010,": Si"))
print(paste("K1_22 =",K1_22_S0010,": Si"))
```

```{r}
K1S0010m=c(K1_20_S0010,K1_21_S0010,K1_22_S0010)
K1S0010=mean(K1S0010m)
summary(K1S0010m)
K1S0010m
print(paste("K1_S0010 =",K1S0010))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0010,": Si"))
```
```

```
print(paste("Kmínd_21 =",Kmínd21_S0010,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0010,": Si"))
```

```{r}
KmíndS0010m=c(Kmínd20_S0010,Kmínd21_S0010,Kmínd22_S0010)
KmíndS0010=mean(KmíndS0010m)
summary(KmíndS0010m)
KmíndS0010m
print(paste("Kmínd_S0010 =",KmíndS0010))
```

## Estación remota S0012 (2020-2022)

### Selección de la base de datos

```{r}
S0012D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0012D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0012D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0012D20=S0012D[1:366,20]
S0012D20EECOVID19=S0012D[76:366,20]
```

```{r}
plot(Fecha20,S0012D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0012 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0012D20EECOVID19),lwd="3",col="red")
abline(h=max(S0012D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0012D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0012=max(S0012D20EECOVID19)
Qp20_S0012=mean(S0012D20EECOVID19)
K1_20_S0012=Qmax20_S0012/Qp20_S0012
print(paste("K1 =",K1_20_S0012))

# Cálculo del coeficiente Kmínd
Qmind20_S0012=min(S0012D20EECOVID19)
Kmínd20_S0012=Qmind20_S0012/Qp20_S0012
print(paste("Kmínd =",Kmínd20_S0012))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0012D21=S0012D[1:365,22]
```

```{r}
plot(Fecha21,S0012D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0012 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0012D21),lwd="3",col="red")
abline(h=max(S0012D21),lwd="3",col="black",lty=2)
abline(h=min(S0012D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0012=max(S0012D21)
Qp21_S0012=mean(S0012D21)
K1_21_S0012=Qmax21_S0012/Qp21_S0012
print(paste("K1 =",K1_21_S0012))

# Cálculo del coeficiente Kmínd
Qmind21_S0012=min(S0012D21)
Kmínd21_S0012=Qmind21_S0012/Qp21_S0012
print(paste("Kmínd =",Kmínd21_S0012))
```

```
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0012D22=S0012D[1:365,24]
S0012D22EECOVID19=S0012D[1:300,24]
```

```{r}
plot(Fecha22,S0012D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0012 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0012D22EECOVID19),lwd="3",col="red")
abline(h=max(S0012D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0012D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0012=max(S0012D22EECOVID19)
Qp22_S0012=mean(S0012D22EECOVID19)
K1_22_S0012=Qmax22_S0012/Qp22_S0012
print(paste("K1 =",K1_22_S0012))

# Cálculo del coeficiente Kmínd
Qmind22_S0012=min(S0012D22EECOVID19)
Kmínd22_S0012=Qmind22_S0012/Qp22_S0012
print(paste("Kmínd =",Kmínd22_S0012))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0012,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0012,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0012,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0012,": Si"))
print(paste("K1_21 =",K1_21_S0012,": Si"))
print(paste("K1_22 =",K1_22_S0012,": Si"))
```

```{r}
K1S0012m=c(K1_20_S0012,K1_21_S0012,K1_22_S0012)
K1S0012=mean(K1S0012m)
summary(K1S0012m)
K1S0012m
print(paste("K1_S0012 =",K1S0012))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0012,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0012,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0012,": Si"))
```

```{r}
KmíndS0012m=c(Kmínd20_S0012,Kmínd21_S0012,Kmínd22_S0012)
KmíndS0012=mean(KmíndS0012m)
summary(KmíndS0012m)
KmíndS0012m
print(paste("Kmínd_S0012 =",KmíndS0012))
```

## Estación remota S0013 (2020-2022)

### Selección de la base de datos

```{r}
S0013D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0013D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0013D)
```

### Extracción y análisis de datos del año 2020

```{r}
```

```
Fecha20=c(1:366)
S0013D20=S0013D[1:366,20]
S0013D20EECOVID19=S0013D[76:366,20]
```

```{r}
plot(Fecha20,S0013D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0013 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0013D20EECOVID19),lwd="3",col="red")
abline(h=max(S0013D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0013D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0013=max(S0013D20EECOVID19)
Qp20_S0013=mean(S0013D20EECOVID19)
K1_20_S0013=Qmax20_S0013/Qp20_S0013
print(paste("K1 =",K1_20_S0013))

# Cálculo del coeficiente Kmínd
Qmind20_S0013=min(S0013D20EECOVID19)
Kmínd20_S0013=Qmind20_S0013/Qp20_S0013
print(paste("Kmínd =",Kmínd20_S0013))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0013D21=S0013D[1:365,22]
```

```{r}
plot(Fecha21,S0013D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0013 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0013D21),lwd="3",col="red")
abline(h=max(S0013D21),lwd="3",col="black",lty=2)
abline(h=min(S0013D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0013=max(S0013D21)
Qp21_S0013=mean(S0013D21)
K1_21_S0013=Qmax21_S0013/Qp21_S0013
print(paste("K1 =",K1_21_S0013))

# Cálculo del coeficiente Kmínd
Qmind21_S0013=min(S0013D21)
Kmínd21_S0013=Qmind21_S0013/Qp21_S0013
print(paste("Kmínd =",Kmínd21_S0013))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0013D22=S0013D[1:365,24]
S0013D22EECOVID19=S0013D[1:300,24]
```

```{r}
plot(Fecha22,S0013D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0013 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0013D22EECOVID19),lwd="3",col="red")
abline(h=max(S0013D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0013D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
```

```
Qmax22_S0013=max(S0013D22EECOVID19)
Qp22_S0013=mean(S0013D22EECOVID19)
K1_22_S0013=Qmax22_S0013/Qp22_S0013
print(paste("K1 =",K1_22_S0013))

# Cálculo del coeficiente Kmínd
Qmind22_S0013=min(S0013D22EECOVID19)
Kmínd22_S0013=Qmind22_S0013/Qp22_S0013
print(paste("Kmínd =",Kmínd22_S0013))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0013,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0013,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0013,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0013,": Si"))
print(paste("K1_21 =",K1_21_S0013,": Si"))
print(paste("K1_22 =",K1_22_S0013,": Si"))
```

```{r}
K1S0013m=c(K1_20_S0013,K1_21_S0013,K1_22_S0013)
K1S0013=mean(K1S0013m)
summary(K1S0013m)
K1S0013m
print(paste("K1_S0013 =",K1S0013))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0013,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0013,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0013,": Si"))
```

```{r}
KmíndS0013m=c(Kmínd20_S0013,Kmínd21_S0013,Kmínd22_S0013)
KmíndS0013=mean(KmíndS0013m)
summary(KmíndS0013m)
KmíndS0013m
print(paste("Kmínd_S0013 =",KmíndS0013))
```

## Estación remota S0014 (2020-2022)

### Selección de la base de datos

```{r}
S0014D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0014D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0014D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0014D20=S0014D[1:366,20]
S0014D20EECOVID19=S0014D[76:366,20]
```

```{r}
plot(Fecha20,S0014D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0014 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0014D20EECOVID19),lwd="3",col="red")
abline(h=max(S0014D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0014D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0014=max(S0014D20EECOVID19)
Qp20_S0014=mean(S0014D20EECOVID19)
K1_20_S0014=Qmax20_S0014/Qp20_S0014
print(paste("K1 =",K1_20_S0014))
```

```
# Cálculo del coeficiente Kmínd
Qmind20_S0014=min(S0014D20EECOVID19)
Kmínd20_S0014=Qmind20_S0014/Qp20_S0014
print(paste("Kmínd =",Kmínd20_S0014))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0014D21=S0014D[1:365,22]
```

```{r}
plot(Fecha21,S0014D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0014 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0014D21),lwd="3",col="red")
abline(h=max(S0014D21),lwd="3",col="black",lty=2)
abline(h=min(S0014D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0014=max(S0014D21)
Qp21_S0014=mean(S0014D21)
K1_21_S0014=Qmax21_S0014/Qp21_S0014
print(paste("K1 =",K1_21_S0014))

# Cálculo del coeficiente Kmínd
Qmind21_S0014=min(S0014D21)
Kmínd21_S0014=Qmind21_S0014/Qp21_S0014
print(paste("Kmínd =",Kmínd21_S0014))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0014D22=S0014D[1:365,24]
S0014D22EECOVID19=S0014D[1:300,24]
```

```{r}
plot(Fecha22,S0014D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0014 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0014D22EECOVID19),lwd="3",col="red")
abline(h=max(S0014D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0014D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0014=max(S0014D22EECOVID19)
Qp22_S0014=mean(S0014D22EECOVID19)
K1_22_S0014=Qmax22_S0014/Qp22_S0014
print(paste("K1 =",K1_22_S0014))

# Cálculo del coeficiente Kmínd
Qmind22_S0014=min(S0014D22EECOVID19)
Kmínd22_S0014=Qmind22_S0014/Qp22_S0014
print(paste("Kmínd =",Kmínd22_S0014))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0014,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0014,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0014,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0014,": Si"))
print(paste("K1_21 =",K1_21_S0014,": Si"))
print(paste("K1_22 =",K1_22_S0014,": Si"))
```

```{r}
K1S0014m=c(K1_20_S0014,K1_21_S0014,K1_22_S0014)
```

```
K1S0014=mean(K1S0014m)
summary(K1S0014m)
K1S0014m
print(paste("K1_S0014 =",K1S0014))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0014,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0014,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0014,": Si"))
```

```{r}
KmíndS0014m=c(Kmínd20_S0014,Kmínd21_S0014,Kmínd22_S0014)
KmíndS0014=mean(KmíndS0014m)
summary(KmíndS0014m)
KmíndS0014m
print(paste("Kmínd_S0014 =",KmíndS0014))
```

## Estación remota S0015 (2020-2022)

### Selección de la base de datos

```{r}
S0015D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0015D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0015D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0015D20=S0015D[1:366,20]
S0015D20EECOVID19=S0015D[76:366,20]
```

```{r}
plot(Fecha20,S0015D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0015 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0015D20EECOVID19),lwd="3",col="red")
abline(h=max(S0015D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0015D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0015=max(S0015D20EECOVID19)
Qp20_S0015=mean(S0015D20EECOVID19)
K1_20_S0015=Qmax20_S0015/Qp20_S0015
print(paste("K1 =",K1_20_S0015))

# Cálculo del coeficiente Kmínd
Qmind20_S0015=min(S0015D20EECOVID19)
Kmínd20_S0015=Qmind20_S0015/Qp20_S0015
print(paste("Kmínd =",Kmínd20_S0015))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0015D21=S0015D[1:365,22]
```

```{r}
plot(Fecha21,S0015D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0015 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0015D21),lwd="3",col="red")
abline(h=max(S0015D21),lwd="3",col="black",lty=2)
abline(h=min(S0015D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}


```

```
# Cálculo del coeficiente K1
Qmax21_S0015=max(S0015D21)
Qp21_S0015=mean(S0015D21)
K1_21_S0015=Qmax21_S0015/Qp21_S0015
print(paste("K1 =",K1_21_S0015))

# Cálculo del coeficiente Kmínd
Qmind21_S0015=min(S0015D21)
Kmínd21_S0015=Qmind21_S0015/Qp21_S0015
print(paste("Kmínd =",Kmínd21_S0015))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0015D22=S0015D[1:365,24]
S0015D22EECOVID19=S0015D[1:300,24]
```

```{r}
plot(Fecha22,S0015D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0015 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0015D22EECOVID19),lwd="3",col="red")
abline(h=max(S0015D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0015D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0015=max(S0015D22EECOVID19)
Qp22_S0015=mean(S0015D22EECOVID19)
K1_22_S0015=Qmax22_S0015/Qp22_S0015
print(paste("K1 =",K1_22_S0015))

# Cálculo del coeficiente Kmínd
Qmind22_S0015=min(S0015D22EECOVID19)
Kmínd22_S0015=Qmind22_S0015/Qp22_S0015
print(paste("Kmínd =",Kmínd22_S0015))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0015,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0015,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0015,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0015,": Si"))
print(paste("K1_21 =",K1_21_S0015,": Si"))
print(paste("K1_22 =",K1_22_S0015,": Si"))
```

```{r}
K1S0015m=c(K1_20_S0015,K1_21_S0015,K1_22_S0015)
K1S0015=mean(K1S0015m)
summary(K1S0015m)
K1S0015m
print(paste("K1_S0015 =",K1S0015))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0015,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0015,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0015,": Si"))
```

```{r}
KmíndS0015m=c(Kmínd20_S0015,Kmínd21_S0015,Kmínd22_S0015)
KmíndS0015=mean(KmíndS0015m)
summary(KmíndS0015m)
KmíndS0015m
print(paste("Kmínd_S0015 =",KmíndS0015))
```

## Estación remota S0016 (2020-2022)

### Selección de la base de datos

```{r}
S0016D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0016D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0016D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0016D20=S0016D[1:366,20]
S0016D20EECOVID19=S0016D[76:366,20]
```

```{r}
plot(Fecha20,S0016D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0016 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0016D20EECOVID19),lwd="3",col="red")
abline(h=max(S0016D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0016D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0016=max(S0016D20EECOVID19)
Qp20_S0016=mean(S0016D20EECOVID19)
K1_20_S0016=Qmax20_S0016/Qp20_S0016
print(paste("K1 =",K1_20_S0016))

# Cálculo del coeficiente Kmínd
Qmind20_S0016=min(S0016D20EECOVID19)
Kmínd20_S0016=Qmind20_S0016/Qp20_S0016
print(paste("Kmínd =",Kmínd20_S0016))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0016D21=S0016D[1:365,22]
```

```{r}
plot(Fecha21,S0016D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0016 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0016D21),lwd="3",col="red")
abline(h=max(S0016D21),lwd="3",col="black",lty=2)
abline(h=min(S0016D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0016=max(S0016D21)
Qp21_S0016=mean(S0016D21)
K1_21_S0016=Qmax21_S0016/Qp21_S0016
print(paste("K1 =",K1_21_S0016))

# Cálculo del coeficiente Kmínd
Qmind21_S0016=min(S0016D21)
Kmínd21_S0016=Qmind21_S0016/Qp21_S0016
print(paste("Kmínd =",Kmínd21_S0016))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0016D22=S0016D[1:365,24]
S0016D22EECOVID19=S0016D[1:300,24]
```

```{r}
plot(Fecha22,S0016D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0016 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0016D22EECOVID19),lwd="3",col="red")
abline(h=max(S0016D22EECOVID19),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0016D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0016=max(S0016D22EECOVID19)
Qp22_S0016=mean(S0016D22EECOVID19)
K1_22_S0016=Qmax22_S0016/Qp22_S0016
print(paste("K1 =",K1_22_S0016))

# Cálculo del coeficiente Kmínd
Qmind22_S0016=min(S0016D22EECOVID19)
Kmínd22_S0016=Qmind22_S0016/Qp22_S0016
print(paste("Kmínd =",Kmínd22_S0016))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0016,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0016,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0016,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0016,": Si"))
print(paste("K1_21 =",K1_21_S0016,": Si"))
print(paste("K1_22 =",K1_22_S0016,": Si"))
```

```{r}
K1S0016m=c(K1_20_S0016,K1_21_S0016,K1_22_S0016)
K1S0016=mean(K1S0016m)
summary(K1S0016m)
K1S0016m
print(paste("K1_S0016 =",K1S0016))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0016,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0016,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0016,": Si"))
```

```{r}
KmíndS0016m=c(Kmínd20_S0016,Kmínd21_S0016,Kmínd22_S0016)
KmíndS0016=mean(KmíndS0016m)
summary(KmíndS0016m)
KmíndS0016m
print(paste("Kmínd_S0016 =",KmíndS0016))
```

## Estación remota S0017 (2020-2022)

### Selección de la base de datos

```{r}
S0017D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0017D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0017D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0017D20=S0017D[1:366,20]
S0017D20EECOVID19=S0017D[76:366,20]
```

```{r}
plot(Fecha20,S0017D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0017 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0017D20EECOVID19),lwd="3",col="red")
abline(h=max(S0017D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0017D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
```

```
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0017=max(S0017D20EECOVID19)
Qp20_S0017=mean(S0017D20EECOVID19)
K1_20_S0017=Qmax20_S0017/Qp20_S0017
print(paste("K1 =",K1_20_S0017))

# Cálculo del coeficiente Kmínd
Qmind20_S0017=min(S0017D20EECOVID19)
Kmínd20_S0017=Qmind20_S0017/Qp20_S0017
print(paste("Kmínd =",Kmínd20_S0017))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0017D21=S0017D[1:365,22]
```

```{r}
plot(Fecha21,S0017D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0017 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0017D21),lwd="3",col="red")
abline(h=max(S0017D21),lwd="3",col="black",lty=2)
abline(h=min(S0017D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0017=max(S0017D21)
Qp21_S0017=mean(S0017D21)
K1_21_S0017=Qmax21_S0017/Qp21_S0017
print(paste("K1 =",K1_21_S0017))

# Cálculo del coeficiente Kmínd
Qmind21_S0017=min(S0017D21)
Kmínd21_S0017=Qmind21_S0017/Qp21_S0017
print(paste("Kmínd =",Kmínd21_S0017))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0017D22=S0017D[1:365,24]
S0017D22EECOVID19=S0017D[1:300,24]
```

```{r}
plot(Fecha22,S0017D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0017 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0017D22EECOVID19),lwd="3",col="red")
abline(h=max(S0017D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0017D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0017=max(S0017D22EECOVID19)
Qp22_S0017=mean(S0017D22EECOVID19)
K1_22_S0017=Qmax22_S0017/Qp22_S0017
print(paste("K1 =",K1_22_S0017))

# Cálculo del coeficiente Kmínd
Qmind22_S0017=min(S0017D22EECOVID19)
Kmínd22_S0017=Qmind22_S0017/Qp22_S0017
print(paste("Kmínd =",Kmínd22_S0017))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0017,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0017,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0017,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0017,": Si"))
print(paste("K1_21 =",K1_21_S0017,": Si"))
print(paste("K1_22 =",K1_22_S0017,": Si"))
```

```{r}
K1S0017m=c(K1_20_S0017,K1_21_S0017,K1_22_S0017)
K1S0017=mean(K1S0017m)
summary(K1S0017m)
K1S0017m
print(paste("K1_S0017 =",K1S0017))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0017,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0017,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0017,": Si"))
```

```{r}
KmíndS0017m=c(Kmínd20_S0017,Kmínd21_S0017,Kmínd22_S0017)
KmíndS0017=mean(KmíndS0017m)
summary(KmíndS0017m)
KmíndS0017m
print(paste("Kmínd_S0017 =",KmíndS0017))
```

## Estación remota S0018 (2020-2022)

### Selección de la base de datos

```{r}
S0018D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0018D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0018D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0018D20=S0018D[1:366,20]
S0018D20EECOVID19=S0018D[76:366,20]
```

```{r}
plot(Fecha20,S0018D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0018 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0018D20EECOVID19),lwd="3",col="red")
abline(h=max(S0018D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0018D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0018=max(S0018D20EECOVID19)
Qp20_S0018=mean(S0018D20EECOVID19)
K1_20_S0018=Qmax20_S0018/Qp20_S0018
print(paste("K1 =",K1_20_S0018))

# Cálculo del coeficiente Kmínd
Qmind20_S0018=min(S0018D20EECOVID19)
Kmínd20_S0018=Qmind20_S0018/Qp20_S0018
print(paste("Kmínd =",Kmínd20_S0018))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0018D21=S0018D[1:365,22]
```

```{r}
plot(Fecha21,S0018D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0018 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0018D21),lwd="3",col="red")
abline(h=max(S0018D21),lwd="3",col="black",lty=2)
abline(h=min(S0018D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0018=max(S0018D21)
Qp21_S0018=mean(S0018D21)
K1_21_S0018=Qmax21_S0018/Qp21_S0018
print(paste("K1 =",K1_21_S0018))

# Cálculo del coeficiente Kmínd
Qmind21_S0018=min(S0018D21)
Kmínd21_S0018=Qmind21_S0018/Qp21_S0018
print(paste("Kmínd =",Kmínd21_S0018))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0018D22=S0018D[1:365,24]
S0018D22EECOVID19=S0018D[1:300,24]
```

```{r}
plot(Fecha22,S0018D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0018 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0018D22EECOVID19),lwd="3",col="red")
abline(h=max(S0018D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0018D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0018=max(S0018D22EECOVID19)
Qp22_S0018=mean(S0018D22EECOVID19)
K1_22_S0018=Qmax22_S0018/Qp22_S0018
print(paste("K1 =",K1_22_S0018))

# Cálculo del coeficiente Kmínd
Qmind22_S0018=min(S0018D22EECOVID19)
Kmínd22_S0018=Qmind22_S0018/Qp22_S0018
print(paste("Kmínd =",Kmínd22_S0018))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0018,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0018,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0018,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0018,": Si"))
print(paste("K1_21 =",K1_21_S0018,": Si"))
print(paste("K1_22 =",K1_22_S0018,": Si"))
```

```{r}
K1S0018m=c(K1_20_S0018,K1_21_S0018,K1_22_S0018)
K1S0018=mean(K1S0018m)
summary(K1S0018m)
K1S0018m
print(paste("K1_S0018 =",K1S0018))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0018,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0018,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0018,": Si"))
```

```{r}
KmíndS0018m=c(Kmínd20_S0018,Kmínd21_S0018,Kmínd22_S0018)
KmíndS0018=mean(KmíndS0018m)
summary(KmíndS0018m)
KmíndS0018m
```

```
print(paste("Kmínd_S0018 =",KmíndS0018))
```

## Estación remota S0019 (2020-2022)

### Selección de la base de datos

```{r}
S0019D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0019D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0019D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0019D20=S0019D[1:366,20]
S0019D20EECOVID19=S0019D[76:366,20]
```

```{r}
plot(Fecha20,S0019D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0019 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0019D20EECOVID19),lwd="3",col="red")
abline(h=max(S0019D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0019D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0019=max(S0019D20EECOVID19)
Qp20_S0019=mean(S0019D20EECOVID19)
K1_20_S0019=Qmax20_S0019/Qp20_S0019
print(paste("K1 =",K1_20_S0019))

# Cálculo del coeficiente Kmínd
Qmind20_S0019=min(S0019D20EECOVID19)
Kmínd20_S0019=Qmind20_S0019/Qp20_S0019
print(paste("Kmínd =",Kmínd20_S0019))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0019D21=S0019D[1:365,22]
```

```{r}
plot(Fecha21,S0019D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0019 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0019D21),lwd="3",col="red")
abline(h=max(S0019D21),lwd="3",col="black",lty=2)
abline(h=min(S0019D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0019=max(S0019D21)
Qp21_S0019=mean(S0019D21)
K1_21_S0019=Qmax21_S0019/Qp21_S0019
print(paste("K1 =",K1_21_S0019))

# Cálculo del coeficiente Kmínd
Qmind21_S0019=min(S0019D21)
Kmínd21_S0019=Qmind21_S0019/Qp21_S0019
print(paste("Kmínd =",Kmínd21_S0019))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0019D22=S0019D[1:365,24]
S0019D22EECOVID19=S0019D[1:300,24]
```

```{r}
plot(Fecha22,S0019D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0019 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0019D22EECOVID19),lwd="3",col="red")
abline(h=max(S0019D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0019D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0019=max(S0019D22EECOVID19)
Qp22_S0019=mean(S0019D22EECOVID19)
K1_22_S0019=Qmax22_S0019/Qp22_S0019
print(paste("K1 =",K1_22_S0019))

# Cálculo del coeficiente Kmínd
Qmind22_S0019=min(S0019D22EECOVID19)
Kmínd22_S0019=Qmind22_S0019/Qp22_S0019
print(paste("Kmínd =",Kmínd22_S0019))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0019,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0019,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0019,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0019,": Si"))
print(paste("K1_21 =",K1_21_S0019,": Si"))
print(paste("K1_22 =",K1_22_S0019,": Si"))
```

```{r}
K1S0019m=c(K1_20_S0019,K1_21_S0019,K1_22_S0019)
K1S0019=mean(K1S0019m)
summary(K1S0019m)
K1S0019m
print(paste("K1_S0019 =",K1S0019))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0019,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0019,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0019,": Si"))
```

```{r}
KmíndS0019m=c(Kmínd20_S0019,Kmínd21_S0019,Kmínd22_S0019)
KmíndS0019=mean(KmíndS0019m)
summary(KmíndS0019m)
KmíndS0019m
print(paste("Kmínd_S0019 =",KmíndS0019))
```

## Estación remota S0028 (2020-2022)

### Selección de la base de datos

```{r}
S0028D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0028D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0028D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0028D20=S0028D[1:366,20]
S0028D20EECOVID19=S0028D[76:366,20]
```

```{r}
plot(Fecha20,S0028D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0028 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
```

```
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0028D20EECOVID19),lwd="3",col="red")
abline(h=max(S0028D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0028D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0028=max(S0028D20EECOVID19)
Qp20_S0028=mean(S0028D20EECOVID19)
K1_20_S0028=Qmax20_S0028/Qp20_S0028
print(paste("K1 =",K1_20_S0028))

# Cálculo del coeficiente Kmínd
Qmind20_S0028=min(S0028D20EECOVID19)
Kmínd20_S0028=Qmind20_S0028/Qp20_S0028
print(paste("Kmínd =",Kmínd20_S0028))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0028D21=S0028D[1:365,22]
```

```{r}
plot(Fecha21,S0028D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0028 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0028D21),lwd="3",col="red")
abline(h=max(S0028D21),lwd="3",col="black",lty=2)
abline(h=min(S0028D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0028=max(S0028D21)
Qp21_S0028=mean(S0028D21)
K1_21_S0028=Qmax21_S0028/Qp21_S0028
print(paste("K1 =",K1_21_S0028))

# Cálculo del coeficiente Kmínd
Qmind21_S0028=min(S0028D21)
Kmínd21_S0028=Qmind21_S0028/Qp21_S0028
print(paste("Kmínd =",Kmínd21_S0028))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0028D22=S0028D[1:365,24]
S0028D22EECOVID19=S0028D[1:300,24]
```

```{r}
plot(Fecha22,S0028D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0028 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0028D22EECOVID19),lwd="3",col="red")
abline(h=max(S0028D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0028D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0028=max(S0028D22EECOVID19)
Qp22_S0028=mean(S0028D22EECOVID19)
K1_22_S0028=Qmax22_S0028/Qp22_S0028
print(paste("K1 =",K1_22_S0028))

# Cálculo del coeficiente Kmínd
Qmind22_S0028=min(S0028D22EECOVID19)
Kmínd22_S0028=Qmind22_S0028/Qp22_S0028
print(paste("Kmínd =",Kmínd22_S0028))
```

```
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0028,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0028,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0028,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0028,": Si"))
print(paste("K1_21 =",K1_21_S0028,": Si"))
print(paste("K1_22 =",K1_22_S0028,": Si"))
```

```{r}
K1S0028m=c(K1_20_S0028,K1_21_S0028,K1_22_S0028)
K1S0028=mean(K1S0028m)
summary(K1S0028m)
K1S0028m
print(paste("K1_S0028 =",K1S0028))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0028,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0028,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0028,": Si"))
```

```{r}
KmíndS0028m=c(Kmínd20_S0028,Kmínd21_S0028,Kmínd22_S0028)
KmíndS0028=mean(KmíndS0028m)
summary(KmíndS0028m)
KmíndS0028m
print(paste("Kmínd_S0028 =",KmíndS0028))
```

## Estación remota S0029 (2020-2022)

### Selección de la base de datos

```{r}
S0029D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0029D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0029D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0029D20=S0029D[1:366,20]
S0029D20EECOVID19=S0029D[76:366,20]
```

```{r}
plot(Fecha20,S0029D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0029 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0029D20EECOVID19),lwd="3",col="red")
abline(h=max(S0029D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0029D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0029=max(S0029D20EECOVID19)
Qp20_S0029=mean(S0029D20EECOVID19)
K1_20_S0029=Qmax20_S0029/Qp20_S0029
print(paste("K1 =",K1_20_S0029))

# Cálculo del coeficiente Kmínd
Qmind20_S0029=min(S0029D20EECOVID19)
Kmínd20_S0029=Qmind20_S0029/Qp20_S0029
print(paste("Kmínd =",Kmínd20_S0029))
```

### Extracción y análisis de datos del año 2021

```{r}
```

```
Fecha21=c(1:365)
S0029D21=S0029D[1:365,22]
```

```{r}
plot(Fecha21,S0029D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0029 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0029D21),lwd="3",col="red")
abline(h=max(S0029D21),lwd="3",col="black",lty=2)
abline(h=min(S0029D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0029=max(S0029D21)
Qp21_S0029=mean(S0029D21)
K1_21_S0029=Qmax21_S0029/Qp21_S0029
print(paste("K1 =",K1_21_S0029))

# Cálculo del coeficiente Kmínd
Qmind21_S0029=min(S0029D21)
Kmínd21_S0029=Qmind21_S0029/Qp21_S0029
print(paste("Kmínd =",Kmínd21_S0029))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0029D22=S0029D[1:365,24]
S0029D22EECOVID19=S0029D[1:300,24]
```

```{r}
plot(Fecha22,S0029D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0029 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0029D22EECOVID19),lwd="3",col="red")
abline(h=max(S0029D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0029D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0029=max(S0029D22EECOVID19)
Qp22_S0029=mean(S0029D22EECOVID19)
K1_22_S0029=Qmax22_S0029/Qp22_S0029
print(paste("K1 =",K1_22_S0029))

# Cálculo del coeficiente Kmínd
Qmind22_S0029=min(S0029D22EECOVID19)
Kmínd22_S0029=Qmind22_S0029/Qp22_S0029
print(paste("Kmínd =",Kmínd22_S0029))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0029,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0029,"l/s",": No"))
print(paste("Qp_22 =",Qp22_S0029,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0029,": Si"))
print(paste("K1_21 =",K1_21_S0029,": No"))
print(paste("K1_22 =",K1_22_S0029,": Si"))
```

```{r}
K1S0029m=c(K1_20_S0029,K1_22_S0029)
K1S0029=mean(K1S0029m)
summary(K1S0029m)
K1S0029m
print(paste("K1_S0029 =",K1S0029))
```

### Determinación del coeficiente Kmínd del sector

```{r}
```

```
print(paste("Kmínd_20 =",Kmínd20_S0029,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0029,": No"))
print(paste("Kmínd_22 =",Kmínd22_S0029,": Si"))
```

```{r}
KmíndS0029m=c(Kmínd20_S0029,Kmínd22_S0029)
KmíndS0029=mean(KmíndS0029m)
summary(KmíndS0029m)
KmíndS0029m
print(paste("Kmínd_S0029 =",KmíndS0029))
```

## Estación remota S0033 (2020-2022)

### Selección de la base de datos

```{r}
S0033D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0033D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0033D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0033D20=S0033D[1:366,20]
S0033D20EECOVID19=S0033D[76:366,20]
```

```{r}
plot(Fecha20,S0033D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0033 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0033D20EECOVID19),lwd="3",col="red")
abline(h=max(S0033D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0033D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0033=max(S0033D20EECOVID19)
Qp20_S0033=mean(S0033D20EECOVID19)
K1_20_S0033=Qmax20_S0033/Qp20_S0033
print(paste("K1 =",K1_20_S0033))

# Cálculo del coeficiente Kmínd
Qmind20_S0033=min(S0033D20EECOVID19)
Kmínd20_S0033=Qmind20_S0033/Qp20_S0033
print(paste("Kmínd =",Kmínd20_S0033))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0033D21=S0033D[1:365,22]
```

```{r}
plot(Fecha21,S0033D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0033 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0033D21),lwd="3",col="red")
abline(h=max(S0033D21),lwd="3",col="black",lty=2)
abline(h=min(S0033D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0033=max(S0033D21)
Qp21_S0033=mean(S0033D21)
K1_21_S0033=Qmax21_S0033/Qp21_S0033
print(paste("K1 =",K1_21_S0033))

# Cálculo del coeficiente Kmínd
Qmind21_S0033=min(S0033D21)
Kmínd21_S0033=Qmind21_S0033/Qp21_S0033
```

```
print(paste("Kmínd =",Kmínd21_S0033))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0033D22=S0033D[1:365,24]
S0033D22EECOVID19=S0033D[1:300,24]
```

```{r}
plot(Fecha22,S0033D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0033 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0033D22EECOVID19),lwd="3",col="red")
abline(h=max(S0033D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0033D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0033=max(S0033D22EECOVID19)
Qp22_S0033=mean(S0033D22EECOVID19)
K1_22_S0033=Qmax22_S0033/Qp22_S0033
print(paste("K1 =",K1_22_S0033))

# Cálculo del coeficiente Kmínd
Qmind22_S0033=min(S0033D22EECOVID19)
Kmínd22_S0033=Qmind22_S0033/Qp22_S0033
print(paste("Kmínd =",Kmínd22_S0033))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0033,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0033,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0033,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0033,": Si"))
print(paste("K1_21 =",K1_21_S0033,": Si"))
print(paste("K1_22 =",K1_22_S0033,": Si"))
```

```{r}
K1S0033m=c(K1_20_S0033,K1_21_S0033,K1_22_S0033)
K1S0033=mean(K1S0033m)
summary(K1S0033m)
K1S0033m
print(paste("K1_S0033 =",K1S0033))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0033,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0033,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0033,": Si"))
```

```{r}
KmíndS0033m=c(Kmínd20_S0033,Kmínd21_S0033,Kmínd22_S0033)
KmíndS0033=mean(KmíndS0033m)
summary(KmíndS0033m)
KmíndS0033m
print(paste("Kmínd_S0033 =",KmíndS0033))
```

## Estación remota S0035 (2020-2022)

### Selección de la base de datos

```{r}
S0035D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0035D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0035D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0035D20=S0035D[1:366,20]
S0035D20EECOVID19=S0035D[76:366,20]
```

```{r}
plot(Fecha20,S0035D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0035 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0035D20EECOVID19),lwd="3",col="red")
abline(h=max(S0035D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0035D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0035=max(S0035D20EECOVID19)
Qp20_S0035=mean(S0035D20EECOVID19)
K1_20_S0035=Qmax20_S0035/Qp20_S0035
print(paste("K1 =",K1_20_S0035))

# Cálculo del coeficiente Kmínd
Qmind20_S0035=min(S0035D20EECOVID19)
Kmínd20_S0035=Qmind20_S0035/Qp20_S0035
print(paste("Kmínd =",Kmínd20_S0035))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0035D21=S0035D[1:365,22]
```

```{r}
plot(Fecha21,S0035D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0035 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0035D21),lwd="3",col="red")
abline(h=max(S0035D21),lwd="3",col="black",lty=2)
abline(h=min(S0035D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0035=max(S0035D21)
Qp21_S0035=mean(S0035D21)
K1_21_S0035=Qmax21_S0035/Qp21_S0035
print(paste("K1 =",K1_21_S0035))

# Cálculo del coeficiente Kmínd
Qmind21_S0035=min(S0035D21)
Kmínd21_S0035=Qmind21_S0035/Qp21_S0035
print(paste("Kmínd =",Kmínd21_S0035))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0035D22=S0035D[1:365,24]
S0035D22EECOVID19=S0035D[1:300,24]
```

```{r}
plot(Fecha22,S0035D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0035 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0035D22EECOVID19),lwd="3",col="red")
abline(h=max(S0035D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0035D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
```

```
# Cálculo del coeficiente K1
Qmax22_S0035=max(S0035D22EECOVID19)
Qp22_S0035=mean(S0035D22EECOVID19)
K1_22_S0035=Qmax22_S0035/Qp22_S0035
print(paste("K1 =",K1_22_S0035))

# Cálculo del coeficiente Kmínd
Qmind22_S0035=min(S0035D22EECOVID19)
Kmínd22_S0035=Qmind22_S0035/Qp22_S0035
print(paste("Kmínd =",Kmínd22_S0035))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0035,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0035,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0035,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0035,": Si"))
print(paste("K1_21 =",K1_21_S0035,": Si"))
print(paste("K1_22 =",K1_22_S0035,": Si"))
```

```{r}
K1S0035m=c(K1_20_S0035,K1_21_S0035,K1_22_S0035)
K1S0035=mean(K1S0035m)
summary(K1S0035m)
K1S0035m
print(paste("K1_S0035 =",K1S0035))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0035,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0035,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0035,": Si"))
```

```{r}
KmíndS0035m=c(Kmínd20_S0035,Kmínd21_S0035,Kmínd22_S0035)
KmíndS0035=mean(KmíndS0035m)
summary(KmíndS0035m)
KmíndS0035m
print(paste("Kmínd_S0035 =",KmíndS0035))
```

## Estación remota S0036 (2020-2022)

### Selección de la base de datos

```{r}
S0036D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0036D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0036D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0036D20=S0036D[1:366,20]
S0036D20EECOVID19=S0036D[76:366,20]
```

```{r}
plot(Fecha20,S0036D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0036 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0036D20EECOVID19),lwd="3",col="red")
abline(h=max(S0036D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0036D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0036=max(S0036D20EECOVID19)
Qp20_S0036=mean(S0036D20EECOVID19)
K1_20_S0036=Qmax20_S0036/Qp20_S0036
print(paste("K1 =",K1_20_S0036))
```

```
# Cálculo del coeficiente Kmínd
Qmind20_S0036=min(S0036D20EECOVID19)
Kmínd20_S0036=Qmind20_S0036/Qp20_S0036
print(paste("Kmínd =",Kmínd20_S0036))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0036D21=S0036D[1:365,22]
```

```{r}
plot(Fecha21,S0036D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0036 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0036D21),lwd="3",col="red")
abline(h=max(S0036D21),lwd="3",col="black",lty=2)
abline(h=min(S0036D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0036=max(S0036D21)
Qp21_S0036=mean(S0036D21)
K1_21_S0036=Qmax21_S0036/Qp21_S0036
print(paste("K1 =",K1_21_S0036))

# Cálculo del coeficiente Kmínd
Qmind21_S0036=min(S0036D21)
Kmínd21_S0036=Qmind21_S0036/Qp21_S0036
print(paste("Kmínd =",Kmínd21_S0036))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0036D22=S0036D[1:365,24]
S0036D22EECOVID19=S0036D[1:300,24]
```

```{r}
plot(Fecha22,S0036D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0036 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0036D22EECOVID19),lwd="3",col="red")
abline(h=max(S0036D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0036D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0036=max(S0036D22EECOVID19)
Qp22_S0036=mean(S0036D22EECOVID19)
K1_22_S0036=Qmax22_S0036/Qp22_S0036
print(paste("K1 =",K1_22_S0036))

# Cálculo del coeficiente Kmínd
Qmind22_S0036=min(S0036D22EECOVID19)
Kmínd22_S0036=Qmind22_S0036/Qp22_S0036
print(paste("Kmínd =",Kmínd22_S0036))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0036,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0036,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0036,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0036,": Si"))
print(paste("K1_21 =",K1_21_S0036,": Si"))
print(paste("K1_22 =",K1_22_S0036,": Si"))
```

```{r}
```

```
K1S0036m=c(K1_20_S0036,K1_21_S0036,K1_22_S0036)
K1S0036=mean(K1S0036m)
summary(K1S0036m)
K1S0036m
print(paste("K1_S0036 =",K1S0036))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0036,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0036,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0036,": Si"))
```

```{r}
KmíndS0036m=c(Kmínd20_S0036,Kmínd21_S0036,Kmínd22_S0036)
KmíndS0036=mean(KmíndS0036m)
summary(KmíndS0036m)
KmíndS0036m
print(paste("Kmínd_S0036 =",KmíndS0036))
```

## Estación remota S0039 (2020-2022)

### Selección de la base de datos

```{r}
S0039D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0039D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0039D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0039D20=S0039D[1:366,20]
S0039D20EECOVID19=S0039D[76:366,20]
```

```{r}
plot(Fecha20,S0039D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0039 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0039D20EECOVID19),lwd="3",col="red")
abline(h=max(S0039D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0039D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0039=max(S0039D20EECOVID19)
Qp20_S0039=mean(S0039D20EECOVID19)
K1_20_S0039=Qmax20_S0039/Qp20_S0039
print(paste("K1 =",K1_20_S0039))

# Cálculo del coeficiente Kmínd
Qmind20_S0039=min(S0039D20EECOVID19)
Kmínd20_S0039=Qmind20_S0039/Qp20_S0039
print(paste("Kmínd =",Kmínd20_S0039))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0039D21=S0039D[1:365,22]
```

```{r}
plot(Fecha21,S0039D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0039 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0039D21),lwd="3",col="red")
abline(h=max(S0039D21),lwd="3",col="black",lty=2)
abline(h=min(S0039D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0039=max(S0039D21)
Qp21_S0039=mean(S0039D21)
K1_21_S0039=Qmax21_S0039/Qp21_S0039
print(paste("K1 =",K1_21_S0039))

# Cálculo del coeficiente Kmínd
Qmind21_S0039=min(S0039D21)
Kmínd21_S0039=Qmind21_S0039/Qp21_S0039
print(paste("Kmínd =",Kmínd21_S0039))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0039D22=S0039D[1:365,24]
S0039D22EECOVID19=S0039D[1:300,24]
```

```{r}
plot(Fecha22,S0039D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0039 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0039D22EECOVID19),lwd="3",col="red")
abline(h=max(S0039D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0039D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0039=max(S0039D22EECOVID19)
Qp22_S0039=mean(S0039D22EECOVID19)
K1_22_S0039=Qmax22_S0039/Qp22_S0039
print(paste("K1 =",K1_22_S0039))

# Cálculo del coeficiente Kmínd
Qmind22_S0039=min(S0039D22EECOVID19)
Kmínd22_S0039=Qmind22_S0039/Qp22_S0039
print(paste("Kmínd =",Kmínd22_S0039))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0039,"l/s",": No"))
print(paste("Qp_21 =",Qp21_S0039,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0039,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0039,": No"))
print(paste("K1_21 =",K1_21_S0039,": Si"))
print(paste("K1_22 =",K1_22_S0039,": Si"))
```

```{r}
K1S0039m=c(K1_21_S0039,K1_22_S0039)
K1S0039=mean(K1S0039m)
summary(K1S0039m)
K1S0039m
print(paste("K1_S0039 =",K1S0039))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0039,": No"))
print(paste("Kmínd_21 =",Kmínd21_S0039,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0039,": Si"))
```

```{r}
KmíndS0039m=c(Kmínd21_S0039,Kmínd22_S0039)
KmíndS0039=mean(KmíndS0039m)
summary(KmíndS0039m)
KmíndS0039m
print(paste("Kmínd_S0039 =",KmíndS0039))
```

## Estación remota S0042 (2020-2022)

### Selección de la base de datos

```{r}
S0042D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0042D.csv",sep=";")
```

```
```

### Visualización de la base de datos

```{r}
# View(S0042D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0042D20=S0042D[1:366,20]
S0042D20EECOVID19=S0042D[76:366,20]
```

```{r}
plot(Fecha20,S0042D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0042 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0042D20EECOVID19),lwd="3",col="red")
abline(h=max(S0042D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0042D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0042=max(S0042D20EECOVID19)
Qp20_S0042=mean(S0042D20EECOVID19)
K1_20_S0042=Qmax20_S0042/Qp20_S0042
print(paste("K1 =",K1_20_S0042))

# Cálculo del coeficiente Kmínd
Qmind20_S0042=min(S0042D20EECOVID19)
Kmínd20_S0042=Qmind20_S0042/Qp20_S0042
print(paste("Kmínd =",Kmínd20_S0042))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0042D21=S0042D[1:365,22]
```

```{r}
plot(Fecha21,S0042D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0042 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0042D21),lwd="3",col="red")
abline(h=max(S0042D21),lwd="3",col="black",lty=2)
abline(h=min(S0042D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0042=max(S0042D21)
Qp21_S0042=mean(S0042D21)
K1_21_S0042=Qmax21_S0042/Qp21_S0042
print(paste("K1 =",K1_21_S0042))

# Cálculo del coeficiente Kmínd
Qmind21_S0042=min(S0042D21)
Kmínd21_S0042=Qmind21_S0042/Qp21_S0042
print(paste("Kmínd =",Kmínd21_S0042))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0042D22=S0042D[1:365,24]
S0042D22EECOVID19=S0042D[1:300,24]
```

```{r}
plot(Fecha22,S0042D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0042 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0042D22EECOVID19),lwd="3",col="red")
```

```
abline(h=max(S0042D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0042D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0042=max(S0042D22EECOVID19)
Qp22_S0042=mean(S0042D22EECOVID19)
K1_22_S0042=Qmax22_S0042/Qp22_S0042
print(paste("K1 =",K1_22_S0042))

# Cálculo del coeficiente Kmínd
Qmind22_S0042=min(S0042D22EECOVID19)
Kmínd22_S0042=Qmind22_S0042/Qp22_S0042
print(paste("Kmínd =",Kmínd22_S0042))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0042,"l/s",": No"))
print(paste("Qp_21 =",Qp21_S0042,"l/s",": No"))
print(paste("Qp_22 =",Qp22_S0042,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0042,": No"))
print(paste("K1_21 =",K1_21_S0042,": No"))
print(paste("K1_22 =",K1_22_S0042,": Si"))
```

```{r}
K1S0042m=c(K1_22_S0042)
K1S0042=mean(K1S0042m)
summary(K1S0042m)
K1S0042m
print(paste("K1_S0042 =",K1S0042))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0042,": No"))
print(paste("Kmínd_21 =",Kmínd21_S0042,": No"))
print(paste("Kmínd_22 =",Kmínd22_S0042,": Si"))
```

```{r}
KmíndS0042m=c(Kmínd22_S0042)
KmíndS0042=mean(KmíndS0042m)
summary(KmíndS0042m)
KmíndS0042m
print(paste("Kmínd_S0042 =",KmíndS0042))
```

## Estación remota S0043 (2020-2022)

### Selección de la base de datos

```{r}
S0043D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0043D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0043D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0043D20=S0043D[1:366,20]
S0043D20EECOVID19=S0043D[76:366,20]
```

```{r}
plot(Fecha20,S0043D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0043 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0043D20EECOVID19),lwd="3",col="red")
abline(h=max(S0043D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0043D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
```

```
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0043=max(S0043D20EECOVID19)
Qp20_S0043=mean(S0043D20EECOVID19)
K1_20_S0043=Qmax20_S0043/Qp20_S0043
print(paste("K1 =",K1_20_S0043))

# Cálculo del coeficiente Kmínd
Qmind20_S0043=min(S0043D20EECOVID19)
Kmínd20_S0043=Qmind20_S0043/Qp20_S0043
print(paste("Kmínd =",Kmínd20_S0043))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0043D21=S0043D[1:365,22]
```

```{r}
plot(Fecha21,S0043D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0043 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0043D21),lwd="3",col="red")
abline(h=max(S0043D21),lwd="3",col="black",lty=2)
abline(h=min(S0043D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0043=max(S0043D21)
Qp21_S0043=mean(S0043D21)
K1_21_S0043=Qmax21_S0043/Qp21_S0043
print(paste("K1 =",K1_21_S0043))

# Cálculo del coeficiente Kmínd
Qmind21_S0043=min(S0043D21)
Kmínd21_S0043=Qmind21_S0043/Qp21_S0043
print(paste("Kmínd =",Kmínd21_S0043))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0043D22=S0043D[1:365,24]
S0043D22EECOVID19=S0043D[1:300,24]
```

```{r}
plot(Fecha22,S0043D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0043 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0043D22EECOVID19),lwd="3",col="red")
abline(h=max(S0043D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0043D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0043=max(S0043D22EECOVID19)
Qp22_S0043=mean(S0043D22EECOVID19)
K1_22_S0043=Qmax22_S0043/Qp22_S0043
print(paste("K1 =",K1_22_S0043))

# Cálculo del coeficiente Kmínd
Qmind22_S0043=min(S0043D22EECOVID19)
Kmínd22_S0043=Qmind22_S0043/Qp22_S0043
print(paste("Kmínd =",Kmínd22_S0043))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0043,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0043,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0043,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0043,": Si"))
print(paste("K1_21 =",K1_21_S0043,": Si"))
print(paste("K1_22 =",K1_22_S0043,": Si"))
```

```{r}
K1S0043m=c(K1_20_S0043,K1_21_S0043,K1_22_S0043)
K1S0043=mean(K1S0043m)
summary(K1S0043m)
K1S0043m
print(paste("K1_S0043 =",K1S0043))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0043,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0043,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0043,": Si"))
```

```{r}
KmíndS0043m=c(Kmínd20_S0043,Kmínd21_S0043,Kmínd22_S0043)
KmíndS0043=mean(KmíndS0043m)
summary(KmíndS0043m)
KmíndS0043m
print(paste("Kmínd_S0043 =",KmíndS0043))
```

## Estación remota S0047 (2020-2022)

### Selección de la base de datos

```{r}
S0047D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0047D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0047D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0047D20=S0047D[1:366,20]
S0047D20EECOVID19=S0047D[76:366,20]
```

```{r}
plot(Fecha20,S0047D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0047 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0047D20EECOVID19),lwd="3",col="red")
abline(h=max(S0047D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0047D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0047=max(S0047D20EECOVID19)
Qp20_S0047=mean(S0047D20EECOVID19)
K1_20_S0047=Qmax20_S0047/Qp20_S0047
print(paste("K1 =",K1_20_S0047))

# Cálculo del coeficiente Kmínd
Qmind20_S0047=min(S0047D20EECOVID19)
Kmínd20_S0047=Qmind20_S0047/Qp20_S0047
print(paste("Kmínd =",Kmínd20_S0047))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0047D21=S0047D[1:365,22]
```

```{r}
plot(Fecha21,S0047D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0047 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
```

```
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0047D21),lwd="3",col="red")
abline(h=max(S0047D21),lwd="3",col="black",lty=2)
abline(h=min(S0047D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0047=max(S0047D21)
Qp21_S0047=mean(S0047D21)
K1_21_S0047=Qmax21_S0047/Qp21_S0047
print(paste("K1 =",K1_21_S0047))

# Cálculo del coeficiente Kmínd
Qmind21_S0047=min(S0047D21)
Kmínd21_S0047=Qmind21_S0047/Qp21_S0047
print(paste("Kmínd =",Kmínd21_S0047))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0047D22=S0047D[1:365,24]
S0047D22EECOVID19=S0047D[1:300,24]
```

```{r}
plot(Fecha22,S0047D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0047 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0047D22EECOVID19),lwd="3",col="red")
abline(h=max(S0047D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0047D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0047=max(S0047D22EECOVID19)
Qp22_S0047=mean(S0047D22EECOVID19)
K1_22_S0047=Qmax22_S0047/Qp22_S0047
print(paste("K1 =",K1_22_S0047))

# Cálculo del coeficiente Kmínd
Qmind22_S0047=min(S0047D22EECOVID19)
Kmínd22_S0047=Qmind22_S0047/Qp22_S0047
print(paste("Kmínd =",Kmínd22_S0047))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0047,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0047,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0047,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0047,": Si"))
print(paste("K1_21 =",K1_21_S0047,": Si"))
print(paste("K1_22 =",K1_22_S0047,": Si"))
```

```{r}
K1S0047m=c(K1_20_S0047,K1_21_S0047,K1_22_S0047)
K1S0047=mean(K1S0047m)
summary(K1S0047m)
K1S0047m
print(paste("K1_S0047 =",K1S0047))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0047,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0047,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0047,": Si"))
```

```{r}
KmíndS0047m=c(Kmínd20_S0047,Kmínd21_S0047,Kmínd22_S0047)
KmíndS0047=mean(KmíndS0047m)
summary(KmíndS0047m)
```

```
KmíndS0047m
print(paste("Kmínd_S0047 =",KmíndS0047))
```

## Estación remota S0048 (2020-2022)

### Selección de la base de datos

```{r}
S0048D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0048D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0048D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0048D20=S0048D[1:366,20]
S0048D20EECOVID19=S0048D[76:366,20]
```

```{r}
plot(Fecha20,S0048D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0048 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0048D20EECOVID19),lwd="3",col="red")
abline(h=max(S0048D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0048D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0048=max(S0048D20EECOVID19)
Qp20_S0048=mean(S0048D20EECOVID19)
K1_20_S0048=Qmax20_S0048/Qp20_S0048
print(paste("K1 =",K1_20_S0048))

# Cálculo del coeficiente Kmínd
Qmind20_S0048=min(S0048D20EECOVID19)
Kmínd20_S0048=Qmind20_S0048/Qp20_S0048
print(paste("Kmínd =",Kmínd20_S0048))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0048D21=S0048D[1:365,22]
```

```{r}
plot(Fecha21,S0048D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0048 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0048D21),lwd="3",col="red")
abline(h=max(S0048D21),lwd="3",col="black",lty=2)
abline(h=min(S0048D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0048=max(S0048D21)
Qp21_S0048=mean(S0048D21)
K1_21_S0048=Qmax21_S0048/Qp21_S0048
print(paste("K1 =",K1_21_S0048))

# Cálculo del coeficiente Kmínd
Qmind21_S0048=min(S0048D21)
Kmínd21_S0048=Qmind21_S0048/Qp21_S0048
print(paste("Kmínd =",Kmínd21_S0048))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0048D22=S0048D[1:365,24]
S0048D22EECOVID19=S0048D[1:300,24]
```

```
```

```{r}
plot(Fecha22,S0048D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0048 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0048D22EECOVID19),lwd="3",col="red")
abline(h=max(S0048D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0048D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0048=max(S0048D22EECOVID19)
Qp22_S0048=mean(S0048D22EECOVID19)
K1_22_S0048=Qmax22_S0048/Qp22_S0048
print(paste("K1 =",K1_22_S0048))

# Cálculo del coeficiente Kmínd
Qmind22_S0048=min(S0048D22EECOVID19)
Kmínd22_S0048=Qmind22_S0048/Qp22_S0048
print(paste("Kmínd =",Kmínd22_S0048))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0048,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0048,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0048,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0048,": Si"))
print(paste("K1_21 =",K1_21_S0048,": Si"))
print(paste("K1_22 =",K1_22_S0048,": Si"))
```

```{r}
K1S0048m=c(K1_20_S0048,K1_21_S0048,K1_22_S0048)
K1S0048=mean(K1S0048m)
summary(K1S0048m)
K1S0048m
print(paste("K1_S0048 =",K1S0048))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0048,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0048,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0048,": Si"))
```

```{r}
KmíndS0048m=c(Kmínd20_S0048,Kmínd21_S0048,Kmínd22_S0048)
KmíndS0048=mean(KmíndS0048m)
summary(KmíndS0048m)
KmíndS0048m
print(paste("Kmínd_S0048 =",KmíndS0048))
```

## Estación remota S0049 (2020-2022)

### Selección de la base de datos

```{r}
S0049D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0049D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0049D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0049D20=S0049D[1:366,20]
S0049D20EECOVID19=S0049D[76:366,20]
```

```{r}
plot(Fecha20,S0049D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0049 - 2020 (EE por COVID-19)",
```

```
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0049D20EECOVID19),lwd="3",col="red")
abline(h=max(S0049D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0049D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0049=max(S0049D20EECOVID19)
Qp20_S0049=mean(S0049D20EECOVID19)
K1_20_S0049=Qmax20_S0049/Qp20_S0049
print(paste("K1 =",K1_20_S0049))

# Cálculo del coeficiente Kmínd
Qmind20_S0049=min(S0049D20EECOVID19)
Kmínd20_S0049=Qmind20_S0049/Qp20_S0049
print(paste("Kmínd =",Kmínd20_S0049))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0049D21=S0049D[1:365,22]
```

```{r}
plot(Fecha21,S0049D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0049 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0049D21),lwd="3",col="red")
abline(h=max(S0049D21),lwd="3",col="black",lty=2)
abline(h=min(S0049D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0049=max(S0049D21)
Qp21_S0049=mean(S0049D21)
K1_21_S0049=Qmax21_S0049/Qp21_S0049
print(paste("K1 =",K1_21_S0049))

# Cálculo del coeficiente Kmínd
Qmind21_S0049=min(S0049D21)
Kmínd21_S0049=Qmind21_S0049/Qp21_S0049
print(paste("Kmínd =",Kmínd21_S0049))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0049D22=S0049D[1:365,24]
S0049D22EECOVID19=S0049D[1:300,24]
```

```{r}
plot(Fecha22,S0049D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0049 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0049D22EECOVID19),lwd="3",col="red")
abline(h=max(S0049D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0049D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0049=max(S0049D22EECOVID19)
Qp22_S0049=mean(S0049D22EECOVID19)
K1_22_S0049=Qmax22_S0049/Qp22_S0049
print(paste("K1 =",K1_22_S0049))

# Cálculo del coeficiente Kmínd
Qmind22_S0049=min(S0049D22EECOVID19)
Kmínd22_S0049=Qmind22_S0049/Qp22_S0049
```

```
print(paste("Kmínd =",Kmínd22_S0049))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0049,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0049,"l/s",": No"))
print(paste("Qp_22 =",Qp22_S0049,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0049,": Si"))
print(paste("K1_21 =",K1_21_S0049,": No"))
print(paste("K1_22 =",K1_22_S0049,": Si"))
```

```{r}
K1S0049m=c(K1_20_S0049,K1_22_S0049)
K1S0049=mean(K1S0049m)
summary(K1S0049m)
K1S0049m
print(paste("K1_S0049 =",K1S0049))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0049,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0049,": No"))
print(paste("Kmínd_22 =",Kmínd22_S0049,": Si"))
```

```{r}
KmíndS0049m=c(Kmínd20_S0049,Kmínd22_S0049)
KmíndS0049=mean(KmíndS0049m)
summary(KmíndS0049m)
KmíndS0049m
print(paste("Kmínd_S0049 =",KmíndS0049))
```

## Estación remota S0054 (2020-2022)

### Selección de la base de datos

```{r}
S0054D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0054D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0054D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0054D20=S0054D[1:366,20]
S0054D20EECOVID19=S0054D[76:366,20]
```

```{r}
plot(Fecha20,S0054D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0054 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0054D20EECOVID19),lwd="3",col="red")
abline(h=max(S0054D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0054D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0054=max(S0054D20EECOVID19)
Qp20_S0054=mean(S0054D20EECOVID19)
K1_20_S0054=Qmax20_S0054/Qp20_S0054
print(paste("K1 =",K1_20_S0054))

# Cálculo del coeficiente Kmínd
Qmind20_S0054=min(S0054D20EECOVID19)
Kmínd20_S0054=Qmind20_S0054/Qp20_S0054
print(paste("Kmínd =",Kmínd20_S0054))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0054D21=S0054D[1:365,22]
```

```{r}
plot(Fecha21,S0054D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0054 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0054D21),lwd="3",col="red")
abline(h=max(S0054D21),lwd="3",col="black",lty=2)
abline(h=min(S0054D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0054=max(S0054D21)
Qp21_S0054=mean(S0054D21)
K1_21_S0054=Qmax21_S0054/Qp21_S0054
print(paste("K1 =",K1_21_S0054))

# Cálculo del coeficiente Kmínd
Qmind21_S0054=min(S0054D21)
Kmínd21_S0054=Qmind21_S0054/Qp21_S0054
print(paste("Kmínd =",Kmínd21_S0054))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0054D22=S0054D[1:365,24]
S0054D22EECOVID19=S0054D[1:300,24]
```

```{r}
plot(Fecha22,S0054D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0054 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0054D22EECOVID19),lwd="3",col="red")
abline(h=max(S0054D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0054D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0054=max(S0054D22EECOVID19)
Qp22_S0054=mean(S0054D22EECOVID19)
K1_22_S0054=Qmax22_S0054/Qp22_S0054
print(paste("K1 =",K1_22_S0054))

# Cálculo del coeficiente Kmínd
Qmind22_S0054=min(S0054D22EECOVID19)
Kmínd22_S0054=Qmind22_S0054/Qp22_S0054
print(paste("Kmínd =",Kmínd22_S0054))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0054,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0054,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0054,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0054,": Si"))
print(paste("K1_21 =",K1_21_S0054,": Si"))
print(paste("K1_22 =",K1_22_S0054,": Si"))
```

```{r}
K1S0054m=c(K1_20_S0054,K1_21_S0054,K1_22_S0054)
K1S0054=mean(K1S0054m)
summary(K1S0054m)
K1S0054m
print(paste("K1_S0054 =",K1S0054))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0054,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0054,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0054,": Si"))
```

```{r}
KmíndS0054m=c(Kmínd20_S0054,Kmínd20_S0054,Kmínd22_S0054)
KmíndS0054=mean(KmíndS0054m)
summary(KmíndS0054m)
KmíndS0054m
print(paste("Kmínd_S0054 =",KmíndS0054))
```

## Estación remota S0056 (2020-2022)

### Selección de la base de datos

```{r}
S0056D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0056D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0056D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0056D20=S0056D[1:366,20]
S0056D20EECOVID19=S0056D[76:366,20]
```

```{r}
plot(Fecha20,S0056D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0056 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0056D20EECOVID19),lwd="3",col="red")
abline(h=max(S0056D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0056D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0056=max(S0056D20EECOVID19)
Qp20_S0056=mean(S0056D20EECOVID19)
K1_20_S0056=Qmax20_S0056/Qp20_S0056
print(paste("K1 =",K1_20_S0056))

# Cálculo del coeficiente Kmínd
Qmind20_S0056=min(S0056D20EECOVID19)
Kmínd20_S0056=Qmind20_S0056/Qp20_S0056
print(paste("Kmínd =",Kmínd20_S0056))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0056D21=S0056D[1:365,22]
```

```{r}
plot(Fecha21,S0056D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0056 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0056D21),lwd="3",col="red")
abline(h=max(S0056D21),lwd="3",col="black",lty=2)
abline(h=min(S0056D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0056=max(S0056D21)
Qp21_S0056=mean(S0056D21)
K1_21_S0056=Qmax21_S0056/Qp21_S0056
print(paste("K1 =",K1_21_S0056))

# Cálculo del coeficiente Kmínd
Qmind21_S0056=min(S0056D21)
```

```
Kmínd21_S0056=Qmind21_S0056/Qp21_S0056
print(paste("Kmínd =",Kmínd21_S0056))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0056D22=S0056D[1:365,24]
S0056D22EECOVID19=S0056D[1:300,24]
```

```{r}
plot(Fecha22,S0056D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0056 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0056D22EECOVID19),lwd="3",col="red")
abline(h=max(S0056D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0056D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0056=max(S0056D22EECOVID19)
Qp22_S0056=mean(S0056D22EECOVID19)
K1_22_S0056=Qmax22_S0056/Qp22_S0056
print(paste("K1 =",K1_22_S0056))

# Cálculo del coeficiente Kmínd
Qmind22_S0056=min(S0056D22EECOVID19)
Kmínd22_S0056=Qmind22_S0056/Qp22_S0056
print(paste("Kmínd =",Kmínd22_S0056))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0056,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0056,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0056,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0056,": Si"))
print(paste("K1_21 =",K1_21_S0056,": Si"))
print(paste("K1_22 =",K1_22_S0056,": Si"))
```

```{r}
K1S0056m=c(K1_20_S0056,K1_21_S0056,K1_22_S0056)
K1S0056=mean(K1S0056m)
summary(K1S0056m)
K1S0056
print(paste("K1_S0056 =",K1S0056))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0056,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0056,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0056,": Si"))
```

```{r}
KmíndS0056m=c(Kmínd20_S0056,Kmínd21_S0056,Kmínd22_S0056)
KmíndS0056=mean(KmíndS0056m)
summary(KmíndS0056m)
KmíndS0056
print(paste("Kmínd_S0056 =",KmíndS0056))
```

## Estación remota S0057 (2020-2022)

### Selección de la base de datos

```{r}
S0057D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0057D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0057D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0057D20=S0057D[1:366,20]
S0057D20EECOVID19=S0057D[76:366,20]
```

```{r}
plot(Fecha20,S0057D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0057 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0057D20EECOVID19),lwd="3",col="red")
abline(h=max(S0057D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0057D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0057=max(S0057D20EECOVID19)
Qp20_S0057=mean(S0057D20EECOVID19)
K1_20_S0057=Qmax20_S0057/Qp20_S0057
print(paste("K1 =",K1_20_S0057))

# Cálculo del coeficiente Kmínd
Qmind20_S0057=min(S0057D20EECOVID19)
Kmínd20_S0057=Qmind20_S0057/Qp20_S0057
print(paste("Kmínd =",Kmínd20_S0057))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0057D21=S0057D[1:365,22]
```

```{r}
plot(Fecha21,S0057D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0057 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0057D21),lwd="3",col="red")
abline(h=max(S0057D21),lwd="3",col="black",lty=2)
abline(h=min(S0057D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0057=max(S0057D21)
Qp21_S0057=mean(S0057D21)
K1_21_S0057=Qmax21_S0057/Qp21_S0057
print(paste("K1 =",K1_21_S0057))

# Cálculo del coeficiente Kmínd
Qmind21_S0057=min(S0057D21)
Kmínd21_S0057=Qmind21_S0057/Qp21_S0057
print(paste("Kmínd =",Kmínd21_S0057))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0057D22=S0057D[1:365,24]
S0057D22EECOVID19=S0057D[1:300,24]
```

```{r}
plot(Fecha22,S0057D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0057 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0057D22EECOVID19),lwd="3",col="red")
abline(h=max(S0057D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0057D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0057=max(S0057D22EECOVID19)
Qp22_S0057=mean(S0057D22EECOVID19)
K1_22_S0057=Qmax22_S0057/Qp22_S0057
print(paste("K1 =",K1_22_S0057))

# Cálculo del coeficiente Kmínd
Qmind22_S0057=min(S0057D22EECOVID19)
Kmínd22_S0057=Qmind22_S0057/Qp22_S0057
print(paste("Kmínd =",Kmínd22_S0057))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0057,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0057,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0057,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0057,": Si"))
print(paste("K1_21 =",K1_21_S0057,": Si"))
print(paste("K1_22 =",K1_22_S0057,": Si"))
```

```{r}
K1S0057m=c(K1_20_S0057,K1_21_S0057,K1_22_S0057)
K1S0057=mean(K1S0057m)
summary(K1S0057m)
K1S0057m
print(paste("K1_S0057 =",K1S0057))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0057,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0057,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0057,": Si"))
```

```{r}
KmíndS0057m=c(Kmínd20_S0057,Kmínd21_S0057,Kmínd22_S0057)
KmíndS0057=mean(KmíndS0057m)
summary(KmíndS0057m)
KmíndS0057m
print(paste("Kmínd_S0057 =",KmíndS0057))
```

## Estación remota S0063 (2020-2022)

### Selección de la base de datos

```{r}
S0063D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0063D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0063D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0063D20=S0063D[1:366,20]
S0063D20EECOVID19=S0063D[76:366,20]
```

```{r}
plot(Fecha20,S0063D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0063 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0063D20EECOVID19),lwd="3",col="red")
abline(h=max(S0063D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0063D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0063=max(S0063D20EECOVID19)
Qp20_S0063=mean(S0063D20EECOVID19)
K1_20_S0063=Qmax20_S0063/Qp20_S0063
```

```
print(paste("K1 =",K1_20_S0063))

# Cálculo del coeficiente Kmínd
Qmind20_S0063=min(S0063D20EECOVID19)
Kmínd20_S0063=Qmind20_S0063/Qp20_S0063
print(paste("Kmínd =",Kmínd20_S0063))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0063D21=S0063D[1:365,22]
```

```{r}
plot(Fecha21,S0063D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0063 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0063D21),lwd="3",col="red")
abline(h=max(S0063D21),lwd="3",col="black",lty=2)
abline(h=min(S0063D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0063=max(S0063D21)
Qp21_S0063=mean(S0063D21)
K1_21_S0063=Qmax21_S0063/Qp21_S0063
print(paste("K1 =",K1_21_S0063))

# Cálculo del coeficiente Kmínd
Qmind21_S0063=min(S0063D21)
Kmínd21_S0063=Qmind21_S0063/Qp21_S0063
print(paste("Kmínd =",Kmínd21_S0063))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0063D22=S0063D[1:365,24]
S0063D22EECOVID19=S0063D[1:300,24]
```

```{r}
plot(Fecha22,S0063D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0063 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0063D22EECOVID19),lwd="3",col="red")
abline(h=max(S0063D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0063D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0063=max(S0063D22EECOVID19)
Qp22_S0063=mean(S0063D22EECOVID19)
K1_22_S0063=Qmax22_S0063/Qp22_S0063
print(paste("K1 =",K1_22_S0063))

# Cálculo del coeficiente Kmínd
Qmind22_S0063=min(S0063D22EECOVID19)
Kmínd22_S0063=Qmind22_S0063/Qp22_S0063
print(paste("Kmínd =",Kmínd22_S0063))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0063,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0063,"l/s",": No"))
print(paste("Qp_22 =",Qp22_S0063,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0063,": Si"))
print(paste("K1_21 =",K1_21_S0063,": No"))
print(paste("K1_22 =",K1_22_S0063,": Si"))
```

```{r}
K1S0063m=c(K1_20_S0063,K1_22_S0063)
K1S0063=mean(K1S0063m)
summary(K1S0063m)
K1S0063m
print(paste("K1_S0063 =",K1S0063))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0063,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0063,": No"))
print(paste("Kmínd_22 =",Kmínd22_S0063,": Si"))
```

```{r}
KmíndS0063m=c(Kmínd20_S0063,Kmínd22_S0063)
KmíndS0063=mean(KmíndS0063m)
summary(KmíndS0063m)
KmíndS0063m
print(paste("Kmínd_S0063 =",KmíndS0063))
```

## Estación remota S0065 (2020-2022)

### Selección de la base de datos

```{r}
S0065D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0065D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0065D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0065D20=S0065D[1:366,20]
S0065D20EECOVID19=S0065D[76:366,20]
```

```{r}
plot(Fecha20,S0065D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0065 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0065D20EECOVID19),lwd="3",col="red")
abline(h=max(S0065D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0065D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0065=max(S0065D20EECOVID19)
Qp20_S0065=mean(S0065D20EECOVID19)
K1_20_S0065=Qmax20_S0065/Qp20_S0065
print(paste("K1 =",K1_20_S0065))

# Cálculo del coeficiente Kmínd
Qmind20_S0065=min(S0065D20EECOVID19)
Kmínd20_S0065=Qmind20_S0065/Qp20_S0065
print(paste("Kmínd =",Kmínd20_S0065))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0065D21=S0065D[1:365,22]
```

```{r}
plot(Fecha21,S0065D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0065 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0065D21),lwd="3",col="red")
abline(h=max(S0065D21),lwd="3",col="black",lty=2)
abline(h=min(S0065D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0065=max(S0065D21)
Qp21_S0065=mean(S0065D21)
K1_21_S0065=Qmax21_S0065/Qp21_S0065
print(paste("K1 =",K1_21_S0065))

# Cálculo del coeficiente Kmínd
Qmind21_S0065=min(S0065D21)
Kmínd21_S0065=Qmind21_S0065/Qp21_S0065
print(paste("Kmínd =",Kmínd21_S0065))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0065D22=S0065D[1:365,24]
S0065D22EECOVID19=S0065D[1:300,24]
```

```{r}
plot(Fecha22,S0065D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0065 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0065D22EECOVID19),lwd="3",col="red")
abline(h=max(S0065D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0065D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0065=max(S0065D22EECOVID19)
Qp22_S0065=mean(S0065D22EECOVID19)
K1_22_S0065=Qmax22_S0065/Qp22_S0065
print(paste("K1 =",K1_22_S0065))

# Cálculo del coeficiente Kmínd
Qmind22_S0065=min(S0065D22EECOVID19)
Kmínd22_S0065=Qmind22_S0065/Qp22_S0065
print(paste("Kmínd =",Kmínd22_S0065))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0065,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0065,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0065,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0065,": Si"))
print(paste("K1_21 =",K1_21_S0065,": Si"))
print(paste("K1_22 =",K1_22_S0065,": Si"))
```

```{r}
K1S0065m=c(K1_20_S0065,K1_21_S0065,K1_22_S0065)
K1S0065=mean(K1S0065m)
summary(K1S0065m)
K1S0065m
print(paste("K1_S0065 =",K1S0065))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0065,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0065,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0065,": Si"))
```

```{r}
KmíndS0065m=c(Kmínd20_S0065,Kmínd21_S0065,Kmínd22_S0065)
KmíndS0065=mean(KmíndS0065m)
summary(KmíndS0065m)
KmíndS0065m
print(paste("Kmínd_S0065 =",KmíndS0065))
```

## Estación remota S0066 (2020-2022)

### Selección de la base de datos

```{r}
```

S0066D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0066D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0066D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0066D20=S0066D[1:366,20]
S0066D20EECOVID19=S0066D[76:366,20]
```

```{r}
plot(Fecha20,S0066D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0066 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0066D20EECOVID19),lwd="3",col="red")
abline(h=max(S0066D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0066D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0066=max(S0066D20EECOVID19)
Qp20_S0066=mean(S0066D20EECOVID19)
K1_20_S0066=Qmax20_S0066/Qp20_S0066
print(paste("K1 =",K1_20_S0066))

# Cálculo del coeficiente Kmínd
Qmind20_S0066=min(S0066D20EECOVID19)
Kmínd20_S0066=Qmind20_S0066/Qp20_S0066
print(paste("Kmínd =",Kmínd20_S0066))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0066D21=S0066D[1:365,22]
```

```{r}
plot(Fecha21,S0066D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0066 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0066D21),lwd="3",col="red")
abline(h=max(S0066D21),lwd="3",col="black",lty=2)
abline(h=min(S0066D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0066=max(S0066D21)
Qp21_S0066=mean(S0066D21)
K1_21_S0066=Qmax21_S0066/Qp21_S0066
print(paste("K1 =",K1_21_S0066))

# Cálculo del coeficiente Kmínd
Qmind21_S0066=min(S0066D21)
Kmínd21_S0066=Qmind21_S0066/Qp21_S0066
print(paste("Kmínd =",Kmínd21_S0066))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0066D22=S0066D[1:365,24]
S0066D22EECOVID19=S0066D[1:300,24]
```

```{r}
plot(Fecha22,S0066D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0066 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")

```
abline(h=mean(S0066D22EECOVID19),lwd="3",col="red")
abline(h=max(S0066D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0066D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0066=max(S0066D22EECOVID19)
Qp22_S0066=mean(S0066D22EECOVID19)
K1_22_S0066=Qmax22_S0066/Qp22_S0066
print(paste("K1 =",K1_22_S0066))

# Cálculo del coeficiente Kmínd
Qmind22_S0066=min(S0066D22EECOVID19)
Kmínd22_S0066=Qmind22_S0066/Qp22_S0066
print(paste("Kmínd =",Kmínd22_S0066))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0066,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0066,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0066,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0066,": Si"))
print(paste("K1_21 =",K1_21_S0066,": Si"))
print(paste("K1_22 =",K1_22_S0066,": Si"))
```

```{r}
K1S0066m=c(K1_20_S0066,K1_21_S0066,K1_22_S0066)
K1S0066=mean(K1S0066m)
summary(K1S0066m)
K1S0066
print(paste("K1_S0066 =",K1S0066))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0066,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0066,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0066,": Si"))
```

```{r}
KmíndS0066m=c(Kmínd20_S0066,Kmínd21_S0066,Kmínd22_S0066)
KmíndS0066=mean(KmíndS0066m)
summary(KmíndS0066m)
KmíndS0066m
print(paste("Kmínd_S0066 =",KmíndS0066))
```

## Estación remota S0067 (2020-2022)

### Selección de la base de datos

```{r}
S0067D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0067D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0067D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0067D20=S0067D[1:366,20]
S0067D20EECOVID19=S0067D[76:366,20]
```

```{r}
plot(Fecha20,S0067D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0067 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0067D20EECOVID19),lwd="3",col="red")
abline(h=max(S0067D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0067D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
```

```
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0067=max(S0067D20EECOVID19)
Qp20_S0067=mean(S0067D20EECOVID19)
K1_20_S0067=Qmax20_S0067/Qp20_S0067
print(paste("K1 =",K1_20_S0067))

# Cálculo del coeficiente Kmínd
Qmind20_S0067=min(S0067D20EECOVID19)
Kmínd20_S0067=Qmind20_S0067/Qp20_S0067
print(paste("Kmínd =",Kmínd20_S0067))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0067D21=S0067D[1:365,22]
```

```{r}
plot(Fecha21,S0067D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0067 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0067D21),lwd="3",col="red")
abline(h=max(S0067D21),lwd="3",col="black",lty=2)
abline(h=min(S0067D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0067=max(S0067D21)
Qp21_S0067=mean(S0067D21)
K1_21_S0067=Qmax21_S0067/Qp21_S0067
print(paste("K1 =",K1_21_S0067))

# Cálculo del coeficiente Kmínd
Qmind21_S0067=min(S0067D21)
Kmínd21_S0067=Qmind21_S0067/Qp21_S0067
print(paste("Kmínd =",Kmínd21_S0067))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0067D22=S0067D[1:365,24]
S0067D22EECOVID19=S0067D[1:300,24]
```

```{r}
plot(Fecha22,S0067D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0067 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0067D22EECOVID19),lwd="3",col="red")
abline(h=max(S0067D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0067D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0067=max(S0067D22EECOVID19)
Qp22_S0067=mean(S0067D22EECOVID19)
K1_22_S0067=Qmax22_S0067/Qp22_S0067
print(paste("K1 =",K1_22_S0067))

# Cálculo del coeficiente Kmínd
Qmind22_S0067=min(S0067D22EECOVID19)
Kmínd22_S0067=Qmind22_S0067/Qp22_S0067
print(paste("Kmínd =",Kmínd22_S0067))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0067,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0067,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0067,"l/s",": Si"))
```

```
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0067,": Si"))
print(paste("K1_21 =",K1_21_S0067,": Si"))
print(paste("K1_22 =",K1_22_S0067,": Si"))
```

```{r}
K1S0067m=c(K1_20_S0067,K1_21_S0067,K1_22_S0067)
K1S0067=mean(K1S0067m)
summary(K1S0067m)
K1S0067m
print(paste("K1_S0067 =",K1S0067))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0067,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0067,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0067,": Si"))
```

```{r}
KmíndS0067m=c(Kmínd20_S0067,Kmínd21_S0067,Kmínd22_S0067)
KmíndS0067=mean(KmíndS0067m)
summary(KmíndS0067m)
KmíndS0067m
print(paste("Kmínd_S0067 =",KmíndS0067))
```

## Estación remota S0068 (2020-2022)

### Selección de la base de datos

```{r}
S0068D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0068D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0068D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0068D20=S0068D[1:366,20]
S0068D20EECOVID19=S0068D[76:366,20]
```

```{r}
plot(Fecha20,S0068D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0068 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0068D20EECOVID19),lwd="3",col="red")
abline(h=max(S0068D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0068D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0068=max(S0068D20EECOVID19)
Qp20_S0068=mean(S0068D20EECOVID19)
K1_20_S0068=Qmax20_S0068/Qp20_S0068
print(paste("K1 =",K1_20_S0068))

# Cálculo del coeficiente Kmínd
Qmind20_S0068=min(S0068D20EECOVID19)
Kmínd20_S0068=Qmind20_S0068/Qp20_S0068
print(paste("Kmínd =",Kmínd20_S0068))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0068D21=S0068D[1:365,22]
```

```{r}
plot(Fecha21,S0068D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0068 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
```

```
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0068D21),lwd="3",col="red")
abline(h=max(S0068D21),lwd="3",col="black",lty=2)
abline(h=min(S0068D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0068=max(S0068D21)
Qp21_S0068=mean(S0068D21)
K1_21_S0068=Qmax21_S0068/Qp21_S0068
print(paste("K1 =",K1_21_S0068))

# Cálculo del coeficiente Kmínd
Qmind21_S0068=min(S0068D21)
Kmínd21_S0068=Qmind21_S0068/Qp21_S0068
print(paste("Kmínd =",Kmínd21_S0068))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0068D22=S0068D[1:365,24]
S0068D22EECOVID19=S0068D[1:300,24]
```

```{r}
plot(Fecha22,S0068D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0068 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0068D22EECOVID19),lwd="3",col="red")
abline(h=max(S0068D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0068D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0068=max(S0068D22EECOVID19)
Qp22_S0068=mean(S0068D22EECOVID19)
K1_22_S0068=Qmax22_S0068/Qp22_S0068
print(paste("K1 =",K1_22_S0068))

# Cálculo del coeficiente Kmínd
Qmind22_S0068=min(S0068D22EECOVID19)
Kmínd22_S0068=Qmind22_S0068/Qp22_S0068
print(paste("Kmínd =",Kmínd22_S0068))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0068,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0068,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0068,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0068,": Si"))
print(paste("K1_21 =",K1_21_S0068,": Si"))
print(paste("K1_22 =",K1_22_S0068,": Si"))
```

```{r}
K1S0068m=c(K1_20_S0068,K1_21_S0068,K1_22_S0068)
K1S0068=mean(K1S0068m)
summary(K1S0068m)
K1S0068m
print(paste("K1_S0068 =",K1S0068))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0068,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0068,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0068,": Si"))
```

```{r}
KmíndS0068m=c(Kmínd20_S0068,Kmínd21_S0068,Kmínd22_S0068)
KmíndS0068=mean(KmíndS0068m)
```

```
summary(KmíndS0068m)
KmíndS0068m
print(paste("Kmínd_S0068 =",KmíndS0068))
```

## Estación remota S0069 (2020-2022)

### Selección de la base de datos

```{r}
S0069D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0069D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0069D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0069D20=S0069D[1:366,20]
S0069D20EECOVID19=S0069D[76:366,20]
```

```{r}
plot(Fecha20,S0069D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0069 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0069D20EECOVID19),lwd="3",col="red")
abline(h=max(S0069D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0069D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0069=max(S0069D20EECOVID19)
Qp20_S0069=mean(S0069D20EECOVID19)
K1_20_S0069=Qmax20_S0069/Qp20_S0069
print(paste("K1 =",K1_20_S0069))

# Cálculo del coeficiente Kmínd
Qmind20_S0069=min(S0069D20EECOVID19)
Kmínd20_S0069=Qmind20_S0069/Qp20_S0069
print(paste("Kmínd =",Kmínd20_S0069))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0069D21=S0069D[1:365,22]
```

```{r}
plot(Fecha21,S0069D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0069 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0069D21),lwd="3",col="red")
abline(h=max(S0069D21),lwd="3",col="black",lty=2)
abline(h=min(S0069D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0069=max(S0069D21)
Qp21_S0069=mean(S0069D21)
K1_21_S0069=Qmax21_S0069/Qp21_S0069
print(paste("K1 =",K1_21_S0069))

# Cálculo del coeficiente Kmínd
Qmind21_S0069=min(S0069D21)
Kmínd21_S0069=Qmind21_S0069/Qp21_S0069
print(paste("Kmínd =",Kmínd21_S0069))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0069D22=S0069D[1:365,24]
```

```
S0069D22EECOVID19=S0069D[1:300,24]
```
```

```{r}
plot(Fecha22,S0069D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0069 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0069D22EECOVID19),lwd="3",col="red")
abline(h=max(S0069D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0069D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0069=max(S0069D22EECOVID19)
Qp22_S0069=mean(S0069D22EECOVID19)
K1_22_S0069=Qmax22_S0069/Qp22_S0069
print(paste("K1 =",K1_22_S0069))

# Cálculo del coeficiente Kmínd
Qmind22_S0069=min(S0069D22EECOVID19)
Kmínd22_S0069=Qmind22_S0069/Qp22_S0069
print(paste("Kmínd =",Kmínd22_S0069))
```
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0069,"l/s",": No"))
print(paste("Qp_21 =",Qp21_S0069,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0069,"l/s",": Si"))
```
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0069,": No"))
print(paste("K1_21 =",K1_21_S0069,": Si"))
print(paste("K1_22 =",K1_22_S0069,": Si"))
```
```

```{r}
K1S0069m=c(K1_21_S0069,K1_22_S0069)
K1S0069=mean(K1S0069m)
summary(K1S0069m)
K1S0069m
print(paste("K1_S0069 =",K1S0069))
```
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0069,": No"))
print(paste("Kmínd_21 =",Kmínd21_S0069,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0069,": Si"))
```
```

```{r}
KmíndS0069m=c(Kmínd21_S0069,Kmínd22_S0069)
KmíndS0069=mean(KmíndS0069m)
summary(KmíndS0069m)
KmíndS0069m
print(paste("Kmínd_S0069 =",KmíndS0069))
```
```

## Estación remota S0071 (2020-2022)

### Selección de la base de datos

```{r}
S0071D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0071D.csv",sep=";")
```
```

### Visualización de la base de datos

```{r}
# View(S0071D)
```
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0071D20=S0071D[1:366,20]
S0071D20EECOVID19=S0071D[76:366,20]
```
```

```{r}
plot(Fecha20,S0071D20,type="l",lwd="2",col="blue",
```
```

```
main="ESTACIÓN S0071 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0071D20EECOVID19),lwd="3",col="red")
abline(h=max(S0071D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0071D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0071=max(S0071D20EECOVID19)
Qp20_S0071=mean(S0071D20EECOVID19)
K1_20_S0071=Qmax20_S0071/Qp20_S0071
print(paste("K1 =",K1_20_S0071))

# Cálculo del coeficiente Kmínd
Qmind20_S0071=min(S0071D20EECOVID19)
Kmínd20_S0071=Qmind20_S0071/Qp20_S0071
print(paste("Kmínd =",Kmínd20_S0071))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0071D21=S0071D[1:365,22]
```

```{r}
plot(Fecha21,S0071D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0071 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0071D21),lwd="3",col="red")
abline(h=max(S0071D21),lwd="3",col="black",lty=2)
abline(h=min(S0071D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0071=max(S0071D21)
Qp21_S0071=mean(S0071D21)
K1_21_S0071=Qmax21_S0071/Qp21_S0071
print(paste("K1 =",K1_21_S0071))

# Cálculo del coeficiente Kmínd
Qmind21_S0071=min(S0071D21)
Kmínd21_S0071=Qmind21_S0071/Qp21_S0071
print(paste("Kmínd =",Kmínd21_S0071))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0071D22=S0071D[1:365,24]
S0071D22EECOVID19=S0071D[1:300,24]
```

```{r}
plot(Fecha22,S0071D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0071 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0071D22EECOVID19),lwd="3",col="red")
abline(h=max(S0071D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0071D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0071=max(S0071D22EECOVID19)
Qp22_S0071=mean(S0071D22EECOVID19)
K1_22_S0071=Qmax22_S0071/Qp22_S0071
print(paste("K1 =",K1_22_S0071))

# Cálculo del coeficiente Kmínd
Qmind22_S0071=min(S0071D22EECOVID19)
```

```
Kmínd22_S0071=Qmind22_S0071/Qp22_S0071
print(paste("Kmínd =",Kmínd22_S0071))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0071,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0071,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0071,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0071,": Si"))
print(paste("K1_21 =",K1_21_S0071,": Si"))
print(paste("K1_22 =",K1_22_S0071,": Si"))
```

```{r}
K1S0071m=c(K1_20_S0071,K1_21_S0071,K1_22_S0071)
K1S0071=mean(K1S0071m)
summary(K1S0071m)
K1S0071m
print(paste("K1_S0071 =",K1S0071))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0071,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0071,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0071,": Si"))
```

```{r}
KmíndS0071m=c(Kmínd20_S0071,Kmínd21_S0071,Kmínd22_S0071)
KmíndS0071=mean(KmíndS0071m)
summary(KmíndS0071m)
KmíndS0071m
print(paste("Kmínd_S0071 =",KmíndS0071))
```

## Estación remota S0073 (2020-2022)

### Selección de la base de datos

```{r}
S0073D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0073D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0073D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0073D20=S0073D[1:366,20]
S0073D20EECOVID19=S0073D[76:366,20]
```

```{r}
plot(Fecha20,S0073D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0073 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0073D20EECOVID19),lwd="3",col="red")
abline(h=max(S0073D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0073D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0073=max(S0073D20EECOVID19)
Qp20_S0073=mean(S0073D20EECOVID19)
K1_20_S0073=Qmax20_S0073/Qp20_S0073
print(paste("K1 =",K1_20_S0073))

# Cálculo del coeficiente Kmínd
Qmind20_S0073=min(S0073D20EECOVID19)
Kmínd20_S0073=Qmind20_S0073/Qp20_S0073
print(paste("Kmínd =",Kmínd20_S0073))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0073D21=S0073D[1:365,22]
```

```{r}
plot(Fecha21,S0073D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0073 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0073D21),lwd="3",col="red")
abline(h=max(S0073D21),lwd="3",col="black",lty=2)
abline(h=min(S0073D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0073=max(S0073D21)
Qp21_S0073=mean(S0073D21)
K1_21_S0073=Qmax21_S0073/Qp21_S0073
print(paste("K1 =",K1_21_S0073))

# Cálculo del coeficiente Kmínd
Qmind21_S0073=min(S0073D21)
Kmínd21_S0073=Qmind21_S0073/Qp21_S0073
print(paste("Kmínd =",Kmínd21_S0073))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0073D22=S0073D[1:365,24]
S0073D22EECOVID19=S0073D[1:300,24]
```

```{r}
plot(Fecha22,S0073D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0073 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0073D22EECOVID19),lwd="3",col="red")
abline(h=max(S0073D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0073D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0073=max(S0073D22EECOVID19)
Qp22_S0073=mean(S0073D22EECOVID19)
K1_22_S0073=Qmax22_S0073/Qp22_S0073
print(paste("K1 =",K1_22_S0073))

# Cálculo del coeficiente Kmínd
Qmind22_S0073=min(S0073D22EECOVID19)
Kmínd22_S0073=Qmind22_S0073/Qp22_S0073
print(paste("Kmínd =",Kmínd22_S0073))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0073,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0073,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0073,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0073,": Si"))
print(paste("K1_21 =",K1_21_S0073,": Si"))
print(paste("K1_22 =",K1_22_S0073,": Si"))
```

```{r}
K1S0073m=c(K1_20_S0073,K1_21_S0073,K1_22_S0073)
K1S0073=mean(K1S0073m)
summary(K1S0073m)
K1S0073m
print(paste("K1_S0073 =",K1S0073))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0073,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0073,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0073,": Si"))
```

```{r}
KmíndS0073m=c(Kmínd20_S0073,Kmínd21_S0073,Kmínd22_S0073)
KmíndS0073=mean(KmíndS0073m)
summary(KmíndS0073m)
KmíndS0073m
print(paste("Kmínd_S0073 =",KmíndS0073))
```

## Estación remota S0081 (2020-2022)

### Selección de la base de datos

```{r}
S0081D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0081D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0081D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0081D20=S0081D[1:366,20]
S0081D20EECOVID19=S0081D[76:366,20]
```

```{r}
plot(Fecha20,S0081D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0081 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0081D20EECOVID19),lwd="3",col="red")
abline(h=max(S0081D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0081D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0081=max(S0081D20EECOVID19)
Qp20_S0081=mean(S0081D20EECOVID19)
K1_20_S0081=Qmax20_S0081/Qp20_S0081
print(paste("K1 =",K1_20_S0081))

# Cálculo del coeficiente Kmínd
Qmind20_S0081=min(S0081D20EECOVID19)
Kmínd20_S0081=Qmind20_S0081/Qp20_S0081
print(paste("Kmínd =",Kmínd20_S0081))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0081D21=S0081D[1:365,22]
```

```{r}
plot(Fecha21,S0081D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0081 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0081D21),lwd="3",col="red")
abline(h=max(S0081D21),lwd="3",col="black",lty=2)
abline(h=min(S0081D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0081=max(S0081D21)
Qp21_S0081=mean(S0081D21)
K1_21_S0081=Qmax21_S0081/Qp21_S0081
print(paste("K1 =",K1_21_S0081))

# Cálculo del coeficiente Kmínd
```

```
Qmind21_S0081=min(S0081D21)
Kmínd21_S0081=Qmind21_S0081/Qp21_S0081
print(paste("Kmínd =",Kmínd21_S0081))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0081D22=S0081D[1:365,24]
S0081D22EECOVID19=S0081D[1:300,24]
```

```{r}
plot(Fecha22,S0081D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0081 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0081D22EECOVID19),lwd="3",col="red")
abline(h=max(S0081D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0081D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0081=max(S0081D22EECOVID19)
Qp22_S0081=mean(S0081D22EECOVID19)
K1_22_S0081=Qmax22_S0081/Qp22_S0081
print(paste("K1 =",K1_22_S0081))

# Cálculo del coeficiente Kmínd
Qmind22_S0081=min(S0081D22EECOVID19)
Kmínd22_S0081=Qmind22_S0081/Qp22_S0081
print(paste("Kmínd =",Kmínd22_S0081))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0081,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0081,"l/s",": No"))
print(paste("Qp_22 =",Qp22_S0081,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0081,": Si"))
print(paste("K1_21 =",K1_21_S0081,": No"))
print(paste("K1_22 =",K1_22_S0081,": Si"))
```

```{r}
K1S0081m=c(K1_20_S0081,K1_22_S0081)
K1S0081=mean(K1S0081m)
summary(K1S0081m)
K1S0081m
print(paste("K1_S0081 =",K1S0081))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0081,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0081,": No"))
print(paste("Kmínd_22 =",Kmínd22_S0081,": Si"))
```

```{r}
KmíndS0081m=c(Kmínd20_S0081,Kmínd22_S0081)
KmíndS0081=mean(KmíndS0081m)
summary(KmíndS0081m)
KmíndS0081m
print(paste("Kmínd_S0081 =",KmíndS0081))
```

## Estación remota S0082 (2020-2022)

### Selección de la base de datos

```{r}
S0082D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0082D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0082D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0082D20=S0082D[1:366,20]
S0082D20EECOVID19=S0082D[76:366,20]
```

```{r}
plot(Fecha20,S0082D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0082 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0082D20EECOVID19),lwd="3",col="red")
abline(h=max(S0082D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0082D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0082=max(S0082D20EECOVID19)
Qp20_S0082=mean(S0082D20EECOVID19)
K1_20_S0082=Qmax20_S0082/Qp20_S0082
print(paste("K1 =",K1_20_S0082))

# Cálculo del coeficiente Kmínd
Qmind20_S0082=min(S0082D20EECOVID19)
Kmínd20_S0082=Qmind20_S0082/Qp20_S0082
print(paste("Kmínd =",Kmínd20_S0082))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0082D21=S0082D[1:365,22]
```

```{r}
plot(Fecha21,S0082D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0082 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0082D21),lwd="3",col="red")
abline(h=max(S0082D21),lwd="3",col="black",lty=2)
abline(h=min(S0082D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0082=max(S0082D21)
Qp21_S0082=mean(S0082D21)
K1_21_S0082=Qmax21_S0082/Qp21_S0082
print(paste("K1 =",K1_21_S0082))

# Cálculo del coeficiente Kmínd
Qmind21_S0082=min(S0082D21)
Kmínd21_S0082=Qmind21_S0082/Qp21_S0082
print(paste("Kmínd =",Kmínd21_S0082))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0082D22=S0082D[1:365,24]
S0082D22EECOVID19=S0082D[1:300,24]
```

```{r}
plot(Fecha22,S0082D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0082 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0082D22EECOVID19),lwd="3",col="red")
abline(h=max(S0082D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0082D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0082=max(S0082D22EECOVID19)
Qp22_S0082=mean(S0082D22EECOVID19)
K1_22_S0082=Qmax22_S0082/Qp22_S0082
print(paste("K1 =",K1_22_S0082))

# Cálculo del coeficiente Kmínd
Qmind22_S0082=min(S0082D22EECOVID19)
Kmínd22_S0082=Qmind22_S0082/Qp22_S0082
print(paste("Kmínd =",Kmínd22_S0082))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0082,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0082,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0082,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0082,": Si"))
print(paste("K1_21 =",K1_21_S0082,": Si"))
print(paste("K1_22 =",K1_22_S0082,": Si"))
```

```{r}
K1S0082m=c(K1_20_S0082,K1_21_S0082,K1_22_S0082)
K1S0082=mean(K1S0082m)
summary(K1S0082m)
K1S0082m
print(paste("K1_S0082 =",K1S0082))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0082,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0082,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0082,": Si"))
```

```{r}
KmíndS0082m=c(Kmínd20_S0082,Kmínd21_S0082,Kmínd22_S0082)
KmíndS0082=mean(KmíndS0082m)
summary(KmíndS0082m)
KmíndS0082m
print(paste("Kmínd_S0082 =",KmíndS0082))
```

## Estación remota S0083 (2020-2022)

### Selección de la base de datos

```{r}
S0083D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0083D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0083D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0083D20=S0083D[1:366,20]
S0083D20EECOVID19=S0083D[76:366,20]
```

```{r}
plot(Fecha20,S0083D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0083 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0083D20EECOVID19),lwd="3",col="red")
abline(h=max(S0083D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0083D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0083=max(S0083D20EECOVID19)
Qp20_S0083=mean(S0083D20EECOVID19)
```

```
K1_20_S0083=Qmax20_S0083/Qp20_S0083
print(paste("K1 =",K1_20_S0083))

# Cálculo del coeficiente Kmínd
Qmind20_S0083=min(S0083D20EECOVID19)
Kmínd20_S0083=Qmind20_S0083/Qp20_S0083
print(paste("Kmínd =",Kmínd20_S0083))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0083D21=S0083D[1:365,22]
```

```{r}
plot(Fecha21,S0083D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0083 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0083D21),lwd="3",col="red")
abline(h=max(S0083D21),lwd="3",col="black",lty=2)
abline(h=min(S0083D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0083=max(S0083D21)
Qp21_S0083=mean(S0083D21)
K1_21_S0083=Qmax21_S0083/Qp21_S0083
print(paste("K1 =",K1_21_S0083))

# Cálculo del coeficiente Kmínd
Qmind21_S0083=min(S0083D21)
Kmínd21_S0083=Qmind21_S0083/Qp21_S0083
print(paste("Kmínd =",Kmínd21_S0083))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0083D22=S0083D[1:365,24]
S0083D22EECOVID19=S0083D[1:300,24]
```

```{r}
plot(Fecha22,S0083D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0083 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0083D22EECOVID19),lwd="3",col="red")
abline(h=max(S0083D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0083D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0083=max(S0083D22EECOVID19)
Qp22_S0083=mean(S0083D22EECOVID19)
K1_22_S0083=Qmax22_S0083/Qp22_S0083
print(paste("K1 =",K1_22_S0083))

# Cálculo del coeficiente Kmínd
Qmind22_S0083=min(S0083D22EECOVID19)
Kmínd22_S0083=Qmind22_S0083/Qp22_S0083
print(paste("Kmínd =",Kmínd22_S0083))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0083,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0083,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0083,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0083,": Si"))
print(paste("K1_21 =",K1_21_S0083,": Si"))
print(paste("K1_22 =",K1_22_S0083,": Si"))
```

```{r}
K1S0083m=c(K1_20_S0083,K1_21_S0083,K1_22_S0083)
K1S0083=mean(K1S0083m)
summary(K1S0083m)
K1S0083m
print(paste("K1_S0083 =",K1S0083))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0083,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0083,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0083,": Si"))
```

```{r}
KmíndS0083m=c(Kmínd20_S0083,Kmínd21_S0083,Kmínd22_S0083)
KmíndS0083=mean(KmíndS0083m)
summary(KmíndS0083m)
KmíndS0083m
print(paste("Kmínd_S0083 =",KmíndS0083))
```

## Estación remota S0095 (2020-2022)

### Selección de la base de datos

```{r}
S0095D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0095D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0095D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0095D20=S0095D[1:366,20]
S0095D20EECOVID19=S0095D[76:366,20]
```

```{r}
plot(Fecha20,S0095D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0095 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0095D20EECOVID19),lwd="3",col="red")
abline(h=max(S0095D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0095D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0095=max(S0095D20EECOVID19)
Qp20_S0095=mean(S0095D20EECOVID19)
K1_20_S0095=Qmax20_S0095/Qp20_S0095
print(paste("K1 =",K1_20_S0095))

# Cálculo del coeficiente Kmínd
Qmind20_S0095=min(S0095D20EECOVID19)
Kmínd20_S0095=Qmind20_S0095/Qp20_S0095
print(paste("Kmínd =",Kmínd20_S0095))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0095D21=S0095D[1:365,22]
```

```{r}
plot(Fecha21,S0095D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0095 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0095D21),lwd="3",col="red")
abline(h=max(S0095D21),lwd="3",col="black",lty=2)
abline(h=min(S0095D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0095=max(S0095D21)
Qp21_S0095=mean(S0095D21)
K1_21_S0095=Qmax21_S0095/Qp21_S0095
print(paste("K1 =",K1_21_S0095))

# Cálculo del coeficiente Kmínd
Qmind21_S0095=min(S0095D21)
Kmínd21_S0095=Qmind21_S0095/Qp21_S0095
print(paste("Kmínd =",Kmínd21_S0095))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0095D22=S0095D[1:365,24]
S0095D22EECOVID19=S0095D[1:300,24]
```

```{r}
plot(Fecha22,S0095D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0095 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0095D22EECOVID19),lwd="3",col="red")
abline(h=max(S0095D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0095D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0095=max(S0095D22EECOVID19)
Qp22_S0095=mean(S0095D22EECOVID19)
K1_22_S0095=Qmax22_S0095/Qp22_S0095
print(paste("K1 =",K1_22_S0095))

# Cálculo del coeficiente Kmínd
Qmind22_S0095=min(S0095D22EECOVID19)
Kmínd22_S0095=Qmind22_S0095/Qp22_S0095
print(paste("Kmínd =",Kmínd22_S0095))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0095,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0095,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0095,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0095,": Si"))
print(paste("K1_21 =",K1_21_S0095,": Si"))
print(paste("K1_22 =",K1_22_S0095,": Si"))
```

```{r}
K1S0095m=c(K1_20_S0095,K1_21_S0095,K1_22_S0095)
K1S0095=mean(K1S0095m)
summary(K1S0095m)
K1S0095m
print(paste("K1_S0095 =",K1S0095))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0095,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0095,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0095,": Si"))
```

```{r}
KmíndS0095m=c(Kmínd20_S0095,Kmínd21_S0095,Kmínd22_S0095)
KmíndS0095=mean(KmíndS0095m)
summary(KmíndS0095m)
KmíndS0095m
print(paste("Kmínd_S0095 =",KmíndS0095))
```

## Estación remota S0116 (2020-2022)

### Selección de la base de datos

```{r}
S0116D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0116D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0116D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0116D20=S0116D[1:366,20]
S0116D20EECOVID19=S0116D[76:366,20]
```

```{r}
plot(Fecha20,S0116D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0116 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0116D20EECOVID19),lwd="3",col="red")
abline(h=max(S0116D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0116D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0116=max(S0116D20EECOVID19)
Qp20_S0116=mean(S0116D20EECOVID19)
K1_20_S0116=Qmax20_S0116/Qp20_S0116
print(paste("K1 =",K1_20_S0116))

# Cálculo del coeficiente Kmínd
Qmind20_S0116=min(S0116D20EECOVID19)
Kmínd20_S0116=Qmind20_S0116/Qp20_S0116
print(paste("Kmínd =",Kmínd20_S0116))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0116D21=S0116D[1:365,22]
```

```{r}
plot(Fecha21,S0116D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0116 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0116D21),lwd="3",col="red")
abline(h=max(S0116D21),lwd="3",col="black",lty=2)
abline(h=min(S0116D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0116=max(S0116D21)
Qp21_S0116=mean(S0116D21)
K1_21_S0116=Qmax21_S0116/Qp21_S0116
print(paste("K1 =",K1_21_S0116))

# Cálculo del coeficiente Kmínd
Qmind21_S0116=min(S0116D21)
Kmínd21_S0116=Qmind21_S0116/Qp21_S0116
print(paste("Kmínd =",Kmínd21_S0116))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0116D22=S0116D[1:365,24]
S0116D22EECOVID19=S0116D[1:300,24]
```

```{r}
plot(Fecha22,S0116D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0116 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0116D22EECOVID19),lwd="3",col="red")
abline(h=max(S0116D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0116D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0116=max(S0116D22EECOVID19)
Qp22_S0116=mean(S0116D22EECOVID19)
K1_22_S0116=Qmax22_S0116/Qp22_S0116
print(paste("K1 =",K1_22_S0116))

# Cálculo del coeficiente Kmínd
Qmind22_S0116=min(S0116D22EECOVID19)
Kmínd22_S0116=Qmind22_S0116/Qp22_S0116
print(paste("Kmínd =",Kmínd22_S0116))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0116,"l/s",": No"))
print(paste("Qp_21 =",Qp21_S0116,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0116,"l/s",": No"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0116,": No"))
print(paste("K1_21 =",K1_21_S0116,": Si"))
print(paste("K1_22 =",K1_22_S0116,": No"))
```

```{r}
K1S0116m=c(K1_21_S0116)
K1S0116=mean(K1S0116m)
summary(K1S0116m)
K1S0116m
print(paste("K1_S0116 =",K1S0116))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0116,": No"))
print(paste("Kmínd_21 =",Kmínd21_S0116,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0116,": No"))
```

```{r}
KmíndS0116m=c(Kmínd21_S0116)
KmíndS0116=mean(KmíndS0116m)
summary(KmíndS0116m)
KmíndS0116m
print(paste("Kmínd_S0116 =",KmíndS0116))
```

## Estación remota S0200 (2020-2022)

### Selección de la base de datos

```{r}
S0200D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0200D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0200D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0200D20=S0200D[1:366,20]
S0200D20EECOVID19=S0200D[76:366,20]
```

```{r}
plot(Fecha20,S0200D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0200 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0200D20EECOVID19),lwd="3",col="red")
abline(h=max(S0200D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0200D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
```

```
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0200=max(S0200D20EECOVID19)
Qp20_S0200=mean(S0200D20EECOVID19)
K1_20_S0200=Qmax20_S0200/Qp20_S0200
print(paste("K1 =",K1_20_S0200))

# Cálculo del coeficiente Kmínd
Qmind20_S0200=min(S0200D20EECOVID19)
Kmínd20_S0200=Qmind20_S0200/Qp20_S0200
print(paste("Kmínd =",Kmínd20_S0200))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0200D21=S0200D[1:365,22]
```

```{r}
plot(Fecha21,S0200D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0200 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0200D21),lwd="3",col="red")
abline(h=max(S0200D21),lwd="3",col="black",lty=2)
abline(h=min(S0200D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0200=max(S0200D21)
Qp21_S0200=mean(S0200D21)
K1_21_S0200=Qmax21_S0200/Qp21_S0200
print(paste("K1 =",K1_21_S0200))

# Cálculo del coeficiente Kmínd
Qmind21_S0200=min(S0200D21)
Kmínd21_S0200=Qmind21_S0200/Qp21_S0200
print(paste("Kmínd =",Kmínd21_S0200))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0200D22=S0200D[1:365,24]
S0200D22EECOVID19=S0200D[1:300,24]
```

```{r}
plot(Fecha22,S0200D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0200 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0200D22EECOVID19),lwd="3",col="red")
abline(h=max(S0200D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0200D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0200=max(S0200D22EECOVID19)
Qp22_S0200=mean(S0200D22EECOVID19)
K1_22_S0200=Qmax22_S0200/Qp22_S0200
print(paste("K1 =",K1_22_S0200))

# Cálculo del coeficiente Kmínd
Qmind22_S0200=min(S0200D22EECOVID19)
Kmínd22_S0200=Qmind22_S0200/Qp22_S0200
print(paste("Kmínd =",Kmínd22_S0200))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0200,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0200,"l/s",": Si"))
```

```
print(paste("Qp_22 =",Qp22_S0200,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0200,": Si"))
print(paste("K1_21 =",K1_21_S0200,": Si"))
print(paste("K1_22 =",K1_22_S0200,": Si"))
```

```{r}
K1S0200m=c(K1_20_S0200,K1_21_S0200,K1_22_S0200)
K1S0200=mean(K1S0200m)
summary(K1S0200m)
K1S0200m
print(paste("K1_S0200 =",K1S0200))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0200,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0200,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0200,": Si"))
```

```{r}
KmíndS0200m=c(Kmínd20_S0200,Kmínd21_S0200,Kmínd22_S0200)
KmíndS0200=mean(KmíndS0200m)
summary(KmíndS0200m)
KmíndS0200m
print(paste("Kmínd_S0200 =",KmíndS0200))
```

## Estación remota S0202 (2020-2022)

### Selección de la base de datos

```{r}
S0202D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0202D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0202D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0202D20=S0202D[1:366,20]
S0202D20EECOVID19=S0202D[76:366,20]
```

```{r}
plot(Fecha20,S0202D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0202 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0202D20EECOVID19),lwd="3",col="red")
abline(h=max(S0202D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0202D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0202=max(S0202D20EECOVID19)
Qp20_S0202=mean(S0202D20EECOVID19)
K1_20_S0202=Qmax20_S0202/Qp20_S0202
print(paste("K1 =",K1_20_S0202))

# Cálculo del coeficiente Kmínd
Qmind20_S0202=min(S0202D20EECOVID19)
Kmínd20_S0202=Qmind20_S0202/Qp20_S0202
print(paste("Kmínd =",Kmínd20_S0202))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0202D21=S0202D[1:365,22]
```

```{r}
plot(Fecha21,S0202D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0202 - 2021 (EE por COVID-19)",
```

```
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0202D21),lwd="3",col="red")
abline(h=max(S0202D21),lwd="3",col="black",lty=2)
abline(h=min(S0202D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0202=max(S0202D21)
Qp21_S0202=mean(S0202D21)
K1_21_S0202=Qmax21_S0202/Qp21_S0202
print(paste("K1 =",K1_21_S0202))

# Cálculo del coeficiente Kmínd
Qmind21_S0202=min(S0202D21)
Kmínd21_S0202=Qmind21_S0202/Qp21_S0202
print(paste("Kmínd =",Kmínd21_S0202))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0202D22=S0202D[1:365,24]
S0202D22EECOVID19=S0202D[1:300,24]
```

```{r}
plot(Fecha22,S0202D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0202 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0202D22EECOVID19),lwd="3",col="red")
abline(h=max(S0202D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0202D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0202=max(S0202D22EECOVID19)
Qp22_S0202=mean(S0202D22EECOVID19)
K1_22_S0202=Qmax22_S0202/Qp22_S0202
print(paste("K1 =",K1_22_S0202))

# Cálculo del coeficiente Kmínd
Qmind22_S0202=min(S0202D22EECOVID19)
Kmínd22_S0202=Qmind22_S0202/Qp22_S0202
print(paste("Kmínd =",Kmínd22_S0202))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0202,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0202,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0202,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0202,": Si"))
print(paste("K1_21 =",K1_21_S0202,": Si"))
print(paste("K1_22 =",K1_22_S0202,": Si"))
```

```{r}
K1S0202m=c(K1_20_S0202,K1_21_S0202,K1_22_S0202)
K1S0202=mean(K1S0202m)
summary(K1S0202m)
K1S0202m
print(paste("K1_S0202 =",K1S0202))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0202,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0202,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0202,": Si"))
```

```{r}
KmíndS0202m=c(Kmínd20_S0202,Kmínd21_S0202,Kmínd22_S0202)
```

```
KmíndS0202=mean(KmíndS0202m)
summary(KmíndS0202m)
KmíndS0202m
print(paste("Kmínd_S0202 =",KmíndS0202))
```

## Estación remota S0204 (2020-2022)

### Selección de la base de datos

```{r}
S0204D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0204D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0204D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0204D20=S0204D[1:366,20]
S0204D20EECOVID19=S0204D[76:366,20]
```

```{r}
plot(Fecha20,S0204D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0204 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0204D20EECOVID19),lwd="3",col="red")
abline(h=max(S0204D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0204D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.475,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0204=max(S0204D20EECOVID19)
Qp20_S0204=mean(S0204D20EECOVID19)
K1_20_S0204=Qmax20_S0204/Qp20_S0204
print(paste("K1 =",K1_20_S0204))

# Cálculo del coeficiente Kmínd
Qmind20_S0204=min(S0204D20EECOVID19)
Kmínd20_S0204=Qmind20_S0204/Qp20_S0204
print(paste("Kmínd =",Kmínd20_S0204))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0204D21=S0204D[1:365,22]
```

```{r}
plot(Fecha21,S0204D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0204 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0204D21),lwd="3",col="red")
abline(h=max(S0204D21),lwd="3",col="black",lty=2)
abline(h=min(S0204D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0204=max(S0204D21)
Qp21_S0204=mean(S0204D21)
K1_21_S0204=Qmax21_S0204/Qp21_S0204
print(paste("K1 =",K1_21_S0204))

# Cálculo del coeficiente Kmínd
Qmind21_S0204=min(S0204D21)
Kmínd21_S0204=Qmind21_S0204/Qp21_S0204
print(paste("Kmínd =",Kmínd21_S0204))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
```

```
S0204D22=S0204D[1:365,24]
S0204D22EECOVID19=S0204D[1:300,24]
```

```{r}
plot(Fecha22,S0204D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0204 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0204D22EECOVID19),lwd="3",col="red")
abline(h=max(S0204D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0204D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0,0),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0204=max(S0204D22EECOVID19)
Qp22_S0204=mean(S0204D22EECOVID19)
K1_22_S0204=Qmax22_S0204/Qp22_S0204
print(paste("K1 =",K1_22_S0204))

# Cálculo del coeficiente Kmínd
Qmind22_S0204=min(S0204D22EECOVID19)
Kmínd22_S0204=Qmind22_S0204/Qp22_S0204
print(paste("Kmínd =",Kmínd22_S0204))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0204,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0204,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0204,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0204,": Si"))
print(paste("K1_21 =",K1_21_S0204,": Si"))
print(paste("K1_22 =",K1_22_S0204,": Si"))
```

```{r}
K1S0204m=c(K1_20_S0204,K1_21_S0204,K1_22_S0204)
K1S0204=mean(K1S0204m)
summary(K1S0204m)
K1S0204m
print(paste("K1_S0204 =",K1S0204))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0204,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0204,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0204,": Si"))
```

```{r}
KmíndS0204m=c(Kmínd20_S0204,Kmínd21_S0204,Kmínd22_S0204)
KmíndS0204=mean(KmíndS0204m)
summary(KmíndS0204m)
KmíndS0204m
print(paste("Kmínd_S0204 =",KmíndS0204))
```

## Estación remota S0205 (2020-2022)

### Selección de la base de datos

```{r}
S0205D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0205D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0205D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0205D20=S0205D[1:366,20]
S0205D20EECOVID19=S0205D[76:366,20]
```

```{r}
```

```
plot(Fecha20,S0205D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0205 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0205D20EECOVID19),lwd="3",col="red")
abline(h=max(S0205D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0205D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0205=max(S0205D20EECOVID19)
Qp20_S0205=mean(S0205D20EECOVID19)
K1_20_S0205=Qmax20_S0205/Qp20_S0205
print(paste("K1 =",K1_20_S0205))

# Cálculo del coeficiente Kmínd
Qmind20_S0205=min(S0205D20EECOVID19)
Kmínd20_S0205=Qmind20_S0205/Qp20_S0205
print(paste("Kmínd =",Kmínd20_S0205))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0205D21=S0205D[1:365,22]
```

```{r}
plot(Fecha21,S0205D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0205 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0205D21),lwd="3",col="red")
abline(h=max(S0205D21),lwd="3",col="black",lty=2)
abline(h=min(S0205D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0205=max(S0205D21)
Qp21_S0205=mean(S0205D21)
K1_21_S0205=Qmax21_S0205/Qp21_S0205
print(paste("K1 =",K1_21_S0205))

# Cálculo del coeficiente Kmínd
Qmind21_S0205=min(S0205D21)
Kmínd21_S0205=Qmind21_S0205/Qp21_S0205
print(paste("Kmínd =",Kmínd21_S0205))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0205D22=S0205D[1:365,24]
S0205D22EECOVID19=S0205D[1:300,24]
```

```{r}
plot(Fecha22,S0205D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0205 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0205D22EECOVID19),lwd="3",col="red")
abline(h=max(S0205D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0205D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0205=max(S0205D22EECOVID19)
Qp22_S0205=mean(S0205D22EECOVID19)
K1_22_S0205=Qmax22_S0205/Qp22_S0205
print(paste("K1 =",K1_22_S0205))

# Cálculo del coeficiente Kmínd
```

```
Qmind22_S0205=min(S0205D22EECOVID19)
Kmínd22_S0205=Qmind22_S0205/Qp22_S0205
print(paste("Kmínd =",Kmínd22_S0205))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0205,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0205,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0205,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0205,": Si"))
print(paste("K1_21 =",K1_21_S0205,": Si"))
print(paste("K1_22 =",K1_22_S0205,": Si"))
```

```{r}
K1S0205m=c(K1_20_S0205,K1_21_S0205,K1_22_S0205)
K1S0205=mean(K1S0205m)
summary(K1S0205m)
K1S0205m
print(paste("K1_S0205 =",K1S0205))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0205,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0205,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0205,": Si"))
```

```{r}
KmíndS0205m=c(Kmínd20_S0205,Kmínd21_S0205,Kmínd22_S0205)
KmíndS0205=mean(KmíndS0205m)
summary(KmíndS0205m)
KmíndS0205m
print(paste("Kmínd_S0205 =",KmíndS0205))
```

## Estación remota S0302 (2020-2022)

### Selección de la base de datos

```{r}
S0302D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0302D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0302D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0302D20=S0302D[1:366,20]
S0302D20EECOVID19=S0302D[76:366,20]
```

```{r}
plot(Fecha20,S0302D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0302 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0302D20EECOVID19),lwd="3",col="red")
abline(h=max(S0302D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0302D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0302=max(S0302D20EECOVID19)
Qp20_S0302=mean(S0302D20EECOVID19)
K1_20_S0302=Qmax20_S0302/Qp20_S0302
print(paste("K1 =",K1_20_S0302))

# Cálculo del coeficiente Kmínd
Qmind20_S0302=min(S0302D20EECOVID19)
Kmínd20_S0302=Qmind20_S0302/Qp20_S0302
print(paste("Kmínd =",Kmínd20_S0302))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0302D21=S0302D[1:365,22]
```

```{r}
plot(Fecha21,S0302D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0302 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0302D21),lwd="3",col="red")
abline(h=max(S0302D21),lwd="3",col="black",lty=2)
abline(h=min(S0302D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0302=max(S0302D21)
Qp21_S0302=mean(S0302D21)
K1_21_S0302=Qmax21_S0302/Qp21_S0302
print(paste("K1 =",K1_21_S0302))

# Cálculo del coeficiente Kmínd
Qmind21_S0302=min(S0302D21)
Kmínd21_S0302=Qmind21_S0302/Qp21_S0302
print(paste("Kmínd =",Kmínd21_S0302))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0302D22=S0302D[1:365,24]
S0302D22EECOVID19=S0302D[1:300,24]
```

```{r}
plot(Fecha22,S0302D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0302 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0302D22EECOVID19),lwd="3",col="red")
abline(h=max(S0302D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0302D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.502,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0302=max(S0302D22EECOVID19)
Qp22_S0302=mean(S0302D22EECOVID19)
K1_22_S0302=Qmax22_S0302/Qp22_S0302
print(paste("K1 =",K1_22_S0302))

# Cálculo del coeficiente Kmínd
Qmind22_S0302=min(S0302D22EECOVID19)
Kmínd22_S0302=Qmind22_S0302/Qp22_S0302
print(paste("Kmínd =",Kmínd22_S0302))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0302,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0302,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0302,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0302,": Si"))
print(paste("K1_21 =",K1_21_S0302,": Si"))
print(paste("K1_22 =",K1_22_S0302,": Si"))
```

```{r}
K1S0302m=c(K1_20_S0302,K1_21_S0302,K1_22_S0302)
K1S0302=mean(K1S0302m)
summary(K1S0302m)
K1S0302m
print(paste("K1_S0302 =",K1S0302))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0302,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0302,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0302,": Si"))
```

```{r}
KmíndS0302m=c(Kmínd20_S0302,Kmínd21_S0302,Kmínd22_S0302)
KmíndS0302=mean(KmíndS0302m)
summary(KmíndS0302m)
KmíndS0302m
print(paste("Kmínd_S0302 =",KmíndS0302))
```

## Estación remota S0304 (2020-2022)

### Selección de la base de datos

```{r}
S0304D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0304D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0304D)
```

### Extracción y análisis de datos del año 2020

```{r}
Fecha20=c(1:366)
S0304D20=S0304D[1:366,20]
S0304D20EECOVID19=S0304D[76:366,20]
```

```{r}
plot(Fecha20,S0304D20,type="l",lwd="2",col="blue",
main="ESTACIÓN S0304 - 2020 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,366,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0304D20EECOVID19),lwd="3",col="red")
abline(h=max(S0304D20EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0304D20EECOVID19),lwd="3",col="black",lty=2)
abline(v=75,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.232,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Inicio EE por COVID-19 (16/03/20)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax20_S0304=max(S0304D20EECOVID19)
Qp20_S0304=mean(S0304D20EECOVID19)
K1_20_S0304=Qmax20_S0304/Qp20_S0304
print(paste("K1 =",K1_20_S0304))

# Cálculo del coeficiente Kmínd
Qmind20_S0304=min(S0304D20EECOVID19)
Kmínd20_S0304=Qmind20_S0304/Qp20_S0304
print(paste("Kmínd =",Kmínd20_S0304))
```

### Extracción y análisis de datos del año 2021

```{r}
Fecha21=c(1:365)
S0304D21=S0304D[1:365,22]
```

```{r}
plot(Fecha21,S0304D21,type="l",lwd="2",col="blue",
main="ESTACIÓN S0304 - 2021 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0304D21),lwd="3",col="red")
abline(h=max(S0304D21),lwd="3",col="black",lty=2)
abline(h=min(S0304D21),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax21_S0304=max(S0304D21)
Qp21_S0304=mean(S0304D21)
K1_21_S0304=Qmax21_S0304/Qp21_S0304
print(paste("K1 =",K1_21_S0304))
```

```
# Cálculo del coeficiente Kmínd
Qmind21_S0304=min(S0304D21)
Kmínd21_S0304=Qmind21_S0304/Qp21_S0304
print(paste("Kmínd =",Kmínd21_S0304))
```

### Extracción y análisis de datos del año 2022

```{r}
Fecha22=c(1:365)
S0304D22=S0304D[1:365,24]
S0304D22EECOVID19=S0304D[1:300,24]
```

```{r}
plot(Fecha22,S0304D22,type="l",lwd="2",col="blue",
main="ESTACIÓN S0304 - 2022 (EE por COVID-19)",
xlab="Tiempo (días)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,365,by=50),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0304D22EECOVID19),lwd="3",col="red")
abline(h=max(S0304D22EECOVID19),lwd="3",col="black",lty=2)
abline(h=min(S0304D22EECOVID19),lwd="3",col="black",lty=2)
abline(v=301,lwd="4",col="green4",lty=1)
legend(x="bottomleft",inset=c(0.29,0.73),
legend=c("Promedio diario (Qd)","Promedio anual (Qp)",
"Fin EE por COVID-19 (27/10/22)"),
lwd=3,col=c("blue","red","green4"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax22_S0304=max(S0304D22EECOVID19)
Qp22_S0304=mean(S0304D22EECOVID19)
K1_22_S0304=Qmax22_S0304/Qp22_S0304
print(paste("K1 =",K1_22_S0304))

# Cálculo del coeficiente Kmínd
Qmind22_S0304=min(S0304D22EECOVID19)
Kmínd22_S0304=Qmind22_S0304/Qp22_S0304
print(paste("Kmínd =",Kmínd22_S0304))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_20 =",Qp20_S0304,"l/s",": Si"))
print(paste("Qp_21 =",Qp21_S0304,"l/s",": Si"))
print(paste("Qp_22 =",Qp22_S0304,"l/s",": Si"))
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_20 =",K1_20_S0304,": Si"))
print(paste("K1_21 =",K1_21_S0304,": Si"))
print(paste("K1_22 =",K1_22_S0304,": Si"))
```

```{r}
K1S0304m=c(K1_20_S0304,K1_21_S0304,K1_22_S0304)
K1S0304=mean(K1S0304m)
summary(K1S0304m)
K1S0304m
print(paste("K1_S0304 =",K1S0304))
```

### Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_20 =",Kmínd20_S0304,": Si"))
print(paste("Kmínd_21 =",Kmínd21_S0304,": Si"))
print(paste("Kmínd_22 =",Kmínd22_S0304,": Si"))
```

```{r}
KmíndS0304m=c(Kmínd20_S0304,Kmínd21_S0304,Kmínd22_S0304)
KmíndS0304=mean(KmíndS0304m)
summary(KmíndS0304m)
KmíndS0304m
print(paste("Kmínd_S0304 =",KmíndS0304))
```

# Determinación del coeficiente K1 del estrato agrupado consolidado 1

```{r}
print(paste("K1_S0003 =",K1S0003))
print(paste("K1_S0007 =",K1S0007))
print(paste("K1_S0008 =",K1S0008))
print(paste("K1_S0010 =",K1S0010))
print(paste("K1_S0012 =",K1S0012))
print(paste("K1_S0013 =",K1S0013))
print(paste("K1_S0014 =",K1S0014))
print(paste("K1_S0015 =",K1S0015))
print(paste("K1_S0016 =",K1S0016))
print(paste("K1_S0017 =",K1S0017))
```

```
print(paste("K1_S0018 =",K1S0018))
print(paste("K1_S0019 =",K1S0019))
print(paste("K1_S0028 =",K1S0028))
print(paste("K1_S0029 =",K1S0029))
print(paste("K1_S0033 =",K1S0033))
print(paste("K1_S0035 =",K1S0035))
print(paste("K1_S0036 =",K1S0036))
print(paste("K1_S0039 =",K1S0039))
print(paste("K1_S0042 =",K1S0042))
print(paste("K1_S0043 =",K1S0043))
print(paste("K1_S0047 =",K1S0047))
print(paste("K1_S0048 =",K1S0048))
print(paste("K1_S0049 =",K1S0049))
print(paste("K1_S0054 =",K1S0054))
print(paste("K1_S0056 =",K1S0056))
print(paste("K1_S0057 =",K1S0057))
print(paste("K1_S0063 =",K1S0063))
print(paste("K1_S0065 =",K1S0065))
print(paste("K1_S0066 =",K1S0066))
print(paste("K1_S0067 =",K1S0067))
print(paste("K1_S0068 =",K1S0068))
print(paste("K1_S0069 =",K1S0069))
print(paste("K1_S0071 =",K1S0071))
print(paste("K1_S0073 =",K1S0073))
print(paste("K1_S0081 =",K1S0081))
print(paste("K1_S0082 =",K1S0082))
print(paste("K1_S0083 =",K1S0083))
print(paste("K1_S0095 =",K1S0095))
print(paste("K1_S0116 =",K1S0116))
print(paste("K1_S0200 =",K1S0200))
print(paste("K1_S0202 =",K1S0202))
print(paste("K1_S0204 =",K1S0204))
print(paste("K1_S0205 =",K1S0205))
print(paste("K1_S0302 =",K1S0302))
print(paste("K1_S0304 =",K1S0304))
```

```{r}
K1EAC1DF=c(K1S0003,K1S0007,K1S0008,K1S0010,K1S0012,K1S0013,K1S0014,K1S0015,
K1S0016,K1S0017,K1S0018,K1S0019,K1S0028,K1S0029,K1S0033,K1S0035,
K1S0036,K1S0039,K1S0042,K1S0043,K1S0047,K1S0048,K1S0049,K1S0054,
K1S0056,K1S0057,K1S0063,K1S0065,K1S0066,K1S0067,K1S0068,K1S0069,
K1S0071,K1S0073,K1S0081,K1S0082,K1S0083,K1S0095,K1S0116,K1S0200,
K1S0202,K1S0204,K1S0205,K1S0302,K1S0304)
K1EAC1DF=data.frame(K1EAC1DF)
K1EAC1_20_22=ggplot(data=K1EAC1DF,aes(x="",y=K1EAC1DF))+
stat_boxplot(geom="errorbar",
width=0.2)+
geom_boxplot(fill="#999999",
outlier.colour="red",
alpha=0.5)+
geom_point(shape=21,fill="white",size=2.5,stroke=1,
colour="blue")+
stat_summary(fun=mean,geom="point",shape=20,size=5)+
# ggtitle("Coeficiente de variación diaria (K1) del estrato
# agrupado consolidado 1 durante el estado de emergencia por COVID-19")+
theme(plot.title=element_text(hjust=0.5),
axis.text.y=element_text(size=14),
axis.title.x=element_text(size=15),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 1")+
ylab("K1 (2020 - 2022: EE por COVID-19)")
summary(K1EAC1DF)
K1EAC1=c(K1S0003,K1S0007,K1S0008,K1S0010,K1S0012,K1S0013,K1S0014,K1S0015,
K1S0016,K1S0017,K1S0018,K1S0019,K1S0028,K1S0029,K1S0033,K1S0035,
K1S0036,K1S0039,K1S0042,K1S0043,K1S0047,K1S0048,K1S0049,K1S0054,
K1S0056,K1S0057,K1S0063,K1S0065,K1S0066,K1S0067,K1S0068,K1S0069,
K1S0071,K1S0073,K1S0081,K1S0082,K1S0083,K1S0095,K1S0116,K1S0200,
K1S0202,K1S0204,K1S0205,K1S0302,K1S0304)
K1EAC1=mean(K1EAC1)
print(paste("K1_EAC1 =",K1EAC1))
```

```{r}
K1EAC1DF=c(K1S0003,K1S0007,K1S0008,K1S0010,K1S0012,K1S0013,K1S0014,K1S0015,
K1S0016,K1S0017,K1S0018,K1S0019,K1S0028,K1S0029,K1S0033,K1S0035,
K1S0036,K1S0039,K1S0042,K1S0047,K1S0048,K1S0049,K1S0054,K1S0056,
K1S0057,K1S0063,K1S0065,K1S0066,K1S0067,K1S0068,K1S0069,K1S0071,
K1S0073,K1S0081,K1S0082,K1S0083,K1S0095,K1S0116,K1S0200,K1S0202,
K1S0204,K1S0205,K1S0302,K1S0304)
K1EAC1DF=data.frame(K1EAC1DF)
K1EAC1_20_22=ggplot(data=K1EAC1DF,aes(x="",y=K1EAC1DF))+
stat_boxplot(geom="errorbar",
width=0.2)+
geom_boxplot(fill="#999999",
outlier.colour="red",
alpha=0.5)+
geom_point(shape=21,fill="white",size=2.5,stroke=1,
colour="blue")+
stat_summary(fun=mean,geom="point",shape=20,size=5)+
# ggtitle("Coeficiente de variación diaria (K1) del estrato
# agrupado consolidado 1 durante el estado de emergencia por COVID-19")+
theme(plot.title=element_text(hjust=0.5),
axis.text.y=element_text(size=14),
axis.title.x=element_text(size=15),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 1")+
```

```
ylab("K1 (2020 - 2022: EE por COVID-19)")
summary(K1EAC1DF)
K1EAC1=c(K1S0003,K1S0007,K1S0008,K1S0010,K1S0012,K1S0013,K1S0014,K1S0015,
K1S0016,K1S0017,K1S0018,K1S0019,K1S0028,K1S0029,K1S0033,K1S0035,
K1S0036,K1S0039,K1S0042,K1S0047,K1S0048,K1S0049,K1S0054,K1S0056,
K1S0057,K1S0063,K1S0065,K1S0066,K1S0067,K1S0068,K1S0069,K1S0071,
K1S0073,K1S0081,K1S0082,K1S0083,K1S0095,K1S0116,K1S0200,K1S0202,
K1S0204,K1S0205,K1S0302,K1S0304)
K1EAC1=mean(K1EAC1)
print(paste("K1_EAC1 =",K1EAC1))
```

# Determinación del coeficiente Kmínd del estrato agrupado consolidado 1

```{r}
print(paste("Kmínd_S0003 =",KmíndS0003))
print(paste("Kmínd_S0007 =",KmíndS0007))
print(paste("Kmínd_S0008 =",KmíndS0008))
print(paste("Kmínd_S0010 =",KmíndS0010))
print(paste("Kmínd_S0012 =",KmíndS0012))
print(paste("Kmínd_S0013 =",KmíndS0013))
print(paste("Kmínd_S0014 =",KmíndS0014))
print(paste("Kmínd_S0015 =",KmíndS0015))
print(paste("Kmínd_S0016 =",KmíndS0016))
print(paste("Kmínd_S0017 =",KmíndS0017))
print(paste("Kmínd_S0018 =",KmíndS0018))
print(paste("Kmínd_S0019 =",KmíndS0019))
print(paste("Kmínd_S0028 =",KmíndS0028))
print(paste("Kmínd_S0029 =",KmíndS0029))
print(paste("Kmínd_S0033 =",KmíndS0033))
print(paste("Kmínd_S0035 =",KmíndS0035))
print(paste("Kmínd_S0036 =",KmíndS0036))
print(paste("Kmínd_S0039 =",KmíndS0039))
print(paste("Kmínd_S0042 =",KmíndS0042))
print(paste("Kmínd_S0043 =",KmíndS0043))
print(paste("Kmínd_S0047 =",KmíndS0047))
print(paste("Kmínd_S0048 =",KmíndS0048))
print(paste("Kmínd_S0049 =",KmíndS0049))
print(paste("Kmínd_S0054 =",KmíndS0054))
print(paste("Kmínd_S0056 =",KmíndS0056))
print(paste("Kmínd_S0057 =",KmíndS0057))
print(paste("Kmínd_S0063 =",KmíndS0063))
print(paste("Kmínd_S0065 =",KmíndS0065))
print(paste("Kmínd_S0066 =",KmíndS0066))
print(paste("Kmínd_S0067 =",KmíndS0067))
print(paste("Kmínd_S0068 =",KmíndS0068))
print(paste("Kmínd_S0069 =",KmíndS0069))
print(paste("Kmínd_S0071 =",KmíndS0071))
print(paste("Kmínd_S0073 =",KmíndS0073))
print(paste("Kmínd_S0081 =",KmíndS0081))
print(paste("Kmínd_S0082 =",KmíndS0082))
print(paste("Kmínd_S0083 =",KmíndS0083))
print(paste("Kmínd_S0095 =",KmíndS0095))
print(paste("Kmínd_S0116 =",KmíndS0116))
print(paste("Kmínd_S0200 =",KmíndS0200))
print(paste("Kmínd_S0202 =",KmíndS0202))
print(paste("Kmínd_S0204 =",KmíndS0204))
print(paste("Kmínd_S0205 =",KmíndS0205))
print(paste("Kmínd_S0302 =",KmíndS0302))
print(paste("Kmínd_S0304 =",KmíndS0304))
```

```{r}
KmíndEAC1DF=c(KmíndS0003,KmíndS0007,KmíndS0008,KmíndS0010,KmíndS0012,KmíndS0013,
KmíndS0014,KmíndS0015,KmíndS0016,KmíndS0017,KmíndS0018,KmíndS0019,
KmíndS0028,KmíndS0029,KmíndS0033,KmíndS0035,KmíndS0036,KmíndS0039,
KmíndS0042,KmíndS0043,KmíndS0047,KmíndS0048,KmíndS0049,KmíndS0054,
KmíndS0056,KmíndS0057,KmíndS0063,KmíndS0065,KmíndS0066,KmíndS0067,
KmíndS0068,KmíndS0069,KmíndS0071,KmíndS0073,KmíndS0081,KmíndS0082,
KmíndS0083,KmíndS0095,KmíndS0116,KmíndS0200,KmíndS0202,KmíndS0204,
KmíndS0205,KmíndS0302,KmíndS0304)
KmíndEAC1DF=data.frame(KmíndEAC1DF)
KmíndEAC1_20_22=ggplot(data=KmíndEAC1DF,aes(x="",y=KmíndEAC1DF))+
stat_boxplot(geom="errorbar",
width=0.2)+
geom_boxplot(fill="#999999",
outlier.colour="red",
alpha=0.5)+
geom_point(shape=21,fill="white",size=2.5,stroke=1,
colour="blue")+
stat_summary(fun=mean,geom="point",shape=20,size=5)+
# ggtitle("Coeficiente de variación mínima diaria (Kmínd) del estrato
# agrupado consolidado 1 durante el estado de emergencia por COVID-19")+
theme(plot.title=element_text(hjust=0.5),
axis.text.y=element_text(size=14),
axis.title.x=element_text(size=15),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 1")+
ylab("Kmínd (2020 - 2022: EE por COVID-19)")
summary(KmíndEAC1DF)
KmíndEAC1=c(KmíndS0003,KmíndS0007,KmíndS0008,KmíndS0010,KmíndS0012,KmíndS0013,
KmíndS0014,KmíndS0015,KmíndS0016,KmíndS0017,KmíndS0018,KmíndS0019,
KmíndS0028,KmíndS0029,KmíndS0033,KmíndS0035,KmíndS0036,KmíndS0039,
KmíndS0042,KmíndS0043,KmíndS0047,KmíndS0048,KmíndS0049,KmíndS0054,
KmíndS0056,KmíndS0057,KmíndS0063,KmíndS0065,KmíndS0066,KmíndS0067,
KmíndS0068,KmíndS0069,KmíndS0071,KmíndS0073,KmíndS0081,KmíndS0082,
KmíndS0083,KmíndS0095,KmíndS0116,KmíndS0200,KmíndS0202,KmíndS0204,
```

```
KmíndS0205,KmíndS0302,KmíndS0304)
KmíndEAC1=mean(KmíndEAC1)
print(paste("Kmínd_EAC1 =",KmíndEAC1))
```

# Diagrama de caja del coeficientes K1 y Kmínd del estrato
# agrupado consolidado 1 en el periodo del 2020 al 2022

```{r}
K1EAC1_20_22+KmíndEAC1_20_22
```

```
---
title: "K2_Kmính_EAC1"
author: "Víctor Raúl León Medina"
date: "21/01/2024"
output: html_document
---
```

# Limpieza de consola

```{r}
ls()
rm(list=ls())
graphics.off()
```

# Instalación de librerías

```{r}
library(ggplot2)
library(patchwork)
```

# Identificación del directorio de trabajo

```{r}
getwd()
```

# DETERMINACIÓN DEL COEFICIENTE DE VARIACIÓN HORARIA (K2)
# Y MÍNIMA HORARIA (Kmính) DEL ESTRATO AGRUPADO CONSOLIDADO 1

## Estación S0003 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0003H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0003H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0003H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0003H13max=S0003H[1:24,6]
S0003H13min=S0003H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0003=128.365231530137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0003,lwd="4",col="red")
abline(h=max(S0003H13max),lwd="3",col="black",lty=2)
abline(h=min(S0003H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
```

```
Qmax13_S0003=max(S0003H13max)
K2_13_S0003=Qmax13_S0003/Qp13_S0003
print(paste("K2 =",K2_13_S0003))
```

```{r}
plot(Hora,S0003H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0003,lwd="4",col="red")
abline(h=max(S0003H13min),lwd="3",col="black",lty=2)
abline(h=min(S0003H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0003=min(S0003H13min)
Kmính13_S0003=Qminh13_S0003/Qp13_S0003
print(paste("Kmính =",Kmính13_S0003))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0003H14max=S0003H[1:24,10]
S0003H14min=S0003H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=184,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=172,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0003=123.950890070137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0003,lwd="4",col="red")
abline(h=max(S0003H14max),lwd="3",col="black",lty=2)
abline(h=min(S0003H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0003=max(S0003H14max)
K2_14_S0003=Qmax14_S0003/Qp14_S0003
print(paste("K2 =",K2_14_S0003))
```

```{r}
plot(Hora,S0003H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0003,lwd="4",col="red")
abline(h=max(S0003H14min),lwd="3",col="black",lty=2)
abline(h=min(S0003H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0003=min(S0003H14min)
Kmính14_S0003=Qminh14_S0003/Qp14_S0003
print(paste("Kmính =",Kmính14_S0003))
```

### Extracción y análisis de datos del año 2015

```{r}


```

```
Hora=c(00:23)
S0003H15max=S0003H[1:24,14]
S0003H15min=S0003H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=204.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=192.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0003=131.891384056986
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0003,lwd="4",col="red")
abline(h=max(S0003H15max),lwd="3",col="black",lty=2)
abline(h=min(S0003H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0003=max(S0003H15max)
K2_15_S0003=Qmax15_S0003/Qp15_S0003
print(paste("K2 =",K2_15_S0003))
```

```{r}
plot(Hora,S0003H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0003,lwd="4",col="red")
abline(h=max(S0003H15min),lwd="3",col="black",lty=2)
abline(h=min(S0003H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0003=min(S0003H15min)
Kmính15_S0003=Qminh15_S0003/Qp15_S0003
print(paste("Kmính =",Kmính15_S0003))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0003H16max=S0003H[1:24,18]
S0003H16min=S0003H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=190,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=179,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0003=122.449586944863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0003,lwd="4",col="red")
abline(h=max(S0003H16max),lwd="3",col="black",lty=2)
abline(h=min(S0003H16max),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0003=max(S0003H16max)
K2_16_S0003=Qmax16_S0003/Qp16_S0003
print(paste("K2 =",K2_16_S0003))
```

```{r}
plot(Hora,S0003H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0003,lwd="4",col="red")
abline(h=max(S0003H16min),lwd="3",col="black",lty=2)
abline(h=min(S0003H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0003=min(S0003H16min)
Kmính16_S0003=Qminh16_S0003/Qp16_S0003
print(paste("Kmính =",Kmính16_S0003))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0003H17max=S0003H[1:24,22]
S0003H17min=S0003H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=183.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=173.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0003=126.227833641644
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0003,lwd="4",col="red")
abline(h=max(S0003H17max),lwd="3",col="black",lty=2)
abline(h=min(S0003H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0003=max(S0003H17max)
K2_17_S0003=Qmax17_S0003/Qp17_S0003
print(paste("K2 =",K2_17_S0003))
```

```{r}
plot(Hora,S0003H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0003,lwd="4",col="red")
abline(h=max(S0003H17min),lwd="3",col="black",lty=2)
abline(h=min(S0003H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0003=min(S0003H17min)
```

```
Kmính17_S0003=Qminh17_S0003/Qp17_S0003
print(paste("Kmính =",Kmính17_S0003))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0003H18max=S0003H[1:24,26]
S0003H18min=S0003H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=188.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=178.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0003=132.552313967397
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0003,lwd="4",col="red")
abline(h=max(S0003H18max),lwd="3",col="black",lty=2)
abline(h=min(S0003H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0003=max(S0003H18max)
K2_18_S0003=Qmax18_S0003/Qp18_S0003
print(paste("K2 =",K2_18_S0003))
```

```{r}
plot(Hora,S0003H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0003,lwd="4",col="red")
abline(h=max(S0003H18min),lwd="3",col="black",lty=2)
abline(h=min(S0003H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0003=min(S0003H18min)
Kmính18_S0003=Qminh18_S0003/Qp18_S0003
print(paste("Kmính =",Kmính18_S0003))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0003H19max=S0003H[1:24,30]
S0003H19min=S0003H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=194.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
Qp19_S0003=136.557577113699
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0003,lwd="4",col="red")
abline(h=max(S0003H19max),lwd="3",col="black",lty=2)
abline(h=min(S0003H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0003=max(S0003H19max)
K2_19_S0003=Qmax19_S0003/Qp19_S0003
print(paste("K2 =",K2_19_S0003))
```

```{r}
plot(Hora,S0003H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0003,lwd="4",col="red")
abline(h=max(S0003H19min),lwd="3",col="black",lty=2)
abline(h=min(S0003H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0003=min(S0003H19min)
Kmính19_S0003=Qminh19_S0003/Qp19_S0003
print(paste("Kmính =",Kmính19_S0003))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0003H23max=S0003H[1:24,46]
S0003H23min=S0003H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0003H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0003 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0003H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=194.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0003H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0003=137.944374472329
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0003,lwd="4",col="red")
abline(h=max(S0003H23max),lwd="3",col="black",lty=2)
abline(h=min(S0003H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0003=max(S0003H23max)
K2_23_S0003=Qmax23_S0003/Qp23_S0003
print(paste("K2 =",K2_23_S0003))
```

```{r}
plot(Hora,S0003H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0003 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0003,lwd="4",col="red")
abline(h=max(S0003H23min),lwd="3",col="black",lty=2)
abline(h=min(S0003H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0003=min(S0003H23min)
Kmính23_S0003=Qminh23_S0003/Qp23_S0003
print(paste("Kmính =",Kmính23_S0003))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0003,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0003,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0003,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0003,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0003,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0003,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0003,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0003,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0003,": Si"))
print(paste("K2_14 =",K2_14_S0003,": Si"))
print(paste("K2_15 =",K2_15_S0003,": No"))
print(paste("K2_16 =",K2_16_S0003,": Si"))
print(paste("K2_17 =",K2_17_S0003,": Si"))
print(paste("K2_18 =",K2_18_S0003,": No"))
print(paste("K2_19 =",K2_19_S0003,": Si"))
print(paste("K2_23 =",K2_23_S0003,": Si"))
```

```{r}
K2S0003m=c(K2_13_S0003,K2_14_S0003,K2_16_S0003,K2_17_S0003,K2_19_S0003,
K2_23_S0003)
K2S0003=mean(K2S0003m)
summary(K2S0003m)
K2S0003m
print(paste("K2_S0003 =",K2S0003))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0003,": Si"))
print(paste("Kmính_14 =",Kmính14_S0003,": Si"))
print(paste("Kmính_15 =",Kmính15_S0003,": No"))
print(paste("Kmính_16 =",Kmính16_S0003,": Si"))
print(paste("Kmính_17 =",Kmính17_S0003,": Si"))
print(paste("Kmính_18 =",Kmính18_S0003,": No"))
print(paste("Kmính_19 =",Kmính19_S0003,": Si"))
print(paste("Kmính_23 =",Kmính23_S0003,": Si"))
```

```{r}
KmínhS0003m=c(Kmính13_S0003,Kmính14_S0003,Kmính16_S0003,Kmính17_S0003,
Kmính19_S0003,Kmính23_S0003)
KmínhS0003=mean(KmínhS0003m)
summary(KmínhS0003m)
KmínhS0003m
print(paste("Kmính_S0003 =",KmínhS0003))
```

## Estación S0007 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0007H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0007H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0007H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0007H13max=S0007H[1:24,6]
S0007H13min=S0007H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0007H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=109,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=102,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0007=70.505284569589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0007,lwd="4",col="red")
abline(h=max(S0007H13max),lwd="3",col="black",lty=2)
abline(h=min(S0007H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0007=max(S0007H13max)
K2_13_S0007=Qmax13_S0007/Qp13_S0007
print(paste("K2 =",K2_13_S0007))
```

```{r}
plot(Hora,S0007H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0007,lwd="4",col="red")
abline(h=max(S0007H13min),lwd="3",col="black",lty=2)
abline(h=min(S0007H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0007=min(S0007H13min)
Kmính13_S0007=Qminh13_S0007/Qp13_S0007
print(paste("Kmính =",Kmính13_S0007))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0007H14max=S0007H[1:24,10]
S0007H14min=S0007H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0007H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=115,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0007=72.1282885238082
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0007,lwd="4",col="red")
abline(h=max(S0007H14max),lwd="3",col="black",lty=2)
abline(h=min(S0007H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0007=max(S0007H14max)
K2_14_S0007=Qmax14_S0007/Qp14_S0007
print(paste("K2 =",K2_14_S0007))
```

```{r}
plot(Hora,S0007H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0007,lwd="4",col="red")
abline(h=max(S0007H14min),lwd="3",col="black",lty=2)
abline(h=min(S0007H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0007=min(S0007H14min)
Kmính14_S0007=Qminh14_S0007/Qp14_S0007
print(paste("Kmính =",Kmính14_S0007))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0007H15max=S0007H[1:24,14]
S0007H15min=S0007H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0007H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0007=76.6486747493151
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0007,lwd="4",col="red")
abline(h=max(S0007H15max),lwd="3",col="black",lty=2)
abline(h=min(S0007H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0007=max(S0007H15max)
K2_15_S0007=Qmax15_S0007/Qp15_S0007
print(paste("K2 =",K2_15_S0007))
```

```{r}
plot(Hora,S0007H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0007,lwd="4",col="red")
abline(h=max(S0007H15min),lwd="3",col="black",lty=2)
abline(h=min(S0007H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0007=min(S0007H15min)
Kmính15_S0007=Qminh15_S0007/Qp15_S0007
print(paste("Kmính =",Kmính15_S0007))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0007H16max=S0007H[1:24,18]
S0007H16min=S0007H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0007H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=131.8,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=123.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0007=83.5187099774044
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0007,lwd="4",col="red")
abline(h=max(S0007H16max),lwd="3",col="black",lty=2)
abline(h=min(S0007H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0007=max(S0007H16max)
K2_16_S0007=Qmax16_S0007/Qp16_S0007
print(paste("K2 =",K2_16_S0007))
```

```{r}
plot(Hora,S0007H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0007,lwd="4",col="red")
abline(h=max(S0007H16min),lwd="3",col="black",lty=2)
abline(h=min(S0007H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0007=min(S0007H16min)
Kmính16_S0007=Qminh16_S0007/Qp16_S0007
print(paste("Kmính =",Kmính16_S0007))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0007H17max=S0007H[1:24,22]
S0007H17min=S0007H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0007H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0007=89.5542368408493
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0007,lwd="4",col="red")
abline(h=max(S0007H17max),lwd="3",col="black",lty=2)
abline(h=min(S0007H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0007=max(S0007H17max)
K2_17_S0007=Qmax17_S0007/Qp17_S0007
print(paste("K2 =",K2_17_S0007))
```

```{r}
plot(Hora,S0007H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0007,lwd="4",col="red")
abline(h=max(S0007H17min),lwd="3",col="black",lty=2)
abline(h=min(S0007H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0007=min(S0007H17min)
Kmính17_S0007=Qminh17_S0007/Qp17_S0007
print(paste("Kmính =",Kmính17_S0007))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0007H18max=S0007H[1:24,26]
S0007H18min=S0007H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0007H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0007=75.186355926137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0007,lwd="4",col="red")
abline(h=max(S0007H18max),lwd="3",col="black",lty=2)
abline(h=min(S0007H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0007=max(S0007H18max)
K2_18_S0007=Qmax18_S0007/Qp18_S0007
print(paste("K2 =",K2_18_S0007))
```

```{r}
plot(Hora,S0007H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0007,lwd="4",col="red")
abline(h=max(S0007H18min),lwd="3",col="black",lty=2)
abline(h=min(S0007H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0007=min(S0007H18min)
Kmính18_S0007=Qminh18_S0007/Qp18_S0007
print(paste("Kmính =",Kmính18_S0007))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0007H19max=S0007H[1:24,30]
S0007H19min=S0007H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0007H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=101.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=94.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0007=60.907323642
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0007,lwd="4",col="red")
abline(h=max(S0007H19max),lwd="3",col="black",lty=2)
abline(h=min(S0007H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0007=max(S0007H19max)
K2_19_S0007=Qmax19_S0007/Qp19_S0007
print(paste("K2 =",K2_19_S0007))
```

```{r}
plot(Hora,S0007H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0007,lwd="4",col="red")
abline(h=max(S0007H19min),lwd="3",col="black",lty=2)
abline(h=min(S0007H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0007=min(S0007H19min)
Kmính19_S0007=Qminh19_S0007/Qp19_S0007
print(paste("Kmính =",Kmính19_S0007))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0007H23max=S0007H[1:24,46]
S0007H23min=S0007H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0007H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0007 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0007H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=103.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=96.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0007H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0007=73.6953754583562
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0007,lwd="4",col="red")
```

```
abline(h=max(S0007H23max),lwd="3",col="black",lty=2)
abline(h=min(S0007H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0007=max(S0007H23max)
K2_23_S0007=Qmax23_S0007/Qp23_S0007
print(paste("K2 =",K2_23_S0007))
```

```{r}
plot(Hora,S0007H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0007 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0007,lwd="4",col="red")
abline(h=max(S0007H23min),lwd="3",col="black",lty=2)
abline(h=min(S0007H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0007=min(S0007H23min)
Kmính23_S0007=Qminh23_S0007/Qp23_S0007
print(paste("Kmính =",Kmính23_S0007))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0007,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0007,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0007,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0007,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0007,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0007,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0007,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0007,"l/s",": No"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0007,": No"))
print(paste("K2_14 =",K2_14_S0007,": Si"))
print(paste("K2_15 =",K2_15_S0007,": Si"))
print(paste("K2_16 =",K2_16_S0007,": Si"))
print(paste("K2_17 =",K2_17_S0007,": No"))
print(paste("K2_18 =",K2_18_S0007,": No"))
print(paste("K2_19 =",K2_19_S0007,": Si"))
print(paste("K2_23 =",K2_23_S0007,": No"))
```

```{r}
K2S0007m=c(K2_14_S0007,K2_15_S0007,K2_16_S0007,K2_19_S0007)
K2S0007=mean(K2S0007m)
summary(K2S0007m)
K2S0007m
print(paste("K2_S0007 =",K2S0007))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0007,": No"))
print(paste("Kmính_14 =",Kmính14_S0007,": Si"))
print(paste("Kmính_15 =",Kmính15_S0007,": Si"))
print(paste("Kmính_16 =",Kmính16_S0007,": Si"))
print(paste("Kmính_17 =",Kmính17_S0007,": No"))
print(paste("Kmính_18 =",Kmính18_S0007,": No"))
print(paste("Kmính_19 =",Kmính19_S0007,": Si"))
print(paste("Kmính_23 =",Kmính23_S0007,": No"))
```

```{r}
KmínhS0007m=c(Kmính14_S0007,Kmính15_S0007,Kmính16_S0007,Kmính19_S0007)
KmínhS0007=mean(KmínhS0007m)
summary(KmínhS0007m)
KmínhS0007m
print(paste("Kmính_S0007 =",KmínhS0007))
```

## Estación S0008 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0008H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0008H.csv",sep=";")
```

```
```

### Visualización de la base de datos

```{r}
# View(S0008H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0008H13max=S0008H[1:24,6]
S0008H13min=S0008H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0008H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0008=125.58340671011
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0008,lwd="4",col="red")
abline(h=max(S0008H13max),lwd="3",col="black",lty=2)
abline(h=min(S0008H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0008=max(S0008H13max)
K2_13_S0008=Qmax13_S0008/Qp13_S0008
print(paste("K2 =",K2_13_S0008))
```

```{r}
plot(Hora,S0008H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0008,lwd="4",col="red")
abline(h=max(S0008H13min),lwd="3",col="black",lty=2)
abline(h=min(S0008H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0008=min(S0008H13min)
Kmính13_S0008=Qminh13_S0008/Qp13_S0008
print(paste("Kmính =",Kmính13_S0008))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0008H14max=S0008H[1:24,10]
S0008H14min=S0008H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0008H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=194.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=183.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0008=124.677871009918
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0008,lwd="4",col="red")
abline(h=max(S0008H14max),lwd="3",col="black",lty=2)
abline(h=min(S0008H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0008=max(S0008H14max)
K2_14_S0008=Qmax14_S0008/Qp14_S0008
print(paste("K2 =",K2_14_S0008))
```

```{r}
plot(Hora,S0008H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0008,lwd="4",col="red")
abline(h=max(S0008H14min),lwd="3",col="black",lty=2)
abline(h=min(S0008H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0008=min(S0008H14min)
Kmính14_S0008=Qminh14_S0008/Qp14_S0008
print(paste("Kmính =",Kmính14_S0008))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0008H15max=S0008H[1:24,14]
S0008H15min=S0008H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0008H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=181.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=169.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0008=116.011252124904
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0008,lwd="4",col="red")
abline(h=max(S0008H15max),lwd="3",col="black",lty=2)
abline(h=min(S0008H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0008=max(S0008H15max)
K2_15_S0008=Qmax15_S0008/Qp15_S0008
print(paste("K2 =",K2_15_S0008))
```

```{r}
plot(Hora,S0008H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp15_S0008,lwd="4",col="red")
abline(h=max(S0008H15min),lwd="3",col="black",lty=2)
abline(h=min(S0008H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0008=min(S0008H15min)
Kmính15_S0008=Qminh15_S0008/Qp15_S0008
print(paste("Kmính =",Kmính15_S0008))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0008H16max=S0008H[1:24,18]
S0008H16min=S0008H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0008H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=176.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=166.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0008=116.45841763194
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0008,lwd="4",col="red")
abline(h=max(S0008H16max),lwd="3",col="black",lty=2)
abline(h=min(S0008H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0008=max(S0008H16max)
K2_16_S0008=Qmax16_S0008/Qp16_S0008
print(paste("K2 =",K2_16_S0008))
```

```{r}
plot(Hora,S0008H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0008,lwd="4",col="red")
abline(h=max(S0008H16min),lwd="3",col="black",lty=2)
abline(h=min(S0008H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0008=min(S0008H16min)
Kmính16_S0008=Qminh16_S0008/Qp16_S0008
print(paste("Kmính =",Kmính16_S0008))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0008H17max=S0008H[1:24,22]
S0008H17min=S0008H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0008H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=169,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=159,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0008=113.146493675014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0008,lwd="4",col="red")
abline(h=max(S0008H17max),lwd="3",col="black",lty=2)
abline(h=min(S0008H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0008=max(S0008H17max)
K2_17_S0008=Qmax17_S0008/Qp17_S0008
print(paste("K2 =",K2_17_S0008))
```

```{r}
plot(Hora,S0008H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0008,lwd="4",col="red")
abline(h=max(S0008H17min),lwd="3",col="black",lty=2)
abline(h=min(S0008H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0008=min(S0008H17min)
Kmính17_S0008=Qminh17_S0008/Qp17_S0008
print(paste("Kmính =",Kmính17_S0008))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0008H18max=S0008H[1:24,26]
S0008H18min=S0008H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0008H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=158.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0008=112.90793134663
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0008,lwd="4",col="red")
abline(h=max(S0008H18max),lwd="3",col="black",lty=2)
abline(h=min(S0008H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0008=max(S0008H18max)
K2_18_S0008=Qmax18_S0008/Qp18_S0008
print(paste("K2 =",K2_18_S0008))
```

```{r}
plot(Hora,S0008H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0008,lwd="4",col="red")
abline(h=max(S0008H18min),lwd="3",col="black",lty=2)
abline(h=min(S0008H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0008=min(S0008H18min)
Kmính18_S0008=Qminh18_S0008/Qp18_S0008
print(paste("Kmính =",Kmính18_S0008))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0008H19max=S0008H[1:24,30]
S0008H19min=S0008H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0008H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=194.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0008=120.268875624
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0008,lwd="4",col="red")
abline(h=max(S0008H19max),lwd="3",col="black",lty=2)
abline(h=min(S0008H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0008=max(S0008H19max)
K2_19_S0008=Qmax19_S0008/Qp19_S0008
print(paste("K2 =",K2_19_S0008))
```

```{r}
plot(Hora,S0008H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0008,lwd="4",col="red")
abline(h=max(S0008H19min),lwd="3",col="black",lty=2)
abline(h=min(S0008H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0008=min(S0008H19min)
Kmính19_S0008=Qminh19_S0008/Qp19_S0008
print(paste("Kmính =",Kmính19_S0008))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0008H23max=S0008H[1:24,46]
S0008H23min=S0008H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0008H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0008 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0008H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=146,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0008H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0008=92.1932774562192
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0008,lwd="4",col="red")
abline(h=max(S0008H23max),lwd="3",col="black",lty=2)
abline(h=min(S0008H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0008=max(S0008H23max)
K2_23_S0008=Qmax23_S0008/Qp23_S0008
print(paste("K2 =",K2_23_S0008))
```

```{r}
plot(Hora,S0008H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0008 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0008,lwd="4",col="red")
abline(h=max(S0008H23min),lwd="3",col="black",lty=2)
abline(h=min(S0008H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0008=min(S0008H23min)
Kmính23_S0008=Qminh23_S0008/Qp23_S0008
print(paste("Kmính =",Kmính23_S0008))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0008,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0008,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0008,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0008,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0008,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0008,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0008,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0008,"l/s",": No"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0008,": Si"))
print(paste("K2_14 =",K2_14_S0008,": Si"))
print(paste("K2_15 =",K2_15_S0008,": Si"))
print(paste("K2_16 =",K2_16_S0008,": No"))
print(paste("K2_17 =",K2_17_S0008,": Si"))
print(paste("K2_18 =",K2_18_S0008,": Si"))
print(paste("K2_19 =",K2_19_S0008,": No"))
print(paste("K2_23 =",K2_23_S0008,": No"))
```

```{r}
K2S0008m=c(K2_13_S0008,K2_14_S0008,K2_15_S0008,K2_17_S0008,K2_18_S0008)
K2S0008=mean(K2S0008m)
summary(K2S0008m)
K2S0008m
print(paste("K2_S0008 =",K2S0008))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0008,": Si"))
```

```
print(paste("Kmính_14 =",Kmính14_S0008,": Si"))
print(paste("Kmính_15 =",Kmính15_S0008,": Si"))
print(paste("Kmính_16 =",Kmính16_S0008,": No"))
print(paste("Kmính_17 =",Kmính17_S0008,": Si"))
print(paste("Kmính_18 =",Kmính18_S0008,": Si"))
print(paste("Kmính_19 =",Kmính19_S0008,": No"))
print(paste("Kmính_23 =",Kmính23_S0008,": No"))
```

```{r}
KmínhS0008m=c(Kmính13_S0008,Kmính14_S0008,Kmính15_S0008,Kmính17_S0008,
Kmính18_S0008)
KmínhS0008=mean(KmínhS0008m)
summary(KmínhS0008m)
KmínhS0008m
print(paste("Kmính_S0008 =",KmínhS0008))
```

## Estación S0010 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0010H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0010H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0010H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0010H13max=S0010H[1:24,6]
S0010H13min=S0010H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=152,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0010=102.16699954926
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0010,lwd="4",col="red")
abline(h=max(S0010H13max),lwd="3",col="black",lty=2)
abline(h=min(S0010H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0010=max(S0010H13max)
K2_13_S0010=Qmax13_S0010/Qp13_S0010
print(paste("K2 =",K2_13_S0010))
```

```{r}
plot(Hora,S0010H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0010,lwd="4",col="red")
abline(h=max(S0010H13min),lwd="3",col="black",lty=2)
abline(h=min(S0010H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0010=min(S0010H13min)
Kmính13_S0010=Qminh13_S0010/Qp13_S0010
print(paste("Kmính =",Kmính13_S0010))
```

```
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0010H14max=S0010H[1:24,10]
S0010H14min=S0010H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=152,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0010=100.047903252849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0010,lwd="4",col="red")
abline(h=max(S0010H14max),lwd="3",col="black",lty=2)
abline(h=min(S0010H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0010=max(S0010H14max)
K2_14_S0010=Qmax14_S0010/Qp14_S0010
print(paste("K2 =",K2_14_S0010))
```

```{r}
plot(Hora,S0010H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0010,lwd="4",col="red")
abline(h=max(S0010H14min),lwd="3",col="black",lty=2)
abline(h=min(S0010H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0010=min(S0010H14min)
Kmính14_S0010=Qminh14_S0010/Qp14_S0010
print(paste("Kmính =",Kmính14_S0010))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0010H15max=S0010H[1:24,14]
S0010H15min=S0010H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=151,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0010=104.473873674137
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0010,lwd="4",col="red")
abline(h=max(S0010H15max),lwd="3",col="black",lty=2)
abline(h=min(S0010H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0010=max(S0010H15max)
K2_15_S0010=Qmax15_S0010/Qp15_S0010
print(paste("K2 =",K2_15_S0010))
```

```{r}
plot(Hora,S0010H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0010,lwd="4",col="red")
abline(h=max(S0010H15min),lwd="3",col="black",lty=2)
abline(h=min(S0010H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0010=min(S0010H15min)
Kmính15_S0010=Qminh15_S0010/Qp15_S0010
print(paste("Kmính =",Kmính15_S0010))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0010H16max=S0010H[1:24,18]
S0010H16min=S0010H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=146.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=138.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0010=99.2863626860929
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0010,lwd="4",col="red")
abline(h=max(S0010H16max),lwd="3",col="black",lty=2)
abline(h=min(S0010H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0010=max(S0010H16max)
K2_16_S0010=Qmax16_S0010/Qp16_S0010
print(paste("K2 =",K2_16_S0010))
```

```{r}
plot(Hora,S0010H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0010,lwd="4",col="red")
abline(h=max(S0010H16min),lwd="3",col="black",lty=2)
abline(h=min(S0010H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0010=min(S0010H16min)
Kmính16_S0010=Qminh16_S0010/Qp16_S0010
print(paste("Kmính =",Kmính16_S0010))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0010H17max=S0010H[1:24,22]
S0010H17min=S0010H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=152,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0010=95.7296819128767
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0010,lwd="4",col="red")
abline(h=max(S0010H17max),lwd="3",col="black",lty=2)
abline(h=min(S0010H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0010=max(S0010H17max)
K2_17_S0010=Qmax17_S0010/Qp17_S0010
print(paste("K2 =",K2_17_S0010))
```

```{r}
plot(Hora,S0010H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0010,lwd="4",col="red")
abline(h=max(S0010H17min),lwd="3",col="black",lty=2)
abline(h=min(S0010H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0010=min(S0010H17min)
Kmính17_S0010=Qminh17_S0010/Qp17_S0010
print(paste("Kmính =",Kmính17_S0010))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0010H18max=S0010H[1:24,26]
S0010H18min=S0010H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=142,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0010=94.9458147523836
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0010,lwd="4",col="red")
abline(h=max(S0010H18max),lwd="3",col="black",lty=2)
abline(h=min(S0010H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0010=max(S0010H18max)
K2_18_S0010=Qmax18_S0010/Qp18_S0010
print(paste("K2 =",K2_18_S0010))
```

```{r}
plot(Hora,S0010H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0010,lwd="4",col="red")
abline(h=max(S0010H18min),lwd="3",col="black",lty=2)
abline(h=min(S0010H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0010=min(S0010H18min)
Kmính18_S0010=Qminh18_S0010/Qp18_S0010
print(paste("Kmính =",Kmính18_S0010))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0010H19max=S0010H[1:24,30]
S0010H19min=S0010H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=140,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=131,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0010=95.0966283315068
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0010,lwd="4",col="red")
abline(h=max(S0010H19max),lwd="3",col="black",lty=2)
abline(h=min(S0010H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0010=max(S0010H19max)
K2_19_S0010=Qmax19_S0010/Qp19_S0010
print(paste("K2 =",K2_19_S0010))
```

```{r}
plot(Hora,S0010H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0010,lwd="4",col="red")
abline(h=max(S0010H19min),lwd="3",col="black",lty=2)
abline(h=min(S0010H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0010=min(S0010H19min)
Kmính19_S0010=Qminh19_S0010/Qp19_S0010
print(paste("Kmính =",Kmính19_S0010))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0010H23max=S0010H[1:24,46]
S0010H23min=S0010H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0010H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0010 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0010H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0010H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0010=82.9115970830959
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0010,lwd="4",col="red")
abline(h=max(S0010H23max),lwd="3",col="black",lty=2)
abline(h=min(S0010H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0010=max(S0010H23max)
K2_23_S0010=Qmax23_S0010/Qp23_S0010
print(paste("K2 =",K2_23_S0010))
```

```{r}
plot(Hora,S0010H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0010 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0010,lwd="4",col="red")
abline(h=max(S0010H23min),lwd="3",col="black",lty=2)
abline(h=min(S0010H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0010=min(S0010H23min)
Kmính23_S0010=Qminh23_S0010/Qp23_S0010
print(paste("Kmính =",Kmính23_S0010))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0010,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0010,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0010,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0010,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0010,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0010,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0010,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0010,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0010,": Si"))
print(paste("K2_14 =",K2_14_S0010,": Si"))
print(paste("K2_15 =",K2_15_S0010,": Si"))
print(paste("K2_16 =",K2_16_S0010,": Si"))
print(paste("K2_17 =",K2_17_S0010,": Si"))
print(paste("K2_18 =",K2_18_S0010,": No"))
print(paste("K2_19 =",K2_19_S0010,": Si"))
print(paste("K2_23 =",K2_23_S0010,": Si"))
```

```{r}
K2S0010m=c(K2_13_S0010,K2_14_S0010,K2_15_S0010,K2_16_S0010,K2_17_S0010,
K2_19_S0010,K2_23_S0010)
K2S0010=mean(K2S0010m)
summary(K2S0010m)
K2S0010m
print(paste("K2_S0010 =",K2S0010))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0010,": Si"))
print(paste("Kmính_14 =",Kmính14_S0010,": Si"))
print(paste("Kmính_15 =",Kmính15_S0010,": Si"))
print(paste("Kmính_16 =",Kmính16_S0010,": Si"))
print(paste("Kmính_17 =",Kmính17_S0010,": Si"))
print(paste("Kmính_18 =",Kmính18_S0010,": No"))
print(paste("Kmính_19 =",Kmính19_S0010,": Si"))
print(paste("Kmính_23 =",Kmính23_S0010,": Si"))
```

```{r}
KmínhS0010m=c(Kmính13_S0010,Kmính14_S0010,Kmính15_S0010,Kmính16_S0010,
Kmính17_S0010,Kmính19_S0010,Kmính23_S0010)
KmínhS0010=mean(KmínhS0010m)
summary(KmínhS0010m)
KmínhS0010m
print(paste("Kmính_S0010 =",KmínhS0010))
```

## Estación S0012 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0012H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0012H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0012H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0012H13max=S0012H[1:24,6]
S0012H13min=S0012H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=179,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=166,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0012=114.526852540712
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0012,lwd="4",col="red")
abline(h=max(S0012H13max),lwd="3",col="black",lty=2)
abline(h=min(S0012H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
```

```
Qmax13_S0012=max(S0012H13max)
K2_13_S0012=Qmax13_S0012/Qp13_S0012
print(paste("K2 =",K2_13_S0012))
```

```{r}
plot(Hora,S0012H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0012,lwd="4",col="red")
abline(h=max(S0012H13min),lwd="3",col="black",lty=2)
abline(h=min(S0012H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0012=min(S0012H13min)
Kmính13_S0012=Qminh13_S0012/Qp13_S0012
print(paste("Kmính =",Kmính13_S0012))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0012H14max=S0012H[1:24,10]
S0012H14min=S0012H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=182.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=169.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0012=118.434347986493
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0012,lwd="4",col="red")
abline(h=max(S0012H14max),lwd="3",col="black",lty=2)
abline(h=min(S0012H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0012=max(S0012H14max)
K2_14_S0012=Qmax14_S0012/Qp14_S0012
print(paste("K2 =",K2_14_S0012))
```

```{r}
plot(Hora,S0012H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0012,lwd="4",col="red")
abline(h=max(S0012H14min),lwd="3",col="black",lty=2)
abline(h=min(S0012H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0012=min(S0012H14min)
Kmính14_S0012=Qminh14_S0012/Qp14_S0012
print(paste("Kmính =",Kmính14_S0012))
```

### Extracción y análisis de datos del año 2015

```{r}


```

```
Hora=c(00:23)
S0012H15max=S0012H[1:24,14]
S0012H15min=S0012H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=182.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=169.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0012=121.618947132877
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0012,lwd="4",col="red")
abline(h=max(S0012H15max),lwd="3",col="black",lty=2)
abline(h=min(S0012H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0012=max(S0012H15max)
K2_15_S0012=Qmax15_S0012/Qp15_S0012
print(paste("K2 =",K2_15_S0012))
```

```{r}
plot(Hora,S0012H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0012,lwd="4",col="red")
abline(h=max(S0012H15min),lwd="3",col="black",lty=2)
abline(h=min(S0012H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0012=min(S0012H15min)
Kmính15_S0012=Qminh15_S0012/Qp15_S0012
print(paste("Kmính =",Kmính15_S0012))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0012H16max=S0012H[1:24,18]
S0012H16min=S0012H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0012=112.250812465055
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0012,lwd="4",col="red")
abline(h=max(S0012H16max),lwd="3",col="black",lty=2)
abline(h=min(S0012H16max),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0012=max(S0012H16max)
K2_16_S0012=Qmax16_S0012/Qp16_S0012
print(paste("K2 =",K2_16_S0012))
```

```{r}
plot(Hora,S0012H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0012,lwd="4",col="red")
abline(h=max(S0012H16min),lwd="3",col="black",lty=2)
abline(h=min(S0012H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0012=min(S0012H16min)
Kmính16_S0012=Qminh16_S0012/Qp16_S0012
print(paste("Kmính =",Kmính16_S0012))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0012H17max=S0012H[1:24,22]
S0012H17min=S0012H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=169,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=158,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0012=110.144751305753
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0012,lwd="4",col="red")
abline(h=max(S0012H17max),lwd="3",col="black",lty=2)
abline(h=min(S0012H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0012=max(S0012H17max)
K2_17_S0012=Qmax17_S0012/Qp17_S0012
print(paste("K2 =",K2_17_S0012))
```

```{r}
plot(Hora,S0012H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0012,lwd="4",col="red")
abline(h=max(S0012H17min),lwd="3",col="black",lty=2)
abline(h=min(S0012H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0012=min(S0012H17min)
```

```
Kmính17_S0012=Qminh17_S0012/Qp17_S0012
print(paste("Kmính =",Kmính17_S0012))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0012H18max=S0012H[1:24,26]
S0012H18min=S0012H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=156,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=146,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0012=110.201848200575
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0012,lwd="4",col="red")
abline(h=max(S0012H18max),lwd="3",col="black",lty=2)
abline(h=min(S0012H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0012=max(S0012H18max)
K2_18_S0012=Qmax18_S0012/Qp18_S0012
print(paste("K2 =",K2_18_S0012))
```

```{r}
plot(Hora,S0012H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0012,lwd="4",col="red")
abline(h=max(S0012H18min),lwd="3",col="black",lty=2)
abline(h=min(S0012H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0012=min(S0012H18min)
Kmính18_S0012=Qminh18_S0012/Qp18_S0012
print(paste("Kmính =",Kmính18_S0012))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0012H19max=S0012H[1:24,30]
S0012H19min=S0012H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=169.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=156.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
Qp19_S0012=111.030163940959
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0012,lwd="4",col="red")
abline(h=max(S0012H19max),lwd="3",col="black",lty=2)
abline(h=min(S0012H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0012=max(S0012H19max)
K2_19_S0012=Qmax19_S0012/Qp19_S0012
print(paste("K2 =",K2_19_S0012))
```

```{r}
plot(Hora,S0012H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0012,lwd="4",col="red")
abline(h=max(S0012H19min),lwd="3",col="black",lty=2)
abline(h=min(S0012H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0012=min(S0012H19min)
Kmính19_S0012=Qminh19_S0012/Qp19_S0012
print(paste("Kmính =",Kmính19_S0012))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0012H23max=S0012H[1:24,46]
S0012H23min=S0012H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0012H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0012 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0012H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=169,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=158,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0012H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0012=107.875367859616
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0012,lwd="4",col="red")
abline(h=max(S0012H23max),lwd="3",col="black",lty=2)
abline(h=min(S0012H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0012=max(S0012H23max)
K2_23_S0012=Qmax23_S0012/Qp23_S0012
print(paste("K2 =",K2_23_S0012))
```

```{r}
plot(Hora,S0012H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0012 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0012,lwd="4",col="red")
abline(h=max(S0012H23min),lwd="3",col="black",lty=2)
abline(h=min(S0012H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0012=min(S0012H23min)
Kmính23_S0012=Qminh23_S0012/Qp23_S0012
print(paste("Kmính =",Kmính23_S0012))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0012,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0012,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0012,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0012,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0012,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0012,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0012,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0012,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0012,": Si"))
print(paste("K2_14 =",K2_14_S0012,": Si"))
print(paste("K2_15 =",K2_15_S0012,": No"))
print(paste("K2_16 =",K2_16_S0012,": Si"))
print(paste("K2_17 =",K2_17_S0012,": Si"))
print(paste("K2_18 =",K2_18_S0012,": Si"))
print(paste("K2_19 =",K2_19_S0012,": Si"))
print(paste("K2_23 =",K2_23_S0012,": Si"))
```

```{r}
K2S0012m=c(K2_13_S0012,K2_14_S0012,K2_16_S0012,K2_17_S0012,K2_18_S0012,
K2_19_S0012,K2_23_S0012)
K2S0012=mean(K2S0012m)
summary(K2S0012m)
K2S0012m
print(paste("K2_S0012 =",K2S0012))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0012,": Si"))
print(paste("Kmính_14 =",Kmính14_S0012,": Si"))
print(paste("Kmính_15 =",Kmính15_S0012,": No"))
print(paste("Kmính_16 =",Kmính16_S0012,": Si"))
print(paste("Kmính_17 =",Kmính17_S0012,": Si"))
print(paste("Kmính_18 =",Kmính18_S0012,": Si"))
print(paste("Kmính_19 =",Kmính19_S0012,": Si"))
print(paste("Kmính_23 =",Kmính23_S0012,": Si"))
```

```{r}
KmínhS0012m=c(Kmính13_S0012,Kmính14_S0012,Kmính16_S0012,Kmính17_S0012,
Kmính18_S0012,Kmính19_S0012,Kmính23_S0012)
KmínhS0012=mean(KmínhS0012m)
summary(KmínhS0012m)
KmínhS0012m
print(paste("Kmính_S0012 =",KmínhS0012))
```

## Estación S0013 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0013H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0013H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0013H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0013H13max=S0013H[1:24,6]
S0013H13min=S0013H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0013H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=151,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=142.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0013=94.3522418229589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0013,lwd="4",col="red")
abline(h=max(S0013H13max),lwd="3",col="black",lty=2)
abline(h=min(S0013H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0013=max(S0013H13max)
K2_13_S0013=Qmax13_S0013/Qp13_S0013
print(paste("K2 =",K2_13_S0013))
```

```{r}
plot(Hora,S0013H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0013,lwd="4",col="red")
abline(h=max(S0013H13min),lwd="3",col="black",lty=2)
abline(h=min(S0013H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0013=min(S0013H13min)
Kmính13_S0013=Qminh13_S0013/Qp13_S0013
print(paste("Kmính =",Kmính13_S0013))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0013H14max=S0013H[1:24,10]
S0013H14min=S0013H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0013H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=152,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0013=100.863125982521
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0013H14max),lwd="4",col="red")
abline(h=max(S0013H14max),lwd="3",col="black",lty=2)
abline(h=min(S0013H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0013=max(S0013H14max)
K2_14_S0013=Qmax14_S0013/Qp14_S0013
print(paste("K2 =",K2_14_S0013))
```

```{r}
plot(Hora,S0013H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0013,lwd="4",col="red")
abline(h=max(S0013H14min),lwd="3",col="black",lty=2)
abline(h=min(S0013H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0013=min(S0013H14min)
Kmính14_S0013=Qminh14_S0013/Qp14_S0013
print(paste("Kmính =",Kmính14_S0013))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0013H15max=S0013H[1:24,14]
S0013H15min=S0013H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0013H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=148.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=140.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0013=101.107789869397
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0013,lwd="4",col="red")
abline(h=max(S0013H15max),lwd="3",col="black",lty=2)
abline(h=min(S0013H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0013=max(S0013H15max)
K2_15_S0013=Qmax15_S0013/Qp15_S0013
print(paste("K2 =",K2_15_S0013))
```

```{r}
plot(Hora,S0013H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0013,lwd="4",col="red")
abline(h=max(S0013H15min),lwd="3",col="black",lty=2)
abline(h=min(S0013H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0013=min(S0013H15min)
Kmính15_S0013=Qminh15_S0013/Qp15_S0013
print(paste("Kmính =",Kmính15_S0013))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0013H16max=S0013H[1:24,18]
S0013H16min=S0013H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0013H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=136,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0013=89.8807742605464
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0013,lwd="4",col="red")
abline(h=max(S0013H16max),lwd="3",col="black",lty=2)
abline(h=min(S0013H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0013=max(S0013H16max)
K2_16_S0013=Qmax16_S0013/Qp16_S0013
print(paste("K2 =",K2_16_S0013))
```

```{r}
plot(Hora,S0013H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0013,lwd="4",col="red")
abline(h=max(S0013H16min),lwd="3",col="black",lty=2)
abline(h=min(S0013H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0013=min(S0013H16min)
Kmính16_S0013=Qminh16_S0013/Qp16_S0013
print(paste("Kmính =",Kmính16_S0013))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0013H17max=S0013H[1:24,22]
S0013H17min=S0013H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0013H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=124,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=117,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0013=85.8166264819178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0013,lwd="4",col="red")
abline(h=max(S0013H17max),lwd="3",col="black",lty=2)
abline(h=min(S0013H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0013=max(S0013H17max)
K2_17_S0013=Qmax17_S0013/Qp17_S0013
print(paste("K2 =",K2_17_S0013))
```

```{r}
plot(Hora,S0013H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0013,lwd="4",col="red")
abline(h=max(S0013H17min),lwd="3",col="black",lty=2)
abline(h=min(S0013H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0013=min(S0013H17min)
Kmính17_S0013=Qminh17_S0013/Qp17_S0013
print(paste("Kmính =",Kmính17_S0013))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0013H18max=S0013H[1:24,26]
S0013H18min=S0013H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0013H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=129.0,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=122.1,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0013=87.3562651459178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0013,lwd="4",col="red")
abline(h=max(S0013H18max),lwd="3",col="black",lty=2)
abline(h=min(S0013H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0013=max(S0013H18max)
K2_18_S0013=Qmax18_S0013/Qp18_S0013
print(paste("K2 =",K2_18_S0013))
```

```{r}
plot(Hora,S0013H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0013,lwd="4",col="red")
abline(h=max(S0013H18min),lwd="3",col="black",lty=2)
abline(h=min(S0013H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0013=min(S0013H18min)
Kmính18_S0013=Qminh18_S0013/Qp18_S0013
print(paste("Kmính =",Kmính18_S0013))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0013H19max=S0013H[1:24,30]
S0013H19min=S0013H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0013H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=132,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=124,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0013=87.4716559719452
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0013,lwd="4",col="red")
abline(h=max(S0013H19max),lwd="3",col="black",lty=2)
abline(h=min(S0013H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0013=max(S0013H19max)
K2_19_S0013=Qmax19_S0013/Qp19_S0013
print(paste("K2 =",K2_19_S0013))
```

```{r}
plot(Hora,S0013H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0013,lwd="4",col="red")
abline(h=max(S0013H19min),lwd="3",col="black",lty=2)
abline(h=min(S0013H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0013=min(S0013H19min)
Kmính19_S0013=Qminh19_S0013/Qp19_S0013
print(paste("Kmính =",Kmính19_S0013))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0013H23max=S0013H[1:24,46]
S0013H23min=S0013H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0013H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0013 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0013H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=122,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=116,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0013H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0013=78.4641671832603
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0013,lwd="4",col="red")
```

```
abline(h=max(S0013H23max),lwd="3",col="black",lty=2)
abline(h=min(S0013H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0013=max(S0013H23max)
K2_23_S0013=Qmax23_S0013/Qp23_S0013
print(paste("K2 =",K2_23_S0013))
```

```{r}
plot(Hora,S0013H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0013 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0013,lwd="4",col="red")
abline(h=max(S0013H23min),lwd="3",col="black",lty=2)
abline(h=min(S0013H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0013=min(S0013H23min)
Kmính23_S0013=Qminh23_S0013/Qp23_S0013
print(paste("Kmính =",Kmính23_S0013))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0013,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0013,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0013,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0013,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0013,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0013,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0013,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0013,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0013,": No"))
print(paste("K2_14 =",K2_14_S0013,": No"))
print(paste("K2_15 =",K2_15_S0013,": Si"))
print(paste("K2_16 =",K2_16_S0013,": No"))
print(paste("K2_17 =",K2_17_S0013,": No"))
print(paste("K2_18 =",K2_18_S0013,": Si"))
print(paste("K2_19 =",K2_19_S0013,": Si"))
print(paste("K2_23 =",K2_23_S0013,": Si"))
```

```{r}
K2S0013m=c(K2_15_S0013,K2_18_S0013,K2_19_S0013,K2_23_S0013)
K2S0013=mean(K2S0013m)
summary(K2S0013m)
K2S0013m
print(paste("K2_S0013 =",K2S0013))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0013,": No"))
print(paste("Kmính_14 =",Kmính14_S0013,": No"))
print(paste("Kmính_15 =",Kmính15_S0013,": Si"))
print(paste("Kmính_16 =",Kmính16_S0013,": No"))
print(paste("Kmính_17 =",Kmính17_S0013,": No"))
print(paste("Kmính_18 =",Kmính18_S0013,": Si"))
print(paste("Kmính_19 =",Kmính19_S0013,": Si"))
print(paste("Kmính_23 =",Kmính23_S0013,": Si"))
```

```{r}
KmínhS0013m=c(Kmính15_S0013,Kmính18_S0013,Kmính19_S0013,Kmính23_S0013)
KmínhS0013=mean(KmínhS0013m)
summary(KmínhS0013m)
KmínhS0013m
print(paste("Kmính_S0013 =",KmínhS0013))
```

## Estación S0014 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0014H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0014H.csv",sep=";")
```

```
```

### Visualización de la base de datos

```{r}
# View(S0014H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0014H13max=S0014H[1:24,6]
S0014H13min=S0014H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0014H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=140,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=131,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0014=92.317939873589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0014,lwd="4",col="red")
abline(h=max(S0014H13max),lwd="3",col="black",lty=2)
abline(h=min(S0014H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0014=max(S0014H13max)
K2_13_S0014=Qmax13_S0014/Qp13_S0014
print(paste("K2 =",K2_13_S0014))
```

```{r}
plot(Hora,S0014H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0014,lwd="4",col="red")
abline(h=max(S0014H13min),lwd="3",col="black",lty=2)
abline(h=min(S0014H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0014=min(S0014H13min)
Kmính13_S0014=Qminh13_S0014/Qp13_S0014
print(paste("Kmính =",Kmính13_S0014))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0014H14max=S0014H[1:24,10]
S0014H14min=S0014H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0014H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=153,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=144,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0014=102.316256184219
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0014,lwd="4",col="red")
abline(h=max(S0014H14max),lwd="3",col="black",lty=2)
abline(h=min(S0014H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0014=max(S0014H14max)
K2_14_S0014=Qmax14_S0014/Qp14_S0014
print(paste("K2 =",K2_14_S0014))
```

```{r}
plot(Hora,S0014H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0014,lwd="4",col="red")
abline(h=max(S0014H14min),lwd="3",col="black",lty=2)
abline(h=min(S0014H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0014=min(S0014H14min)
Kmính14_S0014=Qminh14_S0014/Qp14_S0014
print(paste("Kmính =",Kmính14_S0014))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0014H15max=S0014H[1:24,14]
S0014H15min=S0014H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0014H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=158,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=149,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0014=103.842723215014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0014,lwd="4",col="red")
abline(h=max(S0014H15max),lwd="3",col="black",lty=2)
abline(h=min(S0014H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0014=max(S0014H15max)
K2_15_S0014=Qmax15_S0014/Qp15_S0014
print(paste("K2 =",K2_15_S0014))
```

```{r}
plot(Hora,S0014H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp15_S0014,lwd="4",col="red")
abline(h=max(S0014H15min),lwd="3",col="black",lty=2)
abline(h=min(S0014H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0014=min(S0014H15min)
Kmính15_S0014=Qminh15_S0014/Qp15_S0014
print(paste("Kmính =",Kmính15_S0014))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0014H16max=S0014H[1:24,18]
S0014H16min=S0014H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0014H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=149,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=140,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0014=101.330177201557
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0014,lwd="4",col="red")
abline(h=max(S0014H16max),lwd="3",col="black",lty=2)
abline(h=min(S0014H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0014=max(S0014H16max)
K2_16_S0014=Qmax16_S0014/Qp16_S0014
print(paste("K2 =",K2_16_S0014))
```

```{r}
plot(Hora,S0014H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0014,lwd="4",col="red")
abline(h=max(S0014H16min),lwd="3",col="black",lty=2)
abline(h=min(S0014H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0014=min(S0014H16min)
Kmính16_S0014=Qminh16_S0014/Qp16_S0014
print(paste("Kmính =",Kmính16_S0014))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0014H17max=S0014H[1:24,22]
S0014H17min=S0014H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0014H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=154,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=145,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0014=108.490044275836
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0014,lwd="4",col="red")
abline(h=max(S0014H17max),lwd="3",col="black",lty=2)
abline(h=min(S0014H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0014=max(S0014H17max)
K2_17_S0014=Qmax17_S0014/Qp17_S0014
print(paste("K2 =",K2_17_S0014))
```

```{r}
plot(Hora,S0014H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0014,lwd="4",col="red")
abline(h=max(S0014H17min),lwd="3",col="black",lty=2)
abline(h=min(S0014H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0014=min(S0014H17min)
Kmính17_S0014=Qminh17_S0014/Qp17_S0014
print(paste("Kmính =",Kmính17_S0014))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0014H18max=S0014H[1:24,26]
S0014H18min=S0014H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0014H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=155,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=146,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0014=109.033602179068
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0014,lwd="4",col="red")
abline(h=max(S0014H18max),lwd="3",col="black",lty=2)
abline(h=min(S0014H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0014=max(S0014H18max)
K2_18_S0014=Qmax18_S0014/Qp18_S0014
print(paste("K2 =",K2_18_S0014))
```

```{r}
plot(Hora,S0014H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0014,lwd="4",col="red")
abline(h=max(S0014H18min),lwd="3",col="black",lty=2)
abline(h=min(S0014H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0014=min(S0014H18min)
Kmính18_S0014=Qminh18_S0014/Qp18_S0014
print(paste("Kmính =",Kmính18_S0014))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0014H19max=S0014H[1:24,30]
S0014H19min=S0014H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0014H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=165,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=156,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0014=112.189731057178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0014,lwd="4",col="red")
abline(h=max(S0014H19max),lwd="3",col="black",lty=2)
abline(h=min(S0014H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0014=max(S0014H19max)
K2_19_S0014=Qmax19_S0014/Qp19_S0014
print(paste("K2 =",K2_19_S0014))
```

```{r}
plot(Hora,S0014H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0014,lwd="4",col="red")
abline(h=max(S0014H19min),lwd="3",col="black",lty=2)
abline(h=min(S0014H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0014=min(S0014H19min)
Kmính19_S0014=Qminh19_S0014/Qp19_S0014
print(paste("Kmính =",Kmính19_S0014))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0014H23max=S0014H[1:24,46]
S0014H23min=S0014H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0014H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0014 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0014H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=162,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=153,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0014H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0014=106.418515622521
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0014,lwd="4",col="red")
abline(h=max(S0014H23max),lwd="3",col="black",lty=2)
abline(h=min(S0014H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0014=max(S0014H23max)
K2_23_S0014=Qmax23_S0014/Qp23_S0014
print(paste("K2 =",K2_23_S0014))
```

```{r}
plot(Hora,S0014H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0014 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0014,lwd="4",col="red")
abline(h=max(S0014H23min),lwd="3",col="black",lty=2)
abline(h=min(S0014H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0014=min(S0014H23min)
Kmính23_S0014=Qminh23_S0014/Qp23_S0014
print(paste("Kmính =",Kmính23_S0014))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0014,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0014,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0014,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0014,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0014,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0014,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0014,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0014,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0014,": Si"))
print(paste("K2_14 =",K2_14_S0014,": No"))
print(paste("K2_15 =",K2_15_S0014,": Si"))
print(paste("K2_16 =",K2_16_S0014,": Si"))
print(paste("K2_17 =",K2_17_S0014,": No"))
print(paste("K2_18 =",K2_18_S0014,": Si"))
print(paste("K2_19 =",K2_19_S0014,": Si"))
print(paste("K2_23 =",K2_23_S0014,": Si"))
```

```{r}
K2S0014m=c(K2_13_S0014,K2_15_S0014,K2_16_S0014,K2_18_S0014,K2_19_S0014,
K2_23_S0014)
K2S0014=mean(K2S0014m)
summary(K2S0014m)
K2S0014m
print(paste("K2_S0014 =",K2S0014))
```

### Determinación del coeficiente Kmính del sector

```{r}
```

```
print(paste("Kmính_13 =",Kmính13_S0014,": Si"))
print(paste("Kmính_14 =",Kmính14_S0014,": No"))
print(paste("Kmính_15 =",Kmính15_S0014,": Si"))
print(paste("Kmính_16 =",Kmính16_S0014,": Si"))
print(paste("Kmính_17 =",Kmính17_S0014,": No"))
print(paste("Kmính_18 =",Kmính18_S0014,": Si"))
print(paste("Kmính_19 =",Kmính19_S0014,": Si"))
print(paste("Kmính_23 =",Kmính23_S0014,": Si"))
```

```{r}
KmínhS0014m=c(Kmính13_S0014,Kmính15_S0014,Kmính16_S0014,Kmính18_S0014,
Kmính19_S0014,Kmính23_S0014)
KmínhS0014=mean(KmínhS0014m)
summary(KmínhS0014m)
KmínhS0014m
print(paste("Kmính_S0014 =",KmínhS0014))
```

## Estación S0015 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0015H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0015H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0015H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0015H13max=S0015H[1:24,6]
S0015H13min=S0015H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=160,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=150,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0015H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0015=94.8334074523288
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0015,lwd="4",col="red")
abline(h=max(S0015H13max),lwd="3",col="black",lty=2)
abline(h=min(S0015H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0015=max(S0015H13max)
K2_13_S0015=Qmax13_S0015/Qp13_S0015
print(paste("K2 =",K2_13_S0015))
```

```{r}
plot(Hora,S0015H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0015,lwd="4",col="red")
abline(h=max(S0015H13min),lwd="3",col="black",lty=2)
abline(h=min(S0015H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0015=min(S0015H13min)
Kmính13_S0015=Qminh13_S0015/Qp13_S0015
```

```
print(paste("Kmính =",Kmính13_S0015))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0015H14max=S0015H[1:24,10]
S0015H14min=S0015H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=160,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=150,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0015H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0015=95.4051095982466
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0015,lwd="4",col="red")
abline(h=max(S0015H14max),lwd="3",col="black",lty=2)
abline(h=min(S0015H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0015=max(S0015H14max)
K2_14_S0015=Qmax14_S0015/Qp14_S0015
print(paste("K2 =",K2_14_S0015))
```

```{r}
plot(Hora,S0015H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0015,lwd="4",col="red")
abline(h=max(S0015H14min),lwd="3",col="black",lty=2)
abline(h=min(S0015H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0015=min(S0015H14min)
Kmính14_S0015=Qminh14_S0015/Qp14_S0015
print(paste("Kmính =",Kmính14_S0015))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0015H15max=S0015H[1:24,14]
S0015H15min=S0015H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=158,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0015H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
Qp15_S0015=99.5504468186301
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0015,lwd="4",col="red")
abline(h=max(S0015H15max),lwd="3",col="black",lty=2)
abline(h=min(S0015H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0015=max(S0015H15max)
K2_15_S0015=Qmax15_S0015/Qp15_S0015
print(paste("K2 =",K2_15_S0015))
```

```{r}
plot(Hora,S0015H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0015,lwd="4",col="red")
abline(h=max(S0015H15min),lwd="3",col="black",lty=2)
abline(h=min(S0015H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0015=min(S0015H15min)
Kmính15_S0015=Qminh15_S0015/Qp15_S0015
print(paste("Kmính =",Kmính15_S0015))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0015H16max=S0015H[1:24,18]
S0015H16min=S0015H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=173,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=163,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0015H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0015=101.796695616831
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0015,lwd="4",col="red")
abline(h=max(S0015H16max),lwd="3",col="black",lty=2)
abline(h=min(S0015H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0015=max(S0015H16max)
K2_16_S0015=Qmax16_S0015/Qp16_S0015
print(paste("K2 =",K2_16_S0015))
```

```{r}
plot(Hora,S0015H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0015,lwd="4",col="red")
abline(h=max(S0015H16min),lwd="3",col="black",lty=2)
abline(h=min(S0015H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0015=min(S0015H16min)
Kmính16_S0015=Qminh16_S0015/Qp16_S0015
print(paste("Kmính =",Kmính16_S0015))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0015H17max=S0015H[1:24,22]
S0015H17min=S0015H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=153,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0015H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0015=91.4126393167397
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0015,lwd="4",col="red")
abline(h=max(S0015H17max),lwd="3",col="black",lty=2)
abline(h=min(S0015H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0015=max(S0015H17max)
K2_17_S0015=Qmax17_S0015/Qp17_S0015
print(paste("K2 =",K2_17_S0015))
```

```{r}
plot(Hora,S0015H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0015,lwd="4",col="red")
abline(h=max(S0015H17min),lwd="3",col="black",lty=2)
abline(h=min(S0015H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0015=min(S0015H17min)
Kmính17_S0015=Qminh17_S0015/Qp17_S0015
print(paste("Kmính =",Kmính17_S0015))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0015H18max=S0015H[1:24,26]
S0015H18min=S0015H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```
```

```{r}
plot(Hora,S0015H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0015=92.7854060943562
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0015,lwd="4",col="red")
abline(h=max(S0015H18max),lwd="3",col="black",lty=2)
abline(h=min(S0015H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0015=max(S0015H18max)
K2_18_S0015=Qmax18_S0015/Qp18_S0015
print(paste("K2 =",K2_18_S0015))
```

```{r}
plot(Hora,S0015H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0015,lwd="4",col="red")
abline(h=max(S0015H18min),lwd="3",col="black",lty=2)
abline(h=min(S0015H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0015=min(S0015H18min)
Kmính18_S0015=Qminh18_S0015/Qp18_S0015
print(paste("Kmính =",Kmính18_S0015))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0015H19max=S0015H[1:24,30]
S0015H19min=S0015H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=149,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=139,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0015H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0015=96.4271258887945
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0015,lwd="4",col="red")
abline(h=max(S0015H19max),lwd="3",col="black",lty=2)
abline(h=min(S0015H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0015=max(S0015H19max)
K2_19_S0015=Qmax19_S0015/Qp19_S0015
print(paste("K2 =",K2_19_S0015))
```

```{r}
plot(Hora,S0015H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0015H19min),lwd="4",col="red")
abline(h=max(S0015H19min),lwd="3",col="black",lty=2)
abline(h=min(S0015H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0015=min(S0015H19min)
Kmính19_S0015=Qminh19_S0015/Qp19_S0015
print(paste("Kmính =",Kmính19_S0015))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0015H23max=S0015H[1:24,46]
S0015H23min=S0015H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0015H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0015 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0015H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=155,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=145,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0015H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0015=99.0203758116986
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0015,lwd="4",col="red")
abline(h=max(S0015H23max),lwd="3",col="black",lty=2)
abline(h=min(S0015H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0015=max(S0015H23max)
K2_23_S0015=Qmax23_S0015/Qp23_S0015
print(paste("K2 =",K2_23_S0015))
```

```{r}
plot(Hora,S0015H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0015 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0015H23min),lwd="4",col="red")
abline(h=max(S0015H23min),lwd="3",col="black",lty=2)
abline(h=min(S0015H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0015=min(S0015H23min)
Kmính23_S0015=Qminh23_S0015/Qp23_S0015
print(paste("Kmính =",Kmính23_S0015))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0015,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0015,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0015,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0015,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0015,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0015,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0015,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0015,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0015,": Si"))
print(paste("K2_14 =",K2_14_S0015,": Si"))
print(paste("K2_15 =",K2_15_S0015,": Si"))
print(paste("K2_16 =",K2_16_S0015,": No"))
print(paste("K2_17 =",K2_17_S0015,": Si"))
print(paste("K2_18 =",K2_18_S0015,": Si"))
print(paste("K2_19 =",K2_19_S0015,": Si"))
print(paste("K2_23 =",K2_23_S0015,": Si"))
```

```{r}
K2S0015m=c(K2_13_S0015,K2_14_S0015,K2_15_S0015,K2_17_S0015,K2_18_S0015,
K2_19_S0015,K2_23_S0015)
K2S0015=mean(K2S0015m)
summary(K2S0015m)
K2S0015m
print(paste("K2_S0015 =",K2S0015))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0015,": Si"))
print(paste("Kmính_14 =",Kmính14_S0015,": Si"))
print(paste("Kmính_15 =",Kmính15_S0015,": Si"))
print(paste("Kmính_16 =",Kmính16_S0015,": No"))
print(paste("Kmính_17 =",Kmính17_S0015,": Si"))
print(paste("Kmính_18 =",Kmính18_S0015,": Si"))
print(paste("Kmính_19 =",Kmính19_S0015,": Si"))
print(paste("Kmính_23 =",Kmính23_S0015,": Si"))
```

```{r}
KmínhS0015m=c(Kmính13_S0015,Kmính14_S0015,Kmính15_S0015,Kmính17_S0015,
Kmính18_S0015,Kmính19_S0015,Kmính23_S0015)
KmínhS0015=mean(KmínhS0015m)
summary(KmínhS0015m)
KmínhS0015m
print(paste("Kmính =",KmínhS0015))
```

## Estación S0016 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0016H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0016H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0016H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0016H13max=S0016H[1:24,6]
S0016H13min=S0016H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=54,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=51,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0016=31.6776251209315
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0016,lwd="4",col="red")
abline(h=max(S0016H13max),lwd="3",col="black",lty=2)
abline(h=min(S0016H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
```

```
# Cálculo del coeficiente K2
Qmax13_S0016=max(S0016H13max)
K2_13_S0016=Qmax13_S0016/Qp13_S0016
print(paste("K2 =",K2_13_S0016))
```

```{r}
plot(Hora,S0016H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0016,lwd="4",col="red")
abline(h=max(S0016H13min),lwd="3",col="black",lty=2)
abline(h=min(S0016H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0016=min(S0016H13min)
Kmính13_S0016=Qminh13_S0016/Qp13_S0016
print(paste("Kmính =",Kmính13_S0016))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0016H14max=S0016H[1:24,10]
S0016H14min=S0016H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=54.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=51.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0016=34.2206671854521
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0016,lwd="4",col="red")
abline(h=max(S0016H14max),lwd="3",col="black",lty=2)
abline(h=min(S0016H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0016=max(S0016H14max)
K2_14_S0016=Qmax14_S0016/Qp14_S0016
print(paste("K2 =",K2_14_S0016))
```

```{r}
plot(Hora,S0016H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0016,lwd="4",col="red")
abline(h=max(S0016H14min),lwd="3",col="black",lty=2)
abline(h=min(S0016H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0016=min(S0016H14min)
Kmính14_S0016=Qminh14_S0016/Qp14_S0016
print(paste("Kmính =",Kmính14_S0016))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0016H15max=S0016H[1:24,14]
S0016H15min=S0016H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=53.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0016=37.390026358411
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0016,lwd="4",col="red")
abline(h=max(S0016H15max),lwd="3",col="black",lty=2)
abline(h=min(S0016H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0016=max(S0016H15max)
K2_15_S0016=Qmax15_S0016/Qp15_S0016
print(paste("K2 =",K2_15_S0016))
```

```{r}
plot(Hora,S0016H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0016,lwd="4",col="red")
abline(h=max(S0016H15min),lwd="3",col="black",lty=2)
abline(h=min(S0016H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0016=min(S0016H15min)
Kmính15_S0016=Qminh15_S0016/Qp15_S0016
print(paste("Kmính =",Kmính15_S0016))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0016H16max=S0016H[1:24,18]
S0016H16min=S0016H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=53,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0016=39.6207699268852
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0016,lwd="4",col="red")
abline(h=max(S0016H16max),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0016H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0016=max(S0016H16max)
K2_16_S0016=Qmax16_S0016/Qp16_S0016
print(paste("K2 =",K2_16_S0016))
```

```{r}
plot(Hora,S0016H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0016,lwd="4",col="red")
abline(h=max(S0016H16min),lwd="3",col="black",lty=2)
abline(h=min(S0016H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0016=min(S0016H16min)
Kmính16_S0016=Qminh16_S0016/Qp16_S0016
print(paste("Kmính =",Kmính16_S0016))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0016H17max=S0016H[1:24,22]
S0016H17min=S0016H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=53.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0016=35.6679384808219
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0016,lwd="4",col="red")
abline(h=max(S0016H17max),lwd="3",col="black",lty=2)
abline(h=min(S0016H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0016=max(S0016H17max)
K2_17_S0016=Qmax17_S0016/Qp17_S0016
print(paste("K2 =",K2_17_S0016))
```

```{r}
plot(Hora,S0016H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0016,lwd="4",col="red")
abline(h=max(S0016H17min),lwd="3",col="black",lty=2)
abline(h=min(S0016H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
```

```
Qminh17_S0016=min(S0016H17min)
Kmính17_S0016=Qminh17_S0016/Qp17_S0016
print(paste("Kmính =",Kmính17_S0016))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0016H18max=S0016H[1:24,26]
S0016H18min=S0016H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=54.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=51.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0016=36.221409906
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0016,lwd="4",col="red")
abline(h=max(S0016H18max),lwd="3",col="black",lty=2)
abline(h=min(S0016H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0016=max(S0016H18max)
K2_18_S0016=Qmax18_S0016/Qp18_S0016
print(paste("K2 =",K2_18_S0016))
```

```{r}
plot(Hora,S0016H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0016,lwd="4",col="red")
abline(h=max(S0016H18min),lwd="3",col="black",lty=2)
abline(h=min(S0016H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0016=min(S0016H18min)
Kmính18_S0016=Qminh18_S0016/Qp18_S0016
print(paste("Kmính =",Kmính18_S0016))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0016H19max=S0016H[1:24,30]
S0016H19min=S0016H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=59,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=55,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2019 (Día de máximo consumo)",
```

```
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0016=36.3568870702466
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0016,lwd="4",col="red")
abline(h=max(S0016H19max),lwd="3",col="black",lty=2)
abline(h=min(S0016H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0016=max(S0016H19max)
K2_19_S0016=Qmax19_S0016/Qp19_S0016
print(paste("K2 =",K2_19_S0016))
```

```{r}
plot(Hora,S0016H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0016,lwd="4",col="red")
abline(h=max(S0016H19min),lwd="3",col="black",lty=2)
abline(h=min(S0016H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0016=min(S0016H19min)
Kmính19_S0016=Qminh19_S0016/Qp19_S0016
print(paste("Kmính =",Kmính19_S0016))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0016H23max=S0016H[1:24,46]
S0016H23min=S0016H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0016H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0016 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0016H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=55.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=51.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0016H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0016=33.8261473553973
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0016,lwd="4",col="red")
abline(h=max(S0016H23max),lwd="3",col="black",lty=2)
abline(h=min(S0016H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0016=max(S0016H23max)
K2_23_S0016=Qmax23_S0016/Qp23_S0016
print(paste("K2 =",K2_23_S0016))
```

```{r}
plot(Hora,S0016H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0016 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0016,lwd="4",col="red")
abline(h=max(S0016H23min),lwd="3",col="black",lty=2)
abline(h=min(S0016H23min),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0016=min(S0016H23min)
Kmính23_S0016=Qminh23_S0016/Qp23_S0016
print(paste("Kmính =",Kmính23_S0016))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0016,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0016,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0016,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0016,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0016,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0016,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0016,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0016,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0016,": Si"))
print(paste("K2_14 =",K2_14_S0016,": No"))
print(paste("K2_15 =",K2_15_S0016,": No"))
print(paste("K2_16 =",K2_16_S0016,": No"))
print(paste("K2_17 =",K2_17_S0016,": No"))
print(paste("K2_18 =",K2_18_S0016,": Si"))
print(paste("K2_19 =",K2_19_S0016,": Si"))
print(paste("K2_23 =",K2_23_S0016,": Si"))
```

```{r}
K2S0016m=c(K2_13_S0016,K2_18_S0016,K2_19_S0016,K2_23_S0016)
K2S0016=mean(K2S0016m)
summary(K2S0016m)
K2S0016m
print(paste("K2_S0016 =",K2S0016))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0016,": Si"))
print(paste("Kmính_14 =",Kmính14_S0016,": No"))
print(paste("Kmính_15 =",Kmính15_S0016,": No"))
print(paste("Kmính_16 =",Kmính16_S0016,": No"))
print(paste("Kmính_17 =",Kmính17_S0016,": No"))
print(paste("Kmính_18 =",Kmính18_S0016,": Si"))
print(paste("Kmính_19 =",Kmính19_S0016,": Si"))
print(paste("Kmính_23 =",Kmính23_S0016,": Si"))
```

```{r}
KmínhS0016m=c(Kmính13_S0016,Kmính18_S0016,Kmính19_S0016,Kmính23_S0016)
KmínhS0016=mean(KmínhS0016m)
summary(KmínhS0016m)
KmínhS0016m
print(paste("Kmính_S0016 =",KmínhS0016))
```

## Estación S0017 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0017H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0017H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0017H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0017H13max=S0017H[1:24,6]
S0017H13min=S0017H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H13min),color="blue",lwd=1.2)+
```

```
geom_text(aes(x=3,y=147.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=139,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0017=86.8813909278082
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0017,lwd="4",col="red")
abline(h=max(S0017H13max),lwd="3",col="black",lty=2)
abline(h=min(S0017H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0017=max(S0017H13max)
K2_13_S0017=Qmax13_S0017/Qp13_S0017
print(paste("K2 =",K2_13_S0017))
```

```{r}
plot(Hora,S0017H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0017,lwd="4",col="red")
abline(h=max(S0017H13min),lwd="3",col="black",lty=2)
abline(h=min(S0017H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0017=min(S0017H13min)
Kmính13_S0017=Qminh13_S0017/Qp13_S0017
print(paste("Kmính =",Kmính13_S0017))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0017H14max=S0017H[1:24,10]
S0017H14min=S0017H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=135,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=126,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0017=90.8110282732055
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0017,lwd="4",col="red")
abline(h=max(S0017H14max),lwd="3",col="black",lty=2)
abline(h=min(S0017H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0017=max(S0017H14max)
K2_14_S0017=Qmax14_S0017/Qp14_S0017
print(paste("K2 =",K2_14_S0017))
```

```{r}
```

```
plot(Hora,S0017H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0017,lwd="4",col="red")
abline(h=max(S0017H14min),lwd="3",col="black",lty=2)
abline(h=min(S0017H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0017=min(S0017H14min)
Kmính14_S0017=Qminh14_S0017/Qp14_S0017
print(paste("Kmính =",Kmính14_S0017))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0017H15max=S0017H[1:24,14]
S0017H15min=S0017H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=135,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=126,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0017=90.0232927999178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0017,lwd="4",col="red")
abline(h=max(S0017H15max),lwd="3",col="black",lty=2)
abline(h=min(S0017H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0017=max(S0017H15max)
K2_15_S0017=Qmax15_S0017/Qp15_S0017
print(paste("K2 =",K2_15_S0017))
```

```{r}
plot(Hora,S0017H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0017,lwd="4",col="red")
abline(h=max(S0017H15min),lwd="3",col="black",lty=2)
abline(h=min(S0017H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0017=min(S0017H15min)
Kmính15_S0017=Qminh15_S0017/Qp15_S0017
print(paste("Kmính =",Kmính15_S0017))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0017H16max=S0017H[1:24,18]
S0017H16min=S0017H[1:24,20]
```

```{r}
```

```
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=132,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=124,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0017=89.8092967379235
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0017,lwd="4",col="red")
abline(h=max(S0017H16max),lwd="3",col="black",lty=2)
abline(h=min(S0017H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0017=max(S0017H16max)
K2_16_S0017=Qmax16_S0017/Qp16_S0017
print(paste("K2 =",K2_16_S0017))
```

```{r}
plot(Hora,S0017H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0017,lwd="4",col="red")
abline(h=max(S0017H16min),lwd="3",col="black",lty=2)
abline(h=min(S0017H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0017=min(S0017H16min)
Kmính16_S0017=Qminh16_S0017/Qp16_S0017
print(paste("Kmính =",Kmính16_S0017))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0017H17max=S0017H[1:24,22]
S0017H17min=S0017H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=132.1,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=124.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0017=92.7825644736164
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0017,lwd="4",col="red")
abline(h=max(S0017H17max),lwd="3",col="black",lty=2)
abline(h=min(S0017H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}


```

```
# Cálculo del coeficiente K2
Qmax17_S0017=max(S0017H17max)
K2_17_S0017=Qmax17_S0017/Qp17_S0017
print(paste("K2 =",K2_17_S0017))
```

```{r}
plot(Hora,S0017H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0017,lwd="4",col="red")
abline(h=max(S0017H17min),lwd="3",col="black",lty=2)
abline(h=min(S0017H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0017=min(S0017H17min)
Kmính17_S0017=Qminh17_S0017/Qp17_S0017
print(paste("Kmính =",Kmính17_S0017))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0017H18max=S0017H[1:24,26]
S0017H18min=S0017H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=132.1,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=124.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0017=94.9685039340274
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0017,lwd="4",col="red")
abline(h=max(S0017H18max),lwd="3",col="black",lty=2)
abline(h=min(S0017H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0017=max(S0017H18max)
K2_18_S0017=Qmax18_S0017/Qp18_S0017
print(paste("K2 =",K2_18_S0017))
```

```{r}
plot(Hora,S0017H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0017,lwd="4",col="red")
abline(h=max(S0017H18min),lwd="3",col="black",lty=2)
abline(h=min(S0017H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0017=min(S0017H18min)
Kmính18_S0017=Qminh18_S0017/Qp18_S0017
print(paste("Kmính =",Kmính18_S0017))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0017H19max=S0017H[1:24,30]
S0017H19min=S0017H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0017=94.3653458200274
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0017H19max),lwd="4",col="red")
abline(h=max(S0017H19max),lwd="3",col="black",lty=2)
abline(h=min(S0017H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0017=max(S0017H19max)
K2_19_S0017=Qmax19_S0017/Qp19_S0017
print(paste("K2 =",K2_19_S0017))
```

```{r}
plot(Hora,S0017H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0017,lwd="4",col="red")
abline(h=max(S0017H19min),lwd="3",col="black",lty=2)
abline(h=min(S0017H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0017=min(S0017H19min)
Kmính19_S0017=Qminh19_S0017/Qp19_S0017
print(paste("Kmính =",Kmính19_S0017))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0017H23max=S0017H[1:24,46]
S0017H23min=S0017H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0017H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0017 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0017H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=135.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=127.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0017H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0017=89.2661511815342
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0017H23max),lwd="4",col="red")
abline(h=max(S0017H23max),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0017H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0017=max(S0017H23max)
K2_23_S0017=Qmax23_S0017/Qp23_S0017
print(paste("K2 =",K2_23_S0017))
```

```{r}
plot(Hora,S0017H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0017 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0017,lwd="4",col="red")
abline(h=max(S0017H23min),lwd="3",col="black",lty=2)
abline(h=min(S0017H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0017=min(S0017H23min)
Kmính23_S0017=Qminh23_S0017/Qp23_S0017
print(paste("Kmính =",Kmính23_S0017))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0017,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0017,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0017,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0017,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0017,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0017,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0017,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0017,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0017,": Si"))
print(paste("K2_14 =",K2_14_S0017,": Si"))
print(paste("K2_15 =",K2_15_S0017,": Si"))
print(paste("K2_16 =",K2_16_S0017,": Si"))
print(paste("K2_17 =",K2_17_S0017,": Si"))
print(paste("K2_18 =",K2_18_S0017,": Si"))
print(paste("K2_19 =",K2_19_S0017,": Si"))
print(paste("K2_23 =",K2_23_S0017,": Si"))
```

```{r}
K2S0017m=c(K2_13_S0017,K2_14_S0017,K2_15_S0017,K2_16_S0017,K2_17_S0017,
K2_18_S0017,K2_19_S0017,K2_23_S0017)
K2S0017=mean(K2S0017m)
summary(K2S0017m)
K2S0017m
print(paste("K2_S0017 =",K2S0017))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0017,": Si"))
print(paste("Kmính_14 =",Kmính14_S0017,": Si"))
print(paste("Kmính_15 =",Kmính15_S0017,": Si"))
print(paste("Kmính_16 =",Kmính16_S0017,": Si"))
print(paste("Kmính_17 =",Kmính17_S0017,": Si"))
print(paste("Kmính_18 =",Kmính18_S0017,": Si"))
print(paste("Kmính_19 =",Kmính19_S0017,": Si"))
print(paste("Kmính_23 =",Kmính23_S0017,": Si"))
```

```{r}
KmínhS0017m=c(Kmính13_S0017,Kmính14_S0017,Kmính15_S0017,Kmính16_S0017,
Kmính17_S0017,Kmính18_S0017,Kmính19_S0017,Kmính23_S0017)
KmínhS0017=mean(KmínhS0017m)
summary(KmínhS0017m)
KmínhS0017m
print(paste("Kmính_S0017 =",KmínhS0017))
```

## Estación S0018 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
```

```
S0018H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0018H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0018H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0018H13max=S0018H[1:24,6]
S0018H13min=S0018H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=69,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=65,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0018=47.0100068958356
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0018,lwd="4",col="red")
abline(h=max(S0018H13max),lwd="3",col="black",lty=2)
abline(h=min(S0018H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0018=max(S0018H13max)
K2_13_S0018=Qmax13_S0018/Qp13_S0018
print(paste("K2 =",K2_13_S0018))
```

```{r}
plot(Hora,S0018H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0018,lwd="4",col="red")
abline(h=max(S0018H13min),lwd="3",col="black",lty=2)
abline(h=min(S0018H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0018=min(S0018H13min)
Kmính13_S0018=Qminh13_S0018/Qp13_S0018
print(paste("Kmính =",Kmính13_S0018))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0018H14max=S0018H[1:24,10]
S0018H14min=S0018H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=63,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=59,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0018=40.5318150449589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0018,lwd="4",col="red")
abline(h=max(S0018H14max),lwd="3",col="black",lty=2)
abline(h=min(S0018H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0018=max(S0018H14max)
K2_14_S0018=Qmax14_S0018/Qp14_S0018
print(paste("K2 =",K2_14_S0018))
```

```{r}
plot(Hora,S0018H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0018,lwd="4",col="red")
abline(h=max(S0018H14min),lwd="3",col="black",lty=2)
abline(h=min(S0018H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0018=min(S0018H14min)
Kmính14_S0018=Qminh14_S0018/Qp14_S0018
print(paste("Kmính =",Kmính14_S0018))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0018H15max=S0018H[1:24,14]
S0018H15min=S0018H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=64.9,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=60.9,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0018=41.4234624431233
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0018,lwd="4",col="red")
abline(h=max(S0018H15max),lwd="3",col="black",lty=2)
abline(h=min(S0018H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0018=max(S0018H15max)
K2_15_S0018=Qmax15_S0018/Qp15_S0018
print(paste("K2 =",K2_15_S0018))
```

```{r}
plot(Hora,S0018H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0018,lwd="4",col="red")
abline(h=max(S0018H15min),lwd="3",col="black",lty=2)
abline(h=min(S0018H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0018=min(S0018H15min)
Kmính15_S0018=Qminh15_S0018/Qp15_S0018
print(paste("Kmính =",Kmính15_S0018))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0018H16max=S0018H[1:24,18]
S0018H16min=S0018H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=69.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=65.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0018=44.7304918024863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0018,lwd="4",col="red")
abline(h=max(S0018H16max),lwd="3",col="black",lty=2)
abline(h=min(S0018H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0018=max(S0018H16max)
K2_16_S0018=Qmax16_S0018/Qp16_S0018
print(paste("K2 =",K2_16_S0018))
```

```{r}
plot(Hora,S0018H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0018,lwd="4",col="red")
abline(h=max(S0018H16min),lwd="3",col="black",lty=2)
abline(h=min(S0018H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0018=min(S0018H16min)
Kmính16_S0018=Qminh16_S0018/Qp16_S0018
print(paste("Kmính =",Kmính16_S0018))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0018H17max=S0018H[1:24,22]
S0018H17min=S0018H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
```

```
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=75.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=71.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0018=47.067845584411
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0018,lwd="4",col="red")
abline(h=max(S0018H17max),lwd="3",col="black",lty=2)
abline(h=min(S0018H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0018=max(S0018H17max)
K2_17_S0018=Qmax17_S0018/Qp17_S0018
print(paste("K2 =",K2_17_S0018))
```

```{r}
plot(Hora,S0018H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0018,lwd="4",col="red")
abline(h=max(S0018H17min),lwd="3",col="black",lty=2)
abline(h=min(S0018H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0018=min(S0018H17min)
Kmính17_S0018=Qminh17_S0018/Qp17_S0018
print(paste("Kmính =",Kmính17_S0018))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0018H18max=S0018H[1:24,26]
S0018H18min=S0018H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=78.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=74.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0018=50.2190232898082
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0018,lwd="4",col="red")
abline(h=max(S0018H18max),lwd="3",col="black",lty=2)
abline(h=min(S0018H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0018=max(S0018H18max)
K2_18_S0018=Qmax18_S0018/Qp18_S0018
print(paste("K2 =",K2_18_S0018))
```

```{r}
plot(Hora,S0018H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0018,lwd="4",col="red")
abline(h=max(S0018H18min),lwd="3",col="black",lty=2)
abline(h=min(S0018H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0018=min(S0018H18min)
Kmính18_S0018=Qminh18_S0018/Qp18_S0018
print(paste("Kmính =",Kmính18_S0018))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0018H19max=S0018H[1:24,30]
S0018H19min=S0018H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=76.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=71.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0018=48.6705776876986
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0018,lwd="4",col="red")
abline(h=max(S0018H19max),lwd="3",col="black",lty=2)
abline(h=min(S0018H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0018=max(S0018H19max)
K2_19_S0018=Qmax19_S0018/Qp19_S0018
print(paste("K2 =",K2_19_S0018))
```

```{r}
plot(Hora,S0018H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0018,lwd="4",col="red")
abline(h=max(S0018H19min),lwd="3",col="black",lty=2)
abline(h=min(S0018H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0018=min(S0018H19min)
Kmính19_S0018=Qminh19_S0018/Qp19_S0018
print(paste("Kmính =",Kmính19_S0018))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0018H23max=S0018H[1:24,46]
S0018H23min=S0018H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0018H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0018 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0018H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=65,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=60.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0018H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0018=42.5075596506027
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0018,lwd="4",col="red")
abline(h=max(S0018H23max),lwd="3",col="black",lty=2)
abline(h=min(S0018H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0018=max(S0018H23max)
K2_23_S0018=Qmax23_S0018/Qp23_S0018
print(paste("K2 =",K2_23_S0018))
```

```{r}
plot(Hora,S0018H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0018 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0018,lwd="4",col="red")
abline(h=max(S0018H23min),lwd="3",col="black",lty=2)
abline(h=min(S0018H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0018=min(S0018H23min)
Kmính23_S0018=Qminh23_S0018/Qp23_S0018
print(paste("Kmính =",Kmính23_S0018))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0018,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0018,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0018,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0018,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0018,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0018,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0018,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0018,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0018,": No"))
print(paste("K2_14 =",K2_14_S0018,": Si"))
print(paste("K2_15 =",K2_15_S0018,": No"))
print(paste("K2_16 =",K2_16_S0018,": Si"))
print(paste("K2_17 =",K2_17_S0018,": No"))
print(paste("K2_18 =",K2_18_S0018,": No"))
print(paste("K2_19 =",K2_19_S0018,": Si"))
print(paste("K2_23 =",K2_23_S0018,": Si"))
```

```{r}
K2S0018m=c(K2_14_S0018,K2_16_S0018,K2_19_S0018,K2_23_S0018)
K2S0018=mean(K2S0018m)
summary(K2S0018m)
K2S0018m
print(paste("K2_S0018 =",K2S0018))
```

### Determinación del coeficiente Kmính del sector

```{r}
```

```
print(paste("K2_13 =",K2_13_S0018,": No"))
print(paste("K2_14 =",K2_14_S0018,": Si"))
print(paste("K2_15 =",K2_15_S0018,": No"))
print(paste("K2_16 =",K2_16_S0018,": Si"))
print(paste("K2_17 =",K2_17_S0018,": No"))
print(paste("K2_18 =",K2_18_S0018,": No"))
print(paste("K2_19 =",K2_19_S0018,": Si"))
print(paste("K2_23 =",K2_23_S0018,": Si"))
```

```{r}
KmínhS0018m=c(Kmính14_S0018,Kmính16_S0018,Kmính19_S0018,Kmính23_S0018)
KmínhS0018=mean(KmínhS0018m)
summary(KmínhS0018m)
KmínhS0018m
print(paste("K2_S0018 =",KmínhS0018))
```

## Estación S0019 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0019H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0019H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0019H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0019H13max=S0019H[1:24,6]
S0019H13min=S0019H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=153.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0019=48.9688104349589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0019,lwd="4",col="red")
abline(h=max(S0019H13max),lwd="3",col="black",lty=2)
abline(h=min(S0019H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0019=max(S0019H13max)
K2_13_S0019=Qmax13_S0019/Qp13_S0019
print(paste("K2 =",K2_13_S0019))
```

```{r}
plot(Hora,S0019H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0019,lwd="4",col="red")
abline(h=max(S0019H13min),lwd="3",col="black",lty=2)
abline(h=min(S0019H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0019=min(S0019H13min)
Kmính13_S0019=Qminh13_S0019/Qp13_S0019
print(paste("Kmính =",Kmính13_S0019))
```

```
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0019H14max=S0019H[1:24,10]
S0019H14min=S0019H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0019=43.5835679481918
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0019,lwd="4",col="red")
abline(h=max(S0019H14max),lwd="3",col="black",lty=2)
abline(h=min(S0019H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0019=max(S0019H14max)
K2_14_S0019=Qmax14_S0019/Qp14_S0019
print(paste("K2 =",K2_14_S0019))
```

```{r}
plot(Hora,S0019H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0019,lwd="4",col="red")
abline(h=max(S0019H14min),lwd="3",col="black",lty=2)
abline(h=min(S0019H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0019=min(S0019H14min)
Kmính14_S0019=Qminh14_S0019/Qp14_S0019
print(paste("Kmính =",Kmính14_S0019))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0019H15max=S0019H[1:24,14]
S0019H15min=S0019H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=69,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=65,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0019=41.8334670196712
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0019,lwd="4",col="red")
abline(h=max(S0019H15max),lwd="3",col="black",lty=2)
abline(h=min(S0019H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0019=max(S0019H15max)
K2_15_S0019=Qmax15_S0019/Qp15_S0019
print(paste("K2 =",K2_15_S0019))
```

```{r}
plot(Hora,S0019H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0019,lwd="4",col="red")
abline(h=max(S0019H15min),lwd="3",col="black",lty=2)
abline(h=min(S0019H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0019=min(S0019H15min)
Kmính15_S0019=Qminh15_S0019/Qp15_S0019
print(paste("Kmính =",Kmính15_S0019))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0019H16max=S0019H[1:24,18]
S0019H16min=S0019H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=58.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0019=37.9938841392623
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0019,lwd="4",col="red")
abline(h=max(S0019H16max),lwd="3",col="black",lty=2)
abline(h=min(S0019H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0019=max(S0019H16max)
K2_16_S0019=Qmax16_S0019/Qp16_S0019
print(paste("K2 =",K2_16_S0019))
```

```{r}
plot(Hora,S0019H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0019,lwd="4",col="red")
abline(h=max(S0019H16min),lwd="3",col="black",lty=2)
abline(h=min(S0019H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0019=min(S0019H16min)
Kmính16_S0019=Qminh16_S0019/Qp16_S0019
print(paste("Kmính =",Kmính16_S0019))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0019H17max=S0019H[1:24,22]
S0019H17min=S0019H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0019=39.8449473287671
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0019,lwd="4",col="red")
abline(h=max(S0019H17max),lwd="3",col="black",lty=2)
abline(h=min(S0019H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0019=max(S0019H17max)
K2_17_S0019=Qmax17_S0019/Qp17_S0019
print(paste("K2 =",K2_17_S0019))
```

```{r}
plot(Hora,S0019H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0019,lwd="4",col="red")
abline(h=max(S0019H17min),lwd="3",col="black",lty=2)
abline(h=min(S0019H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0019=min(S0019H17min)
Kmính17_S0019=Qminh17_S0019/Qp17_S0019
print(paste("Kmính =",Kmính17_S0019))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0019H18max=S0019H[1:24,26]
S0019H18min=S0019H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=58.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0019=40.3160292950411
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0019,lwd="4",col="red")
abline(h=max(S0019H18max),lwd="3",col="black",lty=2)
abline(h=min(S0019H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0019=max(S0019H18max)
K2_18_S0019=Qmax18_S0019/Qp18_S0019
print(paste("K2 =",K2_18_S0019))
```

```{r}
plot(Hora,S0019H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0019,lwd="4",col="red")
abline(h=max(S0019H18min),lwd="3",col="black",lty=2)
abline(h=min(S0019H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0019=min(S0019H18min)
Kmính18_S0019=Qminh18_S0019/Qp18_S0019
print(paste("Kmính =",Kmính18_S0019))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0019H19max=S0019H[1:24,30]
S0019H19min=S0019H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=58.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0019=40.3507942309863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0019H19max),lwd="4",col="red")
abline(h=max(S0019H19max),lwd="3",col="black",lty=2)
abline(h=min(S0019H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0019=max(S0019H19max)
K2_19_S0019=Qmax19_S0019/Qp19_S0019
print(paste("K2 =",K2_19_S0019))
```

```{r}
plot(Hora,S0019H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0019,lwd="4",col="red")
abline(h=max(S0019H19min),lwd="3",col="black",lty=2)
abline(h=min(S0019H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0019=min(S0019H19min)
Kmính19_S0019=Qminh19_S0019/Qp19_S0019
print(paste("Kmính =",Kmính19_S0019))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0019H23max=S0019H[1:24,46]
S0019H23min=S0019H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0019H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0019 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0019H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=58.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=54.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0019H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0019=38.1543518192055
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=mean(S0019H23max),lwd="4",col="red")
abline(h=max(S0019H23max),lwd="3",col="black",lty=2)
abline(h=min(S0019H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0019=max(S0019H23max)
K2_23_S0019=Qmax23_S0019/Qp23_S0019
print(paste("K2 =",K2_23_S0019))
```

```{r}
plot(Hora,S0019H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0019 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0019,lwd="4",col="red")
abline(h=max(S0019H23min),lwd="3",col="black",lty=2)
abline(h=min(S0019H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0019=min(S0019H23min)
Kmính23_S0019=Qminh23_S0019/Qp23_S0019
print(paste("Kmính =",Kmính23_S0019))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0019,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0019,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0019,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0019,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0019,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0019,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0019,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0019,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0019,": No"))
print(paste("K2_14 =",K2_14_S0019,": Si"))
print(paste("K2_15 =",K2_15_S0019,": Si"))
print(paste("K2_16 =",K2_16_S0019,": Si"))
print(paste("K2_17 =",K2_17_S0019,": Si"))
print(paste("K2_18 =",K2_18_S0019,": Si"))
print(paste("K2_19 =",K2_19_S0019,": Si"))
print(paste("K2_23 =",K2_23_S0019,": Si"))
```

```{r}
K2S0019m=c(K2_14_S0019,K2_15_S0019,K2_16_S0019,K2_17_S0019,K2_18_S0019,
K2_19_S0019,K2_23_S0019)
K2S0019=mean(K2S0019m)
summary(K2S0019m)
K2S0019m
print(paste("K2_S0019 =",K2S0019))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0019,": No"))
print(paste("Kmính_14 =",Kmính14_S0019,": Si"))
print(paste("Kmính_15 =",Kmính15_S0019,": Si"))
print(paste("Kmính_16 =",Kmính16_S0019,": Si"))
print(paste("Kmính_17 =",Kmính17_S0019,": Si"))
print(paste("Kmính_18 =",Kmính18_S0019,": Si"))
print(paste("Kmính_19 =",Kmính19_S0019,": Si"))
print(paste("Kmính_23 =",Kmính23_S0019,": Si"))
```

```{r}
KmínhS0019m=c(Kmính14_S0019,Kmính15_S0019,Kmính16_S0019,Kmính17_S0019,
Kmính18_S0019,Kmính19_S0019,Kmính23_S0019)
KmínhS0019=mean(KmínhS0019m)
summary(KmínhS0019m)
KmínhS0019m
print(paste("Kmính_S0019 =",KmínhS0019))
```

## Estación S0028 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0028H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0028H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0028H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0028H13max=S0028H[1:24,6]
S0028H13min=S0028H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=271.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=256.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0028=148.604462020822
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0028,lwd="4",col="red")
abline(h=max(S0028H13max),lwd="3",col="black",lty=2)
abline(h=min(S0028H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
```

```
Qmax13_S0028=max(S0028H13max)
K2_13_S0028=Qmax13_S0028/Qp13_S0028
print(paste("K2 =",K2_13_S0028))
```

```{r}
plot(Hora,S0028H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0028,lwd="4",col="red")
abline(h=max(S0028H13min),lwd="3",col="black",lty=2)
abline(h=min(S0028H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0028=min(S0028H13min)
Kmính13_S0028=Qminh13_S0028/Qp13_S0028
print(paste("Kmính =",Kmính13_S0028))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0028H14max=S0028H[1:24,10]
S0028H14min=S0028H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=193,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=183,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0028=134.52110907589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0028,lwd="4",col="red")
abline(h=max(S0028H14max),lwd="3",col="black",lty=2)
abline(h=min(S0028H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0028=max(S0028H14max)
K2_14_S0028=Qmax14_S0028/Qp14_S0028
print(paste("K2 =",K2_14_S0028))
```

```{r}
plot(Hora,S0028H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0028,lwd="4",col="red")
abline(h=max(S0028H14min),lwd="3",col="black",lty=2)
abline(h=min(S0028H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0028=min(S0028H14min)
Kmính14_S0028=Qminh14_S0028/Qp14_S0028
print(paste("Kmính =",Kmính14_S0028))
```

### Extracción y análisis de datos del año 2015

```{r}


```

```
Hora=c(00:23)
S0028H15max=S0028H[1:24,14]
S0028H15min=S0028H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=193.1,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=183.1,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0028=139.195305203014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0028,lwd="4",col="red")
abline(h=max(S0028H15max),lwd="3",col="black",lty=2)
abline(h=min(S0028H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0028=max(S0028H15max)
K2_15_S0028=Qmax15_S0028/Qp15_S0028
print(paste("K2 =",K2_15_S0028))
```

```{r}
plot(Hora,S0028H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0028,lwd="4",col="red")
abline(h=max(S0028H15min),lwd="3",col="black",lty=2)
abline(h=min(S0028H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0028=min(S0028H15min)
Kmính15_S0028=Qminh15_S0028/Qp15_S0028
print(paste("Kmính =",Kmính15_S0028))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0028H16max=S0028H[1:24,18]
S0028H16min=S0028H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=218,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=208,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0028=145.356648277322
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0028,lwd="4",col="red")
abline(h=max(S0028H16max),lwd="3",col="black",lty=2)
abline(h=min(S0028H16max),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0028=max(S0028H16max)
K2_16_S0028=Qmax16_S0028/Qp16_S0028
print(paste("K2 =",K2_16_S0028))
```

```{r}
plot(Hora,S0028H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0028,lwd="4",col="red")
abline(h=max(S0028H16min),lwd="3",col="black",lty=2)
abline(h=min(S0028H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0028=min(S0028H16min)
Kmính16_S0028=Qminh16_S0028/Qp16_S0028
print(paste("Kmính =",Kmính16_S0028))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0028H17max=S0028H[1:24,22]
S0028H17min=S0028H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=218.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=208.1,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0028=143.798623120822
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0028,lwd="4",col="red")
abline(h=max(S0028H17max),lwd="3",col="black",lty=2)
abline(h=min(S0028H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0028=max(S0028H17max)
K2_17_S0028=Qmax17_S0028/Qp17_S0028
print(paste("K2 =",K2_17_S0028))
```

```{r}
plot(Hora,S0028H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0028,lwd="4",col="red")
abline(h=max(S0028H17min),lwd="3",col="black",lty=2)
abline(h=min(S0028H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0028=min(S0028H17min)
```

```
Kmính17_S0028=Qminh17_S0028/Qp17_S0028
print(paste("Kmính =",Kmính17_S0028))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0028H18max=S0028H[1:24,26]
S0028H18min=S0028H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=209,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=198,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0028=148.096813115068
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0028,lwd="4",col="red")
abline(h=max(S0028H18max),lwd="3",col="black",lty=2)
abline(h=min(S0028H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0028=max(S0028H18max)
K2_18_S0028=Qmax18_S0028/Qp18_S0028
print(paste("K2 =",K2_18_S0028))
```

```{r}
plot(Hora,S0028H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0028,lwd="4",col="red")
abline(h=max(S0028H18min),lwd="3",col="black",lty=2)
abline(h=min(S0028H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0028=min(S0028H18min)
Kmính18_S0028=Qminh18_S0028/Qp18_S0028
print(paste("Kmính =",Kmính18_S0028))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0028H19max=S0028H[1:24,30]
S0028H19min=S0028H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=219,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=208,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
Qp19_S0028=146.770244693425
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0028,lwd="4",col="red")
abline(h=max(S0028H19max),lwd="3",col="black",lty=2)
abline(h=min(S0028H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0028=max(S0028H19max)
K2_19_S0028=Qmax19_S0028/Qp19_S0028
print(paste("K2 =",K2_19_S0028))
```

```{r}
plot(Hora,S0028H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0028,lwd="4",col="red")
abline(h=max(S0028H19min),lwd="3",col="black",lty=2)
abline(h=min(S0028H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0028=min(S0028H19min)
Kmính19_S0028=Qminh19_S0028/Qp19_S0028
print(paste("Kmính =",Kmính19_S0028))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0028H23max=S0028H[1:24,46]
S0028H23min=S0028H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0028H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0028 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0028H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=194,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=183,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0028H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0028=133.467698414795
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0028,lwd="4",col="red")
abline(h=max(S0028H23max),lwd="3",col="black",lty=2)
abline(h=min(S0028H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0028=max(S0028H23max)
K2_23_S0028=Qmax23_S0028/Qp23_S0028
print(paste("K2 =",K2_23_S0028))
```

```{r}
plot(Hora,S0028H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0028 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0028,lwd="4",col="red")
abline(h=max(S0028H23min),lwd="3",col="black",lty=2)
abline(h=min(S0028H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0028=min(S0028H23min)
Kmính23_S0028=Qminh23_S0028/Qp23_S0028
print(paste("Kmính =",Kmính23_S0028))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0028,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0028,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0028,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0028,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0028,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0028,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0028,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0028,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0028,": No"))
print(paste("K2_14 =",K2_14_S0028,": Si"))
print(paste("K2_15 =",K2_15_S0028,": Si"))
print(paste("K2_16 =",K2_16_S0028,": Si"))
print(paste("K2_17 =",K2_17_S0028,": Si"))
print(paste("K2_18 =",K2_18_S0028,": Si"))
print(paste("K2_19 =",K2_19_S0028,": Si"))
print(paste("K2_23 =",K2_23_S0028,": Si"))
```

```{r}
K2S0028m=c(K2_14_S0028,K2_15_S0028,K2_16_S0028,K2_17_S0028,K2_18_S0028,
K2_19_S0028,K2_23_S0028)
K2S0028=mean(K2S0028m)
summary(K2S0028m)
K2S0028m
print(paste("K2_S0028 =",K2S0028))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0028,": No"))
print(paste("Kmính_14 =",Kmính14_S0028,": Si"))
print(paste("Kmính_15 =",Kmính15_S0028,": Si"))
print(paste("Kmính_16 =",Kmính16_S0028,": Si"))
print(paste("Kmính_17 =",Kmính17_S0028,": Si"))
print(paste("Kmính_18 =",Kmính18_S0028,": Si"))
print(paste("Kmính_19 =",Kmính19_S0028,": Si"))
print(paste("Kmính_23 =",Kmính23_S0028,": Si"))
```

```{r}
KmínhS0028m=c(Kmính14_S0028,Kmính15_S0028,Kmính16_S0028,Kmính17_S0028,
Kmính18_S0028,Kmính19_S0028,Kmính23_S0028)
KmínhS0028=mean(KmínhS0028m)
summary(KmínhS0028m)
KmínhS0028m
print(paste("Kmính_S0028 =",KmínhS0028))
```

## Estación S0029 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0029H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0029H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0029H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0029H13max=S0029H[1:24,6]
S0029H13min=S0029H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0029H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=155,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=146,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0029=105.118086060658
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0029,lwd="4",col="red")
abline(h=max(S0029H13max),lwd="3",col="black",lty=2)
abline(h=min(S0029H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0029=max(S0029H13max)
K2_13_S0029=Qmax13_S0029/Qp13_S0029
print(paste("K2 =",K2_13_S0029))
```

```{r}
plot(Hora,S0029H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0029,lwd="4",col="red")
abline(h=max(S0029H13min),lwd="3",col="black",lty=2)
abline(h=min(S0029H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0029=min(S0029H13min)
Kmính13_S0029=Qminh13_S0029/Qp13_S0029
print(paste("Kmính =",Kmính13_S0029))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0029H14max=S0029H[1:24,10]
S0029H14min=S0029H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0029H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=147,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=138.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0029=105.645909204356
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0029,lwd="4",col="red")
abline(h=max(S0029H14max),lwd="3",col="black",lty=2)
abline(h=min(S0029H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0029=max(S0029H14max)
K2_14_S0029=Qmax14_S0029/Qp14_S0029
print(paste("K2 =",K2_14_S0029))
```

```{r}
plot(Hora,S0029H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0029,lwd="4",col="red")
abline(h=max(S0029H14min),lwd="3",col="black",lty=2)
abline(h=min(S0029H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0029=min(S0029H14min)
Kmính14_S0029=Qminh14_S0029/Qp14_S0029
print(paste("Kmính =",Kmính14_S0029))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0029H15max=S0029H[1:24,14]
S0029H15min=S0029H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0029H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=160.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=152.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0029=111.733758604822
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0029,lwd="4",col="red")
abline(h=max(S0029H15max),lwd="3",col="black",lty=2)
abline(h=min(S0029H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0029=max(S0029H15max)
K2_15_S0029=Qmax15_S0029/Qp15_S0029
print(paste("K2 =",K2_15_S0029))
```

```{r}
plot(Hora,S0029H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0029,lwd="4",col="red")
abline(h=max(S0029H15min),lwd="3",col="black",lty=2)
abline(h=min(S0029H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0029=min(S0029H15min)
Kmính15_S0029=Qminh15_S0029/Qp15_S0029
print(paste("Kmính =",Kmính15_S0029))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0029H16max=S0029H[1:24,18]
S0029H16min=S0029H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0029H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=157,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=148,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0029=103.979007011339
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0029,lwd="4",col="red")
abline(h=max(S0029H16max),lwd="3",col="black",lty=2)
abline(h=min(S0029H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0029=max(S0029H16max)
K2_16_S0029=Qmax16_S0029/Qp16_S0029
print(paste("K2 =",K2_16_S0029))
```

```{r}
plot(Hora,S0029H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0029,lwd="4",col="red")
abline(h=max(S0029H16min),lwd="3",col="black",lty=2)
abline(h=min(S0029H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0029=min(S0029H16min)
Kmính16_S0029=Qminh16_S0029/Qp16_S0029
print(paste("Kmính =",Kmính16_S0029))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0029H17max=S0029H[1:24,22]
S0029H17min=S0029H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0029H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=147.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=138.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0029=96.158490209589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0029,lwd="4",col="red")
abline(h=max(S0029H17max),lwd="3",col="black",lty=2)
abline(h=min(S0029H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0029=max(S0029H17max)
K2_17_S0029=Qmax17_S0029/Qp17_S0029
print(paste("K2 =",K2_17_S0029))
```

```{r}
plot(Hora,S0029H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0029,lwd="4",col="red")
abline(h=max(S0029H17min),lwd="3",col="black",lty=2)
abline(h=min(S0029H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0029=min(S0029H17min)
Kmính17_S0029=Qminh17_S0029/Qp17_S0029
print(paste("Kmính =",Kmính17_S0029))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0029H18max=S0029H[1:24,26]
S0029H18min=S0029H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0029H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=151,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=142.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0029=99.8717300949863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0029,lwd="4",col="red")
abline(h=max(S0029H18max),lwd="3",col="black",lty=2)
abline(h=min(S0029H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0029=max(S0029H18max)
K2_18_S0029=Qmax18_S0029/Qp18_S0029
print(paste("K2 =",K2_18_S0029))
```

```{r}
plot(Hora,S0029H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0029,lwd="4",col="red")
abline(h=max(S0029H18min),lwd="3",col="black",lty=2)
abline(h=min(S0029H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0029=min(S0029H18min)
Kmính18_S0029=Qminh18_S0029/Qp18_S0029
print(paste("Kmính =",Kmính18_S0029))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0029H19max=S0029H[1:24,30]
S0029H19min=S0029H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0029H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=150.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=142.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0029=103.15897366389
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0029,lwd="4",col="red")
abline(h=max(S0029H19max),lwd="3",col="black",lty=2)
abline(h=min(S0029H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0029=max(S0029H19max)
K2_19_S0029=Qmax19_S0029/Qp19_S0029
print(paste("K2 =",K2_19_S0029))
```

```{r}
plot(Hora,S0029H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0029,lwd="4",col="red")
abline(h=max(S0029H19min),lwd="3",col="black",lty=2)
abline(h=min(S0029H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0029=min(S0029H19min)
Kmính19_S0029=Qminh19_S0029/Qp19_S0029
print(paste("Kmính =",Kmính19_S0029))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0029H23max=S0029H[1:24,46]
S0029H23min=S0029H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0029H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0029 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0029H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=151.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0029H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0029=103.009342665507
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0029,lwd="4",col="red")
```

```
abline(h=max(S0029H23max),lwd="3",col="black",lty=2)
abline(h=min(S0029H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0029=max(S0029H23max)
K2_23_S0029=Qmax23_S0029/Qp23_S0029
print(paste("K2 =",K2_23_S0029))
```

```{r}
plot(Hora,S0029H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0029 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0029,lwd="4",col="red")
abline(h=max(S0029H23min),lwd="3",col="black",lty=2)
abline(h=min(S0029H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0029=min(S0029H23min)
Kmính23_S0029=Qminh23_S0029/Qp23_S0029
print(paste("Kmính =",Kmính23_S0029))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0029,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0029,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0029,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0029,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0029,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0029,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0029,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0029,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0029,": Si"))
print(paste("K2_14 =",K2_14_S0029,": No"))
print(paste("K2_15 =",K2_15_S0029,": No"))
print(paste("K2_16 =",K2_16_S0029,": No"))
print(paste("K2_17 =",K2_17_S0029,": No"))
print(paste("K2_18 =",K2_18_S0029,": Si"))
print(paste("K2_19 =",K2_19_S0029,": Si"))
print(paste("K2_23 =",K2_23_S0029,": Si"))
```

```{r}
K2S0029m=c(K2_13_S0029,K2_18_S0029,K2_19_S0029,K2_23_S0029)
K2S0029=mean(K2S0029m)
summary(K2S0029m)
K2S0029m
print(paste("K2_S0029 =",K2S0029))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0029,": Si"))
print(paste("Kmính_14 =",Kmính14_S0029,": No"))
print(paste("Kmính_15 =",Kmính15_S0029,": No"))
print(paste("Kmính_16 =",Kmính16_S0029,": No"))
print(paste("Kmính_17 =",Kmính17_S0029,": No"))
print(paste("Kmính_18 =",Kmính18_S0029,": Si"))
print(paste("Kmính_19 =",Kmính19_S0029,": Si"))
print(paste("Kmính_23 =",Kmính23_S0029,": Si"))
```

```{r}
KmínhS0029m=c(Kmính13_S0029,Kmính18_S0029,Kmính19_S0029,Kmính23_S0029)
KmínhS0029=mean(KmínhS0029m)
summary(KmínhS0029m)
KmínhS0029m
print(paste("Kmính_S0029 =",KmínhS0029))
```

## Estación S0033 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0033H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0033H.csv",sep=";")
```

```
```

### Visualización de la base de datos

```{r}
# View(S0033H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0033H13max=S0033H[1:24,6]
S0033H13min=S0033H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0033H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0033=83.4921607732055
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0033,lwd="4",col="red")
abline(h=max(S0033H13max),lwd="3",col="black",lty=2)
abline(h=min(S0033H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0033=max(S0033H13max)
K2_13_S0033=Qmax13_S0033/Qp13_S0033
print(paste("K2 =",K2_13_S0033))
```

```{r}
plot(Hora,S0033H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0033,lwd="4",col="red")
abline(h=max(S0033H13min),lwd="3",col="black",lty=2)
abline(h=min(S0033H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0033=min(S0033H13min)
Kmính13_S0033=Qminh13_S0033/Qp13_S0033
print(paste("Kmính =",Kmính13_S0033))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0033H14max=S0033H[1:24,10]
S0033H14min=S0033H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0033H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=111,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0033=65.1748057694247
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0033,lwd="4",col="red")
abline(h=max(S0033H14max),lwd="3",col="black",lty=2)
abline(h=min(S0033H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0033=max(S0033H14max)
K2_14_S0033=Qmax14_S0033/Qp14_S0033
print(paste("K2 =",K2_14_S0033))
```

```{r}
plot(Hora,S0033H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0033,lwd="4",col="red")
abline(h=max(S0033H14min),lwd="3",col="black",lty=2)
abline(h=min(S0033H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0033=min(S0033H14min)
Kmính14_S0033=Qminh14_S0033/Qp14_S0033
print(paste("Kmính =",Kmính14_S0033))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0033H15max=S0033H[1:24,14]
S0033H15min=S0033H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0033H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=102,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=94.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0033=66.7474885965479
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0033,lwd="4",col="red")
abline(h=max(S0033H15max),lwd="3",col="black",lty=2)
abline(h=min(S0033H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0033=max(S0033H15max)
K2_15_S0033=Qmax15_S0033/Qp15_S0033
print(paste("K2 =",K2_15_S0033))
```

```{r}
plot(Hora,S0033H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp15_S0033,lwd="4",col="red")
abline(h=max(S0033H15min),lwd="3",col="black",lty=2)
abline(h=min(S0033H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0033=min(S0033H15min)
Kmính15_S0033=Qminh15_S0033/Qp15_S0033
print(paste("Kmính =",Kmính15_S0033))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0033H16max=S0033H[1:24,18]
S0033H16min=S0033H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0033H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=105,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=99,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0033=70.9353132194262
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0033,lwd="4",col="red")
abline(h=max(S0033H16max),lwd="3",col="black",lty=2)
abline(h=min(S0033H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0033=max(S0033H16max)
K2_16_S0033=Qmax16_S0033/Qp16_S0033
print(paste("K2 =",K2_16_S0033))
```

```{r}
plot(Hora,S0033H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0033,lwd="4",col="red")
abline(h=max(S0033H16min),lwd="3",col="black",lty=2)
abline(h=min(S0033H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0033=min(S0033H16min)
Kmính16_S0033=Qminh16_S0033/Qp16_S0033
print(paste("Kmính =",Kmính16_S0033))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0033H17max=S0033H[1:24,22]
S0033H17min=S0033H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0033H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=99,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=92.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0033=66.8894873460822
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0033,lwd="4",col="red")
abline(h=max(S0033H17max),lwd="3",col="black",lty=2)
abline(h=min(S0033H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0033=max(S0033H17max)
K2_17_S0033=Qmax17_S0033/Qp17_S0033
print(paste("K2 =",K2_17_S0033))
```

```{r}
plot(Hora,S0033H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0033,lwd="4",col="red")
abline(h=max(S0033H17min),lwd="3",col="black",lty=2)
abline(h=min(S0033H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0033=min(S0033H17min)
Kmính17_S0033=Qminh17_S0033/Qp17_S0033
print(paste("Kmính =",Kmính17_S0033))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0033H18max=S0033H[1:24,26]
S0033H18min=S0033H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0033H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=93.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=86.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0033=66.098691366
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0033,lwd="4",col="red")
abline(h=max(S0033H18max),lwd="3",col="black",lty=2)
abline(h=min(S0033H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0033=max(S0033H18max)
K2_18_S0033=Qmax18_S0033/Qp18_S0033
print(paste("K2 =",K2_18_S0033))
```

```{r}
plot(Hora,S0033H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0033,lwd="4",col="red")
abline(h=max(S0033H18min),lwd="3",col="black",lty=2)
abline(h=min(S0033H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0033=min(S0033H18min)
Kmính18_S0033=Qminh18_S0033/Qp18_S0033
print(paste("Kmính =",Kmính18_S0033))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0033H19max=S0033H[1:24,30]
S0033H19min=S0033H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0033H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=91.35,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=84.35,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0033=63.9405999216164
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0033,lwd="4",col="red")
abline(h=max(S0033H19max),lwd="3",col="black",lty=2)
abline(h=min(S0033H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0033=max(S0033H19max)
K2_19_S0033=Qmax19_S0033/Qp19_S0033
print(paste("K2 =",K2_19_S0033))
```

```{r}
plot(Hora,S0033H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0033,lwd="4",col="red")
abline(h=max(S0033H19min),lwd="3",col="black",lty=2)
abline(h=min(S0033H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0033=min(S0033H19min)
Kmính19_S0033=Qminh19_S0033/Qp19_S0033
print(paste("Kmính =",Kmính19_S0033))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0033H23max=S0033H[1:24,46]
S0033H23min=S0033H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0033H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0033 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0033H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=88.35,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=82.35,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0033H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0033=57.0234194633151
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0033,lwd="4",col="red")
abline(h=max(S0033H23max),lwd="3",col="black",lty=2)
abline(h=min(S0033H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0033=max(S0033H23max)
K2_23_S0033=Qmax23_S0033/Qp23_S0033
print(paste("K2 =",K2_23_S0033))
```

```{r}
plot(Hora,S0033H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0033 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0033,lwd="4",col="red")
abline(h=max(S0033H23min),lwd="3",col="black",lty=2)
abline(h=min(S0033H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0033=min(S0033H23min)
Kmính23_S0033=Qminh23_S0033/Qp23_S0033
print(paste("Kmính =",Kmính23_S0033))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0033,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0033,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0033,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0033,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0033,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0033,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0033,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0033,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0033,": Si"))
print(paste("K2_14 =",K2_14_S0033,": No"))
print(paste("K2_15 =",K2_15_S0033,": No"))
print(paste("K2_16 =",K2_16_S0033,": No"))
print(paste("K2_17 =",K2_17_S0033,": Si"))
print(paste("K2_18 =",K2_18_S0033,": No"))
print(paste("K2_19 =",K2_19_S0033,": No"))
print(paste("K2_23 =",K2_23_S0033,": Si"))
```

```{r}
K2S0033m=c(K2_13_S0033,K2_17_S0033,K2_13_S0033)
K2S0033=mean(K2S0033m)
summary(K2S0033m)
K2S0033m
print(paste("K2_S0033 =",K2S0033))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0033,": Si"))
```

```
print(paste("Kmính_14 =",Kmính14_S0033,": No"))
print(paste("Kmính_15 =",Kmính15_S0033,": No"))
print(paste("Kmính_16 =",Kmính16_S0033,": No"))
print(paste("Kmính_17 =",Kmính17_S0033,": Si"))
print(paste("Kmính_18 =",Kmính18_S0033,": No"))
print(paste("Kmính_19 =",Kmính19_S0033,": No"))
print(paste("Kmính_23 =",Kmính23_S0033,": Si"))
```

```{r}
KmínhS0033m=c(Kmính13_S0033,Kmính17_S0033,Kmính23_S0033)
KmínhS0033=mean(KmínhS0033m)
summary(KmínhS0033m)
KmínhS0033m
print(paste("Kmính_S0033 =",KmínhS0033))
```

## Estación S0035 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0035H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0035H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0035H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0035H13max=S0035H[1:24,6]
S0035H13min=S0035H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=118.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0035=78.6674948478356
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0035,lwd="4",col="red")
abline(h=max(S0035H13max),lwd="3",col="black",lty=2)
abline(h=min(S0035H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0035=max(S0035H13max)
K2_13_S0035=Qmax13_S0035/Qp13_S0035
print(paste("K2 =",K2_13_S0035))
```

```{r}
plot(Hora,S0035H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0035,lwd="4",col="red")
abline(h=max(S0035H13min),lwd="3",col="black",lty=2)
abline(h=min(S0035H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0035=min(S0035H13min)
Kmính13_S0035=Qminh13_S0035/Qp13_S0035
print(paste("Kmính =",Kmính13_S0035))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0035H14max=S0035H[1:24,10]
S0035H14min=S0035H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=118,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0035=81.9634952609863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0035,lwd="4",col="red")
abline(h=max(S0035H14max),lwd="3",col="black",lty=2)
abline(h=min(S0035H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0035=max(S0035H14max)
K2_14_S0035=Qmax14_S0035/Qp14_S0035
print(paste("K2 =",K2_14_S0035))
```

```{r}
plot(Hora,S0035H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0035,lwd="4",col="red")
abline(h=max(S0035H14min),lwd="3",col="black",lty=2)
abline(h=min(S0035H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0035=min(S0035H14min)
Kmính14_S0035=Qminh14_S0035/Qp14_S0035
print(paste("Kmính =",Kmính14_S0035))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0035H15max=S0035H[1:24,14]
S0035H15min=S0035H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=114.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0035=83.2892450884383
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0035,lwd="4",col="red")
abline(h=max(S0035H15max),lwd="3",col="black",lty=2)
abline(h=min(S0035H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0035=max(S0035H15max)
K2_15_S0035=Qmax15_S0035/Qp15_S0035
print(paste("K2 =",K2_15_S0035))
```

```{r}
plot(Hora,S0035H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0035,lwd="4",col="red")
abline(h=max(S0035H15min),lwd="3",col="black",lty=2)
abline(h=min(S0035H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0035=min(S0035H15min)
Kmính15_S0035=Qminh15_S0035/Qp15_S0035
print(paste("Kmính =",Kmính15_S0035))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0035H16max=S0035H[1:24,18]
S0035H16min=S0035H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=117.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0035=78.9593955835519
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0035,lwd="4",col="red")
abline(h=max(S0035H16max),lwd="3",col="black",lty=2)
abline(h=min(S0035H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0035=max(S0035H16max)
K2_16_S0035=Qmax16_S0035/Qp16_S0035
print(paste("K2 =",K2_16_S0035))
```

```{r}
plot(Hora,S0035H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0035,lwd="4",col="red")
abline(h=max(S0035H16min),lwd="3",col="black",lty=2)
abline(h=min(S0035H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0035=min(S0035H16min)
Kmính16_S0035=Qminh16_S0035/Qp16_S0035
print(paste("Kmính =",Kmính16_S0035))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0035H17max=S0035H[1:24,22]
S0035H17min=S0035H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=117.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0035=81.7582854183562
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0035,lwd="4",col="red")
abline(h=max(S0035H17max),lwd="3",col="black",lty=2)
abline(h=min(S0035H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0035=max(S0035H17max)
K2_17_S0035=Qmax17_S0035/Qp17_S0035
print(paste("K2 =",K2_17_S0035))
```

```{r}
plot(Hora,S0035H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0035,lwd="4",col="red")
abline(h=max(S0035H17min),lwd="3",col="black",lty=2)
abline(h=min(S0035H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0035=min(S0035H17min)
Kmính17_S0035=Qminh17_S0035/Qp17_S0035
print(paste("Kmính =",Kmính17_S0035))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0035H18max=S0035H[1:24,26]
S0035H18min=S0035H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=117.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0035=80.3420635745753
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0035,lwd="4",col="red")
abline(h=max(S0035H18max),lwd="3",col="black",lty=2)
abline(h=min(S0035H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0035=max(S0035H18max)
K2_18_S0035=Qmax18_S0035/Qp18_S0035
print(paste("K2 =",K2_18_S0035))
```

```{r}
plot(Hora,S0035H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0035,lwd="4",col="red")
abline(h=max(S0035H18min),lwd="3",col="black",lty=2)
abline(h=min(S0035H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0035=min(S0035H18min)
Kmính18_S0035=Qminh18_S0035/Qp18_S0035
print(paste("Kmính =",Kmính18_S0035))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0035H19max=S0035H[1:24,30]
S0035H19min=S0035H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0035=81.9618699598904
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0035,lwd="4",col="red")
abline(h=max(S0035H19max),lwd="3",col="black",lty=2)
abline(h=min(S0035H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0035=max(S0035H19max)
K2_19_S0035=Qmax19_S0035/Qp19_S0035
print(paste("K2 =",K2_19_S0035))
```

```{r}
plot(Hora,S0035H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp19_S0035,lwd="4",col="red")
abline(h=max(S0035H19min),lwd="3",col="black",lty=2)
abline(h=min(S0035H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0035=min(S0035H19min)
Kmính19_S0035=Qminh19_S0035/Qp19_S0035
print(paste("Kmính =",Kmính19_S0035))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0035H23max=S0035H[1:24,46]
S0035H23min=S0035H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0035H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0035 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0035H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=109.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0035H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0035=69.7828701154247
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0035,lwd="4",col="red")
abline(h=max(S0035H23max),lwd="3",col="black",lty=2)
abline(h=min(S0035H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0035=max(S0035H23max)
K2_23_S0035=Qmax23_S0035/Qp23_S0035
print(paste("K2 =",K2_23_S0035))
```

```{r}
plot(Hora,S0035H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0035 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0035,lwd="4",col="red")
abline(h=max(S0035H23min),lwd="3",col="black",lty=2)
abline(h=min(S0035H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0035=min(S0035H23min)
Kmính23_S0035=Qminh23_S0035/Qp23_S0035
print(paste("Kmính =",Kmính23_S0035))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0035,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0035,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0035,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0035,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0035,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0035,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0035,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0035,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0035,": Si"))
print(paste("K2_14 =",K2_14_S0035,": No"))
print(paste("K2_15 =",K2_15_S0035,": No"))
print(paste("K2_16 =",K2_16_S0035,": Si"))
print(paste("K2_17 =",K2_17_S0035,": No"))
print(paste("K2_18 =",K2_18_S0035,": Si"))
print(paste("K2_19 =",K2_19_S0035,": Si"))
print(paste("K2_23 =",K2_23_S0035,": Si"))
```

```{r}
K2S0035m=c(K2_13_S0035,K2_16_S0035,K2_18_S0035,K2_19_S0035,K2_23_S0035)
K2S0035=mean(K2S0035m)
summary(K2S0035m)
K2S0035m
print(paste("K2_S0035 =",K2S0035))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0035,": Si"))
print(paste("Kmính_14 =",Kmính14_S0035,": No"))
print(paste("Kmính_15 =",Kmính15_S0035,": No"))
print(paste("Kmính_16 =",Kmính16_S0035,": Si"))
print(paste("Kmính_17 =",Kmính17_S0035,": No"))
print(paste("Kmính_18 =",Kmính18_S0035,": Si"))
print(paste("Kmính_19 =",Kmính19_S0035,": Si"))
print(paste("Kmính_23 =",Kmính23_S0035,": Si"))
```

```{r}
KmínhS0035m=c(Kmính13_S0035,Kmính16_S0035,Kmính18_S0035,Kmính19_S0035,
Kmính23_S0035)
KmínhS0035=mean(KmínhS0035m)
summary(KmínhS0035m)
KmínhS0035m
print(paste("Kmính_S0035 =",KmínhS0035))
```

## Estación S0036 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0036H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0036H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0036H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0036H13max=S0036H[1:24,6]
S0036H13min=S0036H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=113,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=107,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0036H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0036=66.7375883983836
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0036,lwd="4",col="red")
abline(h=max(S0036H13max),lwd="3",col="black",lty=2)
abline(h=min(S0036H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0036=max(S0036H13max)
K2_13_S0036=Qmax13_S0036/Qp13_S0036
```

```
print(paste("K2 =",K2_13_S0036))
```

```{r}
plot(Hora,S0036H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0036,lwd="4",col="red")
abline(h=max(S0036H13min),lwd="3",col="black",lty=2)
abline(h=min(S0036H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0036=min(S0036H13min)
Kmính13_S0036=Qminh13_S0036/Qp13_S0036
print(paste("Kmính =",Kmính13_S0036))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0036H14max=S0036H[1:24,10]
S0036H14min=S0036H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=113,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=107,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0036H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0036=67.5367595229863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0036,lwd="4",col="red")
abline(h=max(S0036H14max),lwd="3",col="black",lty=2)
abline(h=min(S0036H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0036=max(S0036H14max)
K2_14_S0036=Qmax14_S0036/Qp14_S0036
print(paste("K2 =",K2_14_S0036))
```

```{r}
plot(Hora,S0036H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0036,lwd="4",col="red")
abline(h=max(S0036H14min),lwd="3",col="black",lty=2)
abline(h=min(S0036H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0036=min(S0036H14min)
Kmính14_S0036=Qminh14_S0036/Qp14_S0036
print(paste("Kmính =",Kmính14_S0036))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0036H15max=S0036H[1:24,14]
```

```
S0036H15min=S0036H[1:24,16]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=116,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=110,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0036H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0036=71.429224679726
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0036,lwd="4",col="red")
abline(h=max(S0036H15max),lwd="3",col="black",lty=2)
abline(h=min(S0036H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0036=max(S0036H15max)
K2_15_S0036=Qmax15_S0036/Qp15_S0036
print(paste("K2 =",K2_15_S0036))
```
```

```{r}
plot(Hora,S0036H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0036,lwd="4",col="red")
abline(h=max(S0036H15min),lwd="3",col="black",lty=2)
abline(h=min(S0036H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0036=min(S0036H15min)
Kmính15_S0036=Qminh15_S0036/Qp15_S0036
print(paste("Kmính =",Kmính15_S0036))
```
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0036H16max=S0036H[1:24,18]
S0036H16min=S0036H[1:24,20]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=107.8,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=102.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0036H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0036=72.7921382448907
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0036,lwd="4",col="red")
abline(h=max(S0036H16max),lwd="3",col="black",lty=2)
abline(h=min(S0036H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0036=max(S0036H16max)
K2_16_S0036=Qmax16_S0036/Qp16_S0036
print(paste("K2 =",K2_16_S0036))
```

```{r}
plot(Hora,S0036H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0036,lwd="4",col="red")
abline(h=max(S0036H16min),lwd="3",col="black",lty=2)
abline(h=min(S0036H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0036=min(S0036H16min)
Kmính16_S0036=Qminh16_S0036/Qp16_S0036
print(paste("Kmính =",Kmính16_S0036))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0036H17max=S0036H[1:24,22]
S0036H17min=S0036H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=108.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=102.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0036H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0036=65.7066775285205
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0036,lwd="4",col="red")
abline(h=max(S0036H17max),lwd="3",col="black",lty=2)
abline(h=min(S0036H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0036=max(S0036H17max)
K2_17_S0036=Qmax17_S0036/Qp17_S0036
print(paste("K2 =",K2_17_S0036))
```

```{r}
plot(Hora,S0036H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0036,lwd="4",col="red")
abline(h=max(S0036H17min),lwd="3",col="black",lty=2)
abline(h=min(S0036H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0036=min(S0036H17min)
Kmính17_S0036=Qminh17_S0036/Qp17_S0036
print(paste("Kmính =",Kmính17_S0036))
```

```
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0036H18max=S0036H[1:24,26]
S0036H18min=S0036H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=106.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=101.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0036H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0036=68.9200213786575
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0036,lwd="4",col="red")
abline(h=max(S0036H18max),lwd="3",col="black",lty=2)
abline(h=min(S0036H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0036=max(S0036H18max)
K2_18_S0036=Qmax18_S0036/Qp18_S0036
print(paste("K2 =",K2_18_S0036))
```

```{r}
plot(Hora,S0036H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0036,lwd="4",col="red")
abline(h=max(S0036H18min),lwd="3",col="black",lty=2)
abline(h=min(S0036H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0036=min(S0036H18min)
Kmính18_S0036=Qminh18_S0036/Qp18_S0036
print(paste("Kmính =",Kmính18_S0036))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0036H19max=S0036H[1:24,30]
S0036H19min=S0036H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=104.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0036H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0036=65.332118344137
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0036,lwd="4",col="red")
abline(h=max(S0036H19max),lwd="3",col="black",lty=2)
abline(h=min(S0036H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0036=max(S0036H19max)
K2_19_S0036=Qmax19_S0036/Qp19_S0036
print(paste("K2 =",K2_19_S0036))
```

```{r}
plot(Hora,S0036H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0036,lwd="4",col="red")
abline(h=max(S0036H19min),lwd="3",col="black",lty=2)
abline(h=min(S0036H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0036=min(S0036H19min)
Kmính19_S0036=Qminh19_S0036/Qp19_S0036
print(paste("Kmính =",Kmính19_S0036))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0036H23max=S0036H[1:24,46]
S0036H23min=S0036H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0036H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0036 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0036H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=98.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=92.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0036H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0036=62.5132238454521
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0036,lwd="4",col="red")
abline(h=max(S0036H23max),lwd="3",col="black",lty=2)
abline(h=min(S0036H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0036=max(S0036H23max)
K2_23_S0036=Qmax23_S0036/Qp23_S0036
print(paste("K2 =",K2_23_S0036))
```

```{r}
plot(Hora,S0036H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0036 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0036,lwd="4",col="red")
abline(h=max(S0036H23min),lwd="3",col="black",lty=2)
abline(h=min(S0036H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0036=min(S0036H23min)
Kmính23_S0036=Qminh23_S0036/Qp23_S0036
print(paste("Kmính =",Kmính23_S0036))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0036,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0036,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0036,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0036,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0036,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0036,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0036,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0036,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0036,": Si"))
print(paste("K2_14 =",K2_14_S0036,": No"))
print(paste("K2_15 =",K2_15_S0036,": Si"))
print(paste("K2_16 =",K2_16_S0036,": Si"))
print(paste("K2_17 =",K2_17_S0036,": No"))
print(paste("K2_18 =",K2_18_S0036,": No"))
print(paste("K2_19 =",K2_19_S0036,": No"))
print(paste("K2_23 =",K2_23_S0036,": Si"))
```

```{r}
K2S0036m=c(K2_13_S0036,K2_15_S0036,K2_16_S0036,K2_23_S0036)
K2S0036=mean(K2S0036m)
summary(K2S0036m)
K2S0036m
print(paste("K2_S0036 =",K2S0036))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0036,": Si"))
print(paste("Kmính_14 =",Kmính14_S0036,": No"))
print(paste("Kmính_15 =",Kmính15_S0036,": Si"))
print(paste("Kmính_16 =",Kmính16_S0036,": Si"))
print(paste("Kmính_17 =",Kmính17_S0036,": No"))
print(paste("Kmính_18 =",Kmính18_S0036,": No"))
print(paste("Kmính_19 =",Kmính19_S0036,": No"))
print(paste("Kmính_23 =",Kmính23_S0036,": Si"))
```

```{r}
KmínhS0036m=c(Kmính13_S0036,Kmính15_S0036,Kmính16_S0036,Kmính23_S0036)
KmínhS0036=mean(KmínhS0036m)
summary(KmínhS0036m)
KmínhS0036m
print(paste("Kmính_S0036 =",KmínhS0036))
```

## Estación S0039 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0039H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0039H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0039H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0039H13max=S0039H[1:24,6]
S0039H13min=S0039H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=133,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=123.5,label="- Día de mínimo consumo"),
```

```
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0039H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0039=87.1994978266027
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0039,lwd="4",col="red")
abline(h=max(S0039H13max),lwd="3",col="black",lty=2)
abline(h=min(S0039H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0039=max(S0039H13max)
K2_13_S0039=Qmax13_S0039/Qp13_S0039
print(paste("K2 =",K2_13_S0039))
```

```{r}
plot(Hora,S0039H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0039,lwd="4",col="red")
abline(h=max(S0039H13min),lwd="3",col="black",lty=2)
abline(h=min(S0039H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0039=min(S0039H13min)
Kmính13_S0039=Qminh13_S0039/Qp13_S0039
print(paste("Kmính =",Kmính13_S0039))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0039H14max=S0039H[1:24,10]
S0039H14min=S0039H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=153,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0039H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0039=101.410516365973
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0039,lwd="4",col="red")
abline(h=max(S0039H14max),lwd="3",col="black",lty=2)
abline(h=min(S0039H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0039=max(S0039H14max)
K2_14_S0039=Qmax14_S0039/Qp14_S0039
print(paste("K2 =",K2_14_S0039))
```

```{r}
plot(Hora,S0039H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0039,lwd="4",col="red")
abline(h=max(S0039H14min),lwd="3",col="black",lty=2)
abline(h=min(S0039H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0039=min(S0039H14min)
Kmính14_S0039=Qminh14_S0039/Qp14_S0039
print(paste("Kmính =",Kmính14_S0039))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0039H15max=S0039H[1:24,14]
S0039H15min=S0039H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=152,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=141,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0039H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0039=105.887375108959
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0039,lwd="4",col="red")
abline(h=max(S0039H15max),lwd="3",col="black",lty=2)
abline(h=min(S0039H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0039=max(S0039H15max)
K2_15_S0039=Qmax15_S0039/Qp15_S0039
print(paste("K2 =",K2_15_S0039))
```

```{r}
plot(Hora,S0039H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0039,lwd="4",col="red")
abline(h=max(S0039H15min),lwd="3",col="black",lty=2)
abline(h=min(S0039H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0039=min(S0039H15min)
Kmính15_S0039=Qminh15_S0039/Qp15_S0039
print(paste("Kmính =",Kmính15_S0039))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0039H16max=S0039H[1:24,18]
S0039H16min=S0039H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2016")+
```

```
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=147,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=136,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0039H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0039=90.5437827074044
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0039,lwd="4",col="red")
abline(h=max(S0039H16max),lwd="3",col="black",lty=2)
abline(h=min(S0039H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0039=max(S0039H16max)
K2_16_S0039=Qmax16_S0039/Qp16_S0039
print(paste("K2 =",K2_16_S0039))
```

```{r}
plot(Hora,S0039H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0039,lwd="4",col="red")
abline(h=max(S0039H16min),lwd="3",col="black",lty=2)
abline(h=min(S0039H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0039=min(S0039H16min)
Kmính16_S0039=Qminh16_S0039/Qp16_S0039
print(paste("Kmính =",Kmính16_S0039))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0039H17max=S0039H[1:24,22]
S0039H17min=S0039H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=146,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=136,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0039H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0039=98.0920192282192
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0039,lwd="4",col="red")
abline(h=max(S0039H17max),lwd="3",col="black",lty=2)
abline(h=min(S0039H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0039=max(S0039H17max)
K2_17_S0039=Qmax17_S0039/Qp17_S0039
```

```
print(paste("K2 =",K2_17_S0039))
```

```{r}
plot(Hora,S0039H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0039,lwd="4",col="red")
abline(h=max(S0039H17min),lwd="3",col="black",lty=2)
abline(h=min(S0039H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0039=min(S0039H17min)
Kmính17_S0039=Qminh17_S0039/Qp17_S0039
print(paste("Kmính =",Kmính17_S0039))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0039H18max=S0039H[1:24,26]
S0039H18min=S0039H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=146,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0039H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0039=98.4539606280548
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0039,lwd="4",col="red")
abline(h=max(S0039H18max),lwd="3",col="black",lty=2)
abline(h=min(S0039H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0039=max(S0039H18max)
K2_18_S0039=Qmax18_S0039/Qp18_S0039
print(paste("K2 =",K2_18_S0039))
```

```{r}
plot(Hora,S0039H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0039,lwd="4",col="red")
abline(h=max(S0039H18min),lwd="3",col="black",lty=2)
abline(h=min(S0039H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0039=min(S0039H18min)
Kmính18_S0039=Qminh18_S0039/Qp18_S0039
print(paste("Kmính =",Kmính18_S0039))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0039H19max=S0039H[1:24,30]
```

```
S0039H19min=S0039H[1:24,32]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=146,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0039H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0039=100.90052717474
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0039,lwd="4",col="red")
abline(h=max(S0039H19max),lwd="3",col="black",lty=2)
abline(h=min(S0039H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0039=max(S0039H19max)
K2_19_S0039=Qmax19_S0039/Qp19_S0039
print(paste("K2 =",K2_19_S0039))
```
```

```{r}
plot(Hora,S0039H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0039,lwd="4",col="red")
abline(h=max(S0039H19min),lwd="3",col="black",lty=2)
abline(h=min(S0039H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0039=min(S0039H19min)
Kmính19_S0039=Qminh19_S0039/Qp19_S0039
print(paste("Kmính =",Kmính19_S0039))
```
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0039H23max=S0039H[1:24,46]
S0039H23min=S0039H[1:24,48]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0039H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0039 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0039H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=143,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=134,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0039H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0039=92.9644071578082
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0039,lwd="4",col="red")
abline(h=max(S0039H23max),lwd="3",col="black",lty=2)
abline(h=min(S0039H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0039=max(S0039H23max)
K2_23_S0039=Qmax23_S0039/Qp23_S0039
print(paste("K2 =",K2_23_S0039))
```

```{r}
plot(Hora,S0039H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0039 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0039,lwd="4",col="red")
abline(h=max(S0039H23min),lwd="3",col="black",lty=2)
abline(h=min(S0039H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0039=min(S0039H23min)
Kmính23_S0039=Qminh23_S0039/Qp23_S0039
print(paste("Kmính =",Kmính23_S0039))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0039,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0039,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0039,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0039,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0039,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0039,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0039,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0039,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0039,": No"))
print(paste("K2_14 =",K2_14_S0039,": No"))
print(paste("K2_15 =",K2_15_S0039,": Si"))
print(paste("K2_16 =",K2_16_S0039,": No"))
print(paste("K2_17 =",K2_17_S0039,": Si"))
print(paste("K2_18 =",K2_18_S0039,": No"))
print(paste("K2_19 =",K2_19_S0039,": Si"))
print(paste("K2_23 =",K2_23_S0039,": Si"))
```

```{r}
K2S0039m=c(K2_15_S0039,K2_17_S0039,K2_19_S0039,K2_23_S0039)
K2S0039=mean(K2S0039m)
summary(K2S0039m)
K2S0039m
print(paste("K2_S0039 =",K2S0039))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0039,": No"))
print(paste("Kmính_14 =",Kmính14_S0039,": No"))
print(paste("Kmính_15 =",Kmính15_S0039,": Si"))
print(paste("Kmính_16 =",Kmính16_S0039,": No"))
print(paste("Kmính_17 =",Kmính17_S0039,": Si"))
print(paste("Kmính_18 =",Kmính18_S0039,": No"))
print(paste("Kmính_19 =",Kmính19_S0039,": Si"))
print(paste("Kmính_23 =",Kmính23_S0039,": Si"))
```

```{r}
KmínhS0039m=c(Kmính15_S0039,Kmính17_S0039,Kmính19_S0039,Kmính23_S0039)
KmínhS0039=mean(KmínhS0039m)
summary(KmínhS0039m)
KmínhS0039m
print(paste("Kmính_S0039 =",KmínhS0039))
```

## Estación S0042 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0042H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0042H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0042H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0042H13max=S0042H[1:24,6]
S0042H13min=S0042H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=59.8,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=55.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0042=36.2888937815069
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0042,lwd="4",col="red")
abline(h=max(S0042H13max),lwd="3",col="black",lty=2)
abline(h=min(S0042H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0042=max(S0042H13max)
K2_13_S0042=Qmax13_S0042/Qp13_S0042
print(paste("K2 =",K2_13_S0042))
```

```{r}
plot(Hora,S0042H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0042,lwd="4",col="red")
abline(h=max(S0042H13min),lwd="3",col="black",lty=2)
abline(h=min(S0042H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0042=min(S0042H13min)
Kmính13_S0042=Qminh13_S0042/Qp13_S0042
print(paste("Kmính =",Kmính13_S0042))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0042H14max=S0042H[1:24,10]
S0042H14min=S0042H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=58.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
Qp14_S0042=38.0772407852877
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0042,lwd="4",col="red")
abline(h=max(S0042H14max),lwd="3",col="black",lty=2)
abline(h=min(S0042H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0042=max(S0042H14max)
K2_14_S0042=Qmax14_S0042/Qp14_S0042
print(paste("K2 =",K2_14_S0042))
```

```{r}
plot(Hora,S0042H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0042,lwd="4",col="red")
abline(h=max(S0042H14min),lwd="3",col="black",lty=2)
abline(h=min(S0042H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0042=min(S0042H14min)
Kmính14_S0042=Qminh14_S0042/Qp14_S0042
print(paste("Kmính =",Kmính14_S0042))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0042H15max=S0042H[1:24,14]
S0042H15min=S0042H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=59.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=56,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0042=36.0944696926027
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0042,lwd="4",col="red")
abline(h=max(S0042H15max),lwd="3",col="black",lty=2)
abline(h=min(S0042H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0042=max(S0042H15max)
K2_15_S0042=Qmax15_S0042/Qp15_S0042
print(paste("K2 =",K2_15_S0042))
```

```{r}
plot(Hora,S0042H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0042,lwd="4",col="red")
abline(h=max(S0042H15min),lwd="3",col="black",lty=2)
abline(h=min(S0042H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0042=min(S0042H15min)
Kmính15_S0042=Qminh15_S0042/Qp15_S0042
print(paste("Kmính =",Kmính15_S0042))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0042H16max=S0042H[1:24,18]
S0042H16min=S0042H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=61,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=57.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0042=40.8339164195082
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0042,lwd="4",col="red")
abline(h=max(S0042H16max),lwd="3",col="black",lty=2)
abline(h=min(S0042H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0042=max(S0042H16max)
K2_16_S0042=Qmax16_S0042/Qp16_S0042
print(paste("K2 =",K2_16_S0042))
```

```{r}
plot(Hora,S0042H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0042,lwd="4",col="red")
abline(h=max(S0042H16min),lwd="3",col="black",lty=2)
abline(h=min(S0042H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0042=min(S0042H16min)
Kmính16_S0042=Qminh16_S0042/Qp16_S0042
print(paste("Kmính =",Kmính16_S0042))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0042H17max=S0042H[1:24,22]
S0042H17min=S0042H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=64.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=61.1,label="- Día de mínimo consumo"),
```

```
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0042=40.7057228491233
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0042,lwd="4",col="red")
abline(h=max(S0042H17max),lwd="3",col="black",lty=2)
abline(h=min(S0042H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0042=max(S0042H17max)
K2_17_S0042=Qmax17_S0042/Qp17_S0042
print(paste("K2 =",K2_17_S0042))
```

```{r}
plot(Hora,S0042H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0042,lwd="4",col="red")
abline(h=max(S0042H17min),lwd="3",col="black",lty=2)
abline(h=min(S0042H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0042=min(S0042H17min)
Kmính17_S0042=Qminh17_S0042/Qp17_S0042
print(paste("Kmính =",Kmính17_S0042))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0042H18max=S0042H[1:24,26]
S0042H18min=S0042H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=61.65,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=58.65,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0042=40.7172638439178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0042,lwd="4",col="red")
abline(h=max(S0042H18max),lwd="3",col="black",lty=2)
abline(h=min(S0042H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0042=max(S0042H18max)
K2_18_S0042=Qmax18_S0042/Qp18_S0042
print(paste("K2 =",K2_18_S0042))
```

```{r}
plot(Hora,S0042H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0042,lwd="4",col="red")
abline(h=max(S0042H18min),lwd="3",col="black",lty=2)
abline(h=min(S0042H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0042=min(S0042H18min)
Kmính18_S0042=Qminh18_S0042/Qp18_S0042
print(paste("Kmính =",Kmính18_S0042))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0042H19max=S0042H[1:24,30]
S0042H19min=S0042H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=59.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=56,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0042=41.393788571863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0042,lwd="4",col="red")
abline(h=max(S0042H19max),lwd="3",col="black",lty=2)
abline(h=min(S0042H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0042=max(S0042H19max)
K2_19_S0042=Qmax19_S0042/Qp19_S0042
print(paste("K2 =",K2_19_S0042))
```

```{r}
plot(Hora,S0042H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0042,lwd="4",col="red")
abline(h=max(S0042H19min),lwd="3",col="black",lty=2)
abline(h=min(S0042H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0042=min(S0042H19min)
Kmính19_S0042=Qminh19_S0042/Qp19_S0042
print(paste("Kmính =",Kmính19_S0042))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0042H23max=S0042H[1:24,46]
S0042H23min=S0042H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0042H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0042 - 2023")+
```

```
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0042H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=52,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=48.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0042H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0042=33.4300773192055
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0042,lwd="4",col="red")
abline(h=max(S0042H23max),lwd="3",col="black",lty=2)
abline(h=min(S0042H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0042=max(S0042H23max)
K2_23_S0042=Qmax23_S0042/Qp23_S0042
print(paste("K2 =",K2_23_S0042))
```

```{r}
plot(Hora,S0042H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0042 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0042,lwd="4",col="red")
abline(h=max(S0042H23min),lwd="3",col="black",lty=2)
abline(h=min(S0042H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0042=min(S0042H23min)
Kmính23_S0042=Qminh23_S0042/Qp23_S0042
print(paste("Kmính =",Kmính23_S0042))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0042,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0042,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0042,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0042,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0042,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0042,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0042,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0042,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0042,": Si"))
print(paste("K2_14 =",K2_14_S0042,": Si"))
print(paste("K2_15 =",K2_15_S0042,": Si"))
print(paste("K2_16 =",K2_16_S0042,": Si"))
print(paste("K2_17 =",K2_17_S0042,": Si"))
print(paste("K2_18 =",K2_18_S0042,": Si"))
print(paste("K2_19 =",K2_19_S0042,": No"))
print(paste("K2_23 =",K2_23_S0042,": Si"))
```

```{r}
K2S0042m=c(K2_13_S0042,K2_14_S0042,K2_15_S0042,K2_16_S0042,K2_17_S0042,
K2_18_S0042,K2_23_S0042)
K2S0042=mean(K2S0042m)
summary(K2S0042m)
K2S0042m
print(paste("K2_S0042 =",K2S0042))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0042,": Si"))
print(paste("Kmính_14 =",Kmính14_S0042,": Si"))
print(paste("Kmính_15 =",Kmính15_S0042,": Si"))
print(paste("Kmính_16 =",Kmính16_S0042,": Si"))
```

```
print(paste("Kmính_17 =",Kmính17_S0042,": Si"))
print(paste("Kmính_18 =",Kmính18_S0042,": Si"))
print(paste("Kmính_19 =",Kmính19_S0042,": No"))
print(paste("Kmính_23 =",Kmính23_S0042,": Si"))
```

```{r}
KmínhS0042m=c(Kmính13_S0042,Kmính14_S0042,Kmính15_S0042,Kmính16_S0042,
Kmính17_S0042,Kmính18_S0042,Kmính23_S0042)
KmínhS0042=mean(KmínhS0042m)
summary(KmínhS0042m)
KmínhS0042m
print(paste("Kmính_S0042 =",KmínhS0042))
```

## Estación S0043 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0043H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0043H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0043H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0043H13max=S0043H[1:24,6]
S0043H13min=S0043H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=26,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=24,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0043=11.5321193644
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0043,lwd="4",col="red")
abline(h=max(S0043H13max),lwd="3",col="black",lty=2)
abline(h=min(S0043H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0043=max(S0043H13max)
K2_13_S0043=Qmax13_S0043/Qp13_S0043
print(K2_13_S0043)
```

```{r}
plot(Hora,S0043H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0043,lwd="4",col="red")
abline(h=max(S0043H13min),lwd="3",col="black",lty=2)
abline(h=min(S0043H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0043=min(S0043H13min)
Kmính13_S0043=Qminh13_S0043/Qp13_S0043
print(Kmính13_S0043)
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0043H14max=S0043H[1:24,10]
S0043H14min=S0043H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=26.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=24,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0043=11.1670509967507
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0043,lwd="4",col="red")
abline(h=max(S0043H14max),lwd="3",col="black",lty=2)
abline(h=min(S0043H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0043=max(S0043H14max)
K2_14_S0043=Qmax14_S0043/Qp14_S0043
print(K2_14_S0043)
```

```{r}
plot(Hora,S0043H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0043,lwd="4",col="red")
abline(h=max(S0043H14min),lwd="3",col="black",lty=2)
abline(h=min(S0043H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0043=min(S0043H14min)
Kmính14_S0043=Qminh14_S0043/Qp14_S0043
print(Kmính14_S0043)
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0043H15max=S0043H[1:24,14]
S0043H15min=S0043H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=26,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=24,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0043=12.375610871937
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0043,lwd="4",col="red")
```

```
abline(h=max(S0043H15max),lwd="3",col="black",lty=2)
abline(h=min(S0043H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0043=max(S0043H15max)
K2_15_S0043=Qmax15_S0043/Qp15_S0043
print(K2_15_S0043)
```

```{r}
plot(Hora,S0043H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0043,lwd="4",col="red")
abline(h=max(S0043H15min),lwd="3",col="black",lty=2)
abline(h=min(S0043H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0043=min(S0043H15min)
Kmính15_S0043=Qminh15_S0043/Qp15_S0043
print(Kmính15_S0043)
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0043H16max=S0043H[1:24,18]
S0043H16min=S0043H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=24.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=22.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0043=12.3919882668306
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0043,lwd="4",col="red")
abline(h=max(S0043H16max),lwd="3",col="black",lty=2)
abline(h=min(S0043H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0043=max(S0043H16max)
K2_16_S0043=Qmax16_S0043/Qp16_S0043
print(K2_16_S0043)
```

```{r}
plot(Hora,S0043H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0043,lwd="4",col="red")
abline(h=max(S0043H16min),lwd="3",col="black",lty=2)
abline(h=min(S0043H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}


```

```
# Cálculo del coeficiente Kmính
Qminh16_S0043=min(S0043H16min)
Kmính16_S0043=Qminh16_S0043/Qp16_S0043
print(Kmính16_S0043)
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0043H17max=S0043H[1:24,22]
S0043H17min=S0043H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=23.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=21.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0043=12.9755339968384
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0043,lwd="4",col="red")
abline(h=max(S0043H17max),lwd="3",col="black",lty=2)
abline(h=min(S0043H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0043=max(S0043H17max)
K2_17_S0043=Qmax17_S0043/Qp17_S0043
print(K2_17_S0043)
```

```{r}
plot(Hora,S0043H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0043,lwd="4",col="red")
abline(h=max(S0043H17min),lwd="3",col="black",lty=2)
abline(h=min(S0043H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0043=min(S0043H17min)
Kmính17_S0043=Qminh17_S0043/Qp17_S0043
print(Kmính17_S0043)
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0043H18max=S0043H[1:24,26]
S0043H18min=S0043H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=27.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=25.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H18max,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0043 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0043=13.6618366045205
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0043,lwd="4",col="red")
abline(h=max(S0043H18max),lwd="3",col="black",lty=2)
abline(h=min(S0043H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0043=max(S0043H18max)
K2_18_S0043=Qmax18_S0043/Qp18_S0043
print(K2_18_S0043)
```

```{r}
plot(Hora,S0043H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0043,lwd="4",col="red")
abline(h=max(S0043H18min),lwd="3",col="black",lty=2)
abline(h=min(S0043H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0043=min(S0043H18min)
Kmính18_S0043=Qminh18_S0043/Qp18_S0043
print(Kmính18_S0043)
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0043H19max=S0043H[1:24,30]
S0043H19min=S0043H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=26.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=24.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0043=13.115479103674
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0043,lwd="4",col="red")
abline(h=max(S0043H19max),lwd="3",col="black",lty=2)
abline(h=min(S0043H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0043=max(S0043H19max)
K2_19_S0043=Qmax19_S0043/Qp19_S0043
print(K2_19_S0043)
```

```{r}
plot(Hora,S0043H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0043,lwd="4",col="red")
abline(h=max(S0043H19min),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0043H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0043=min(S0043H19min)
Kmính19_S0043=Qminh19_S0043/Qp19_S0043
print(Kmính19_S0043)
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0043H23max=S0043H[1:24,46]
S0043H23min=S0043H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0043H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0043 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0043H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=26.15,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=24.15,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0043H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0043=13.637610756
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0043,lwd="4",col="red")
abline(h=max(S0043H23max),lwd="3",col="black",lty=2)
abline(h=min(S0043H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0043=max(S0043H23max)
K2_23_S0043=Qmax23_S0043/Qp23_S0043
print(K2_23_S0043)
```

```{r}
plot(Hora,S0043H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0043 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0043,lwd="4",col="red")
abline(h=max(S0043H23min),lwd="3",col="black",lty=2)
abline(h=min(S0043H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0043=min(S0043H23min)
Kmính23_S0043=Qminh23_S0043/Qp23_S0043
print(Kmính23_S0043)
```

### Caudales promedio del sector

```{r}
print(paste("Qp13 =",Qp13_S0043,"l/s",": Si"))
print(paste("Qp14 =",Qp14_S0043,"l/s",": Si"))
print(paste("Qp15 =",Qp15_S0043,"l/s",": No"))
print(paste("Qp16 =",Qp16_S0043,"l/s",": Si"))
print(paste("Qp17 =",Qp17_S0043,"l/s",": Si"))
print(paste("Qp18 =",Qp18_S0043,"l/s",": No"))
print(paste("Qp19 =",Qp19_S0043,"l/s",": Si"))
print(paste("Qp23 =",Qp23_S0043,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0043,": Si"))
```

```
print(paste("K2_14 =",K2_14_S0043,": Si"))
print(paste("K2_15 =",K2_15_S0043,": No"))
print(paste("K2_16 =",K2_16_S0043,": Si"))
print(paste("K2_17 =",K2_17_S0043,": Si"))
print(paste("K2_18 =",K2_18_S0043,": No"))
print(paste("K2_19 =",K2_19_S0043,": Si"))
print(paste("K2_23 =",K2_23_S0043,": Si"))
```

```{r}
K2S0043m=c(K2_13_S0043,K2_14_S0043,K2_16_S0043,K2_17_S0043,K2_19_S0043,
K2_23_S0043)
K2S0043=mean(K2S0043m)
summary(K2S0043m)
K2S0043m
print(paste("K2_S0043 =",K2S0043))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0043,": No"))
print(paste("Kmính_14 =",Kmính14_S0043,": No"))
print(paste("Kmính_15 =",Kmính15_S0043,": No"))
print(paste("Kmính_16 =",Kmính16_S0043,": No"))
print(paste("Kmính_17 =",Kmính17_S0043,": No"))
print(paste("Kmính_18 =",Kmính18_S0043,": No"))
print(paste("Kmính_19 =",Kmính19_S0043,": No"))
print(paste("Kmính_23 =",Kmính23_S0043,": No"))
```

```{r}
KmínhS0043m=c(Kmính13_S0043,Kmính14_S0043,Kmính16_S0043,Kmính17_S0043,
Kmính19_S0043,Kmính23_S0043)
KmínhS0043=mean(KmínhS0043m)
summary(KmínhS0043m)
KmínhS0043m
print(paste("Kmính_S0043 =",KmínhS0043))
```

## Estación S0047 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0047H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0047H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0047H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0047H13max=S0047H[1:24,6]
S0047H13min=S0047H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=158,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0047=119.952827073973
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0047,lwd="4",col="red")
abline(h=max(S0047H13max),lwd="3",col="black",lty=2)
abline(h=min(S0047H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0047=max(S0047H13max)
K2_13_S0047=Qmax13_S0047/Qp13_S0047
print(paste("K2 =",K2_13_S0047))
```

```
```

```{r}
plot(Hora,S0047H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0047,lwd="4",col="red")
abline(h=max(S0047H13min),lwd="3",col="black",lty=2)
abline(h=min(S0047H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0047=min(S0047H13min)
Kmính13_S0047=Qminh13_S0047/Qp13_S0047
print(paste("Kmính =",Kmính13_S0047))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0047H14max=S0047H[1:24,10]
S0047H14min=S0047H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=162.9,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=153.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0047=122.437518767671
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0047,lwd="4",col="red")
abline(h=max(S0047H14max),lwd="3",col="black",lty=2)
abline(h=min(S0047H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0047=max(S0047H14max)
K2_14_S0047=Qmax14_S0047/Qp14_S0047
print(paste("K2 =",K2_14_S0047))
```

```{r}
plot(Hora,S0047H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0047,lwd="4",col="red")
abline(h=max(S0047H14min),lwd="3",col="black",lty=2)
abline(h=min(S0047H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0047=min(S0047H14min)
Kmính14_S0047=Qminh14_S0047/Qp14_S0047
print(paste("Kmính =",Kmính14_S0047))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0047H15max=S0047H[1:24,14]
S0047H15min=S0047H[1:24,16]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=178,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=168,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0047=130.751410068219
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0047,lwd="4",col="red")
abline(h=max(S0047H15max),lwd="3",col="black",lty=2)
abline(h=min(S0047H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0047=max(S0047H15max)
K2_15_S0047=Qmax15_S0047/Qp15_S0047
print(paste("K2 =",K2_15_S0047))
```

```{r}
plot(Hora,S0047H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0047,lwd="4",col="red")
abline(h=max(S0047H15min),lwd="3",col="black",lty=2)
abline(h=min(S0047H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0047=min(S0047H15min)
Kmính15_S0047=Qminh15_S0047/Qp15_S0047
print(paste("Kmính =",Kmính15_S0047))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0047H16max=S0047H[1:24,18]
S0047H16min=S0047H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=178.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=168.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0047=126.813900682486
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0047,lwd="4",col="red")
abline(h=max(S0047H16max),lwd="3",col="black",lty=2)
abline(h=min(S0047H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0047=max(S0047H16max)
K2_16_S0047=Qmax16_S0047/Qp16_S0047
print(paste("K2 =",K2_16_S0047))
```

```{r}
plot(Hora,S0047H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0047,lwd="4",col="red")
abline(h=max(S0047H16min),lwd="3",col="black",lty=2)
abline(h=min(S0047H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0047=min(S0047H16min)
Kmính16_S0047=Qminh16_S0047/Qp16_S0047
print(paste("Kmính =",Kmính16_S0047))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0047H17max=S0047H[1:24,22]
S0047H17min=S0047H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=158.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0047=123.263195771233
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0047,lwd="4",col="red")
abline(h=max(S0047H17max),lwd="3",col="black",lty=2)
abline(h=min(S0047H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0047=max(S0047H17max)
K2_17_S0047=Qmax17_S0047/Qp17_S0047
print(paste("K2 =",K2_17_S0047))
```

```{r}
plot(Hora,S0047H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0047,lwd="4",col="red")
abline(h=max(S0047H17min),lwd="3",col="black",lty=2)
abline(h=min(S0047H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0047=min(S0047H17min)
Kmính17_S0047=Qminh17_S0047/Qp17_S0047
print(paste("Kmính =",Kmính17_S0047))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0047H18max=S0047H[1:24,26]
S0047H18min=S0047H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=185.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=175.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0047=132.387366951507
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0047,lwd="4",col="red")
abline(h=max(S0047H18max),lwd="3",col="black",lty=2)
abline(h=min(S0047H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0047=max(S0047H18max)
K2_18_S0047=Qmax18_S0047/Qp18_S0047
print(paste("K2 =",K2_18_S0047))
```

```{r}
plot(Hora,S0047H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0047,lwd="4",col="red")
abline(h=max(S0047H18min),lwd="3",col="black",lty=2)
abline(h=min(S0047H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0047=min(S0047H18min)
Kmính18_S0047=Qminh18_S0047/Qp18_S0047
print(paste("Kmính =",Kmính18_S0047))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0047H19max=S0047H[1:24,30]
S0047H19min=S0047H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=185.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0047=141.260485883836
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0047,lwd="4",col="red")
abline(h=max(S0047H19max),lwd="3",col="black",lty=2)
abline(h=min(S0047H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0047=max(S0047H19max)
K2_19_S0047=Qmax19_S0047/Qp19_S0047
print(paste("K2 =",K2_19_S0047))
```

```{r}
plot(Hora,S0047H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0047,lwd="4",col="red")
abline(h=max(S0047H19min),lwd="3",col="black",lty=2)
abline(h=min(S0047H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0047=min(S0047H19min)
Kmính19_S0047=Qminh19_S0047/Qp19_S0047
print(paste("Kmính =",Kmính19_S0047))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0047H23max=S0047H[1:24,46]
S0047H23min=S0047H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0047H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0047 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0047H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=177.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=167.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0047H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0047=123.29810180137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0047,lwd="4",col="red")
abline(h=max(S0047H23max),lwd="3",col="black",lty=2)
abline(h=min(S0047H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0047=max(S0047H23max)
K2_23_S0047=Qmax23_S0047/Qp23_S0047
print(paste("K2 =",K2_23_S0047))
```

```{r}
plot(Hora,S0047H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0047 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0047,lwd="4",col="red")
abline(h=max(S0047H23min),lwd="3",col="black",lty=2)
abline(h=min(S0047H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0047=min(S0047H23min)
Kmính23_S0047=Qminh23_S0047/Qp23_S0047
print(paste("Kmính =",Kmính23_S0047))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0047,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0047,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0047,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0047,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0047,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0047,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0047,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0047,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0047,": No"))
print(paste("K2_14 =",K2_14_S0047,": Si"))
print(paste("K2_15 =",K2_15_S0047,": No"))
print(paste("K2_16 =",K2_16_S0047,": No"))
print(paste("K2_17 =",K2_17_S0047,": Si"))
print(paste("K2_18 =",K2_18_S0047,": No"))
print(paste("K2_19 =",K2_19_S0047,": Si"))
print(paste("K2_23 =",K2_23_S0047,": Si"))
```

```{r}
K2S0047m=c(K2_14_S0047,K2_17_S0047,K2_19_S0047,K2_23_S0047)
K2S0047=mean(K2S0047m)
summary(K2S0047m)
K2S0047m
print(paste("K2_S0047 =",K2S0047))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0047,": No"))
print(paste("Kmính_14 =",Kmính14_S0047,": Si"))
print(paste("Kmính_15 =",Kmính15_S0047,": No"))
print(paste("Kmính_16 =",Kmính16_S0047,": No"))
print(paste("Kmính_17 =",Kmính17_S0047,": Si"))
print(paste("Kmính_18 =",Kmính18_S0047,": No"))
print(paste("Kmính_19 =",Kmính19_S0047,": Si"))
print(paste("Kmính_23 =",Kmính23_S0047,": Si"))
```

```{r}
KmínhS0047m=c(Kmính14_S0047,Kmính17_S0047,Kmính19_S0047,Kmính23_S0047)
KmínhS0047=mean(KmínhS0047m)
summary(KmínhS0047m)
KmínhS0047m
print(paste("Kmính_S0047 =",KmínhS0047))
```

## Estación S0048 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0048H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0048H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0048H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0048H13max=S0048H[1:24,6]
S0048H13min=S0048H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=215,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=205,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```
```

```{r}
plot(Hora,S0048H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0048=137.314105002466
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0048,lwd="4",col="red")
abline(h=max(S0048H13max),lwd="3",col="black",lty=2)
abline(h=min(S0048H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0048=max(S0048H13max)
K2_13_S0048=Qmax13_S0048/Qp13_S0048
print(paste("K2 =",K2_13_S0048))
```

```{r}
plot(Hora,S0048H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0048,lwd="4",col="red")
abline(h=max(S0048H13min),lwd="3",col="black",lty=2)
abline(h=min(S0048H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0048=min(S0048H13min)
Kmính13_S0048=Qminh13_S0048/Qp13_S0048
print(paste("Kmính =",Kmính13_S0048))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0048H14max=S0048H[1:24,10]
S0048H14min=S0048H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=205,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=195,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0048H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0048=131.278512186849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0048,lwd="4",col="red")
abline(h=max(S0048H14max),lwd="3",col="black",lty=2)
abline(h=min(S0048H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0048=max(S0048H14max)
K2_14_S0048=Qmax14_S0048/Qp14_S0048
print(paste("K2 =",K2_14_S0048))
```

```{r}
plot(Hora,S0048H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0048,lwd="4",col="red")
abline(h=max(S0048H14min),lwd="3",col="black",lty=2)
abline(h=min(S0048H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0048=min(S0048H14min)
Kmính14_S0048=Qminh14_S0048/Qp14_S0048
print(paste("Kmính =",Kmính14_S0048))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0048H15max=S0048H[1:24,14]
S0048H15min=S0048H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=185,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0048H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0048=132.522633759178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0048,lwd="4",col="red")
abline(h=max(S0048H15max),lwd="3",col="black",lty=2)
abline(h=min(S0048H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0048=max(S0048H15max)
K2_15_S0048=Qmax15_S0048/Qp15_S0048
print(paste("K2 =",K2_15_S0048))
```

```{r}
plot(Hora,S0048H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0048,lwd="4",col="red")
abline(h=max(S0048H15min),lwd="3",col="black",lty=2)
abline(h=min(S0048H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0048=min(S0048H15min)
Kmính15_S0048=Qminh15_S0048/Qp15_S0048
print(paste("Kmính =",Kmính15_S0048))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0048H16max=S0048H[1:24,18]
S0048H16min=S0048H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=190,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=180,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0048H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0048=128.891363338525
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0048,lwd="4",col="red")
abline(h=max(S0048H16max),lwd="3",col="black",lty=2)
abline(h=min(S0048H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0048=max(S0048H16max)
K2_16_S0048=Qmax16_S0048/Qp16_S0048
print(paste("K2 =",K2_16_S0048))
```

```{r}
plot(Hora,S0048H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0048,lwd="4",col="red")
abline(h=max(S0048H16min),lwd="3",col="black",lty=2)
abline(h=min(S0048H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0048=min(S0048H16min)
Kmính16_S0048=Qminh16_S0048/Qp16_S0048
print(paste("Kmính =",Kmính16_S0048))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0048H17max=S0048H[1:24,22]
S0048H17min=S0048H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=190,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=180,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0048H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0048=122.944988236192
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0048,lwd="4",col="red")
abline(h=max(S0048H17max),lwd="3",col="black",lty=2)
abline(h=min(S0048H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0048=max(S0048H17max)
K2_17_S0048=Qmax17_S0048/Qp17_S0048
print(paste("K2 =",K2_17_S0048))
```

```
```

```{r}
plot(Hora,S0048H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0048,lwd="4",col="red")
abline(h=max(S0048H17min),lwd="3",col="black",lty=2)
abline(h=min(S0048H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0048=min(S0048H17min)
Kmính17_S0048=Qminh17_S0048/Qp17_S0048
print(paste("Kmính =",Kmính17_S0048))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0048H18max=S0048H[1:24,26]
S0048H18min=S0048H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=200,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=190,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0048H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0048=131.320306376384
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0048,lwd="4",col="red")
abline(h=max(S0048H18max),lwd="3",col="black",lty=2)
abline(h=min(S0048H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0048=max(S0048H18max)
K2_18_S0048=Qmax18_S0048/Qp18_S0048
print(paste("K2 =",K2_18_S0048))
```

```{r}
plot(Hora,S0048H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0048,lwd="4",col="red")
abline(h=max(S0048H18min),lwd="3",col="black",lty=2)
abline(h=min(S0048H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0048=min(S0048H18min)
Kmính18_S0048=Qminh18_S0048/Qp18_S0048
print(paste("Kmính =",Kmính18_S0048))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0048H19max=S0048H[1:24,30]
S0048H19min=S0048H[1:24,32]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=210,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=200,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0048H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0048=130.18223110474
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0048,lwd="4",col="red")
abline(h=max(S0048H19max),lwd="3",col="black",lty=2)
abline(h=min(S0048H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0048=max(S0048H19max)
K2_19_S0048=Qmax19_S0048/Qp19_S0048
print(paste("K2 =",K2_19_S0048))
```

```{r}
plot(Hora,S0048H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0048,lwd="4",col="red")
abline(h=max(S0048H19min),lwd="3",col="black",lty=2)
abline(h=min(S0048H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0048=min(S0048H19min)
Kmính19_S0048=Qminh19_S0048/Qp19_S0048
print(paste("Kmính =",Kmính19_S0048))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0048H23max=S0048H[1:24,46]
S0048H23min=S0048H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0048H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0048 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0048H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=180,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=172,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0048H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0048=121.995614631973
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0048,lwd="4",col="red")
abline(h=max(S0048H23max),lwd="3",col="black",lty=2)
abline(h=min(S0048H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0048=max(S0048H23max)
K2_23_S0048=Qmax23_S0048/Qp23_S0048
print(paste("K2 =",K2_23_S0048))
```

```{r}
plot(Hora,S0048H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0048 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0048,lwd="4",col="red")
abline(h=max(S0048H23min),lwd="3",col="black",lty=2)
abline(h=min(S0048H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0048=min(S0048H23min)
Kmính23_S0048=Qminh23_S0048/Qp23_S0048
print(paste("Kmính =",Kmính23_S0048))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0048,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0048,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0048,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0048,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0048,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0048,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0048,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0048,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0048,": No"))
print(paste("K2_14 =",K2_14_S0048,": Si"))
print(paste("K2_15 =",K2_15_S0048,": Si"))
print(paste("K2_16 =",K2_16_S0048,": No"))
print(paste("K2_17 =",K2_17_S0048,": No"))
print(paste("K2_18 =",K2_18_S0048,": Si"))
print(paste("K2_19 =",K2_19_S0048,": Si"))
print(paste("K2_23 =",K2_23_S0048,": Si"))
```

```{r}
K2S0048m=c(K2_14_S0048,K2_15_S0048,K2_18_S0048,K2_19_S0048,K2_23_S0048)
K2S0048=mean(K2S0048m)
summary(K2S0048m)
K2S0048m
print(paste("K2_S0048 =",K2S0048))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0048,": No"))
print(paste("Kmính_14 =",Kmính14_S0048,": Si"))
print(paste("Kmính_15 =",Kmính15_S0048,": Si"))
print(paste("Kmính_16 =",Kmính16_S0048,": No"))
print(paste("Kmính_17 =",Kmính17_S0048,": No"))
print(paste("Kmính_18 =",Kmính18_S0048,": Si"))
print(paste("Kmính_19 =",Kmính19_S0048,": Si"))
print(paste("Kmính_23 =",Kmính23_S0048,": Si"))
```

```{r}
KmínhS0048m=c(Kmính14_S0048,Kmính15_S0048,Kmính18_S0048,Kmính19_S0048,
Kmính23_S0048)
KmínhS0048=mean(KmínhS0048m)
summary(KmínhS0048m)
KmínhS0048m
print(paste("Kmính_S0048 =",KmínhS0048))
```

## Estación S0049 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0049H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0049H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0049H)
```

### Extracción y análisis de datos del año 2013

```{r}
# Año sin datos en el sistema SCADA de SEDAPAL
```

### Extracción y análisis de datos del año 2014

```{r}
# Año con datos incompletos en el sistema SCADA de SEDAPAL
Hora=c(00:23)
S0049H14max=S0049H[1:24,10]
S0049H14min=S0049H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0049H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0049 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0049H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=115,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0049H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0049=63.1739135896438
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0049,lwd="4",col="red")
abline(h=max(S0049H14max),lwd="3",col="black",lty=2)
abline(h=min(S0049H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0049=max(S0049H14max)
K2_14_S0049=Qmax14_S0049/Qp14_S0049
print(paste("K2 =",K2_14_S0049))
```

```{r}
plot(Hora,S0049H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0049,lwd="4",col="red")
abline(h=max(S0049H14min),lwd="3",col="black",lty=2)
abline(h=min(S0049H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0049=min(S0049H14min)
Kmính14_S0049=Qminh14_S0049/Qp14_S0049
print(paste("Kmính =",Kmính14_S0049))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0049H15max=S0049H[1:24,14]
S0049H15min=S0049H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0049H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0049 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0049H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=122,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115,label="- Día de mínimo consumo"),
```

```
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0049H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0049=60.7497011624384
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0049,lwd="4",col="red")
abline(h=max(S0049H15max),lwd="3",col="black",lty=2)
abline(h=min(S0049H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0049=max(S0049H15max)
K2_15_S0049=Qmax15_S0049/Qp15_S0049
print(paste("K2 =",K2_15_S0049))
```
```

```{r}
plot(Hora,S0049H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0049,lwd="4",col="red")
abline(h=max(S0049H15min),lwd="3",col="black",lty=2)
abline(h=min(S0049H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0049=min(S0049H15min)
Kmính15_S0049=Qminh15_S0049/Qp15_S0049
print(paste("Kmính =",Kmính15_S0049))
```
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0049H16max=S0049H[1:24,18]
S0049H16min=S0049H[1:24,20]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0049H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0049 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0049H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=117,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=110,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0049H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0049=60.7803330756011
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0049,lwd="4",col="red")
abline(h=max(S0049H16max),lwd="3",col="black",lty=2)
abline(h=min(S0049H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0049=max(S0049H16max)
K2_16_S0049=Qmax16_S0049/Qp16_S0049
print(paste("K2 =",K2_16_S0049))
```
```

```{r}
plot(Hora,S0049H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
```
```

```
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0049,lwd="4",col="red")
abline(h=max(S0049H16min),lwd="3",col="black",lty=2)
abline(h=min(S0049H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0049=min(S0049H16min)
Kmính16_S0049=Qminh16_S0049/Qp16_S0049
print(paste("Kmính =",Kmính16_S0049))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0049H17max=S0049H[1:24,22]
S0049H17min=S0049H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0049H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0049 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0049H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=112,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=105,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0049H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0049=64.6201837781096
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0049,lwd="4",col="red")
abline(h=max(S0049H17max),lwd="3",col="black",lty=2)
abline(h=min(S0049H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0049=max(S0049H17max)
K2_17_S0049=Qmax17_S0049/Qp17_S0049
print(paste("K2 =",K2_17_S0049))
```

```{r}
plot(Hora,S0049H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0049,lwd="4",col="red")
abline(h=max(S0049H17min),lwd="3",col="black",lty=2)
abline(h=min(S0049H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0049=min(S0049H17min)
Kmính17_S0049=Qminh17_S0049/Qp17_S0049
print(paste("Kmính =",Kmính17_S0049))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0049H18max=S0049H[1:24,26]
S0049H18min=S0049H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0049H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0049 - 2018")+
```

```
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0049H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=120,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=113,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0049H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0049=60.4907681581096
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0049,lwd="4",col="red")
abline(h=max(S0049H18max),lwd="3",col="black",lty=2)
abline(h=min(S0049H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0049=max(S0049H18max)
K2_18_S0049=Qmax18_S0049/Qp18_S0049
print(paste("K2 =",K2_18_S0049))
```

```{r}
plot(Hora,S0049H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0049,lwd="4",col="red")
abline(h=max(S0049H18min),lwd="3",col="black",lty=2)
abline(h=min(S0049H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0049=min(S0049H18min)
Kmính18_S0049=Qminh18_S0049/Qp18_S0049
print(paste("Kmính =",Kmính18_S0049))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0049H19max=S0049H[1:24,30]
S0049H19min=S0049H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0049H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0049 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0049H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=113,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=106,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0049H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0049=59.0054152335342
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0049,lwd="4",col="red")
abline(h=max(S0049H19max),lwd="3",col="black",lty=2)
abline(h=min(S0049H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0049=max(S0049H19max)
K2_19_S0049=Qmax19_S0049/Qp19_S0049
```

```
print(paste("K2 =",K2_19_S0049))
```

```{r}
plot(Hora,S0049H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0049,lwd="4",col="red")
abline(h=max(S0049H19min),lwd="3",col="black",lty=2)
abline(h=min(S0049H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0049=min(S0049H19min)
Kmính19_S0049=Qminh19_S0049/Qp19_S0049
print(paste("Kmính =",Kmính19_S0049))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0049H23max=S0049H[1:24,46]
S0049H23min=S0049H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0049H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0049 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0049H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=115,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0049H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0049=61.6088552805753
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0049,lwd="4",col="red")
abline(h=max(S0049H23max),lwd="3",col="black",lty=2)
abline(h=min(S0049H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0049=max(S0049H23max)
K2_23_S0049=Qmax23_S0049/Qp23_S0049
print(paste("K2 =",K2_23_S0049))
```

```{r}
plot(Hora,S0049H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0049 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0049,lwd="4",col="red")
abline(h=max(S0049H23min),lwd="3",col="black",lty=2)
abline(h=min(S0049H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0049=min(S0049H23min)
Kmính23_S0049=Qminh23_S0049/Qp23_S0049
print(paste("Kmính =",Kmính23_S0049))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_14 =",Qp14_S0049,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0049,"l/s",": Si"))
```

```
print(paste("Qp_16 =",Qp16_S0049,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0049,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0049,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0049,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0049,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_14 =",K2_14_S0049,": No"))
print(paste("K2_15 =",K2_15_S0049,": Si"))
print(paste("K2_16 =",K2_16_S0049,": Si"))
print(paste("K2_17 =",K2_17_S0049,": No"))
print(paste("K2_18 =",K2_18_S0049,": Si"))
print(paste("K2_19 =",K2_19_S0049,": Si"))
print(paste("K2_23 =",K2_23_S0049,": Si"))
```

```{r}
K2S0049m=c(K2_15_S0049,K2_16_S0049,K2_18_S0049,K2_19_S0049,K2_23_S0049)
K2S0049=mean(K2S0049m)
summary(K2S0049m)
K2S0049m
print(paste("K2_S0049 =",K2S0049))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_14 =",Kmính14_S0049,": No"))
print(paste("Kmính_15 =",Kmính15_S0049,": Si"))
print(paste("Kmính_16 =",Kmính16_S0049,": Si"))
print(paste("Kmính_17 =",Kmính17_S0049,": No"))
print(paste("Kmính_18 =",Kmính18_S0049,": Si"))
print(paste("Kmính_19 =",Kmính19_S0049,": Si"))
print(paste("Kmính_23 =",Kmính23_S0049,": Si"))
```

```{r}
KmínhS0049m=c(Kmính15_S0049,Kmính16_S0049,Kmính18_S0049,Kmính19_S0049,
Kmính23_S0049)
KmínhS0049=mean(KmínhS0049m)
summary(KmínhS0049m)
KmínhS0049m
print(paste("Kmính_S0049 =",KmínhS0049))
```

## Estación S0054 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0054H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0054H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0054H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0054H13max=S0054H[1:24,6]
S0054H13min=S0054H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=230,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=220,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0054=151.946020165753
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0054,lwd="4",col="red")
abline(h=max(S0054H13max),lwd="3",col="black",lty=2)
abline(h=min(S0054H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0054=max(S0054H13max)
K2_13_S0054=Qmax13_S0054/Qp13_S0054
print(paste("K2 =",K2_13_S0054))
```

```{r}
plot(Hora,S0054H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0054,lwd="4",col="red")
abline(h=max(S0054H13min),lwd="3",col="black",lty=2)
abline(h=min(S0054H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0054=min(S0054H13min)
Kmính13_S0054=Qminh13_S0054/Qp13_S0054
print(paste("Kmính =",Kmính13_S0054))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0054H14max=S0054H[1:24,10]
S0054H14min=S0054H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=229,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=219,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0054=152.09000258
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0054,lwd="4",col="red")
abline(h=max(S0054H14max),lwd="3",col="black",lty=2)
abline(h=min(S0054H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0054=max(S0054H14max)
K2_14_S0054=Qmax14_S0054/Qp14_S0054
print(paste("K2 =",K2_14_S0054))
```

```{r}
plot(Hora,S0054H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0054,lwd="4",col="red")
abline(h=max(S0054H14min),lwd="3",col="black",lty=2)
abline(h=min(S0054H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0054=min(S0054H14min)
Kmính14_S0054=Qminh14_S0054/Qp14_S0054
print(paste("Kmính =",Kmính14_S0054))
```

```
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0054H15max=S0054H[1:24,14]
S0054H15min=S0054H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=240,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=230,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0054=153.134639326849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0054,lwd="4",col="red")
abline(h=max(S0054H15max),lwd="3",col="black",lty=2)
abline(h=min(S0054H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0054=max(S0054H15max)
K2_15_S0054=Qmax15_S0054/Qp15_S0054
print(paste("K2 =",K2_15_S0054))
```

```{r}
plot(Hora,S0054H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0054,lwd="4",col="red")
abline(h=max(S0054H15min),lwd="3",col="black",lty=2)
abline(h=min(S0054H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0054=min(S0054H15min)
Kmính15_S0054=Qminh15_S0054/Qp15_S0054
print(paste("Kmính =",Kmính15_S0054))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0054H16max=S0054H[1:24,18]
S0054H16min=S0054H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=220,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=210,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0054=144.015804273224
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0054,lwd="4",col="red")
abline(h=max(S0054H16max),lwd="3",col="black",lty=2)
abline(h=min(S0054H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0054=max(S0054H16max)
K2_16_S0054=Qmax16_S0054/Qp16_S0054
print(paste("K2 =",K2_16_S0054))
```

```{r}
plot(Hora,S0054H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0054,lwd="4",col="red")
abline(h=max(S0054H16min),lwd="3",col="black",lty=2)
abline(h=min(S0054H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0054=min(S0054H16min)
Kmính16_S0054=Qminh16_S0054/Qp16_S0054
print(paste("Kmính =",Kmính16_S0054))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0054H17max=S0054H[1:24,22]
S0054H17min=S0054H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=224,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=214,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0054=147.102104034795
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0054,lwd="4",col="red")
abline(h=max(S0054H17max),lwd="3",col="black",lty=2)
abline(h=min(S0054H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0054=max(S0054H17max)
K2_17_S0054=Qmax17_S0054/Qp17_S0054
print(paste("K2 =",K2_17_S0054))
```

```{r}
plot(Hora,S0054H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0054,lwd="4",col="red")
abline(h=max(S0054H17min),lwd="3",col="black",lty=2)
abline(h=min(S0054H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0054=min(S0054H17min)
Kmính17_S0054=Qminh17_S0054/Qp17_S0054
print(paste("Kmính =",Kmính17_S0054))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0054H18max=S0054H[1:24,26]
S0054H18min=S0054H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=223,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=213,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0054=147.744195199178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0054,lwd="4",col="red")
abline(h=max(S0054H18max),lwd="3",col="black",lty=2)
abline(h=min(S0054H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0054=max(S0054H18max)
K2_18_S0054=Qmax18_S0054/Qp18_S0054
print(paste("K2 =",K2_18_S0054))
```

```{r}
plot(Hora,S0054H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0054,lwd="4",col="red")
abline(h=max(S0054H18min),lwd="3",col="black",lty=2)
abline(h=min(S0054H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0054=min(S0054H18min)
Kmính18_S0054=Qminh18_S0054/Qp18_S0054
print(paste("Kmính =",Kmính18_S0054))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0054H19max=S0054H[1:24,30]
S0054H19min=S0054H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=225,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=215,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0054=150.724802716164
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0054,lwd="4",col="red")
abline(h=max(S0054H19max),lwd="3",col="black",lty=2)
abline(h=min(S0054H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0054=max(S0054H19max)
K2_19_S0054=Qmax19_S0054/Qp19_S0054
print(paste("K2 =",K2_19_S0054))
```

```{r}
plot(Hora,S0054H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0054,lwd="4",col="red")
abline(h=max(S0054H19min),lwd="3",col="black",lty=2)
abline(h=min(S0054H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0054=min(S0054H19min)
Kmính19_S0054=Qminh19_S0054/Qp19_S0054
print(paste("Kmính =",Kmính19_S0054))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0054H23max=S0054H[1:24,46]
S0054H23min=S0054H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0054H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0054 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0054H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=206,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=196,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0054H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0054=135.859123403014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0054,lwd="4",col="red")
abline(h=max(S0054H23max),lwd="3",col="black",lty=2)
abline(h=min(S0054H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0054=max(S0054H23max)
K2_23_S0054=Qmax23_S0054/Qp23_S0054
print(paste("K2 =",K2_23_S0054))
```

```{r}
plot(Hora,S0054H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0054 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0054,lwd="4",col="red")
abline(h=max(S0054H23min),lwd="3",col="black",lty=2)
abline(h=min(S0054H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0054=min(S0054H23min)
Kmính23_S0054=Qminh23_S0054/Qp23_S0054
print(paste("Kmính =",Kmính23_S0054))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0054,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0054,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0054,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0054,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0054,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0054,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0054,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0054,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0054,": Si"))
print(paste("K2_14 =",K2_14_S0054,": Si"))
print(paste("K2_15 =",K2_15_S0054,": No"))
print(paste("K2_16 =",K2_16_S0054,": Si"))
print(paste("K2_17 =",K2_17_S0054,": Si"))
print(paste("K2_18 =",K2_18_S0054,": Si"))
print(paste("K2_19 =",K2_19_S0054,": Si"))
print(paste("K2_23 =",K2_23_S0054,": Si"))
```

```{r}
K2S0054m=c(K2_13_S0054,K2_14_S0054,K2_16_S0054,K2_17_S0054,K2_18_S0054,
K2_19_S0054,K2_23_S0054)
K2S0054=mean(K2S0054m)
summary(K2S0054m)
K2S0054m
print(paste("K2_S0054 =",K2S0054))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0054,": Si"))
print(paste("Kmính_14 =",Kmính14_S0054,": Si"))
print(paste("Kmính_15 =",Kmính15_S0054,": No"))
print(paste("Kmính_16 =",Kmính16_S0054,": Si"))
print(paste("Kmính_17 =",Kmính17_S0054,": Si"))
print(paste("Kmính_18 =",Kmính18_S0054,": Si"))
print(paste("Kmính_19 =",Kmính19_S0054,": Si"))
print(paste("Kmính_23 =",Kmính23_S0054,": Si"))
```

```{r}
KmínhS0054m=c(Kmính13_S0054,Kmính14_S0054,Kmính16_S0054,Kmính17_S0054,
Kmính18_S0054,Kmính19_S0054,Kmính23_S0054)
KmínhS0054=mean(KmínhS0054m)
summary(KmínhS0054m)
KmínhS0054m
print(paste("Kmính_S0054 =",KmínhS0054))
```

## Estación S0056 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0056H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0056H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0056H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0056H13max=S0056H[1:24,6]
S0056H13min=S0056H[1:24,8]
```

```{r}
ggplot()+
```

```
geom_line(mapping=aes(x=Hora,y=S0056H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=320,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=305,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0056=186.304367886849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0056,lwd="4",col="red")
abline(h=max(S0056H13max),lwd="3",col="black",lty=2)
abline(h=min(S0056H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0056=max(S0056H13max)
K2_13_S0056=Qmax13_S0056/Qp13_S0056
print(paste("K2 =",K2_13_S0056))
```

```{r}
plot(Hora,S0056H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0056,lwd="4",col="red")
abline(h=max(S0056H13min),lwd="3",col="black",lty=2)
abline(h=min(S0056H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0056=min(S0056H13min)
Kmính13_S0056=Qminh13_S0056/Qp13_S0056
print(paste("Kmính =",Kmính13_S0056))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0056H14max=S0056H[1:24,10]
S0056H14min=S0056H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0056H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=227,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=217,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0056=170.840220366575
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0056,lwd="4",col="red")
abline(h=max(S0056H14max),lwd="3",col="black",lty=2)
abline(h=min(S0056H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
```

```
Qmax14_S0056=max(S0056H14max)
K2_14_S0056=Qmax14_S0056/Qp14_S0056
print(paste("K2 =",K2_14_S0056))
```

```{r}
plot(Hora,S0056H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0056,lwd="4",col="red")
abline(h=max(S0056H14min),lwd="3",col="black",lty=2)
abline(h=min(S0056H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0056=min(S0056H14min)
Kmính14_S0056=Qminh14_S0056/Qp14_S0056
print(paste("Kmính =",Kmính14_S0056))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0056H15max=S0056H[1:24,14]
S0056H15min=S0056H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0056H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=243,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=233,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0056=174.560973544931
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0056,lwd="4",col="red")
abline(h=max(S0056H15max),lwd="3",col="black",lty=2)
abline(h=min(S0056H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0056=max(S0056H15max)
K2_15_S0056=Qmax15_S0056/Qp15_S0056
print(paste("K2 =",K2_15_S0056))
```

```{r}
plot(Hora,S0056H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0056,lwd="4",col="red")
abline(h=max(S0056H15min),lwd="3",col="black",lty=2)
abline(h=min(S0056H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0056=min(S0056H15min)
Kmính15_S0056=Qminh15_S0056/Qp15_S0056
print(paste("Kmính =",Kmính15_S0056))
```

### Extracción y análisis de datos del año 2016

```{r}
```

```
Hora=c(00:23)
S0056H16max=S0056H[1:24,18]
S0056H16min=S0056H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0056H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=240,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=230,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0056=173.378048869399
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0056,lwd="4",col="red")
abline(h=max(S0056H16max),lwd="3",col="black",lty=2)
abline(h=min(S0056H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0056=max(S0056H16max)
K2_16_S0056=Qmax16_S0056/Qp16_S0056
print(paste("K2 =",K2_16_S0056))
```

```{r}
plot(Hora,S0056H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0056,lwd="4",col="red")
abline(h=max(S0056H16min),lwd="3",col="black",lty=2)
abline(h=min(S0056H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0056=min(S0056H16min)
Kmính16_S0056=Qminh16_S0056/Qp16_S0056
print(paste("Kmính =",Kmính16_S0056))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0056H17max=S0056H[1:24,22]
S0056H17min=S0056H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0056H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=240,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=230,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0056=176.269107391507
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0056,lwd="4",col="red")
abline(h=max(S0056H17max),lwd="3",col="black",lty=2)
abline(h=min(S0056H17max),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0056=max(S0056H17max)
K2_17_S0056=Qmax17_S0056/Qp17_S0056
print(paste("K2 =",K2_17_S0056))
```

```{r}
plot(Hora,S0056H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0056,lwd="4",col="red")
abline(h=max(S0056H17min),lwd="3",col="black",lty=2)
abline(h=min(S0056H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0056=min(S0056H17min)
Kmính17_S0056=Qminh17_S0056/Qp17_S0056
print(paste("Kmính =",Kmính17_S0056))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0056H18max=S0056H[1:24,26]
S0056H18min=S0056H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0056H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=247,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=237,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0056=178.362099366575
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0056,lwd="4",col="red")
abline(h=max(S0056H18max),lwd="3",col="black",lty=2)
abline(h=min(S0056H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0056=max(S0056H18max)
K2_18_S0056=Qmax18_S0056/Qp18_S0056
print(paste("K2 =",K2_18_S0056))
```

```{r}
plot(Hora,S0056H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0056,lwd="4",col="red")
abline(h=max(S0056H18min),lwd="3",col="black",lty=2)
abline(h=min(S0056H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0056=min(S0056H18min)
```

```
Kmính18_S0056=Qminh18_S0056/Qp18_S0056
print(paste("Kmính =",Kmính18_S0056))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0056H19max=S0056H[1:24,30]
S0056H19min=S0056H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0056H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=239,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=229,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0056=176.442762561644
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0056,lwd="4",col="red")
abline(h=max(S0056H19max),lwd="3",col="black",lty=2)
abline(h=min(S0056H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0056=max(S0056H19max)
K2_19_S0056=Qmax19_S0056/Qp19_S0056
print(paste("K2 =",K2_19_S0056))
```

```{r}
plot(Hora,S0056H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0056,lwd="4",col="red")
abline(h=max(S0056H19min),lwd="3",col="black",lty=2)
abline(h=min(S0056H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0056=min(S0056H19min)
Kmính19_S0056=Qminh19_S0056/Qp19_S0056
print(paste("Kmính =",Kmính19_S0056))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0056H23max=S0056H[1:24,46]
S0056H23min=S0056H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0056H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0056 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0056H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=219,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=209,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0056H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
Qp23_S0056=160.592379016438
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0056,lwd="4",col="red")
abline(h=max(S0056H23max),lwd="3",col="black",lty=2)
abline(h=min(S0056H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0056=max(S0056H23max)
K2_23_S0056=Qmax23_S0056/Qp23_S0056
print(paste("K2 =",K2_23_S0056))
```

```{r}
plot(Hora,S0056H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0056 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0056,lwd="4",col="red")
abline(h=max(S0056H23min),lwd="3",col="black",lty=2)
abline(h=min(S0056H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0056=min(S0056H23min)
Kmính23_S0056=Qminh23_S0056/Qp23_S0056
print(paste("Kmính =",Kmính23_S0056))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0056,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0056,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0056,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0056,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0056,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0056,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0056,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0056,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0056,": No"))
print(paste("K2_14 =",K2_14_S0056,": Si"))
print(paste("K2_15 =",K2_15_S0056,": Si"))
print(paste("K2_16 =",K2_16_S0056,": Si"))
print(paste("K2_17 =",K2_17_S0056,": Si"))
print(paste("K2_18 =",K2_18_S0056,": Si"))
print(paste("K2_19 =",K2_19_S0056,": Si"))
print(paste("K2_23 =",K2_23_S0056,": Si"))
```

```{r}
K2S0056m=c(K2_14_S0056,K2_15_S0056,K2_16_S0056,K2_17_S0056,K2_18_S0056,
K2_19_S0056,K2_23_S0056)
K2S0056=mean(K2S0056m)
summary(K2S0056m)
K2S0056m
print(paste("K2_S0056 =",K2S0056))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0056,": No"))
print(paste("Kmính_14 =",Kmính14_S0056,": Si"))
print(paste("Kmính_15 =",Kmính15_S0056,": Si"))
print(paste("Kmính_16 =",Kmính16_S0056,": Si"))
print(paste("Kmính_17 =",Kmính17_S0056,": Si"))
print(paste("Kmính_18 =",Kmính18_S0056,": Si"))
print(paste("Kmính_19 =",Kmính19_S0056,": Si"))
print(paste("Kmính_23 =",Kmính23_S0056,": Si"))
```

```{r}
KmínhS0056m=c(Kmính14_S0056,Kmính15_S0056,Kmính16_S0056,Kmính17_S0056,
Kmính18_S0056,Kmính19_S0056,Kmính23_S0056)
KmínhS0056=mean(KmínhS0056m)
summary(KmínhS0056m)
KmínhS0056m
print(paste("Kmính_S0056 =",KmínhS0056))
```

## Estación S0057 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0057H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0057H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0057H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0057H13max=S0057H[1:24,6]
S0057H13min=S0057H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0057H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=65,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0057=39.1089081343288
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0057,lwd="4",col="red")
abline(h=max(S0057H13max),lwd="3",col="black",lty=2)
abline(h=min(S0057H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0057=max(S0057H13max)
K2_13_S0057=Qmax13_S0057/Qp13_S0057
print(paste("K2 =",K2_13_S0057))
```

```{r}
plot(Hora,S0057H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0057,lwd="4",col="red")
abline(h=max(S0057H13min),lwd="3",col="black",lty=2)
abline(h=min(S0057H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0057=min(S0057H13min)
Kmính13_S0057=Qminh13_S0057/Qp13_S0057
print(paste("Kmính =",Kmính13_S0057))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0057H14max=S0057H[1:24,10]
S0057H14min=S0057H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0057H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=79,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=75,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0057=48.1385178120548
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0057,lwd="4",col="red")
abline(h=max(S0057H14max),lwd="3",col="black",lty=2)
abline(h=min(S0057H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0057=max(S0057H14max)
K2_14_S0057=Qmax14_S0057/Qp14_S0057
print(paste("K2 =",K2_14_S0057))
```

```{r}
plot(Hora,S0057H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0057,lwd="4",col="red")
abline(h=max(S0057H14min),lwd="3",col="black",lty=2)
abline(h=min(S0057H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0057=min(S0057H14min)
Kmính14_S0057=Qminh14_S0057/Qp14_S0057
print(paste("Kmính =",Kmính14_S0057))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0057H15max=S0057H[1:24,14]
S0057H15min=S0057H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0057H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=81,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=77,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0057=45.2448499178904
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0057,lwd="4",col="red")
abline(h=max(S0057H15max),lwd="3",col="black",lty=2)
abline(h=min(S0057H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0057=max(S0057H15max)
K2_15_S0057=Qmax15_S0057/Qp15_S0057
print(paste("K2 =",K2_15_S0057))
```

```{r}
plot(Hora,S0057H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0057,lwd="4",col="red")
abline(h=max(S0057H15min),lwd="3",col="black",lty=2)
abline(h=min(S0057H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0057=min(S0057H15min)
Kmính15_S0057=Qminh15_S0057/Qp15_S0057
print(paste("Kmính =",Kmính15_S0057))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0057H16max=S0057H[1:24,18]
S0057H16min=S0057H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0057H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=84,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=80,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0057=44.7966527876503
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0057,lwd="4",col="red")
abline(h=max(S0057H16max),lwd="3",col="black",lty=2)
abline(h=min(S0057H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0057=max(S0057H16max)
K2_16_S0057=Qmax16_S0057/Qp16_S0057
print(paste("K2 =",K2_16_S0057))
```

```{r}
plot(Hora,S0057H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0057,lwd="4",col="red")
abline(h=max(S0057H16min),lwd="3",col="black",lty=2)
abline(h=min(S0057H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0057=min(S0057H16min)
Kmính16_S0057=Qminh16_S0057/Qp16_S0057
print(paste("Kmính =",Kmính16_S0057))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0057H17max=S0057H[1:24,22]
S0057H17min=S0057H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0057H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=84,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=80,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0057=45.157118884411
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0057,lwd="4",col="red")
abline(h=max(S0057H17max),lwd="3",col="black",lty=2)
abline(h=min(S0057H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0057=max(S0057H17max)
K2_17_S0057=Qmax17_S0057/Qp17_S0057
print(paste("K2 =",K2_17_S0057))
```

```{r}
plot(Hora,S0057H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0057,lwd="4",col="red")
abline(h=max(S0057H17min),lwd="3",col="black",lty=2)
abline(h=min(S0057H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0057=min(S0057H17min)
Kmính17_S0057=Qminh17_S0057/Qp17_S0057
print(paste("Kmính =",Kmính17_S0057))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0057H18max=S0057H[1:24,26]
S0057H18min=S0057H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0057H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=83,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=79,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0057=47.0464442496986
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0057,lwd="4",col="red")
abline(h=max(S0057H18max),lwd="3",col="black",lty=2)
abline(h=min(S0057H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0057=max(S0057H18max)
K2_18_S0057=Qmax18_S0057/Qp18_S0057
print(paste("K2 =",K2_18_S0057))
```

```{r}
plot(Hora,S0057H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0057,lwd="4",col="red")
abline(h=max(S0057H18min),lwd="3",col="black",lty=2)
abline(h=min(S0057H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0057=min(S0057H18min)
Kmính18_S0057=Qminh18_S0057/Qp18_S0057
print(paste("Kmính =",Kmính18_S0057))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0057H19max=S0057H[1:24,30]
S0057H19min=S0057H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0057H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=86,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=82,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0057=49.2163381362192
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0057,lwd="4",col="red")
abline(h=max(S0057H19max),lwd="3",col="black",lty=2)
abline(h=min(S0057H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0057=max(S0057H19max)
K2_19_S0057=Qmax19_S0057/Qp19_S0057
print(paste("K2 =",K2_19_S0057))
```

```{r}
plot(Hora,S0057H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0057,lwd="4",col="red")
abline(h=max(S0057H19min),lwd="3",col="black",lty=2)
abline(h=min(S0057H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0057=min(S0057H19min)
Kmính19_S0057=Qminh19_S0057/Qp19_S0057
print(paste("Kmính =",Kmính19_S0057))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0057H23max=S0057H[1:24,46]
S0057H23min=S0057H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0057H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0057 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0057H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=75,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=71.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0057H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0057=45.2682635803288
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0057,lwd="4",col="red")
abline(h=max(S0057H23max),lwd="3",col="black",lty=2)
abline(h=min(S0057H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0057=max(S0057H23max)
K2_23_S0057=Qmax23_S0057/Qp23_S0057
print(paste("K2 =",K2_23_S0057))
```

```{r}
plot(Hora,S0057H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0057 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0057,lwd="4",col="red")
abline(h=max(S0057H23min),lwd="3",col="black",lty=2)
abline(h=min(S0057H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0057=min(S0057H23min)
Kmính23_S0057=Qminh23_S0057/Qp23_S0057
print(paste("Kmính =",Kmính23_S0057))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0057,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0057,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0057,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0057,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0057,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0057,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0057,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0057,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0057,": Si"))
print(paste("K2_14 =",K2_14_S0057,": No"))
print(paste("K2_15 =",K2_15_S0057,": Si"))
print(paste("K2_16 =",K2_16_S0057,": Si"))
print(paste("K2_17 =",K2_17_S0057,": Si"))
print(paste("K2_18 =",K2_18_S0057,": Si"))
print(paste("K2_19 =",K2_19_S0057,": Si"))
print(paste("K2_23 =",K2_23_S0057,": Si"))
```

```{r}
K2S0057m=c(K2_13_S0057,K2_15_S0057,K2_16_S0057,K2_17_S0057,K2_18_S0057,
K2_19_S0057,K2_23_S0057)
K2S0057=mean(K2S0057m)
summary(K2S0057m)
```

```
K2S0057m
print(paste("K2_S0057 =",K2S0057))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0057,": Si"))
print(paste("Kmính_14 =",Kmính14_S0057,": No"))
print(paste("Kmính_15 =",Kmính15_S0057,": Si"))
print(paste("Kmính_16 =",Kmính16_S0057,": Si"))
print(paste("Kmính_17 =",Kmính17_S0057,": Si"))
print(paste("Kmính_18 =",Kmính18_S0057,": Si"))
print(paste("Kmính_19 =",Kmính19_S0057,": Si"))
print(paste("Kmính_23 =",Kmính23_S0057,": Si"))
```

```{r}
KmínhS0057m=c(Kmính13_S0057,Kmính15_S0057,Kmính16_S0057,Kmính17_S0057,
Kmính18_S0057,Kmính19_S0057,Kmính23_S0057)
KmínhS0057=mean(KmínhS0057m)
summary(KmínhS0057m)
KmínhS0057m
print(paste("Kmính_S0057 =",KmínhS0057))
```

## Estación S0063 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0063H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0063H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0063H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0063H13max=S0063H[1:24,6]
S0063H13min=S0063H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=128,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=121,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0063H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0063=72.3987581423014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0063,lwd="4",col="red")
abline(h=max(S0063H13max),lwd="3",col="black",lty=2)
abline(h=min(S0063H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0063=max(S0063H13max)
K2_13_S0063=Qmax13_S0063/Qp13_S0063
print(paste("K2 =",K2_13_S0063))
```

```{r}
plot(Hora,S0063H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0063,lwd="4",col="red")
abline(h=max(S0063H13min),lwd="3",col="black",lty=2)
abline(h=min(S0063H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0063=min(S0063H13min)
Kmính13_S0063=Qminh13_S0063/Qp13_S0063
print(paste("Kmính =",Kmính13_S0063))
```
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0063H14max=S0063H[1:24,10]
S0063H14min=S0063H[1:24,12]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=127,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=120,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0063H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0063=70.7676505107123
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0063,lwd="4",col="red")
abline(h=max(S0063H14max),lwd="3",col="black",lty=2)
abline(h=min(S0063H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0063=max(S0063H14max)
K2_14_S0063=Qmax14_S0063/Qp14_S0063
print(paste("K2 =",K2_14_S0063))
```
```

```{r}
plot(Hora,S0063H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0063,lwd="4",col="red")
abline(h=max(S0063H14min),lwd="3",col="black",lty=2)
abline(h=min(S0063H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0063=min(S0063H14min)
Kmính14_S0063=Qminh14_S0063/Qp14_S0063
print(paste("Kmính =",Kmính14_S0063))
```
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0063H15max=S0063H[1:24,14]
S0063H15min=S0063H[1:24,16]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=119,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=112,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```
```

```{r}
plot(Hora,S0063H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0063=69.0376415250137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0063,lwd="4",col="red")
abline(h=max(S0063H15max),lwd="3",col="black",lty=2)
abline(h=min(S0063H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0063=max(S0063H15max)
K2_15_S0063=Qmax15_S0063/Qp15_S0063
print(paste("K2 =",K2_15_S0063))
```

```{r}
plot(Hora,S0063H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0063,lwd="4",col="red")
abline(h=max(S0063H15min),lwd="3",col="black",lty=2)
abline(h=min(S0063H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0063=min(S0063H15min)
Kmính15_S0063=Qminh15_S0063/Qp15_S0063
print(paste("Kmính =",Kmính15_S0063))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0063H16max=S0063H[1:24,18]
S0063H16min=S0063H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=115,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0063H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0063=70.7940249944262
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0063,lwd="4",col="red")
abline(h=max(S0063H16max),lwd="3",col="black",lty=2)
abline(h=min(S0063H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0063=max(S0063H16max)
K2_16_S0063=Qmax16_S0063/Qp16_S0063
print(paste("K2 =",K2_16_S0063))
```

```{r}
plot(Hora,S0063H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0063,lwd="4",col="red")
abline(h=max(S0063H16min),lwd="3",col="black",lty=2)
abline(h=min(S0063H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0063=min(S0063H16min)
Kmính16_S0063=Qminh16_S0063/Qp16_S0063
print(paste("Kmính =",Kmính16_S0063))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0063H17max=S0063H[1:24,22]
S0063H17min=S0063H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=116,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0063H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0063=71.4562093685479
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0063,lwd="4",col="red")
abline(h=max(S0063H17max),lwd="3",col="black",lty=2)
abline(h=min(S0063H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0063=max(S0063H17max)
K2_17_S0063=Qmax17_S0063/Qp17_S0063
print(paste("K2 =",K2_17_S0063))
```

```{r}
plot(Hora,S0063H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0063,lwd="4",col="red")
abline(h=max(S0063H17min),lwd="3",col="black",lty=2)
abline(h=min(S0063H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0063=min(S0063H17min)
Kmính17_S0063=Qminh17_S0063/Qp17_S0063
print(paste("Kmính =",Kmính17_S0063))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0063H18max=S0063H[1:24,26]
S0063H18min=S0063H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=128,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=121,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0063H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0063=76.5786267238904
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0063,lwd="4",col="red")
abline(h=max(S0063H18max),lwd="3",col="black",lty=2)
abline(h=min(S0063H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0063=max(S0063H18max)
K2_18_S0063=Qmax18_S0063/Qp18_S0063
print(paste("K2 =",K2_18_S0063))
```

```{r}
plot(Hora,S0063H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0063,lwd="4",col="red")
abline(h=max(S0063H18min),lwd="3",col="black",lty=2)
abline(h=min(S0063H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0063=min(S0063H18min)
Kmính18_S0063=Qminh18_S0063/Qp18_S0063
print(paste("Kmính =",Kmính18_S0063))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0063H19max=S0063H[1:24,30]
S0063H19min=S0063H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=128,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=121,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0063H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0063=73.7602868791233
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0063,lwd="4",col="red")
abline(h=max(S0063H19max),lwd="3",col="black",lty=2)
abline(h=min(S0063H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0063=max(S0063H19max)
K2_19_S0063=Qmax19_S0063/Qp19_S0063
print(paste("K2 =",K2_19_S0063))
```

```
```

```{r}
plot(Hora,S0063H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0063,lwd="4",col="red")
abline(h=max(S0063H19min),lwd="3",col="black",lty=2)
abline(h=min(S0063H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0063=min(S0063H19min)
Kmính19_S0063=Qminh19_S0063/Qp19_S0063
print(paste("Kmính =",Kmính19_S0063))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0063H23max=S0063H[1:24,46]
S0063H23min=S0063H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0063H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0063 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0063H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=117,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=110,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0063H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0063=72.5690830347397
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0063,lwd="4",col="red")
abline(h=max(S0063H23max),lwd="3",col="black",lty=2)
abline(h=min(S0063H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0063=max(S0063H23max)
K2_23_S0063=Qmax23_S0063/Qp23_S0063
print(paste("K2 =",K2_23_S0063))
```

```{r}
plot(Hora,S0063H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0063 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0063,lwd="4",col="red")
abline(h=max(S0063H23min),lwd="3",col="black",lty=2)
abline(h=min(S0063H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0063=min(S0063H23min)
Kmính23_S0063=Qminh23_S0063/Qp23_S0063
print(paste("Kmính =",Kmính23_S0063))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0063,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0063,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0063,"l/s",": Si"))
```

```
print(paste("Qp_16 =",Qp16_S0063,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0063,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0063,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0063,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0063,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0063,": Si"))
print(paste("K2_14 =",K2_14_S0063,": Si"))
print(paste("K2_15 =",K2_15_S0063,": Si"))
print(paste("K2_16 =",K2_16_S0063,": Si"))
print(paste("K2_17 =",K2_17_S0063,": Si"))
print(paste("K2_18 =",K2_18_S0063,": No"))
print(paste("K2_19 =",K2_19_S0063,": Si"))
print(paste("K2_23 =",K2_23_S0063,": Si"))
```

```{r}
K2S0063m=c(K2_13_S0063,K2_14_S0063,K2_15_S0063,K2_16_S0063,K2_17_S0063,
K2_19_S0063,K2_23_S0063)
K2S0063=mean(K2S0063m)
summary(K2S0063m)
K2S0063m
print(paste("K2_S0063 =",K2S0063))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0063,": Si"))
print(paste("Kmính_14 =",Kmính14_S0063,": Si"))
print(paste("Kmính_15 =",Kmính15_S0063,": Si"))
print(paste("Kmính_16 =",Kmính16_S0063,": Si"))
print(paste("Kmính_17 =",Kmính17_S0063,": Si"))
print(paste("Kmính_18 =",Kmính18_S0063,": No"))
print(paste("Kmính_19 =",Kmính19_S0063,": Si"))
print(paste("Kmính_23 =",Kmính23_S0063,": Si"))
```

```{r}
KmínhS0063m=c(Kmính13_S0063,Kmính14_S0063,Kmính15_S0063,Kmính16_S0063,
Kmính17_S0063,Kmính19_S0063,Kmính23_S0063)
KmínhS0063=mean(KmínhS0063m)
summary(KmínhS0063m)
KmínhS0063m
print(paste("Kmính_S0063 =",KmínhS0063))
```

## Estación S0065 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0065H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0065H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0065H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0065H13max=S0065H[1:24,6]
S0065H13min=S0065H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=76,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=72,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0065=45.8214494049863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0065,lwd="4",col="red")
abline(h=max(S0065H13max),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0065H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0065=max(S0065H13max)
K2_13_S0065=Qmax13_S0065/Qp13_S0065
print(paste("K2 =",K2_13_S0065))
```

```{r}
plot(Hora,S0065H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0065,lwd="4",col="red")
abline(h=max(S0065H13min),lwd="3",col="black",lty=2)
abline(h=min(S0065H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0065=min(S0065H13min)
Kmính13_S0065=Qminh13_S0065/Qp13_S0065
print(paste("Kmính =",Kmính13_S0065))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0065H14max=S0065H[1:24,10]
S0065H14min=S0065H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=79,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=75,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0065=47.2643111659726
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0065,lwd="4",col="red")
abline(h=max(S0065H14max),lwd="3",col="black",lty=2)
abline(h=min(S0065H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0065=max(S0065H14max)
K2_14_S0065=Qmax14_S0065/Qp14_S0065
print(paste("K2 =",K2_14_S0065))
```

```{r}
plot(Hora,S0065H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0065,lwd="4",col="red")
abline(h=max(S0065H14min),lwd="3",col="black",lty=2)
abline(h=min(S0065H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
```

```
Qminh14_S0065=min(S0065H14min)
Kmính14_S0065=Qminh14_S0065/Qp14_S0065
print(paste("Kmính =",Kmính14_S0065))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0065H15max=S0065H[1:24,14]
S0065H15min=S0065H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=87,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=82,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0065=47.6332861899726
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0065,lwd="4",col="red")
abline(h=max(S0065H15max),lwd="3",col="black",lty=2)
abline(h=min(S0065H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0065=max(S0065H15max)
K2_15_S0065=Qmax15_S0065/Qp15_S0065
print(paste("K2 =",K2_15_S0065))
```

```{r}
plot(Hora,S0065H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0065,lwd="4",col="red")
abline(h=max(S0065H15min),lwd="3",col="black",lty=2)
abline(h=min(S0065H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0065=min(S0065H15min)
Kmính15_S0065=Qminh15_S0065/Qp15_S0065
print(paste("Kmính =",Kmính15_S0065))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0065H16max=S0065H[1:24,18]
S0065H16min=S0065H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=81,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=76,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2016 (Día de máximo consumo)",
```

```
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0065=45.2187845734426
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0065,lwd="4",col="red")
abline(h=max(S0065H16max),lwd="3",col="black",lty=2)
abline(h=min(S0065H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0065=max(S0065H16max)
K2_16_S0065=Qmax16_S0065/Qp16_S0065
print(paste("K2 =",K2_16_S0065))
```

```{r}
plot(Hora,S0065H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0065,lwd="4",col="red")
abline(h=max(S0065H16min),lwd="3",col="black",lty=2)
abline(h=min(S0065H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0065=min(S0065H16min)
Kmính16_S0065=Qminh16_S0065/Qp16_S0065
print(paste("Kmính =",Kmính16_S0065))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0065H17max=S0065H[1:24,22]
S0065H17min=S0065H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=82,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=77,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0065=46.5291092609863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0065,lwd="4",col="red")
abline(h=max(S0065H17max),lwd="3",col="black",lty=2)
abline(h=min(S0065H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0065=max(S0065H17max)
K2_17_S0065=Qmax17_S0065/Qp17_S0065
print(paste("K2 =",K2_17_S0065))
```

```{r}
plot(Hora,S0065H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0065,lwd="4",col="red")
abline(h=max(S0065H17min),lwd="3",col="black",lty=2)
abline(h=min(S0065H17min),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0065=min(S0065H17min)
Kmính17_S0065=Qminh17_S0065/Qp17_S0065
print(paste("Kmính =",Kmính17_S0065))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0065H18max=S0065H[1:24,26]
S0065H18min=S0065H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=79.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=75,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0065=46.3504764195342
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0065,lwd="4",col="red")
abline(h=max(S0065H18max),lwd="3",col="black",lty=2)
abline(h=min(S0065H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0065=max(S0065H18max)
K2_18_S0065=Qmax18_S0065/Qp18_S0065
print(paste("K2 =",K2_18_S0065))
```

```{r}
plot(Hora,S0065H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0065,lwd="4",col="red")
abline(h=max(S0065H18min),lwd="3",col="black",lty=2)
abline(h=min(S0065H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0065=min(S0065H18min)
Kmính18_S0065=Qminh18_S0065/Qp18_S0065
print(paste("Kmính =",Kmính18_S0065))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0065H19max=S0065H[1:24,30]
S0065H19min=S0065H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=83,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
```

```
geom_text(aes(x=3,y=78,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0065=48.3243481376712
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0065,lwd="4",col="red")
abline(h=max(S0065H19max),lwd="3",col="black",lty=2)
abline(h=min(S0065H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0065=max(S0065H19max)
K2_19_S0065=Qmax19_S0065/Qp19_S0065
print(paste("K2 =",K2_19_S0065))
```

```{r}
plot(Hora,S0065H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0065,lwd="4",col="red")
abline(h=max(S0065H19min),lwd="3",col="black",lty=2)
abline(h=min(S0065H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0065=min(S0065H19min)
Kmính19_S0065=Qminh19_S0065/Qp19_S0065
print(paste("Kmính =",Kmính19_S0065))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0065H23max=S0065H[1:24,46]
S0065H23min=S0065H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0065H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0065 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0065H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=83,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0065H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0065=48.9910527569041
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0065,lwd="4",col="red")
abline(h=max(S0065H23max),lwd="3",col="black",lty=2)
abline(h=min(S0065H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0065=max(S0065H23max)
K2_23_S0065=Qmax23_S0065/Qp23_S0065
print(paste("K2 =",K2_23_S0065))
```

```{r}
plot(Hora,S0065H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0065 - 2023 (Día de mínimo consumo)",
```

```
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0065,lwd="4",col="red")
abline(h=max(S0065H23min),lwd="3",col="black",lty=2)
abline(h=min(S0065H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0065=min(S0065H23min)
Kmính23_S0065=Qminh23_S0065/Qp23_S0065
print(paste("Kmính =",Kmính23_S0065))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0065,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0065,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0065,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0065,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0065,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0065,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0065,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0065,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0065,": Si"))
print(paste("K2_14 =",K2_14_S0065,": Si"))
print(paste("K2_15 =",K2_15_S0065,": Si"))
print(paste("K2_16 =",K2_16_S0065,": Si"))
print(paste("K2_17 =",K2_17_S0065,": Si"))
print(paste("K2_18 =",K2_18_S0065,": Si"))
print(paste("K2_19 =",K2_19_S0065,": Si"))
print(paste("K2_23 =",K2_23_S0065,": Si"))
```

```{r}
K2S0065m=c(K2_13_S0065,K2_14_S0065,K2_15_S0065,K2_16_S0065,K2_17_S0065,
K2_18_S0065,K2_19_S0065,K2_23_S0065)
K2S0065=mean(K2S0065m)
summary(K2S0065m)
K2S0065m
print(paste("K2_S0065 =",K2S0065))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0065,": Si"))
print(paste("Kmính_14 =",Kmính14_S0065,": Si"))
print(paste("Kmính_15 =",Kmính15_S0065,": Si"))
print(paste("Kmính_16 =",Kmính16_S0065,": Si"))
print(paste("Kmính_17 =",Kmính17_S0065,": Si"))
print(paste("Kmính_18 =",Kmính18_S0065,": Si"))
print(paste("Kmính_19 =",Kmính19_S0065,": Si"))
print(paste("Kmính_23 =",Kmính23_S0065,": Si"))
```

```{r}
KmínhS0065m=c(Kmính13_S0065,Kmính14_S0065,Kmính15_S0065,Kmính16_S0065,
Kmính17_S0065,Kmính18_S0065,Kmính19_S0065,Kmính23_S0065)
KmínhS0065=mean(KmínhS0065m)
summary(KmínhS0065m)
KmínhS0065m
print(paste("Kmính_S0065 =",KmínhS0065))
```

## Estación S0066 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0066H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0066H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0066H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0066H13max=S0066H[1:24,6]
S0066H13min=S0066H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=199,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=189,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0066H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0066=110.178535610438
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0066,lwd="4",col="red")
abline(h=max(S0066H13max),lwd="3",col="black",lty=2)
abline(h=min(S0066H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0066=max(S0066H13max)
K2_13_S0066=Qmax13_S0066/Qp13_S0066
print(paste("K2 =",K2_13_S0066))
```

```{r}
plot(Hora,S0066H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0066,lwd="4",col="red")
abline(h=max(S0066H13min),lwd="3",col="black",lty=2)
abline(h=min(S0066H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0066=min(S0066H13min)
Kmính13_S0066=Qminh13_S0066/Qp13_S0066
print(paste("Kmính =",Kmính13_S0066))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0066H14max=S0066H[1:24,10]
S0066H14min=S0066H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=199,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=189,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0066H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0066=109.993797380986
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0066,lwd="4",col="red")
abline(h=max(S0066H14max),lwd="3",col="black",lty=2)
abline(h=min(S0066H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0066=max(S0066H14max)
K2_14_S0066=Qmax14_S0066/Qp14_S0066
print(paste("K2 =",K2_14_S0066))
```

```{r}
plot(Hora,S0066H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0066,lwd="4",col="red")
abline(h=max(S0066H14min),lwd="3",col="black",lty=2)
abline(h=min(S0066H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0066=min(S0066H14min)
Kmính14_S0066=Qminh14_S0066/Qp14_S0066
print(paste("Kmính =",Kmính14_S0066))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0066H15max=S0066H[1:24,14]
S0066H15min=S0066H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=199,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=189,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0066H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0066=114.372211867863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0066,lwd="4",col="red")
abline(h=max(S0066H15max),lwd="3",col="black",lty=2)
abline(h=min(S0066H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0066=max(S0066H15max)
K2_15_S0066=Qmax15_S0066/Qp15_S0066
print(paste("K2 =",K2_15_S0066))
```

```{r}
plot(Hora,S0066H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0066,lwd="4",col="red")
abline(h=max(S0066H15min),lwd="3",col="black",lty=2)
abline(h=min(S0066H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0066=min(S0066H15min)
Kmính15_S0066=Qminh15_S0066/Qp15_S0066
print(paste("Kmính =",Kmính15_S0066))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0066H16max=S0066H[1:24,18]
S0066H16min=S0066H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=190,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=180,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0066H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0066=109.317490793197
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0066,lwd="4",col="red")
abline(h=max(S0066H16max),lwd="3",col="black",lty=2)
abline(h=min(S0066H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0066=max(S0066H16max)
K2_16_S0066=Qmax16_S0066/Qp16_S0066
print(paste("K2 =",K2_16_S0066))
```

```{r}
plot(Hora,S0066H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0066,lwd="4",col="red")
abline(h=max(S0066H16min),lwd="3",col="black",lty=2)
abline(h=min(S0066H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0066=min(S0066H16min)
Kmính16_S0066=Qminh16_S0066/Qp16_S0066
print(paste("Kmính =",Kmính16_S0066))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0066H17max=S0066H[1:24,22]
S0066H17min=S0066H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=172,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=162,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0066H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0066=101.581646802521
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp17_S0066,lwd="4",col="red")
abline(h=max(S0066H17max),lwd="3",col="black",lty=2)
abline(h=min(S0066H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0066=max(S0066H17max)
K2_17_S0066=Qmax17_S0066/Qp17_S0066
print(paste("K2 =",K2_17_S0066))
```

```{r}
plot(Hora,S0066H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0066,lwd="4",col="red")
abline(h=max(S0066H17min),lwd="3",col="black",lty=2)
abline(h=min(S0066H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0066=min(S0066H17min)
Kmính17_S0066=Qminh17_S0066/Qp17_S0066
print(paste("Kmính =",Kmính17_S0066))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0066H18max=S0066H[1:24,26]
S0066H18min=S0066H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=172,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=162,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0066H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0066=97.5160645466027
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0066,lwd="4",col="red")
abline(h=max(S0066H18max),lwd="3",col="black",lty=2)
abline(h=min(S0066H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0066=max(S0066H18max)
K2_18_S0066=Qmax18_S0066/Qp18_S0066
print(paste("K2 =",K2_18_S0066))
```

```{r}
plot(Hora,S0066H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0066,lwd="4",col="red")
abline(h=max(S0066H18min),lwd="3",col="black",lty=2)
abline(h=min(S0066H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0066=min(S0066H18min)
Kmính18_S0066=Qminh18_S0066/Qp18_S0066
print(paste("Kmính =",Kmính18_S0066))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0066H19max=S0066H[1:24,30]
S0066H19min=S0066H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=163,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=153,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0066H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0066=96.5678608068767
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0066,lwd="4",col="red")
abline(h=max(S0066H19max),lwd="3",col="black",lty=2)
abline(h=min(S0066H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0066=max(S0066H19max)
K2_19_S0066=Qmax19_S0066/Qp19_S0066
print(paste("K2 =",K2_19_S0066))
```

```{r}
plot(Hora,S0066H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0066,lwd="4",col="red")
abline(h=max(S0066H19min),lwd="3",col="black",lty=2)
abline(h=min(S0066H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0066=min(S0066H19min)
Kmính19_S0066=Qminh19_S0066/Qp19_S0066
print(paste("Kmính =",Kmính19_S0066))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0066H23max=S0066H[1:24,46]
S0066H23min=S0066H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0066H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0066 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0066H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=163,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=153,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
```

```
plot(Hora,S0066H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0066=95.8687694074247
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0066,lwd="4",col="red")
abline(h=max(S0066H23max),lwd="3",col="black",lty=2)
abline(h=min(S0066H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0066=max(S0066H23max)
K2_23_S0066=Qmax23_S0066/Qp23_S0066
print(paste("K2 =",K2_23_S0066))
```

```{r}
plot(Hora,S0066H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0066 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0066,lwd="4",col="red")
abline(h=max(S0066H23min),lwd="3",col="black",lty=2)
abline(h=min(S0066H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0066=min(S0066H23min)
Kmính23_S0066=Qminh23_S0066/Qp23_S0066
print(paste("Kmính =",Kmính23_S0066))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0066,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0066,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0066,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0066,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0066,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0066,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0066,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0066,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0066,": Si"))
print(paste("K2_14 =",K2_14_S0066,": Si"))
print(paste("K2_15 =",K2_15_S0066,": Si"))
print(paste("K2_16 =",K2_16_S0066,": Si"))
print(paste("K2_17 =",K2_17_S0066,": Si"))
print(paste("K2_18 =",K2_18_S0066,": Si"))
print(paste("K2_19 =",K2_19_S0066,": Si"))
print(paste("K2_23 =",K2_23_S0066,": Si"))
```

```{r}
K2S0066m=c(K2_13_S0066,K2_14_S0066,K2_15_S0066,K2_16_S0066,K2_17_S0066,
K2_18_S0066,K2_19_S0066,K2_23_S0066)
K2S0066=mean(K2S0066m)
summary(K2S0066m)
K2S0066m
print(paste("K2_S0066 =",K2S0066))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0066,": Si"))
print(paste("Kmính_14 =",Kmính14_S0066,": Si"))
print(paste("Kmính_15 =",Kmính15_S0066,": Si"))
print(paste("Kmính_16 =",Kmính16_S0066,": Si"))
print(paste("Kmính_17 =",Kmính17_S0066,": Si"))
print(paste("Kmính_18 =",Kmính18_S0066,": Si"))
print(paste("Kmính_19 =",Kmính19_S0066,": Si"))
print(paste("Kmính_23 =",Kmính23_S0066,": Si"))
```

```{r}
KmínhS0066m=c(Kmính13_S0066,Kmính14_S0066,Kmính15_S0066,Kmính16_S0066,
Kmính17_S0066,Kmính18_S0066,Kmính19_S0066,Kmính23_S0066)
KmínhS0066=mean(KmínhS0066m)
summary(KmínhS0066m)
```

```
KmínhS0066m
print(paste("Kmính_S0066 =",KmínhS0066))
```

## Estación S0067 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0067H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0067H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0067H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0067H13max=S0067H[1:24,6]
S0067H13min=S0067H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=117.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=107.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0067H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0067=76.8591800374794
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0067,lwd="4",col="red")
abline(h=max(S0067H13max),lwd="3",col="black",lty=2)
abline(h=min(S0067H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0067=max(S0067H13max)
K2_13_S0067=Qmax13_S0067/Qp13_S0067
print(paste("K2 =",K2_13_S0067))
```

```{r}
plot(Hora,S0067H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0067,lwd="4",col="red")
abline(h=max(S0067H13min),lwd="3",col="black",lty=2)
abline(h=min(S0067H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0067=min(S0067H13min)
Kmính13_S0067=Qminh13_S0067/Qp13_S0067
print(paste("Kmính =",Kmính13_S0067))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0067H14max=S0067H[1:24,10]
S0067H14min=S0067H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2014")+
```

```
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=102,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=94,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0067H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0067=74.4092865242192
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0067,lwd="4",col="red")
abline(h=max(S0067H14max),lwd="3",col="black",lty=2)
abline(h=min(S0067H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0067=max(S0067H14max)
K2_14_S0067=Qmax14_S0067/Qp14_S0067
print(paste("K2 =",K2_14_S0067))
```

```{r}
plot(Hora,S0067H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0067,lwd="4",col="red")
abline(h=max(S0067H14min),lwd="3",col="black",lty=2)
abline(h=min(S0067H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0067=min(S0067H14min)
Kmính14_S0067=Qminh14_S0067/Qp14_S0067
print(paste("Kmính =",Kmính14_S0067))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0067H15max=S0067H[1:24,14]
S0067H15min=S0067H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=111,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0067H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0067=79.592484267589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0067,lwd="4",col="red")
abline(h=max(S0067H15max),lwd="3",col="black",lty=2)
abline(h=min(S0067H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0067=max(S0067H15max)
K2_15_S0067=Qmax15_S0067/Qp15_S0067
```

```
print(paste("K2 =",K2_15_S0067))
```

```{r}
plot(Hora,S0067H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0067,lwd="4",col="red")
abline(h=max(S0067H15min),lwd="3",col="black",lty=2)
abline(h=min(S0067H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0067=min(S0067H15min)
Kmính15_S0067=Qminh15_S0067/Qp15_S0067
print(paste("Kmính =",Kmính15_S0067))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0067H16max=S0067H[1:24,18]
S0067H16min=S0067H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110.8,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0067H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0067=83.620325903224
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0067,lwd="4",col="red")
abline(h=max(S0067H16max),lwd="3",col="black",lty=2)
abline(h=min(S0067H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0067=max(S0067H16max)
K2_16_S0067=Qmax16_S0067/Qp16_S0067
print(paste("K2 =",K2_16_S0067))
```

```{r}
plot(Hora,S0067H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0067,lwd="4",col="red")
abline(h=max(S0067H16min),lwd="3",col="black",lty=2)
abline(h=min(S0067H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0067=min(S0067H16min)
Kmính16_S0067=Qminh16_S0067/Qp16_S0067
print(paste("Kmính =",Kmính16_S0067))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0067H17max=S0067H[1:24,22]
```

```
S0067H17min=S0067H[1:24,24]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=118,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0067H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0067=78.8684358601918
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0067,lwd="4",col="red")
abline(h=max(S0067H17max),lwd="3",col="black",lty=2)
abline(h=min(S0067H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0067=max(S0067H17max)
K2_17_S0067=Qmax17_S0067/Qp17_S0067
print(paste("K2 =",K2_17_S0067))
```
```

```{r}
plot(Hora,S0067H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0067,lwd="4",col="red")
abline(h=max(S0067H17min),lwd="3",col="black",lty=2)
abline(h=min(S0067H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0067=min(S0067H17min)
Kmính17_S0067=Qminh17_S0067/Qp17_S0067
print(paste("Kmính =",Kmính17_S0067))
```
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0067H18max=S0067H[1:24,26]
S0067H18min=S0067H[1:24,28]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0067H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0067=78.2624228207123
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0067,lwd="4",col="red")
abline(h=max(S0067H18max),lwd="3",col="black",lty=2)
abline(h=min(S0067H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0067=max(S0067H18max)
K2_18_S0067=Qmax18_S0067/Qp18_S0067
print(paste("K2 =",K2_18_S0067))
```

```{r}
plot(Hora,S0067H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0067,lwd="4",col="red")
abline(h=max(S0067H18min),lwd="3",col="black",lty=2)
abline(h=min(S0067H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0067=min(S0067H18min)
Kmính18_S0067=Qminh18_S0067/Qp18_S0067
print(paste("Kmính =",Kmính18_S0067))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0067H19max=S0067H[1:24,30]
S0067H19min=S0067H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=125.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0067H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0067=82.1280529594794
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0067,lwd="4",col="red")
abline(h=max(S0067H19max),lwd="3",col="black",lty=2)
abline(h=min(S0067H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0067=max(S0067H19max)
K2_19_S0067=Qmax19_S0067/Qp19_S0067
print(paste("K2 =",K2_19_S0067))
```

```{r}
plot(Hora,S0067H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0067,lwd="4",col="red")
abline(h=max(S0067H19min),lwd="3",col="black",lty=2)
abline(h=min(S0067H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0067=min(S0067H19min)
Kmính19_S0067=Qminh19_S0067/Qp19_S0067
print(paste("Kmính =",Kmính19_S0067))
```

```
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0067H23max=S0067H[1:24,46]
S0067H23min=S0067H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0067H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0067 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0067H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=99,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=92,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0067H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0067=74.7413066501644
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0067,lwd="4",col="red")
abline(h=max(S0067H23max),lwd="3",col="black",lty=2)
abline(h=min(S0067H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0067=max(S0067H23max)
K2_23_S0067=Qmax23_S0067/Qp23_S0067
print(paste("K2 =",K2_23_S0067))
```

```{r}
plot(Hora,S0067H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0067 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0067,lwd="4",col="red")
abline(h=max(S0067H23min),lwd="3",col="black",lty=2)
abline(h=min(S0067H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0067=min(S0067H23min)
Kmính23_S0067=Qminh23_S0067/Qp23_S0067
print(paste("Kmính =",Kmính23_S0067))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0067,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0067,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0067,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0067,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0067,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0067,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0067,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0067,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0067,": No"))
print(paste("K2_14 =",K2_14_S0067,": No"))
print(paste("K2_15 =",K2_15_S0067,": No"))
print(paste("K2_16 =",K2_16_S0067,": Si"))
print(paste("K2_17 =",K2_17_S0067,": No"))
print(paste("K2_18 =",K2_18_S0067,": No"))
print(paste("K2_19 =",K2_19_S0067,": Si"))
print(paste("K2_23 =",K2_23_S0067,": Si"))
```

```{r}
K2S0067m=c(K2_16_S0067,K2_19_S0067,K2_23_S0067)
```

```
K2S0067=mean(K2S0067m)
summary(K2S0067m)
K2S0067m
print(paste("K2_S0067 =",K2S0067))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0067,": No"))
print(paste("Kmính_14 =",Kmính14_S0067,": No"))
print(paste("Kmính_15 =",Kmính15_S0067,": No"))
print(paste("Kmính_16 =",Kmính16_S0067,": Si"))
print(paste("Kmính_17 =",Kmính17_S0067,": No"))
print(paste("Kmính_18 =",Kmính18_S0067,": No"))
print(paste("Kmính_19 =",Kmính19_S0067,": Si"))
print(paste("Kmính_23 =",Kmính23_S0067,": Si"))
```

```{r}
KmínhS0067m=c(Kmính16_S0067,Kmính19_S0067,Kmính23_S0067)
KmínhS0067=mean(KmínhS0067m)
summary(KmínhS0067m)
KmínhS0067m
print(paste("Kmính_S0067 =",KmínhS0067))
```

## Estación S0068 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0068H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0068H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0068H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0068H13max=S0068H[1:24,6]
S0068H13min=S0068H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0068 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=127,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=120,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0068=75.6243581893699
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0068,lwd="4",col="red")
abline(h=max(S0068H13max),lwd="3",col="black",lty=2)
abline(h=min(S0068H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0068=max(S0068H13max)
K2_13_S0068=Qmax13_S0068/Qp13_S0068
print(paste("K2 =",K2_13_S0068))
```

```{r}
plot(Hora,S0068H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0068,lwd="4",col="red")
abline(h=max(S0068H13min),lwd="3",col="black",lty=2)
abline(h=min(S0068H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0068=min(S0068H13min)
Kmính13_S0068=Qminh13_S0068/Qp13_S0068
print(paste("Kmính =",Kmính13_S0068))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0068H14max=S0068H[1:24,10]
S0068H14min=S0068H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0068 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=120,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=113,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0068=76.2104949892055
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0068,lwd="4",col="red")
abline(h=max(S0068H14max),lwd="3",col="black",lty=2)
abline(h=min(S0068H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0068=max(S0068H14max)
K2_14_S0068=Qmax14_S0068/Qp14_S0068
print(paste("K2 =",K2_14_S0068))
```

```{r}
plot(Hora,S0068H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0068,lwd="4",col="red")
abline(h=max(S0068H14min),lwd="3",col="black",lty=2)
abline(h=min(S0068H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0068=min(S0068H14min)
Kmính14_S0068=Qminh14_S0068/Qp14_S0068
print(paste("Kmính =",Kmính14_S0068))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0068H15max=S0068H[1:24,14]
S0068H15min=S0068H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0068 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=133,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=126,label="- Día de mínimo consumo"),
```

```
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0068=78.8504013436164
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0068,lwd="4",col="red")
abline(h=max(S0068H15max),lwd="3",col="black",lty=2)
abline(h=min(S0068H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0068=max(S0068H15max)
K2_15_S0068=Qmax15_S0068/Qp15_S0068
print(paste("K2 =",K2_15_S0068))
```

```{r}
plot(Hora,S0068H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0068,lwd="4",col="red")
abline(h=max(S0068H15min),lwd="3",col="black",lty=2)
abline(h=min(S0068H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0068=min(S0068H15min)
Kmính15_S0068=Qminh15_S0068/Qp15_S0068
print(paste("Kmính =",Kmính15_S0068))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0068H16max=S0068H[1:24,18]
S0068H16min=S0068H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0068 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=134,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=127,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0068=81.2559880401366
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0068,lwd="4",col="red")
abline(h=max(S0068H16max),lwd="3",col="black",lty=2)
abline(h=min(S0068H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0068=max(S0068H16max)
K2_16_S0068=Qmax16_S0068/Qp16_S0068
print(paste("K2 =",K2_16_S0068))
```

```{r}
plot(Hora,S0068H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0068,lwd="4",col="red")
abline(h=max(S0068H16min),lwd="3",col="black",lty=2)
abline(h=min(S0068H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0068=min(S0068H16min)
Kmính16_S0068=Qminh16_S0068/Qp16_S0068
print(paste("Kmính =",Kmính16_S0068))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0068H17max=S0068H[1:24,22]
S0068H17min=S0068H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0068 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=116,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0068=76.2914794867397
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0068,lwd="4",col="red")
abline(h=max(S0068H17max),lwd="3",col="black",lty=2)
abline(h=min(S0068H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0068=max(S0068H17max)
K2_17_S0068=Qmax17_S0068/Qp17_S0068
print(paste("K2 =",K2_17_S0068))
```

```{r}
plot(Hora,S0068H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0068,lwd="4",col="red")
abline(h=max(S0068H17min),lwd="3",col="black",lty=2)
abline(h=min(S0068H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0068=min(S0068H17min)
Kmính17_S0068=Qminh17_S0068/Qp17_S0068
print(paste("Kmính =",Kmính17_S0068))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0068H18max=S0068H[1:24,26]
S0068H18min=S0068H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0068 - 2018")+
```

```
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=114,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=107,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0068=74.4816920226027
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0068,lwd="4",col="red")
abline(h=max(S0068H18max),lwd="3",col="black",lty=2)
abline(h=min(S0068H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0068=max(S0068H18max)
K2_18_S0068=Qmax18_S0068/Qp18_S0068
print(paste("K2 =",K2_18_S0068))
```

```{r}
plot(Hora,S0068H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0068,lwd="4",col="red")
abline(h=max(S0068H18min),lwd="3",col="black",lty=2)
abline(h=min(S0068H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0068=min(S0068H18min)
Kmính18_S0068=Qminh18_S0068/Qp18_S0068
print(paste("Kmính =",Kmính18_S0068))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0068H19max=S0068H[1:24,30]
S0068H19min=S0068H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0068 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=111,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=104,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0068=72.4345485044658
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0068,lwd="4",col="red")
abline(h=max(S0068H19max),lwd="3",col="black",lty=2)
abline(h=min(S0068H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0068=max(S0068H19max)
K2_19_S0068=Qmax19_S0068/Qp19_S0068
```

```
print(paste("K2 =",K2_19_S0068))
```

```{r}
plot(Hora,S0068H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0068,lwd="4",col="red")
abline(h=max(S0068H19min),lwd="3",col="black",lty=2)
abline(h=min(S0068H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0068=min(S0068H19min)
Kmính19_S0068=Qminh19_S0068/Qp19_S0068
print(paste("Kmính =",Kmính19_S0068))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0068H23max=S0068H[1:24,46]
S0068H23min=S0068H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0068H23max),color="red",lwd=1.2)+
ggtitle("SECTOR S0068 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0068H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0068H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0068=67.57493639
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0068,lwd="4",col="red")
abline(h=max(S0068H23max),lwd="3",col="black",lty=2)
abline(h=min(S0068H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0068=max(S0068H23max)
K2_23_S0068=Qmax23_S0068/Qp23_S0068
print(paste("K2 =",K2_23_S0068))
```

```{r}
plot(Hora,S0068H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0068 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0068,lwd="4",col="red")
abline(h=max(S0068H23min),lwd="3",col="black",lty=2)
abline(h=min(S0068H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0068=min(S0068H23min)
Kmính23_S0068=Qminh23_S0068/Qp23_S0068
print(paste("Kmính =",Kmính23_S0068))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0068,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0068,"l/s",": Si"))
```

```
print(paste("Qp_15 =",Qp15_S0068,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0068,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0068,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0068,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0068,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0068,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0068,": Si"))
print(paste("K2_14 =",K2_14_S0068,": Si"))
print(paste("K2_15 =",K2_15_S0068,": Si"))
print(paste("K2_16 =",K2_16_S0068,": Si"))
print(paste("K2_17 =",K2_17_S0068,": Si"))
print(paste("K2_18 =",K2_18_S0068,": Si"))
print(paste("K2_19 =",K2_19_S0068,": Si"))
print(paste("K2_23 =",K2_23_S0068,": Si"))
```

```{r}
K2S0068m=c(K2_13_S0068,K2_14_S0068,K2_15_S0068,K2_16_S0068,K2_17_S0068,
K2_18_S0068,K2_19_S0068,K2_23_S0068)
K2S0068=mean(K2S0068m)
summary(K2S0068m)
K2S0068m
print(paste("K2_S0068 =",K2S0068))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0068,": Si"))
print(paste("Kmính_14 =",Kmính14_S0068,": Si"))
print(paste("Kmính_15 =",Kmính15_S0068,": Si"))
print(paste("Kmính_16 =",Kmính16_S0068,": Si"))
print(paste("Kmính_17 =",Kmính17_S0068,": Si"))
print(paste("Kmính_18 =",Kmính18_S0068,": Si"))
print(paste("Kmính_19 =",Kmính19_S0068,": Si"))
print(paste("Kmính_23 =",Kmính23_S0068,": Si"))
```

```{r}
KmínhS0068m=c(Kmính13_S0068,Kmính14_S0068,Kmính15_S0068,Kmính16_S0068,
Kmính17_S0068,Kmính18_S0068,Kmính19_S0068,Kmính23_S0068)
KmínhS0068=mean(KmínhS0068m)
summary(KmínhS0068m)
KmínhS0068m
print(paste("Kmính_S0068 =",KmínhS0068))
```

## Estación S0069 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0069H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0069H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0069H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0069H13max=S0069H[1:24,6]
S0069H13min=S0069H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=88,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=83,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0069=50.9727163227945
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0069,lwd="4",col="red")
```

```
abline(h=max(S0069H13max),lwd="3",col="black",lty=2)
abline(h=min(S0069H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0069=max(S0069H13max)
K2_13_S0069=Qmax13_S0069/Qp13_S0069
print(paste("K2 =",K2_13_S0069))
```

```{r}
plot(Hora,S0069H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0069,lwd="4",col="red")
abline(h=max(S0069H13min),lwd="3",col="black",lty=2)
abline(h=min(S0069H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0069=min(S0069H13min)
Kmính13_S0069=Qminh13_S0069/Qp13_S0069
print(paste("Kmính =",Kmính13_S0069))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0069H14max=S0069H[1:24,10]
S0069H14min=S0069H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=86.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=81.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0069=52.4290025568493
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0069,lwd="4",col="red")
abline(h=max(S0069H14max),lwd="3",col="black",lty=2)
abline(h=min(S0069H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0069=max(S0069H14max)
K2_14_S0069=Qmax14_S0069/Qp14_S0069
print(paste("K2 =",K2_14_S0069))
```

```{r}
plot(Hora,S0069H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0069,lwd="4",col="red")
abline(h=max(S0069H14min),lwd="3",col="black",lty=2)
abline(h=min(S0069H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
```

```
# Cálculo del coeficiente Kmính
Qminh14_S0069=min(S0069H14min)
Kmính14_S0069=Qminh14_S0069/Qp14_S0069
print(paste("Kmính =",Kmính14_S0069))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0069H15max=S0069H[1:24,14]
S0069H15min=S0069H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=98,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=93,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0069=56.1225855386849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0069,lwd="4",col="red")
abline(h=max(S0069H15max),lwd="3",col="black",lty=2)
abline(h=min(S0069H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0069=max(S0069H15max)
K2_15_S0069=Qmax15_S0069/Qp15_S0069
print(paste("K2 =",K2_15_S0069))
```

```{r}
plot(Hora,S0069H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0069,lwd="4",col="red")
abline(h=max(S0069H15min),lwd="3",col="black",lty=2)
abline(h=min(S0069H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0069=min(S0069H15min)
Kmính15_S0069=Qminh15_S0069/Qp15_S0069
print(paste("Kmính =",Kmính15_S0069))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0069H16max=S0069H[1:24,18]
S0069H16min=S0069H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=98,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=93,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H16max,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0069 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0069=58.1022884252459
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0069,lwd="4",col="red")
abline(h=max(S0069H16max),lwd="3",col="black",lty=2)
abline(h=min(S0069H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0069=max(S0069H16max)
K2_16_S0069=Qmax16_S0069/Qp16_S0069
print(paste("K2 =",K2_16_S0069))
```

```{r}
plot(Hora,S0069H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0069,lwd="4",col="red")
abline(h=max(S0069H16min),lwd="3",col="black",lty=2)
abline(h=min(S0069H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0069=min(S0069H16min)
Kmính16_S0069=Qminh16_S0069/Qp16_S0069
print(paste("Kmính =",Kmính16_S0069))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0069H17max=S0069H[1:24,22]
S0069H17min=S0069H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=97,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=92,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0069=60.5483323889315
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0069,lwd="4",col="red")
abline(h=max(S0069H17max),lwd="3",col="black",lty=2)
abline(h=min(S0069H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0069=max(S0069H17max)
K2_17_S0069=Qmax17_S0069/Qp17_S0069
print(paste("K2 =",K2_17_S0069))
```

```{r}
plot(Hora,S0069H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0069,lwd="4",col="red")
abline(h=max(S0069H17min),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0069H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0069=min(S0069H17min)
Kmính17_S0069=Qminh17_S0069/Qp17_S0069
print(paste("Kmính =",Kmính17_S0069))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0069H18max=S0069H[1:24,26]
S0069H18min=S0069H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=107,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=102,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0069=66.2073056493151
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0069,lwd="4",col="red")
abline(h=max(S0069H18max),lwd="3",col="black",lty=2)
abline(h=min(S0069H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0069=max(S0069H18max)
K2_18_S0069=Qmax18_S0069/Qp18_S0069
print(paste("K2 =",K2_18_S0069))
```

```{r}
plot(Hora,S0069H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0069,lwd="4",col="red")
abline(h=max(S0069H18min),lwd="3",col="black",lty=2)
abline(h=min(S0069H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0069=min(S0069H18min)
Kmính18_S0069=Qminh18_S0069/Qp18_S0069
print(paste("Kmính =",Kmính18_S0069))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0069H19max=S0069H[1:24,30]
S0069H19min=S0069H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=108,label=" - Día de máximo consumo"),
```

```
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0069=70.3794075205205
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0069,lwd="4",col="red")
abline(h=max(S0069H19max),lwd="3",col="black",lty=2)
abline(h=min(S0069H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0069=max(S0069H19max)
K2_19_S0069=Qmax19_S0069/Qp19_S0069
print(paste("K2 =",K2_19_S0069))
```

```{r}
plot(Hora,S0069H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0069,lwd="4",col="red")
abline(h=max(S0069H19min),lwd="3",col="black",lty=2)
abline(h=min(S0069H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0069=min(S0069H19min)
Kmính19_S0069=Qminh19_S0069/Qp19_S0069
print(paste("Kmính =",Kmính19_S0069))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0069H23max=S0069H[1:24,46]
S0069H23min=S0069H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0069H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0069 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0069H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=92.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=87.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0069H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0069 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0069=57.1244959888493
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0069,lwd="4",col="red")
abline(h=max(S0069H23max),lwd="3",col="black",lty=2)
abline(h=min(S0069H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0069=max(S0069H23max)
K2_23_S0069=Qmax23_S0069/Qp23_S0069
print(paste("K2 =",K2_23_S0069))
```

```{r}
plot(Hora,S0069H23min,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0069 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0069,lwd="4",col="red")
abline(h=max(S0069H23min),lwd="3",col="black",lty=2)
abline(h=min(S0069H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0069=min(S0069H23min)
Kmính23_S0069=Qminh23_S0069/Qp23_S0069
print(paste("Kmính =",Kmính23_S0069))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0069,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0069,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0069,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0069,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0069,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0069,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0069,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0069,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0069,": Si"))
print(paste("K2_14 =",K2_14_S0069,": Si"))
print(paste("K2_15 =",K2_15_S0069,": No"))
print(paste("K2_16 =",K2_16_S0069,": Si"))
print(paste("K2_17 =",K2_17_S0069,": No"))
print(paste("K2_18 =",K2_18_S0069,": Si"))
print(paste("K2_19 =",K2_19_S0069,": No"))
print(paste("K2_23 =",K2_23_S0069,": Si"))
```

```{r}
K2S0069m=c(K2_13_S0069,K2_14_S0069,K2_16_S0069,K2_18_S0069,K2_23_S0069)
K2S0069=mean(K2S0069m)
summary(K2S0069m)
K2S0069m
print(paste("K2_S0069 =",K2S0069))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0069,": Si"))
print(paste("Kmính_14 =",Kmính14_S0069,": Si"))
print(paste("Kmính_15 =",Kmính15_S0069,": No"))
print(paste("Kmính_16 =",Kmính16_S0069,": Si"))
print(paste("Kmính_17 =",Kmính17_S0069,": No"))
print(paste("Kmính_18 =",Kmính18_S0069,": Si"))
print(paste("Kmính_19 =",Kmính19_S0069,": No"))
print(paste("Kmính_23 =",Kmính23_S0069,": Si"))
```

```{r}
KmínhS0069m=c(Kmính13_S0069,Kmính14_S0069,Kmính16_S0069,Kmính18_S0069,
Kmính23_S0069)
KmínhS0069=mean(KmínhS0069m)
summary(KmínhS0069m)
KmínhS0069m
print(paste("Kmính_S0069 =",KmínhS0069))
```

## Estación S0071 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0071H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0071H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0071H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0071H13max=S0071H[1:24,6]
S0071H13min=S0071H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=130,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=122,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0071H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0071=74.8783846341918
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0071,lwd="4",col="red")
abline(h=max(S0071H13max),lwd="3",col="black",lty=2)
abline(h=min(S0071H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0071=max(S0071H13max)
K2_13_S0071=Qmax13_S0071/Qp13_S0071
print(paste("K2 =",K2_13_S0071))
```

```{r}
plot(Hora,S0071H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0071,lwd="4",col="red")
abline(h=max(S0071H13min),lwd="3",col="black",lty=2)
abline(h=min(S0071H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0071=min(S0071H13min)
Kmính13_S0071=Qminh13_S0071/Qp13_S0071
print(paste("Kmính =",Kmính13_S0071))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0071H14max=S0071H[1:24,10]
S0071H14min=S0071H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=129.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=121.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0071H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0071=76.3908899772877
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0071,lwd="4",col="red")
abline(h=max(S0071H14max),lwd="3",col="black",lty=2)
abline(h=min(S0071H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0071=max(S0071H14max)
K2_14_S0071=Qmax14_S0071/Qp14_S0071
print(paste("K2 =",K2_14_S0071))
```

```{r}
plot(Hora,S0071H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0071,lwd="4",col="red")
abline(h=max(S0071H14min),lwd="3",col="black",lty=2)
abline(h=min(S0071H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0071=min(S0071H14min)
Kmính14_S0071=Qminh14_S0071/Qp14_S0071
print(paste("Kmính =",Kmính14_S0071))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0071H15max=S0071H[1:24,14]
S0071H15min=S0071H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=136,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=128,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0071H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0071=79.1201475814247
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0071,lwd="4",col="red")
abline(h=max(S0071H15max),lwd="3",col="black",lty=2)
abline(h=min(S0071H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0071=max(S0071H15max)
K2_15_S0071=Qmax15_S0071/Qp15_S0071
print(paste("K2 =",K2_15_S0071))
```

```{r}
plot(Hora,S0071H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0071,lwd="4",col="red")
abline(h=max(S0071H15min),lwd="3",col="black",lty=2)
abline(h=min(S0071H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0071=min(S0071H15min)
Kmính15_S0071=Qminh15_S0071/Qp15_S0071
print(paste("Kmính =",Kmính15_S0071))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0071H16max=S0071H[1:24,18]
S0071H16min=S0071H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=149,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=141,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0071H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0071=94.0696208808743
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0071,lwd="4",col="red")
abline(h=max(S0071H16max),lwd="3",col="black",lty=2)
abline(h=min(S0071H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0071=max(S0071H16max)
K2_16_S0071=Qmax16_S0071/Qp16_S0071
print(paste("K2 =",K2_16_S0071))
```

```{r}
plot(Hora,S0071H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0071,lwd="4",col="red")
abline(h=max(S0071H16min),lwd="3",col="black",lty=2)
abline(h=min(S0071H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0071=min(S0071H16min)
Kmính16_S0071=Qminh16_S0071/Qp16_S0071
print(paste("Kmính =",Kmính16_S0071))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0071H17max=S0071H[1:24,22]
S0071H17min=S0071H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=158,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=149,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0071H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0071=90.7131425643288
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp17_S0071,lwd="4",col="red")
abline(h=max(S0071H17max),lwd="3",col="black",lty=2)
abline(h=min(S0071H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0071=max(S0071H17max)
K2_17_S0071=Qmax17_S0071/Qp17_S0071
print(paste("K2 =",K2_17_S0071))
```

```{r}
plot(Hora,S0071H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0071,lwd="4",col="red")
abline(h=max(S0071H17min),lwd="3",col="black",lty=2)
abline(h=min(S0071H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0071=min(S0071H17min)
Kmính17_S0071=Qminh17_S0071/Qp17_S0071
print(paste("Kmính =",Kmính17_S0071))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0071H18max=S0071H[1:24,26]
S0071H18min=S0071H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=140,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=132,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0071H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0071=85.823004609726
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0071,lwd="4",col="red")
abline(h=max(S0071H18max),lwd="3",col="black",lty=2)
abline(h=min(S0071H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0071=max(S0071H18max)
K2_18_S0071=Qmax18_S0071/Qp18_S0071
print(paste("K2 =",K2_18_S0071))
```

```{r}
plot(Hora,S0071H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0071,lwd="4",col="red")
abline(h=max(S0071H18min),lwd="3",col="black",lty=2)
abline(h=min(S0071H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0071=min(S0071H18min)
Kmính18_S0071=Qminh18_S0071/Qp18_S0071
print(paste("Kmính =",Kmính18_S0071))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0071H19max=S0071H[1:24,30]
S0071H19min=S0071H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=146,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=138,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0071H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0071=88.3334027710685
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0071,lwd="4",col="red")
abline(h=max(S0071H19max),lwd="3",col="black",lty=2)
abline(h=min(S0071H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0071=max(S0071H19max)
K2_19_S0071=Qmax19_S0071/Qp19_S0071
print(paste("K2 =",K2_19_S0071))
```

```{r}
plot(Hora,S0071H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0071,lwd="4",col="red")
abline(h=max(S0071H19min),lwd="3",col="black",lty=2)
abline(h=min(S0071H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0071=min(S0071H19min)
Kmính19_S0071=Qminh19_S0071/Qp19_S0071
print(paste("Kmính =",Kmính19_S0071))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0071H23max=S0071H[1:24,46]
S0071H23min=S0071H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0071H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0071 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0071H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=151,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=143,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
```

```
plot(Hora,S0071H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0071=91.1063482467397
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0071,lwd="4",col="red")
abline(h=max(S0071H23max),lwd="3",col="black",lty=2)
abline(h=min(S0071H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0071=max(S0071H23max)
K2_23_S0071=Qmax23_S0071/Qp23_S0071
print(paste("K2 =",K2_23_S0071))
```

```{r}
plot(Hora,S0071H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0071 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0071,lwd="4",col="red")
abline(h=max(S0071H23min),lwd="3",col="black",lty=2)
abline(h=min(S0071H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0071=min(S0071H23min)
Kmính23_S0071=Qminh23_S0071/Qp23_S0071
print(paste("Kmính =",Kmính23_S0071))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0071,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0071,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0071,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0071,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0071,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0071,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0071,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0071,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0071,": Si"))
print(paste("K2_14 =",K2_14_S0071,": Si"))
print(paste("K2_15 =",K2_15_S0071,": No"))
print(paste("K2_16 =",K2_16_S0071,": No"))
print(paste("K2_17 =",K2_17_S0071,": No"))
print(paste("K2_18 =",K2_18_S0071,": Si"))
print(paste("K2_19 =",K2_19_S0071,": Si"))
print(paste("K2_23 =",K2_23_S0071,": Si"))
```

```{r}
K2S0071m=c(K2_13_S0071,K2_14_S0071,K2_18_S0071,K2_19_S0071,K2_23_S0071)
K2S0071=mean(K2S0071m)
summary(K2S0071m)
K2S0071m
print(paste("K2_S0071 =",K2S0071))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0071,": Si"))
print(paste("Kmính_14 =",Kmính14_S0071,": Si"))
print(paste("Kmính_15 =",Kmính15_S0071,": No"))
print(paste("Kmính_16 =",Kmính16_S0071,": No"))
print(paste("Kmính_17 =",Kmính17_S0071,": No"))
print(paste("Kmính_18 =",Kmính18_S0071,": Si"))
print(paste("Kmính_19 =",Kmính19_S0071,": Si"))
print(paste("Kmính_23 =",Kmính23_S0071,": Si"))
```

```{r}
KmínhS0071m=c(Kmính13_S0071,Kmính14_S0071,Kmính18_S0071,Kmính19_S0071,
Kmính23_S0071)
KmínhS0071=mean(KmínhS0071m)
summary(KmínhS0071m)
KmínhS0071m
```

```
print(paste("Kmính_S0071 =",KmínhS0071))
```

## Estación S0073 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0073H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0073H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0073H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0073H13max=S0073H[1:24,6]
S0073H13min=S0073H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=65,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=61,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0073=34.0933811829041
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0073,lwd="4",col="red")
abline(h=max(S0073H13max),lwd="3",col="black",lty=2)
abline(h=min(S0073H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0073=max(S0073H13max)
K2_13_S0073=Qmax13_S0073/Qp13_S0073
print(paste("K2 =",K2_13_S0073))
```

```{r}
plot(Hora,S0073H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0073,lwd="4",col="red")
abline(h=max(S0073H13min),lwd="3",col="black",lty=2)
abline(h=min(S0073H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0073=min(S0073H13min)
Kmính13_S0073=Qminh13_S0073/Qp13_S0073
print(paste("Kmính =",Kmính13_S0073))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0073H14max=S0073H[1:24,10]
S0073H14min=S0073H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=66,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0073=32.5240609019452
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0073,lwd="4",col="red")
abline(h=max(S0073H14max),lwd="3",col="black",lty=2)
abline(h=min(S0073H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0073=max(S0073H14max)
K2_14_S0073=Qmax14_S0073/Qp14_S0073
print(paste("K2 =",K2_14_S0073))
```

```{r}
plot(Hora,S0073H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0073,lwd="4",col="red")
abline(h=max(S0073H14min),lwd="3",col="black",lty=2)
abline(h=min(S0073H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0073=min(S0073H14min)
Kmính14_S0073=Qminh14_S0073/Qp14_S0073
print(paste("Kmính =",Kmính14_S0073))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0073H15max=S0073H[1:24,14]
S0073H15min=S0073H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=69,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=65,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0073=34.6328608336986
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0073,lwd="4",col="red")
abline(h=max(S0073H15max),lwd="3",col="black",lty=2)
abline(h=min(S0073H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0073=max(S0073H15max)
K2_15_S0073=Qmax15_S0073/Qp15_S0073
print(paste("K2 =",K2_15_S0073))
```

```
```

```{r}
plot(Hora,S0073H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0073,lwd="4",col="red")
abline(h=max(S0073H15min),lwd="3",col="black",lty=2)
abline(h=min(S0073H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0073=min(S0073H15min)
Kmính15_S0073=Qminh15_S0073/Qp15_S0073
print(paste("Kmính =",Kmính15_S0073))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0073H16max=S0073H[1:24,18]
S0073H16min=S0073H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=83,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0073=38.3311522930601
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0073,lwd="4",col="red")
abline(h=max(S0073H16max),lwd="3",col="black",lty=2)
abline(h=min(S0073H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0073=max(S0073H16max)
K2_16_S0073=Qmax16_S0073/Qp16_S0073
print(paste("K2 =",K2_16_S0073))
```

```{r}
plot(Hora,S0073H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0073,lwd="4",col="red")
abline(h=max(S0073H16min),lwd="3",col="black",lty=2)
abline(h=min(S0073H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0073=min(S0073H16min)
Kmính16_S0073=Qminh16_S0073/Qp16_S0073
print(paste("Kmính =",Kmính16_S0073))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0073H17max=S0073H[1:24,22]
S0073H17min=S0073H[1:24,24]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=69,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=64,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0073=34.3378945024384
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0073,lwd="4",col="red")
abline(h=max(S0073H17max),lwd="3",col="black",lty=2)
abline(h=min(S0073H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0073=max(S0073H17max)
K2_17_S0073=Qmax17_S0073/Qp17_S0073
print(paste("K2 =",K2_17_S0073))
```

```{r}
plot(Hora,S0073H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0073,lwd="4",col="red")
abline(h=max(S0073H17min),lwd="3",col="black",lty=2)
abline(h=min(S0073H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0073=min(S0073H17min)
Kmính17_S0073=Qminh17_S0073/Qp17_S0073
print(paste("Kmính =",Kmính17_S0073))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0073H18max=S0073H[1:24,26]
S0073H18min=S0073H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=69,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=64,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0073=36.4480005172055
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0073,lwd="4",col="red")
abline(h=max(S0073H18max),lwd="3",col="black",lty=2)
abline(h=min(S0073H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario","Promedio dia"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0073=max(S0073H18max)
K2_18_S0073=Qmax18_S0073/Qp18_S0073
print(paste("K2 =",K2_18_S0073))
```

```{r}
plot(Hora,S0073H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0073,lwd="4",col="red")
abline(h=max(S0073H18min),lwd="3",col="black",lty=2)
abline(h=min(S0073H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0073=min(S0073H18min)
Kmính18_S0073=Qminh18_S0073/Qp18_S0073
print(paste("Kmính =",Kmính18_S0073))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0073H19max=S0073H[1:24,30]
S0073H19min=S0073H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=79,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=74,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0073=42.7594341714794
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0073,lwd="4",col="red")
abline(h=max(S0073H19max),lwd="3",col="black",lty=2)
abline(h=min(S0073H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0073=max(S0073H19max)
K2_19_S0073=Qmax19_S0073/Qp19_S0073
print(paste("K2 =",K2_19_S0073))
```

```{r}
plot(Hora,S0073H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0073,lwd="4",col="red")
abline(h=max(S0073H19min),lwd="3",col="black",lty=2)
abline(h=min(S0073H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0073=min(S0073H19min)
Kmính19_S0073=Qminh19_S0073/Qp19_S0073
print(paste("Kmính =",Kmính19_S0073))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0073H23max=S0073H[1:24,46]
S0073H23min=S0073H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0073H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0073 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0073H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=73,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=68,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0073H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0073=41.1762286372877
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0073,lwd="4",col="red")
abline(h=max(S0073H23max),lwd="3",col="black",lty=2)
abline(h=min(S0073H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0073=max(S0073H23max)
K2_23_S0073=Qmax23_S0073/Qp23_S0073
print(paste("K2 =",K2_23_S0073))
```

```{r}
plot(Hora,S0073H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0073 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0073,lwd="4",col="red")
abline(h=max(S0073H23min),lwd="3",col="black",lty=2)
abline(h=min(S0073H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0073=min(S0073H23min)
Kmính23_S0073=Qminh23_S0073/Qp23_S0073
print(paste("Kmính =",Kmính23_S0073))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0073,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0073,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0073,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0073,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0073,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0073,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0073,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0073,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0073,": Si"))
print(paste("K2_14 =",K2_14_S0073,": Si"))
print(paste("K2_15 =",K2_15_S0073,": Si"))
print(paste("K2_16 =",K2_16_S0073,": No"))
print(paste("K2_17 =",K2_17_S0073,": Si"))
print(paste("K2_18 =",K2_18_S0073,": No"))
print(paste("K2_19 =",K2_19_S0073,": Si"))
print(paste("K2_23 =",K2_23_S0073,": Si"))
```

```{r}
K2S0073m=c(K2_13_S0073,K2_14_S0073,K2_15_S0073,K2_17_S0073,K2_19_S0073,
K2_23_S0073)
```

```
K2S0073=mean(K2S0073m)
summary(K2S0073m)
K2S0073m
print(paste("K2_S0073 =",K2S0073))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0073,": Si"))
print(paste("Kmính_14 =",Kmính14_S0073,": Si"))
print(paste("Kmính_15 =",Kmính15_S0073,": Si"))
print(paste("Kmính_16 =",Kmính16_S0073,": No"))
print(paste("Kmính_17 =",Kmính17_S0073,": Si"))
print(paste("Kmính_18 =",Kmính18_S0073,": No"))
print(paste("Kmính_19 =",Kmính19_S0073,": Si"))
print(paste("Kmính_23 =",Kmính23_S0073,": Si"))
```

```{r}
KmínhS0073m=c(Kmính13_S0073,Kmính14_S0073,Kmính15_S0073,Kmính17_S0073,
Kmính19_S0073,Kmính23_S0073)
KmínhS0073=mean(KmínhS0073m)
summary(KmínhS0073m)
KmínhS0073m
print(paste("Kmính_S0073 =",KmínhS0073))
```

## Estación S0081 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0081H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0081H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0081H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0081H13max=S0081H[1:24,6]
S0081H13min=S0081H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0081H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0081=151.87367947863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0081,lwd="4",col="red")
abline(h=max(S0081H13max),lwd="3",col="black",lty=2)
abline(h=min(S0081H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0081=max(S0081H13max)
K2_13_S0081=Qmax13_S0081/Qp13_S0081
print(paste("K2 =",K2_13_S0081))
```

```{r}
plot(Hora,S0081H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0081,lwd="4",col="red")
abline(h=max(S0081H13min),lwd="3",col="black",lty=2)
abline(h=min(S0081H13min),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0081=min(S0081H13min)
Kmính13_S0081=Qminh13_S0081/Qp13_S0081
print(paste("Kmính =",Kmính13_S0081))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0081H14max=S0081H[1:24,10]
S0081H14min=S0081H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0081H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0081=158.237687450137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0081,lwd="4",col="red")
abline(h=max(S0081H14max),lwd="3",col="black",lty=2)
abline(h=min(S0081H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0081=max(S0081H14max)
K2_14_S0081=Qmax14_S0081/Qp14_S0081
print(paste("K2 =",K2_14_S0081))
```

```{r}
plot(Hora,S0081H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0081,lwd="4",col="red")
abline(h=max(S0081H14min),lwd="3",col="black",lty=2)
abline(h=min(S0081H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0081=min(S0081H14min)
Kmính14_S0081=Qminh14_S0081/Qp14_S0081
print(paste("Kmính =",Kmính14_S0081))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0081H15max=S0081H[1:24,14]
S0081H15min=S0081H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0081H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
```

```
geom_text(aes(x=3,y=182.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0081=158.934409098904
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0081,lwd="4",col="red")
abline(h=max(S0081H15max),lwd="3",col="black",lty=2)
abline(h=min(S0081H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0081=max(S0081H15max)
K2_15_S0081=Qmax15_S0081/Qp15_S0081
print(paste("K2 =",K2_15_S0081))
```

```{r}
plot(Hora,S0081H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0081,lwd="4",col="red")
abline(h=max(S0081H15min),lwd="3",col="black",lty=2)
abline(h=min(S0081H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0081=min(S0081H15min)
Kmính15_S0081=Qminh15_S0081/Qp15_S0081
print(paste("Kmính =",Kmính15_S0081))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0081H16max=S0081H[1:24,18]
S0081H16min=S0081H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0081H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0081=157.341551664754
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0081,lwd="4",col="red")
abline(h=max(S0081H16max),lwd="3",col="black",lty=2)
abline(h=min(S0081H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0081=max(S0081H16max)
K2_16_S0081=Qmax16_S0081/Qp16_S0081
print(paste("K2 =",K2_16_S0081))
```

```{r}
plot(Hora,S0081H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2016 (Día de mínimo consumo)",
```

```
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0081,lwd="4",col="red")
abline(h=max(S0081H16min),lwd="3",col="black",lty=2)
abline(h=min(S0081H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0081=min(S0081H16min)
Kmính16_S0081=Qminh16_S0081/Qp16_S0081
print(paste("Kmính =",Kmính16_S0081))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0081H17max=S0081H[1:24,22]
S0081H17min=S0081H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0081H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0081=161.38966342137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0081,lwd="4",col="red")
abline(h=max(S0081H17max),lwd="3",col="black",lty=2)
abline(h=min(S0081H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0081=max(S0081H17max)
K2_17_S0081=Qmax17_S0081/Qp17_S0081
print(paste("K2 =",K2_17_S0081))
```

```{r}
plot(Hora,S0081H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0081,lwd="4",col="red")
abline(h=max(S0081H17min),lwd="3",col="black",lty=2)
abline(h=min(S0081H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0081=min(S0081H17min)
Kmính17_S0081=Qminh17_S0081/Qp17_S0081
print(paste("Kmính =",Kmính17_S0081))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0081H18max=S0081H[1:24,26]
S0081H18min=S0081H[1:24,28]
```

```{r}
ggplot()+
```

```
geom_line(mapping=aes(x=Hora,y=S0081H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=220,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=207,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0081=163.123953533425
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0081,lwd="4",col="red")
abline(h=max(S0081H18max),lwd="3",col="black",lty=2)
abline(h=min(S0081H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0081=max(S0081H18max)
K2_18_S0081=Qmax18_S0081/Qp18_S0081
print(paste("K2 =",K2_18_S0081))
```

```{r}
plot(Hora,S0081H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0081,lwd="4",col="red")
abline(h=max(S0081H18min),lwd="3",col="black",lty=2)
abline(h=min(S0081H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0081=min(S0081H18min)
Kmính18_S0081=Qminh18_S0081/Qp18_S0081
print(paste("Kmính =",Kmính18_S0081))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0081H19max=S0081H[1:24,30]
S0081H19min=S0081H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0081H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=220,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=207,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0081=165.703742620548
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0081,lwd="4",col="red")
abline(h=max(S0081H19max),lwd="3",col="black",lty=2)
abline(h=min(S0081H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
```

```
Qmax19_S0081=max(S0081H19max)
K2_19_S0081=Qmax19_S0081/Qp19_S0081
print(paste("K2 =",K2_19_S0081))
```

```{r}
plot(Hora,S0081H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0081,lwd="4",col="red")
abline(h=max(S0081H19min),lwd="3",col="black",lty=2)
abline(h=min(S0081H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0081=min(S0081H19min)
Kmính19_S0081=Qminh19_S0081/Qp19_S0081
print(paste("Kmính =",Kmính19_S0081))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0081H23max=S0081H[1:24,46]
S0081H23min=S0081H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0081H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0081 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0081H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=220,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=207,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0081H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0081=170.867233546301
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0081,lwd="4",col="red")
abline(h=max(S0081H23max),lwd="3",col="black",lty=2)
abline(h=min(S0081H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0081=max(S0081H23max)
K2_23_S0081=Qmax23_S0081/Qp23_S0081
print(paste("K2 =",K2_23_S0081))
```

```{r}
plot(Hora,S0081H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0081 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0081,lwd="4",col="red")
abline(h=max(S0081H23min),lwd="3",col="black",lty=2)
abline(h=min(S0081H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0081=min(S0081H23min)
Kmính23_S0081=Qminh23_S0081/Qp23_S0081
print(paste("Kmính =",Kmính23_S0081))
```

### Caudales promedio del sector

```{r}
```

```
print(paste("Qp_13 =",Qp13_S0081,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0081,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0081,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0081,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0081,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0081,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0081,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0081,"l/s",": Si"))
```

```{r}
print(paste("K2_13 =",K2_13_S0081,": Si"))
print(paste("K2_14 =",K2_14_S0081,": No"))
print(paste("K2_15 =",K2_15_S0081,": No"))
print(paste("K2_16 =",K2_16_S0081,": Si"))
print(paste("K2_17 =",K2_17_S0081,": Si"))
print(paste("K2_18 =",K2_18_S0081,": No"))
print(paste("K2_19 =",K2_19_S0081,": Si"))
print(paste("K2_23 =",K2_23_S0081,": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
K2S0081m=c(K2_13_S0081,K2_16_S0081,K2_17_S0081,K2_19_S0081,K2_23_S0081)
K2S0081=mean(K2S0081m)
summary(K2S0081m)
K2S0081m
print(paste("K2_S0081 =",K2S0081))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0081,": Si"))
print(paste("Kmính_14 =",Kmính14_S0081,": No"))
print(paste("Kmính_15 =",Kmính15_S0081,": No"))
print(paste("Kmính_16 =",Kmính16_S0081,": Si"))
print(paste("Kmính_17 =",Kmính17_S0081,": Si"))
print(paste("Kmính_18 =",Kmính18_S0081,": No"))
print(paste("Kmính_19 =",Kmính19_S0081,": Si"))
print(paste("Kmính_23 =",Kmính23_S0081,": Si"))
```

```{r}
KmínhS0081m=c(Kmính13_S0081,Kmính16_S0081,Kmính17_S0081,Kmính19_S0081,
Kmính23_S0081)
KmínhS0081=mean(KmínhS0081m)
summary(KmínhS0081m)
KmínhS0081m
print(paste("Kmính_S0081 =",KmínhS0081))
```

## Estación S0082 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0082H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0082H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0082H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0082H13max=S0082H[1:24,6]
S0082H13min=S0082H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=155,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=146,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0082H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0082=114.699730804274
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp13_S0082,lwd="4",col="red")
abline(h=max(S0082H13max),lwd="3",col="black",lty=2)
abline(h=min(S0082H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0082=max(S0082H13max)
K2_13_S0082=Qmax13_S0082/Qp13_S0082
print(paste("K2 =",K2_13_S0082))
```

```{r}
plot(Hora,S0082H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0082,lwd="4",col="red")
abline(h=max(S0082H13min),lwd="3",col="black",lty=2)
abline(h=min(S0082H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0082=min(S0082H13min)
Kmính13_S0082=Qminh13_S0082/Qp13_S0082
print(paste("Kmính =",Kmính13_S0082))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0082H14max=S0082H[1:24,10]
S0082H14min=S0082H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=163,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=153,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0082H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0082=114.476084815315
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0082,lwd="4",col="red")
abline(h=max(S0082H14max),lwd="3",col="black",lty=2)
abline(h=min(S0082H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0082=max(S0082H14max)
K2_14_S0082=Qmax14_S0082/Qp14_S0082
print(paste("K2 =",K2_14_S0082))
```

```{r}
plot(Hora,S0082H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0082,lwd="4",col="red")
abline(h=max(S0082H14min),lwd="3",col="black",lty=2)
abline(h=min(S0082H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0082=min(S0082H14min)
Kmính14_S0082=Qminh14_S0082/Qp14_S0082
print(paste("Kmính =",Kmính14_S0082))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0082H15max=S0082H[1:24,14]
S0082H15min=S0082H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=156,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=146,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0082H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0082=111.928347089589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0082,lwd="4",col="red")
abline(h=max(S0082H15max),lwd="3",col="black",lty=2)
abline(h=min(S0082H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0082=max(S0082H15max)
K2_15_S0082=Qmax15_S0082/Qp15_S0082
print(paste("K2 =",K2_15_S0082))
```

```{r}
plot(Hora,S0082H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0082,lwd="4",col="red")
abline(h=max(S0082H15min),lwd="3",col="black",lty=2)
abline(h=min(S0082H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0082=min(S0082H15min)
Kmính15_S0082=Qminh15_S0082/Qp15_S0082
print(paste("Kmính =",Kmính15_S0082))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0082H16max=S0082H[1:24,18]
S0082H16min=S0082H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
```

```
plot(Hora,S0082H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0082=108.028497738716
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0082,lwd="4",col="red")
abline(h=max(S0082H16max),lwd="3",col="black",lty=2)
abline(h=min(S0082H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0082=max(S0082H16max)
K2_16_S0082=Qmax16_S0082/Qp16_S0082
print(paste("K2 =",K2_16_S0082))
```

```{r}
plot(Hora,S0082H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0082,lwd="4",col="red")
abline(h=max(S0082H16min),lwd="3",col="black",lty=2)
abline(h=min(S0082H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0082=min(S0082H16min)
Kmính16_S0082=Qminh16_S0082/Qp16_S0082
print(paste("Kmính =",Kmính16_S0082))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0082H17max=S0082H[1:24,22]
S0082H17min=S0082H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=147.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=138.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0082H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0082=104.371018435123
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0082,lwd="4",col="red")
abline(h=max(S0082H17max),lwd="3",col="black",lty=2)
abline(h=min(S0082H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0082=max(S0082H17max)
K2_17_S0082=Qmax17_S0082/Qp17_S0082
print(paste("K2 =",K2_17_S0082))
```

```{r}
plot(Hora,S0082H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0082,lwd="4",col="red")
```

```
abline(h=max(S0082H17min),lwd="3",col="black",lty=2)
abline(h=min(S0082H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0082=min(S0082H17min)
Kmính17_S0082=Qminh17_S0082/Qp17_S0082
print(paste("Kmính =",Kmính17_S0082))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0082H18max=S0082H[1:24,26]
S0082H18min=S0082H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=147,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=139,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0082H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0082=105.118130487945
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0082,lwd="4",col="red")
abline(h=max(S0082H18max),lwd="3",col="black",lty=2)
abline(h=min(S0082H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0082=max(S0082H18max)
K2_18_S0082=Qmax18_S0082/Qp18_S0082
print(paste("K2 =",K2_18_S0082))
```

```{r}
plot(Hora,S0082H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0082,lwd="4",col="red")
abline(h=max(S0082H18min),lwd="3",col="black",lty=2)
abline(h=min(S0082H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0082=min(S0082H18min)
Kmính18_S0082=Qminh18_S0082/Qp18_S0082
print(paste("Kmính =",Kmính18_S0082))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0082H19max=S0082H[1:24,30]
S0082H19min=S0082H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H19min),color="blue",lwd=1.2)+
```

```
geom_text(aes(x=3,y=147,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=139,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0082H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0082=106.607988346219
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0082,lwd="4",col="red")
abline(h=max(S0082H19max),lwd="3",col="black",lty=2)
abline(h=min(S0082H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0082=max(S0082H19max)
K2_19_S0082=Qmax19_S0082/Qp19_S0082
print(paste("K2 =",K2_19_S0082))
```

```{r}
plot(Hora,S0082H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0082,lwd="4",col="red")
abline(h=max(S0082H19min),lwd="3",col="black",lty=2)
abline(h=min(S0082H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0082=min(S0082H19min)
Kmính19_S0082=Qminh19_S0082/Qp19_S0082
print(paste("Kmính =",Kmính19_S0082))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0082H23max=S0082H[1:24,46]
S0082H23min=S0082H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0082H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0082 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0082H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=131,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=123,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0082H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0082=84.1815348175068
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0082,lwd="4",col="red")
abline(h=max(S0082H23max),lwd="3",col="black",lty=2)
abline(h=min(S0082H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0082=max(S0082H23max)
K2_23_S0082=Qmax23_S0082/Qp23_S0082
print(paste("K2 =",K2_23_S0082))
```

```{r}
```

```
plot(Hora,S0082H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0082 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0082,lwd="4",col="red")
abline(h=max(S0082H23min),lwd="3",col="black",lty=2)
abline(h=min(S0082H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0082=min(S0082H23min)
Kmính23_S0082=Qminh23_S0082/Qp23_S0082
print(paste("Kmính =",Kmính23_S0082))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0082,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0082,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0082,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0082,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0082,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0082,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0082,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0082,"l/s",": No"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0082,": Si"))
print(paste("K2_14 =",K2_14_S0082,": Si"))
print(paste("K2_15 =",K2_15_S0082,": Si"))
print(paste("K2_16 =",K2_16_S0082,": Si"))
print(paste("K2_17 =",K2_17_S0082,": Si"))
print(paste("K2_18 =",K2_18_S0082,": Si"))
print(paste("K2_19 =",K2_19_S0082,": Si"))
print(paste("K2_23 =",K2_23_S0082,": No"))
```

```{r}
K2S0082m=c(K2_13_S0082,K2_14_S0082,K2_15_S0082,K2_16_S0082,K2_17_S0082,
K2_18_S0082,K2_19_S0082)
K2S0082=mean(K2S0082m)
summary(K2S0082m)
K2S0082m
print(paste("K2_S0082 =",K2S0082))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0082,": Si"))
print(paste("Kmính_14 =",Kmính14_S0082,": Si"))
print(paste("Kmính_15 =",Kmính15_S0082,": Si"))
print(paste("Kmính_16 =",Kmính16_S0082,": Si"))
print(paste("Kmính_17 =",Kmính17_S0082,": Si"))
print(paste("Kmính_18 =",Kmính18_S0082,": Si"))
print(paste("Kmính_19 =",Kmính19_S0082,": Si"))
print(paste("Kmính_23 =",Kmính23_S0082,": No"))
```

```{r}
KmínhS0082m=c(Kmính13_S0082,Kmính14_S0082,Kmính15_S0082,Kmính16_S0082,
Kmính17_S0082,Kmính18_S0082,Kmính19_S0082)
KmínhS0082=mean(KmínhS0082m)
summary(KmínhS0082m)
KmínhS0082m
print(paste("Kmính_S0082 =",KmínhS0082))
```

## Estación S0083 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0083H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0083H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0083H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0083H13max=S0083H[1:24,6]
```

```
S0083H13min=S0083H[1:24,8]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=155.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=146.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0083H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0083=124.129629474247
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0083,lwd="4",col="red")
abline(h=max(S0083H13max),lwd="3",col="black",lty=2)
abline(h=min(S0083H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0083=max(S0083H13max)
K2_13_S0083=Qmax13_S0083/Qp13_S0083
print(paste("K2 =",K2_13_S0083))
```
```

```{r}
plot(Hora,S0083H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0083,lwd="4",col="red")
abline(h=max(S0083H13min),lwd="3",col="black",lty=2)
abline(h=min(S0083H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0083=min(S0083H13min)
Kmính13_S0083=Qminh13_S0083/Qp13_S0083
print(paste("Kmính =",Kmính13_S0083))
```
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0083H14max=S0083H[1:24,10]
S0083H14min=S0083H[1:24,12]
```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=156,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=146,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```
```

```{r}
plot(Hora,S0083H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0083=127.139462643014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0083,lwd="4",col="red")
abline(h=max(S0083H14max),lwd="3",col="black",lty=2)
abline(h=min(S0083H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0083=max(S0083H14max)
K2_14_S0083=Qmax14_S0083/Qp14_S0083
print(paste("K2 =",K2_14_S0083))
```

```{r}
plot(Hora,S0083H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0083,lwd="4",col="red")
abline(h=max(S0083H14min),lwd="3",col="black",lty=2)
abline(h=min(S0083H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0083=min(S0083H14min)
Kmính14_S0083=Qminh14_S0083/Qp14_S0083
print(paste("Kmính =",Kmính14_S0083))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0083H15max=S0083H[1:24,14]
S0083H15min=S0083H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0083H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0083=125.072023336164
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0083,lwd="4",col="red")
abline(h=max(S0083H15max),lwd="3",col="black",lty=2)
abline(h=min(S0083H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0083=max(S0083H15max)
K2_15_S0083=Qmax15_S0083/Qp15_S0083
print(paste("K2 =",K2_15_S0083))
```

```{r}
plot(Hora,S0083H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0083,lwd="4",col="red")
abline(h=max(S0083H15min),lwd="3",col="black",lty=2)
abline(h=min(S0083H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0083=min(S0083H15min)
Kmính15_S0083=Qminh15_S0083/Qp15_S0083
print(paste("Kmính =",Kmính15_S0083))
```

```
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0083H16max=S0083H[1:24,18]
S0083H16min=S0083H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0083H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0083=121.457744791803
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0083,lwd="4",col="red")
abline(h=max(S0083H16max),lwd="3",col="black",lty=2)
abline(h=min(S0083H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0083=max(S0083H16max)
K2_16_S0083=Qmax16_S0083/Qp16_S0083
print(paste("K2 =",K2_16_S0083))
```

```{r}
plot(Hora,S0083H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0083,lwd="4",col="red")
abline(h=max(S0083H16min),lwd="3",col="black",lty=2)
abline(h=min(S0083H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0083=min(S0083H16min)
Kmính16_S0083=Qminh16_S0083/Qp16_S0083
print(paste("Kmính =",Kmính16_S0083))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0083H17max=S0083H[1:24,22]
S0083H17min=S0083H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168.45,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.45,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0083H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0083=128.964301323288
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0083,lwd="4",col="red")
abline(h=max(S0083H17max),lwd="3",col="black",lty=2)
abline(h=min(S0083H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0083=max(S0083H17max)
K2_17_S0083=Qmax17_S0083/Qp17_S0083
print(paste("K2 =",K2_17_S0083))
```

```{r}
plot(Hora,S0083H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0083,lwd="4",col="red")
abline(h=max(S0083H17min),lwd="3",col="black",lty=2)
abline(h=min(S0083H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0083=min(S0083H17min)
Kmính17_S0083=Qminh17_S0083/Qp17_S0083
print(paste("Kmính =",Kmính17_S0083))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0083H18max=S0083H[1:24,26]
S0083H18min=S0083H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=168.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0083H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0083=133.39709858411
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0083,lwd="4",col="red")
abline(h=max(S0083H18max),lwd="3",col="black",lty=2)
abline(h=min(S0083H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0083=max(S0083H18max)
K2_18_S0083=Qmax18_S0083/Qp18_S0083
print(paste("K2 =",K2_18_S0083))
```

```{r}
plot(Hora,S0083H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0083,lwd="4",col="red")
abline(h=max(S0083H18min),lwd="3",col="black",lty=2)
abline(h=min(S0083H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0083=min(S0083H18min)
Kmính18_S0083=Qminh18_S0083/Qp18_S0083
print(paste("Kmính =",Kmính18_S0083))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0083H19max=S0083H[1:24,30]
S0083H19min=S0083H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=182,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=170,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0083H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0083=132.729613893425
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0083,lwd="4",col="red")
abline(h=max(S0083H19max),lwd="3",col="black",lty=2)
abline(h=min(S0083H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0083=max(S0083H19max)
K2_19_S0083=Qmax19_S0083/Qp19_S0083
print(paste("K2 =",K2_19_S0083))
```

```{r}
plot(Hora,S0083H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0083,lwd="4",col="red")
abline(h=max(S0083H19min),lwd="3",col="black",lty=2)
abline(h=min(S0083H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0083=min(S0083H19min)
Kmính19_S0083=Qminh19_S0083/Qp19_S0083
print(paste("Kmính =",Kmính19_S0083))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0083H23max=S0083H[1:24,46]
S0083H23min=S0083H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0083H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0083 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0083H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=144,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=132,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0083H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0083=0.27365433789863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0083,lwd="4",col="red")
abline(h=max(S0083H23max),lwd="3",col="black",lty=2)
abline(h=min(S0083H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0083=max(S0083H23max)
K2_23_S0083=Qmax23_S0083/Qp23_S0083
print(paste("K2 =",K2_23_S0083))
```

```{r}
plot(Hora,S0083H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0083 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0083,lwd="4",col="red")
abline(h=max(S0083H23min),lwd="3",col="black",lty=2)
abline(h=min(S0083H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0083=min(S0083H23min)
Kmính23_S0083=Qminh23_S0083/Qp23_S0083
print(paste("Kmính =",Kmính23_S0083))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0083,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0083,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0083,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0083,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0083,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0083,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0083,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0083,"l/s",": No"))
```

```{r}
print(paste("K2_13 =",K2_13_S0083,": Si"))
print(paste("K2_14 =",K2_14_S0083,": Si"))
print(paste("K2_15 =",K2_15_S0083,": No"))
print(paste("K2_16 =",K2_16_S0083,": Si"))
print(paste("K2_17 =",K2_17_S0083,": No"))
print(paste("K2_18 =",K2_18_S0083,": Si"))
print(paste("K2_19 =",K2_19_S0083,": Si"))
print(paste("K2_23 =",K2_23_S0083,": No"))
```

### Determinación del coeficiente K2 del sector

```{r}
K2S0083m=c(K2_13_S0083,K2_14_S0083,K2_16_S0083,K2_18_S0083,K2_19_S0083)
K2S0083=mean(K2S0083m)
summary(K2S0083m)
K2S0083m
print(paste("K2_S0083 =",K2S0083))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0083,": Si"))
print(paste("Kmính_14 =",Kmính14_S0083,": Si"))
print(paste("Kmính_15 =",Kmính15_S0083,": No"))
print(paste("Kmính_16 =",Kmính16_S0083,": Si"))
print(paste("Kmính_17 =",Kmính17_S0083,": No"))
print(paste("Kmính_18 =",Kmính18_S0083,": Si"))
print(paste("Kmính_19 =",Kmính19_S0083,": Si"))
print(paste("Kmính_23 =",Kmính23_S0083,": No"))
```

```{r}
KmínhS0083m=c(Kmính13_S0083,Kmính14_S0083,Kmính16_S0083,Kmính18_S0083,
Kmính19_S0083)
KmínhS0083=mean(KmínhS0083m)
```

```
summary(KmínhS0083m)
KmínhS0083m
print(paste("Kmính_S0083 =",KmínhS0083))
```

## Estación S0095 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0095H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0095H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0095H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0095H13max=S0095H[1:24,6]
S0095H13min=S0095H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0095 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=98.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=92.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0095=64.0778237241644
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0095,lwd="4",col="red")
abline(h=max(S0095H13max),lwd="3",col="black",lty=2)
abline(h=min(S0095H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0095=max(S0095H13max)
K2_13_S0095=Qmax13_S0095/Qp13_S0095
print(paste("K2 =",K2_13_S0095))
```

```{r}
plot(Hora,S0095H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0095,lwd="4",col="red")
abline(h=max(S0095H13min),lwd="3",col="black",lty=2)
abline(h=min(S0095H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0095=min(S0095H13min)
Kmính13_S0095=Qminh13_S0095/Qp13_S0095
print(paste("Kmính =",Kmính13_S0095))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0095H14max=S0095H[1:24,10]
S0095H14min=S0095H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H14max),color="red",lwd=1.2)+
```

```
ggtitle("ESTACIÓN S0095 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=103.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=97.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0095=69.7914702177534
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0095,lwd="4",col="red")
abline(h=max(S0095H14max),lwd="3",col="black",lty=2)
abline(h=min(S0095H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0095=max(S0095H14max)
K2_14_S0095=Qmax14_S0095/Qp14_S0095
print(paste("K2 =",K2_14_S0095))
```

```{r}
plot(Hora,S0095H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0095,lwd="4",col="red")
abline(h=max(S0095H14min),lwd="3",col="black",lty=2)
abline(h=min(S0095H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0095=min(S0095H14min)
Kmính14_S0095=Qminh14_S0095/Qp14_S0095
print(paste("Kmính =",Kmính14_S0095))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0095H15max=S0095H[1:24,14]
S0095H15min=S0095H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0095 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=102,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=96,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0095=70.1976627126849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0095,lwd="4",col="red")
abline(h=max(S0095H15max),lwd="3",col="black",lty=2)
abline(h=min(S0095H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0095=max(S0095H15max)
```

```
K2_15_S0095=Qmax15_S0095/Qp15_S0095
print(paste("K2 =",K2_15_S0095))
```

```{r}
plot(Hora,S0095H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0095,lwd="4",col="red")
abline(h=max(S0095H15min),lwd="3",col="black",lty=2)
abline(h=min(S0095H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0095=min(S0095H15min)
Kmính15_S0095=Qminh15_S0095/Qp15_S0095
print(paste("Kmính =",Kmính15_S0095))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0095H16max=S0095H[1:24,18]
S0095H16min=S0095H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0095 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=114.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0095=71.3035142153552
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0095,lwd="4",col="red")
abline(h=max(S0095H16max),lwd="3",col="black",lty=2)
abline(h=min(S0095H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0095=max(S0095H16max)
K2_16_S0095=Qmax16_S0095/Qp16_S0095
print(paste("K2 =",K2_16_S0095))
```

```{r}
plot(Hora,S0095H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0095,lwd="4",col="red")
abline(h=max(S0095H16min),lwd="3",col="black",lty=2)
abline(h=min(S0095H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0095=min(S0095H16min)
Kmính16_S0095=Qminh16_S0095/Qp16_S0095
print(paste("Kmính =",Kmính16_S0095))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
```

```
S0095H17max=S0095H[1:24,22]
S0095H17min=S0095H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0095 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=112,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=106,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0095=74.0046878703014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0095,lwd="4",col="red")
abline(h=max(S0095H17max),lwd="3",col="black",lty=2)
abline(h=min(S0095H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0095=max(S0095H17max)
K2_17_S0095=Qmax17_S0095/Qp17_S0095
print(paste("K2 =",K2_17_S0095))
```

```{r}
plot(Hora,S0095H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0095,lwd="4",col="red")
abline(h=max(S0095H17min),lwd="3",col="black",lty=2)
abline(h=min(S0095H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0095=min(S0095H17min)
Kmính17_S0095=Qminh17_S0095/Qp17_S0095
print(paste("Kmính =",Kmính17_S0095))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0095H18max=S0095H[1:24,26]
S0095H18min=S0095H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0095 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=116.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=110.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0095=76.0868693544383
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0095,lwd="4",col="red")
abline(h=max(S0095H18max),lwd="3",col="black",lty=2)
abline(h=min(S0095H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0095=max(S0095H18max)
K2_18_S0095=Qmax18_S0095/Qp18_S0095
print(paste("K2 =",K2_18_S0095))
```

```{r}
plot(Hora,S0095H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0095,lwd="4",col="red")
abline(h=max(S0095H18min),lwd="3",col="black",lty=2)
abline(h=min(S0095H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0095=min(S0095H18min)
Kmính18_S0095=Qminh18_S0095/Qp18_S0095
print(paste("Kmính =",Kmính18_S0095))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0095H19max=S0095H[1:24,30]
S0095H19min=S0095H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0095 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=121.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=114.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0095=78.6961224033151
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0095,lwd="4",col="red")
abline(h=max(S0095H19max),lwd="3",col="black",lty=2)
abline(h=min(S0095H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0095=max(S0095H19max)
K2_19_S0095=Qmax19_S0095/Qp19_S0095
print(paste("K2 =",K2_19_S0095))
```

```{r}
plot(Hora,S0095H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0095,lwd="4",col="red")
abline(h=max(S0095H19min),lwd="3",col="black",lty=2)
abline(h=min(S0095H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0095=min(S0095H19min)
Kmính19_S0095=Qminh19_S0095/Qp19_S0095
```

```
print(paste("Kmính =",Kmính19_S0095))
```
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0095H23max=S0095H[1:24,46]
S0095H23min=S0095H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0095H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0095 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0095H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=109,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=102,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0095H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0095=76.7761435630137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0095,lwd="4",col="red")
abline(h=max(S0095H23max),lwd="3",col="black",lty=2)
abline(h=min(S0095H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0095=max(S0095H23max)
K2_23_S0095=Qmax23_S0095/Qp23_S0095
print(paste("K2 =",K2_23_S0095))
```

```{r}
plot(Hora,S0095H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0095 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0095,lwd="4",col="red")
abline(h=max(S0095H23min),lwd="3",col="black",lty=2)
abline(h=min(S0095H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0095=min(S0095H23min)
Kmính23_S0095=Qminh23_S0095/Qp23_S0095
print(paste("Kmính =",Kmính23_S0095))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0095,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0095,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0095,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0095,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0095,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0095,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0095,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0095,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0095,": Si"))
print(paste("K2_14 =",K2_14_S0095,": Si"))
print(paste("K2_15 =",K2_15_S0095,": No"))
print(paste("K2_16 =",K2_16_S0095,": No"))
print(paste("K2_17 =",K2_17_S0095,": Si"))
print(paste("K2_18 =",K2_18_S0095,": No"))
print(paste("K2_19 =",K2_19_S0095,": Si"))
print(paste("K2_23 =",K2_23_S0095,": Si"))
```

```{r}

```
K2S0095m=c(K2_13_S0095,K2_14_S0095,K2_17_S0095,K2_19_S0095,K2_23_S0095)
K2S0095=mean(K2S0095m)
summary(K2S0095m)
K2S0095m
print(paste("K2_S0095 =",K2S0095))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0095,": Si"))
print(paste("Kmính_14 =",Kmính14_S0095,": Si"))
print(paste("Kmính_15 =",Kmính15_S0095,": No"))
print(paste("Kmính_16 =",Kmính16_S0095,": No"))
print(paste("Kmính_17 =",Kmính17_S0095,": Si"))
print(paste("Kmính_18 =",Kmính18_S0095,": No"))
print(paste("Kmính_19 =",Kmính19_S0095,": Si"))
print(paste("Kmính_23 =",Kmính23_S0095,": Si"))
```

```{r}
KmínhS0095m=c(Kmính13_S0095,Kmính14_S0095,Kmính17_S0095,Kmính19_S0095,
Kmính23_S0095)
KmínhS0095=mean(KmínhS0095m)
summary(KmínhS0095m)
KmínhS0095m
print(paste("Kmính_S0095 =",KmínhS0095))
```

## Estación S0116 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0116H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0116H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0116H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0116H13max=S0116H[1:24,6]
S0116H13min=S0116H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0116H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145.65,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.65,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0116=105.040303340849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0116,lwd="4",col="red")
abline(h=max(S0116H13max),lwd="3",col="black",lty=2)
abline(h=min(S0116H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0116=max(S0116H13max)
K2_13_S0116=Qmax13_S0116/Qp13_S0116
print(paste("K2 =",K2_13_S0116))
```

```{r}
plot(Hora,S0116H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0116,lwd="4",col="red")
abline(h=max(S0116H13min),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0116H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0116=min(S0116H13min)
Kmính13_S0116=Qminh13_S0116/Qp13_S0116
print(paste("Kmính =",Kmính13_S0116))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0116H14max=S0116H[1:24,10]
S0116H14min=S0116H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0116H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=148,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=138,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0116=108.877910313671
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0116,lwd="4",col="red")
abline(h=max(S0116H14max),lwd="3",col="black",lty=2)
abline(h=min(S0116H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0116=max(S0116H14max)
K2_14_S0116=Qmax14_S0116/Qp14_S0116
print(paste("K2 =",K2_14_S0116))
```

```{r}
plot(Hora,S0116H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0116,lwd="4",col="red")
abline(h=max(S0116H14min),lwd="3",col="black",lty=2)
abline(h=min(S0116H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0116=min(S0116H14min)
Kmính14_S0116=Qminh14_S0116/Qp14_S0116
print(paste("Kmính =",Kmính14_S0116))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0116H15max=S0116H[1:24,14]
S0116H15min=S0116H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0116H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=156,label=" - Día de máximo consumo"),
```

```
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=145.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0116=111.318118459178
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0116,lwd="4",col="red")
abline(h=max(S0116H15max),lwd="3",col="black",lty=2)
abline(h=min(S0116H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0116=max(S0116H15max)
K2_15_S0116=Qmax15_S0116/Qp15_S0116
print(paste("K2 =",K2_15_S0116))
```

```{r}
plot(Hora,S0116H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0116,lwd="4",col="red")
abline(h=max(S0116H15min),lwd="3",col="black",lty=2)
abline(h=min(S0116H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0116=min(S0116H15min)
Kmính15_S0116=Qminh15_S0116/Qp15_S0116
print(paste("Kmính =",Kmính15_S0116))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0116H16max=S0116H[1:24,18]
S0116H16min=S0116H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0116H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0116=109.59924517888
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0116,lwd="4",col="red")
abline(h=max(S0116H16max),lwd="3",col="black",lty=2)
abline(h=min(S0116H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0116=max(S0116H16max)
K2_16_S0116=Qmax16_S0116/Qp16_S0116
print(paste("K2 =",K2_16_S0116))
```

```{r}
plot(Hora,S0116H16min,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0116 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0116,lwd="4",col="red")
abline(h=max(S0116H16min),lwd="3",col="black",lty=2)
abline(h=min(S0116H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0116=min(S0116H16min)
Kmính16_S0116=Qminh16_S0116/Qp16_S0116
print(paste("Kmính =",Kmính16_S0116))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0116H17max=S0116H[1:24,22]
S0116H17min=S0116H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0116H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=132.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=124,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0116=97.3561322476164
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0116,lwd="4",col="red")
abline(h=max(S0116H17max),lwd="3",col="black",lty=2)
abline(h=min(S0116H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0116=max(S0116H17max)
K2_17_S0116=Qmax17_S0116/Qp17_S0116
print(paste("K2 =",K2_17_S0116))
```

```{r}
plot(Hora,S0116H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0116,lwd="4",col="red")
abline(h=max(S0116H17min),lwd="3",col="black",lty=2)
abline(h=min(S0116H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0116=min(S0116H17min)
Kmính17_S0116=Qminh17_S0116/Qp17_S0116
print(paste("Kmính =",Kmính17_S0116))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0116H18max=S0116H[1:24,26]
S0116H18min=S0116H[1:24,28]
```

```{r}
ggplot()+
```

```
geom_line(mapping=aes(x=Hora,y=S0116H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=141,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=131,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0116=102.479371036904
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0116,lwd="4",col="red")
abline(h=max(S0116H18max),lwd="3",col="black",lty=2)
abline(h=min(S0116H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0116=max(S0116H18max)
K2_18_S0116=Qmax18_S0116/Qp18_S0116
print(paste("K2 =",K2_18_S0116))
```

```{r}
plot(Hora,S0116H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0116,lwd="4",col="red")
abline(h=max(S0116H18min),lwd="3",col="black",lty=2)
abline(h=min(S0116H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0116=min(S0116H18min)
Kmính18_S0116=Qminh18_S0116/Qp18_S0116
print(paste("Kmính =",Kmính18_S0116))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0116H19max=S0116H[1:24,30]
S0116H19min=S0116H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0116H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=135.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0116=103.875265325753
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0116,lwd="4",col="red")
abline(h=max(S0116H19max),lwd="3",col="black",lty=2)
abline(h=min(S0116H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
```

```
Qmax19_S0116=max(S0116H19max)
K2_19_S0116=Qmax19_S0116/Qp19_S0116
print(paste("K2 =",K2_19_S0116))
```

```{r}
plot(Hora,S0116H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0116,lwd="4",col="red")
abline(h=max(S0116H19min),lwd="3",col="black",lty=2)
abline(h=min(S0116H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0116=min(S0116H19min)
Kmính19_S0116=Qminh19_S0116/Qp19_S0116
print(paste("Kmính =",Kmính19_S0116))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0116H23max=S0116H[1:24,46]
S0116H23min=S0116H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0116H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0116 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0116H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=140,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=131,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0116H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0116=101.45877344537
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0116,lwd="4",col="red")
abline(h=max(S0116H23max),lwd="3",col="black",lty=2)
abline(h=min(S0116H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0116=max(S0116H23max)
K2_23_S0116=Qmax23_S0116/Qp23_S0116
print(paste("K2 =",K2_23_S0116))
```

```{r}
plot(Hora,S0116H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0116 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0116,lwd="4",col="red")
abline(h=max(S0116H23min),lwd="3",col="black",lty=2)
abline(h=min(S0116H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0116=min(S0116H23min)
Kmính23_S0116=Qminh23_S0116/Qp23_S0116
print(paste("Kmính =",Kmính23_S0116))
```

### Caudales promedio del sector

```{r}
```

```
print(paste("Qp_13 =",Qp13_S0116,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0116,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0116,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0116,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0116,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0116,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0116,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0116,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0116,": Si"))
print(paste("K2_14 =",K2_14_S0116,": Si"))
print(paste("K2_15 =",K2_15_S0116,": Si"))
print(paste("K2_16 =",K2_16_S0116,": Si"))
print(paste("K2_17 =",K2_17_S0116,": No"))
print(paste("K2_18 =",K2_18_S0116,": No"))
print(paste("K2_19 =",K2_19_S0116,": Si"))
print(paste("K2_23 =",K2_23_S0116,": Si"))
```

```{r}
K2S0116m=c(K2_13_S0116,K2_14_S0116,K2_15_S0116,K2_16_S0116,K2_19_S0116,
K2_23_S0116)
K2S0116=mean(K2S0116m)
summary(K2S0116m)
K2S0116m
print(paste("K2_S0116 =",K2S0116))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0116,": Si"))
print(paste("Kmính_14 =",Kmính14_S0116,": Si"))
print(paste("Kmính_15 =",Kmính15_S0116,": Si"))
print(paste("Kmính_16 =",Kmính16_S0116,": Si"))
print(paste("Kmính_17 =",Kmính17_S0116,": No"))
print(paste("Kmính_18 =",Kmính18_S0116,": No"))
print(paste("Kmính_19 =",Kmính19_S0116,": Si"))
print(paste("Kmính_23 =",Kmính23_S0116,": Si"))
```

```{r}
KmínhS0116m=c(Kmính13_S0116,Kmính14_S0116,Kmính15_S0116,Kmính16_S0116,
Kmính19_S0116,Kmính23_S0116)
KmínhS0116=mean(KmínhS0116m)
summary(KmínhS0116m)
KmínhS0116m
print(paste("Kmính_S0116 =",KmínhS0116))
```

## Estación S0200 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0200H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0200H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0200H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0200H13max=S0200H[1:24,6]
S0200H13min=S0200H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0200 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0200H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=159,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=149,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0200=98.8558797889863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0200,lwd="4",col="red")
abline(h=max(S0200H13max),lwd="3",col="black",lty=2)
abline(h=min(S0200H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0200=max(S0200H13max)
K2_13_S0200=Qmax13_S0200/Qp13_S0200
print(paste("K2 =",K2_13_S0200))
```

```{r}
plot(Hora,S0200H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0200,lwd="4",col="red")
abline(h=max(S0200H13min),lwd="3",col="black",lty=2)
abline(h=min(S0200H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0200=min(S0200H13min)
Kmính13_S0200=Qminh13_S0200/Qp13_S0200
print(paste("Kmính =",Kmính13_S0200))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0200H14max=S0200H[1:24,10]
S0200H14min=S0200H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0200 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0200H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=164,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=154,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0200=101.052640852767
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0200,lwd="4",col="red")
abline(h=max(S0200H14max),lwd="3",col="black",lty=2)
abline(h=min(S0200H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0200=max(S0200H14max)
K2_14_S0200=Qmax14_S0200/Qp14_S0200
print(paste("K2 =",K2_14_S0200))
```

```{r}
plot(Hora,S0200H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0200,lwd="4",col="red")
abline(h=max(S0200H14min),lwd="3",col="black",lty=2)
abline(h=min(S0200H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0200=min(S0200H14min)
Kmính14_S0200=Qminh14_S0200/Qp14_S0200
print(paste("Kmính =",Kmính14_S0200))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0200H15max=S0200H[1:24,14]
S0200H15min=S0200H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0200 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0200H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0200=105.299813059151
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0200,lwd="4",col="red")
abline(h=max(S0200H15max),lwd="3",col="black",lty=2)
abline(h=min(S0200H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0200=max(S0200H15max)
K2_15_S0200=Qmax15_S0200/Qp15_S0200
print(paste("K2 =",K2_15_S0200))
```

```{r}
plot(Hora,S0200H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0200,lwd="4",col="red")
abline(h=max(S0200H15min),lwd="3",col="black",lty=2)
abline(h=min(S0200H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0200=min(S0200H15min)
Kmính15_S0200=Qminh15_S0200/Qp15_S0200
print(paste("Kmính =",Kmính15_S0200))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0200H16max=S0200H[1:24,18]
S0200H16min=S0200H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0200 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0200H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=169.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0200=108.092907779945
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0200,lwd="4",col="red")
abline(h=max(S0200H16max),lwd="3",col="black",lty=2)
abline(h=min(S0200H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0200=max(S0200H16max)
K2_16_S0200=Qmax16_S0200/Qp16_S0200
print(paste("K2 =",K2_16_S0200))
```

```{r}
plot(Hora,S0200H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0200,lwd="4",col="red")
abline(h=max(S0200H16min),lwd="3",col="black",lty=2)
abline(h=min(S0200H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0200=min(S0200H16min)
Kmính16_S0200=Qminh16_S0200/Qp16_S0200
print(paste("Kmính =",Kmính16_S0200))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0200H17max=S0200H[1:24,22]
S0200H17min=S0200H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0200 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0200H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0200=110.860807118219
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0200,lwd="4",col="red")
abline(h=max(S0200H17max),lwd="3",col="black",lty=2)
abline(h=min(S0200H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0200=max(S0200H17max)
K2_17_S0200=Qmax17_S0200/Qp17_S0200
print(paste("K2 =",K2_17_S0200))
```

```{r}
plot(Hora,S0200H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
```

```
abline(h=Qp17_S0200,lwd="4",col="red")
abline(h=max(S0200H17min),lwd="3",col="black",lty=2)
abline(h=min(S0200H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0200=min(S0200H17min)
Kmính17_S0200=Qminh17_S0200/Qp17_S0200
print(paste("Kmính =",Kmính17_S0200))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0200H18max=S0200H[1:24,26]
S0200H18min=S0200H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0200 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0200H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0200=109.977265353425
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0200,lwd="4",col="red")
abline(h=max(S0200H18max),lwd="3",col="black",lty=2)
abline(h=min(S0200H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0200=max(S0200H18max)
K2_18_S0200=Qmax18_S0200/Qp18_S0200
print(paste("K2 =",K2_18_S0200))
```

```{r}
plot(Hora,S0200H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0200,lwd="4",col="red")
abline(h=max(S0200H18min),lwd="3",col="black",lty=2)
abline(h=min(S0200H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0200=min(S0200H18min)
Kmính18_S0200=Qminh18_S0200/Qp18_S0200
print(paste("Kmính =",Kmính18_S0200))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0200H19max=S0200H[1:24,30]
S0200H19min=S0200H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0200 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0200H19min),color="blue",lwd=1.2)+
  geom_text(aes(x=3,y=168.5,label=" - Día de máximo consumo"),
            stat="unique",size=4,color="red")+
  geom_text(aes(x=3,y=158.4,label="- Día de mínimo consumo"),
            stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2019 (Día de máximo consumo)",
     xlab="Tiempo (horas)",
     ylab="Caudal (l/s)")
Qp19_S0200=113.823564636274
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0200,lwd="4",col="red")
abline(h=max(S0200H19max),lwd="3",col="black",lty=2)
abline(h=min(S0200H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
       lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0200=max(S0200H19max)
K2_19_S0200=Qmax19_S0200/Qp19_S0200
print(paste("K2 =",K2_19_S0200))
```

```{r}
plot(Hora,S0200H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2019 (Día de mínimo consumo)",
     xlab="Tiempo (horas)",
     ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0200,lwd="4",col="red")
abline(h=max(S0200H19min),lwd="3",col="black",lty=2)
abline(h=min(S0200H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
       lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0200=min(S0200H19min)
Kmính19_S0200=Qminh19_S0200/Qp19_S0200
print(paste("Kmính =",Kmính19_S0200))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0200H23max=S0200H[1:24,46]
S0200H23min=S0200H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0200H23max),color="red",lwd=1.2)+
  ggtitle("ESTACIÓN S0200 - 2023")+
  theme(plot.title=element_text(hjust=0.5))+
  xlab("Tiempo (horas)")+
  ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0200H23min),color="blue",lwd=1.2)+
  geom_text(aes(x=3,y=175,label=" - Día de máximo consumo"),
            stat="unique",size=4,color="red")+
  geom_text(aes(x=3,y=165,label="- Día de mínimo consumo"),
            stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0200H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2023 (Día de máximo consumo)",
     xlab="Tiempo (horas)",
     ylab="Caudal (l/s)")
Qp23_S0200=112.721343895068
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0200,lwd="4",col="red")
abline(h=max(S0200H23max),lwd="3",col="black",lty=2)
abline(h=min(S0200H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
       lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0200=max(S0200H23max)
K2_23_S0200=Qmax23_S0200/Qp23_S0200
print(paste("K2 =",K2_23_S0200))
```

```{r}
plot(Hora,S0200H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0200 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0200,lwd="4",col="red")
abline(h=max(S0200H23min),lwd="3",col="black",lty=2)
abline(h=min(S0200H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0200=min(S0200H23min)
Kmính23_S0200=Qminh23_S0200/Qp23_S0200
print(paste("Kmính =",Kmính23_S0200))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0200,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0200,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0200,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0200,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0200,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0200,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0200,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0200,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0200,": Si"))
print(paste("K2_14 =",K2_14_S0200,": No"))
print(paste("K2_15 =",K2_15_S0200,": No"))
print(paste("K2_16 =",K2_16_S0200,": No"))
print(paste("K2_17 =",K2_17_S0200,": Si"))
print(paste("K2_18 =",K2_18_S0200,": No"))
print(paste("K2_19 =",K2_19_S0200,": Si"))
print(paste("K2_23 =",K2_23_S0200,": Si"))
```

```{r}
K2S0200m=c(K2_13_S0200,K2_17_S0200,K2_19_S0200,K2_23_S0200)
K2S0200=mean(K2S0200m)
summary(K2S0200m)
K2S0200m
print(paste("K2_S0200 =",K2S0200))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0200,": Si"))
print(paste("Kmính_14 =",Kmính14_S0200,": No"))
print(paste("Kmính_15 =",Kmính15_S0200,": No"))
print(paste("Kmính_16 =",Kmính16_S0200,": No"))
print(paste("Kmính_17 =",Kmính17_S0200,": Si"))
print(paste("Kmính_18 =",Kmính18_S0200,": No"))
print(paste("Kmính_19 =",Kmính19_S0200,": Si"))
print(paste("Kmính_23 =",Kmính23_S0200,": Si"))
```

```{r}
KmínhS0200m=c(Kmính13_S0200,Kmính17_S0200,Kmính19_S0200,Kmính23_S0200)
KmínhS0200=mean(KmínhS0200m)
summary(KmínhS0200m)
KmínhS0200m
print(paste("Kmính_S0200 =",KmínhS0200))
```

## Estación S0202 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0202H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0202H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0202H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0202H13max=S0202H[1:24,6]
S0202H13min=S0202H[1:24,8]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=136.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0202=93.1607507028493
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0202,lwd="4",col="red")
abline(h=max(S0202H13max),lwd="3",col="black",lty=2)
abline(h=min(S0202H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0202=max(S0202H13max)
K2_13_S0202=Qmax13_S0202/Qp13_S0202
print(paste("K2 =",K2_13_S0202))
```

```{r}
plot(Hora,S0202H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0202,lwd="4",col="red")
abline(h=max(S0202H13min),lwd="3",col="black",lty=2)
abline(h=min(S0202H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0202=min(S0202H13min)
Kmính13_S0202=Qminh13_S0202/Qp13_S0202
print(paste("Kmính =",Kmính13_S0202))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0202H14max=S0202H[1:24,10]
S0202H14min=S0202H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=136,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0202=96.0149621476438
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0202,lwd="4",col="red")
abline(h=max(S0202H14max),lwd="3",col="black",lty=2)
abline(h=min(S0202H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0202=max(S0202H14max)
K2_14_S0202=Qmax14_S0202/Qp14_S0202
print(paste("K2 =",K2_14_S0202))
```

```{r}
plot(Hora,S0202H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0202,lwd="4",col="red")
abline(h=max(S0202H14min),lwd="3",col="black",lty=2)
abline(h=min(S0202H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0202=min(S0202H14min)
Kmính14_S0202=Qminh14_S0202/Qp14_S0202
print(paste("Kmính =",Kmính14_S0202))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0202H15max=S0202H[1:24,14]
S0202H15min=S0202H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=145,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=136,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0202=94.6285258542466
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0202,lwd="4",col="red")
abline(h=max(S0202H15max),lwd="3",col="black",lty=2)
abline(h=min(S0202H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0202=max(S0202H15max)
K2_15_S0202=Qmax15_S0202/Qp15_S0202
print(paste("K2 =",K2_15_S0202))
```

```{r}
plot(Hora,S0202H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0202,lwd="4",col="red")
abline(h=max(S0202H15min),lwd="3",col="black",lty=2)
abline(h=min(S0202H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0202=min(S0202H15min)
Kmính15_S0202=Qminh15_S0202/Qp15_S0202
print(paste("Kmính =",Kmính15_S0202))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0202H16max=S0202H[1:24,18]
S0202H16min=S0202H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=129,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=122,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0202=87.7873098458743
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0202,lwd="4",col="red")
abline(h=max(S0202H16max),lwd="3",col="black",lty=2)
abline(h=min(S0202H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0202=max(S0202H16max)
K2_16_S0202=Qmax16_S0202/Qp16_S0202
print(paste("K2 =",K2_16_S0202))
```

```{r}
plot(Hora,S0202H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0202,lwd="4",col="red")
abline(h=max(S0202H16min),lwd="3",col="black",lty=2)
abline(h=min(S0202H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0202=min(S0202H16min)
Kmính16_S0202=Qminh16_S0202/Qp16_S0202
print(paste("Kmính =",Kmính16_S0202))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0202H17max=S0202H[1:24,22]
S0202H17min=S0202H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=142,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=134,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0202=94.3019530895069
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
```

```
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0202,lwd="4",col="red")
abline(h=max(S0202H17max),lwd="3",col="black",lty=2)
abline(h=min(S0202H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0202=max(S0202H17max)
K2_17_S0202=Qmax17_S0202/Qp17_S0202
print(paste("K2 =",K2_17_S0202))
```

```{r}
plot(Hora,S0202H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0202,lwd="4",col="red")
abline(h=max(S0202H17min),lwd="3",col="black",lty=2)
abline(h=min(S0202H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0202=min(S0202H17min)
Kmính17_S0202=Qminh17_S0202/Qp17_S0202
print(paste("Kmính =",Kmính17_S0202))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0202H18max=S0202H[1:24,26]
S0202H18min=S0202H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=139.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=131.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0202=97.2920213210411
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0202,lwd="4",col="red")
abline(h=max(S0202H18max),lwd="3",col="black",lty=2)
abline(h=min(S0202H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0202=max(S0202H18max)
K2_18_S0202=Qmax18_S0202/Qp18_S0202
print(paste("K2 =",K2_18_S0202))
```

```{r}
plot(Hora,S0202H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0202,lwd="4",col="red")
abline(h=max(S0202H18min),lwd="3",col="black",lty=2)
abline(h=min(S0202H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0202=min(S0202H18min)
Kmính18_S0202=Qminh18_S0202/Qp18_S0202
print(paste("Kmính =",Kmính18_S0202))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0202H19max=S0202H[1:24,30]
S0202H19min=S0202H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=142,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=134,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0202=93.3109351416438
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0202,lwd="4",col="red")
abline(h=max(S0202H19max),lwd="3",col="black",lty=2)
abline(h=min(S0202H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0202=max(S0202H19max)
K2_19_S0202=Qmax19_S0202/Qp19_S0202
print(paste("K2 =",K2_19_S0202))
```

```{r}
plot(Hora,S0202H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0202,lwd="4",col="red")
abline(h=max(S0202H19min),lwd="3",col="black",lty=2)
abline(h=min(S0202H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0202=min(S0202H19min)
Kmính19_S0202=Qminh19_S0202/Qp19_S0202
print(paste("Kmính =",Kmính19_S0202))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0202H23max=S0202H[1:24,46]
S0202H23min=S0202H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0202H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0202 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0202H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=152,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=144,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0202H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0202=98.870354988274
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0202,lwd="4",col="red")
abline(h=max(S0202H23max),lwd="3",col="black",lty=2)
abline(h=min(S0202H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0202=max(S0202H23max)
K2_23_S0202=Qmax23_S0202/Qp23_S0202
print(paste("K2 =",K2_23_S0202))
```

```{r}
plot(Hora,S0202H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0202 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0202,lwd="4",col="red")
abline(h=max(S0202H23min),lwd="3",col="black",lty=2)
abline(h=min(S0202H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0202=min(S0202H23min)
Kmính23_S0202=Qminh23_S0202/Qp23_S0202
print(paste("Kmính =",Kmính23_S0202))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0202,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0202,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0202,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0202,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0202,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0202,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0202,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0202,"l/s",": Si"))
```

```{r}
print(paste("K2_13 =",K2_13_S0202,": Si"))
print(paste("K2_14 =",K2_14_S0202,": No"))
print(paste("K2_15 =",K2_15_S0202,": No"))
print(paste("K2_16 =",K2_16_S0202,": No"))
print(paste("K2_17 =",K2_17_S0202,": No"))
print(paste("K2_18 =",K2_18_S0202,": Si"))
print(paste("K2_19 =",K2_19_S0202,": Si"))
print(paste("K2_23 =",K2_23_S0202,": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
K2S0202m=c(K2_13_S0202,K2_18_S0202,K2_19_S0202,K2_23_S0202)
K2S0202=mean(K2S0202m)
summary(K2S0202m)
K2S0202m
print(paste("K2_S0202 =",K2S0202))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0202,": Si"))
print(paste("Kmính_14 =",Kmính14_S0202,": No"))
print(paste("Kmính_15 =",Kmính15_S0202,": No"))
print(paste("Kmính_16 =",Kmính16_S0202,": No"))
print(paste("Kmính_17 =",Kmính17_S0202,": No"))
print(paste("Kmính_18 =",Kmính18_S0202,": Si"))
print(paste("Kmính_19 =",Kmính19_S0202,": Si"))
print(paste("Kmính_23 =",Kmính23_S0202,": Si"))
```

```{r}
KmínhS0202m=c(Kmính13_S0202,Kmính18_S0202,Kmính19_S0202,Kmính23_S0202)
KmínhS0202=mean(KmínhS0202m)
summary(KmínhS0202m)
KmínhS0202m
```

```
print(paste("Kmính_S0202 =",KmínhS0202))
```

## Estación S0204 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0204H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0204H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0204H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0204H13max=S0204H[1:24,6]
S0204H13min=S0204H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=156.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=145,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0204=104.616606158082
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0204,lwd="4",col="red")
abline(h=max(S0204H13max),lwd="3",col="black",lty=2)
abline(h=min(S0204H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0204=max(S0204H13max)
K2_13_S0204=Qmax13_S0204/Qp13_S0204
print(paste("K2 =",K2_13_S0204))
```

```{r}
plot(Hora,S0204H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0204,lwd="4",col="red")
abline(h=max(S0204H13min),lwd="3",col="black",lty=2)
abline(h=min(S0204H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0204=min(S0204H13min)
Kmính13_S0204=Qminh13_S0204/Qp13_S0204
print(paste("Kmính =",Kmính13_S0204))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0204H14max=S0204H[1:24,10]
S0204H14min=S0204H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=169,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=158,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0204=118.935295149041
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0204,lwd="4",col="red")
abline(h=max(S0204H14max),lwd="3",col="black",lty=2)
abline(h=min(S0204H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0204=max(S0204H14max)
K2_14_S0204=Qmax14_S0204/Qp14_S0204
print(paste("K2 =",K2_14_S0204))
```

```{r}
plot(Hora,S0204H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0204,lwd="4",col="red")
abline(h=max(S0204H14min),lwd="3",col="black",lty=2)
abline(h=min(S0204H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0204=min(S0204H14min)
Kmính14_S0204=Qminh14_S0204/Qp14_S0204
print(paste("Kmính =",Kmính14_S0204))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0204H15max=S0204H[1:24,14]
S0204H15min=S0204H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=167,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=155,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0204=118.089717546411
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0204,lwd="4",col="red")
abline(h=max(S0204H15max),lwd="3",col="black",lty=2)
abline(h=min(S0204H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0204=max(S0204H15max)
K2_15_S0204=Qmax15_S0204/Qp15_S0204
print(paste("K2 =",K2_15_S0204))
```

```
```

```{r}
plot(Hora,S0204H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0204,lwd="4",col="red")
abline(h=max(S0204H15min),lwd="3",col="black",lty=2)
abline(h=min(S0204H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0204=min(S0204H15min)
Kmính15_S0204=Qminh15_S0204/Qp15_S0204
print(paste("Kmính =",Kmính15_S0204))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0204H16max=S0204H[1:24,18]
S0204H16min=S0204H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0204=119.682097909563
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0204,lwd="4",col="red")
abline(h=max(S0204H16max),lwd="3",col="black",lty=2)
abline(h=min(S0204H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0204=max(S0204H16max)
K2_16_S0204=Qmax16_S0204/Qp16_S0204
print(paste("K2 =",K2_16_S0204))
```

```{r}
plot(Hora,S0204H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0204,lwd="4",col="red")
abline(h=max(S0204H16min),lwd="3",col="black",lty=2)
abline(h=min(S0204H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0204=min(S0204H16min)
Kmính16_S0204=Qminh16_S0204/Qp16_S0204
print(paste("Kmính =",Kmính16_S0204))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0204H17max=S0204H[1:24,22]
S0204H17min=S0204H[1:24,24]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0204=122.468069266849
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0204,lwd="4",col="red")
abline(h=max(S0204H17max),lwd="3",col="black",lty=2)
abline(h=min(S0204H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0204=max(S0204H17max)
K2_17_S0204=Qmax17_S0204/Qp17_S0204
print(paste("K2 =",K2_17_S0204))
```

```{r}
plot(Hora,S0204H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0204,lwd="4",col="red")
abline(h=max(S0204H17min),lwd="3",col="black",lty=2)
abline(h=min(S0204H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0204=min(S0204H17min)
Kmính17_S0204=Qminh17_S0204/Qp17_S0204
print(paste("Kmính =",Kmính17_S0204))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0204H18max=S0204H[1:24,26]
S0204H18min=S0204H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=181,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=170,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0204=132.846669043562
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0204,lwd="4",col="red")
abline(h=max(S0204H18max),lwd="3",col="black",lty=2)
abline(h=min(S0204H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0204=max(S0204H18max)
K2_18_S0204=Qmax18_S0204/Qp18_S0204
print(paste("K2 =",K2_18_S0204))
```

```{r}
plot(Hora,S0204H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0204,lwd="4",col="red")
abline(h=max(S0204H18min),lwd="3",col="black",lty=2)
abline(h=min(S0204H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0204=min(S0204H18min)
Kmính18_S0204=Qminh18_S0204/Qp18_S0204
print(paste("Kmính =",Kmính18_S0204))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0204H19max=S0204H[1:24,30]
S0204H19min=S0204H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=196,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=186,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0204=141.36209149863
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0204,lwd="4",col="red")
abline(h=max(S0204H19max),lwd="3",col="black",lty=2)
abline(h=min(S0204H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0204=max(S0204H19max)
K2_19_S0204=Qmax19_S0204/Qp19_S0204
print(paste("K2 =",K2_19_S0204))
```

```{r}
plot(Hora,S0204H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0204,lwd="4",col="red")
abline(h=max(S0204H19min),lwd="3",col="black",lty=2)
abline(h=min(S0204H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0204=min(S0204H19min)
Kmính19_S0204=Qminh19_S0204/Qp19_S0204
print(paste("Kmính =",Kmính19_S0204))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0204H23max=S0204H[1:24,46]
S0204H23min=S0204H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0204H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0204 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0204H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=177.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=168.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0204H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0204=127.722026195342
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0204,lwd="4",col="red")
abline(h=max(S0204H23max),lwd="3",col="black",lty=2)
abline(h=min(S0204H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0204=max(S0204H23max)
K2_23_S0204=Qmax23_S0204/Qp23_S0204
print(paste("K2 =",K2_23_S0204))
```

```{r}
plot(Hora,S0204H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0204 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0204,lwd="4",col="red")
abline(h=max(S0204H23min),lwd="3",col="black",lty=2)
abline(h=min(S0204H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0204=min(S0204H23min)
Kmính23_S0204=Qminh23_S0204/Qp23_S0204
print(paste("Kmính =",Kmính23_S0204))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0204,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0204,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0204,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0204,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0204,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0204,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0204,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0204,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0204,": Si"))
print(paste("K2_14 =",K2_14_S0204,": Si"))
print(paste("K2_15 =",K2_15_S0204,": No"))
print(paste("K2_16 =",K2_16_S0204,": No"))
print(paste("K2_17 =",K2_17_S0204,": No"))
print(paste("K2_18 =",K2_18_S0204,": No"))
print(paste("K2_19 =",K2_19_S0204,": No"))
print(paste("K2_23 =",K2_23_S0204,": Si"))
```

```{r}
K2S0204m=c(K2_13_S0204,K2_14_S0204,K2_23_S0204)
K2S0204=mean(K2S0204m)
```

```
summary(K2S0204m)
K2S0204m
print(paste("K2_S0204 =",K2S0204))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0204,": Si"))
print(paste("Kmính_14 =",Kmính14_S0204,": Si"))
print(paste("Kmính_15 =",Kmính15_S0204,": No"))
print(paste("Kmính_16 =",Kmính16_S0204,": No"))
print(paste("Kmính_17 =",Kmính17_S0204,": No"))
print(paste("Kmính_18 =",Kmính18_S0204,": No"))
print(paste("Kmính_19 =",Kmính19_S0204,": No"))
print(paste("Kmính_23 =",Kmính23_S0204,": Si"))
```

```{r}
KmínhS0204m=c(Kmính13_S0204,Kmính14_S0204,Kmính23_S0204)
KmínhS0204=mean(KmínhS0204m)
summary(KmínhS0204m)
KmínhS0204m
print(paste("Kmính_S0204 =",KmínhS0204))
```

## Estación S0205 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0205H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0205H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0205H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0205H13max=S0205H[1:24,6]
S0205H13min=S0205H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=103.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=97.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0205H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0205=74.5621224083014
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0205,lwd="4",col="red")
abline(h=max(S0205H13max),lwd="3",col="black",lty=2)
abline(h=min(S0205H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0205=max(S0205H13max)
K2_13_S0205=Qmax13_S0205/Qp13_S0205
print(paste("K2 =",K2_13_S0205))
```

```{r}
plot(Hora,S0205H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0205,lwd="4",col="red")
abline(h=max(S0205H13min),lwd="3",col="black",lty=2)
abline(h=min(S0205H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0205=min(S0205H13min)
Kmính13_S0205=Qminh13_S0205/Qp13_S0205
print(paste("Kmính =",Kmính13_S0205))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0205H14max=S0205H[1:24,10]
S0205H14min=S0205H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=96.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=91.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0205H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0205=67.2541987701096
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0205,lwd="4",col="red")
abline(h=max(S0205H14max),lwd="3",col="black",lty=2)
abline(h=min(S0205H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0205=max(S0205H14max)
K2_14_S0205=Qmax14_S0205/Qp14_S0205
print(paste("K2 =",K2_14_S0205))
```

```{r}
plot(Hora,S0205H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0205,lwd="4",col="red")
abline(h=max(S0205H14min),lwd="3",col="black",lty=2)
abline(h=min(S0205H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0205=min(S0205H14min)
Kmính14_S0205=Qminh14_S0205/Qp14_S0205
print(paste("Kmính =",Kmính14_S0205))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0205H15max=S0205H[1:24,14]
S0205H15min=S0205H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=88,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=83,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```
```

```{r}
plot(Hora,S0205H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0205=67.8346486790137
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0205,lwd="4",col="red")
abline(h=max(S0205H15max),lwd="3",col="black",lty=2)
abline(h=min(S0205H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0205=max(S0205H15max)
K2_15_S0205=Qmax15_S0205/Qp15_S0205
print(paste("K2 =",K2_15_S0205))
```

```{r}
plot(Hora,S0205H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0205,lwd="4",col="red")
abline(h=max(S0205H15min),lwd="3",col="black",lty=2)
abline(h=min(S0205H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0205=min(S0205H15min)
Kmính15_S0205=Qminh15_S0205/Qp15_S0205
print(paste("Kmính =",Kmính15_S0205))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0205H16max=S0205H[1:24,18]
S0205H16min=S0205H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=88,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=83,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0205H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0205=67.3792718687705
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0205,lwd="4",col="red")
abline(h=max(S0205H16max),lwd="3",col="black",lty=2)
abline(h=min(S0205H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0205=max(S0205H16max)
K2_16_S0205=Qmax16_S0205/Qp16_S0205
print(paste("K2 =",K2_16_S0205))
```

```{r}
plot(Hora,S0205H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0205,lwd="4",col="red")
abline(h=max(S0205H16min),lwd="3",col="black",lty=2)
abline(h=min(S0205H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0205=min(S0205H16min)
Kmính16_S0205=Qminh16_S0205/Qp16_S0205
print(paste("Kmính =",Kmính16_S0205))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0205H17max=S0205H[1:24,22]
S0205H17min=S0205H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=88,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=83,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0205H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0205=63.6524950207945
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0205,lwd="4",col="red")
abline(h=max(S0205H17max),lwd="3",col="black",lty=2)
abline(h=min(S0205H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0205=max(S0205H17max)
K2_17_S0205=Qmax17_S0205/Qp17_S0205
print(paste("K2 =",K2_17_S0205))
```

```{r}
plot(Hora,S0205H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0205,lwd="4",col="red")
abline(h=max(S0205H17min),lwd="3",col="black",lty=2)
abline(h=min(S0205H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0205=min(S0205H17min)
Kmính17_S0205=Qminh17_S0205/Qp17_S0205
print(paste("Kmính =",Kmính17_S0205))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0205H18max=S0205H[1:24,26]
S0205H18min=S0205H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=87.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=82.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0205H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0205=63.5205248745479
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0205,lwd="4",col="red")
abline(h=max(S0205H18max),lwd="3",col="black",lty=2)
abline(h=min(S0205H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0205=max(S0205H18max)
K2_18_S0205=Qmax18_S0205/Qp18_S0205
print(paste("K2 =",K2_18_S0205))
```

```{r}
plot(Hora,S0205H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0205,lwd="4",col="red")
abline(h=max(S0205H18min),lwd="3",col="black",lty=2)
abline(h=min(S0205H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0205=min(S0205H18min)
Kmính18_S0205=Qminh18_S0205/Qp18_S0205
print(paste("Kmính =",Kmính18_S0205))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0205H19max=S0205H[1:24,30]
S0205H19min=S0205H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=88,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=83,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0205H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0205=62.6615707691233
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0205,lwd="4",col="red")
abline(h=max(S0205H19max),lwd="3",col="black",lty=2)
abline(h=min(S0205H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0205=max(S0205H19max)
K2_19_S0205=Qmax19_S0205/Qp19_S0205
print(paste("K2 =",K2_19_S0205))
```

```
```

```{r}
plot(Hora,S0205H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0205,lwd="4",col="red")
abline(h=max(S0205H19min),lwd="3",col="black",lty=2)
abline(h=min(S0205H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0205=min(S0205H19min)
Kmính19_S0205=Qminh19_S0205/Qp19_S0205
print(paste("Kmính =",Kmính19_S0205))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0205H23max=S0205H[1:24,46]
S0205H23min=S0205H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0205H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0205 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0205H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=88,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=83,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0205H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0205=57.5200840747945
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0205,lwd="4",col="red")
abline(h=max(S0205H23max),lwd="3",col="black",lty=2)
abline(h=min(S0205H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0205=max(S0205H23max)
K2_23_S0205=Qmax23_S0205/Qp23_S0205
print(paste("K2 =",K2_23_S0205))
```

```{r}
plot(Hora,S0205H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0205 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0205,lwd="4",col="red")
abline(h=max(S0205H23min),lwd="3",col="black",lty=2)
abline(h=min(S0205H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0205=min(S0205H23min)
Kmính23_S0205=Qminh23_S0205/Qp23_S0205
print(paste("Kmính =",Kmính23_S0205))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0205,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0205,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0205,"l/s",": No"))
```

```
print(paste("Qp_16 =",Qp16_S0205,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0205,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0205,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0205,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0205,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0205,": Si"))
print(paste("K2_14 =",K2_14_S0205,": No"))
print(paste("K2_15 =",K2_15_S0205,": No"))
print(paste("K2_16 =",K2_16_S0205,": No"))
print(paste("K2_17 =",K2_17_S0205,": Si"))
print(paste("K2_18 =",K2_18_S0205,": No"))
print(paste("K2_19 =",K2_19_S0205,": Si"))
print(paste("K2_23 =",K2_23_S0205,": Si"))
```

```{r}
K2S0205m=c(K2_13_S0205,K2_17_S0205,K2_19_S0205,K2_23_S0205)
K2S0205=mean(K2S0205m)
summary(K2S0205m)
K2S0205m
print(paste("K2_S0205 =",K2S0205))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0205,": Si"))
print(paste("Kmính_14 =",Kmính14_S0205,": No"))
print(paste("Kmính_15 =",Kmính15_S0205,": No"))
print(paste("Kmính_16 =",Kmính16_S0205,": No"))
print(paste("Kmính_17 =",Kmính17_S0205,": Si"))
print(paste("Kmính_18 =",Kmính18_S0205,": No"))
print(paste("Kmính_19 =",Kmính19_S0205,": Si"))
print(paste("Kmính_23 =",Kmính23_S0205,": Si"))
```

```{r}
KmínhS0205m=c(Kmính13_S0205,Kmính17_S0205,Kmính19_S0205,Kmính23_S0205)
KmínhS0205=mean(KmínhS0205m)
summary(KmínhS0205m)
KmínhS0205m
print(paste("Kmính_S0205 =",KmínhS0205))
```

## Estación S0302 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0302H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0302H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0302H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0302H13max=S0302H[1:24,6]
S0302H13min=S0302H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=149,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=139,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0302H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0302=78.0531455013425
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0302,lwd="4",col="red")
abline(h=max(S0302H13max),lwd="3",col="black",lty=2)
abline(h=min(S0302H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0302=max(S0302H13max)
K2_13_S0302=Qmax13_S0302/Qp13_S0302
print(paste("K2 =",K2_13_S0302))
```

```{r}
plot(Hora,S0302H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0302,lwd="4",col="red")
abline(h=max(S0302H13min),lwd="3",col="black",lty=2)
abline(h=min(S0302H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0302=min(S0302H13min)
Kmính13_S0302=Qminh13_S0302/Qp13_S0302
print(paste("Kmính =",Kmính13_S0302))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0302H14max=S0302H[1:24,10]
S0302H14min=S0302H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=210,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=192,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0302H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0302=102.527979780959
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0302,lwd="4",col="red")
abline(h=max(S0302H14max),lwd="3",col="black",lty=2)
abline(h=min(S0302H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0302=max(S0302H14max)
K2_14_S0302=Qmax14_S0302/Qp14_S0302
print(paste("K2 =",K2_14_S0302))
```

```{r}
plot(Hora,S0302H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0302,lwd="4",col="red")
abline(h=max(S0302H14min),lwd="3",col="black",lty=2)
abline(h=min(S0302H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0302=min(S0302H14min)
Kmính14_S0302=Qminh14_S0302/Qp14_S0302
```

```
print(paste("Kmính =",Kmính14_S0302))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0302H15max=S0302H[1:24,14]
S0302H15min=S0302H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0302H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0302=77.4484444893699
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0302,lwd="4",col="red")
abline(h=max(S0302H15max),lwd="3",col="black",lty=2)
abline(h=min(S0302H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0302=max(S0302H15max)
K2_15_S0302=Qmax15_S0302/Qp15_S0302
print(paste("K2 =",K2_15_S0302))
```

```{r}
plot(Hora,S0302H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0302,lwd="4",col="red")
abline(h=max(S0302H15min),lwd="3",col="black",lty=2)
abline(h=min(S0302H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0302=min(S0302H15min)
Kmính15_S0302=Qminh15_S0302/Qp15_S0302
print(paste("Kmính =",Kmính15_S0302))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0302H16max=S0302H[1:24,18]
S0302H16min=S0302H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0302H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
Qp16_S0302=87.6599611362568
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0302,lwd="4",col="red")
abline(h=max(S0302H16max),lwd="3",col="black",lty=2)
abline(h=min(S0302H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0302=max(S0302H16max)
K2_16_S0302=Qmax16_S0302/Qp16_S0302
print(paste("K2 =",K2_16_S0302))
```

```{r}
plot(Hora,S0302H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0302,lwd="4",col="red")
abline(h=max(S0302H16min),lwd="3",col="black",lty=2)
abline(h=min(S0302H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0302=min(S0302H16min)
Kmính16_S0302=Qminh16_S0302/Qp16_S0302
print(paste("Kmính =",Kmính16_S0302))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0302H17max=S0302H[1:24,22]
S0302H17min=S0302H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=170,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=157,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0302H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0302=86.8349704307397
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0302,lwd="4",col="red")
abline(h=max(S0302H17max),lwd="3",col="black",lty=2)
abline(h=min(S0302H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0302=max(S0302H17max)
K2_17_S0302=Qmax17_S0302/Qp17_S0302
print(paste("K2 =",K2_17_S0302))
```

```{r}
plot(Hora,S0302H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0302,lwd="4",col="red")
abline(h=max(S0302H17min),lwd="3",col="black",lty=2)
abline(h=min(S0302H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
```

```
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0302=min(S0302H17min)
Kmính17_S0302=Qminh17_S0302/Qp17_S0302
print(paste("Kmính =",Kmính17_S0302))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0302H18max=S0302H[1:24,26]
S0302H18min=S0302H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=185,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=168,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0302H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0302=88.9960719886575
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0302,lwd="4",col="red")
abline(h=max(S0302H18max),lwd="3",col="black",lty=2)
abline(h=min(S0302H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0302=max(S0302H18max)
K2_18_S0302=Qmax18_S0302/Qp18_S0302
print(paste("K2 =",K2_18_S0302))
```

```{r}
plot(Hora,S0302H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0302,lwd="4",col="red")
abline(h=max(S0302H18min),lwd="3",col="black",lty=2)
abline(h=min(S0302H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0302=min(S0302H18min)
Kmính18_S0302=Qminh18_S0302/Qp18_S0302
print(paste("Kmính =",Kmính18_S0302))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0302H19max=S0302H[1:24,30]
S0302H19min=S0302H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=160,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=149,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```
```

```{r}
plot(Hora,S0302H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0302=89.0043455509589
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0302,lwd="4",col="red")
abline(h=max(S0302H19max),lwd="3",col="black",lty=2)
abline(h=min(S0302H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0302=max(S0302H19max)
K2_19_S0302=Qmax19_S0302/Qp19_S0302
print(paste("K2 =",K2_19_S0302))
```

```{r}
plot(Hora,S0302H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0302,lwd="4",col="red")
abline(h=max(S0302H19min),lwd="3",col="black",lty=2)
abline(h=min(S0302H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0302=min(S0302H19min)
Kmính19_S0302=Qminh19_S0302/Qp19_S0302
print(paste("Kmính =",Kmính19_S0302))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0302H23max=S0302H[1:24,46]
S0302H23min=S0302H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0302H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0302 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0302H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=195,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=182,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0302H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0302=93.9041830517534
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0302,lwd="4",col="red")
abline(h=max(S0302H23max),lwd="3",col="black",lty=2)
abline(h=min(S0302H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0302=max(S0302H23max)
K2_23_S0302=Qmax23_S0302/Qp23_S0302
print(paste("K2 =",K2_23_S0302))
```

```{r}
plot(Hora,S0302H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0302 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0302,lwd="4",col="red")
abline(h=max(S0302H23min),lwd="3",col="black",lty=2)
abline(h=min(S0302H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0302=min(S0302H23min)
Kmính23_S0302=Qminh23_S0302/Qp23_S0302
print(paste("Kmính =",Kmính23_S0302))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0302,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0302,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0302,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0302,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0302,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0302,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0302,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0302,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0302,": Si"))
print(paste("K2_14 =",K2_14_S0302,": No"))
print(paste("K2_15 =",K2_15_S0302,": Si"))
print(paste("K2_16 =",K2_16_S0302,": Si"))
print(paste("K2_17 =",K2_17_S0302,": No"))
print(paste("K2_18 =",K2_18_S0302,": Si"))
print(paste("K2_19 =",K2_19_S0302,": No"))
print(paste("K2_23 =",K2_23_S0302,": Si"))
```

```{r}
K2S0302m=c(K2_13_S0302,K2_15_S0302,K2_16_S0302,K2_18_S0302,K2_23_S0302)
K2S0302=mean(K2S0302m)
summary(K2S0302m)
K2S0302m
print(paste("K2_S0302 =",K2S0302))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0302,": Si"))
print(paste("Kmính_14 =",Kmính14_S0302,": No"))
print(paste("Kmính_15 =",Kmính15_S0302,": Si"))
print(paste("Kmính_16 =",Kmính16_S0302,": Si"))
print(paste("Kmính_17 =",Kmính17_S0302,": No"))
print(paste("Kmính_18 =",Kmính18_S0302,": No"))
print(paste("Kmính_19 =",Kmính19_S0302,": No"))
print(paste("Kmính_23 =",Kmính23_S0302,": No"))
```

```{r}
KmínhS0302m=c(Kmính13_S0302,Kmính15_S0302,Kmính16_S0302)
KmínhS0302=mean(KmínhS0302m)
summary(KmínhS0302m)
KmínhS0302m
print(paste("Kmính_S0302 =",KmínhS0302))
```

## Estación S0304 (2013 - 2019 y 2023)

### Selección de la base de datos

```{r}
S0304H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/01 Estrato agrupado consolidado 1/S0304H.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0304H)
```

### Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0304H13max=S0304H[1:24,6]
S0304H13min=S0304H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H13max),color="red",lwd=1.2)+
```

```
ggtitle("ESTACIÓN S0304 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=118,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=111,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0304=68.1501736080274
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0304,lwd="4",col="red")
abline(h=max(S0304H13max),lwd="3",col="black",lty=2)
abline(h=min(S0304H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax13_S0304=max(S0304H13max)
K2_13_S0304=Qmax13_S0304/Qp13_S0304
print(paste("K2 =",K2_13_S0304))
```

```{r}
plot(Hora,S0304H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2013 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp13_S0304,lwd="4",col="red")
abline(h=max(S0304H13min),lwd="3",col="black",lty=2)
abline(h=min(S0304H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh13_S0304=min(S0304H13min)
Kmính13_S0304=Qminh13_S0304/Qp13_S0304
print(paste("Kmính =",Kmính13_S0304))
```

### Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0304H14max=S0304H[1:24,10]
S0304H14min=S0304H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0304 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=119,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=112,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0304=67.8193782519452
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0304,lwd="4",col="red")
abline(h=max(S0304H14max),lwd="3",col="black",lty=2)
abline(h=min(S0304H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax14_S0304=max(S0304H14max)
```

```
K2_14_S0304=Qmax14_S0304/Qp14_S0304
print(paste("K2 =",K2_14_S0304))
```

```{r}
plot(Hora,S0304H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2014 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp14_S0304,lwd="4",col="red")
abline(h=max(S0304H14min),lwd="3",col="black",lty=2)
abline(h=min(S0304H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh14_S0304=min(S0304H14min)
Kmính14_S0304=Qminh14_S0304/Qp14_S0304
print(paste("Kmính =",Kmính14_S0304))
```

### Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0304H15max=S0304H[1:24,14]
S0304H15min=S0304H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0304 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=115,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=108,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0304=68.1104707719726
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0304,lwd="4",col="red")
abline(h=max(S0304H15max),lwd="3",col="black",lty=2)
abline(h=min(S0304H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax15_S0304=max(S0304H15max)
K2_15_S0304=Qmax15_S0304/Qp15_S0304
print(paste("K2 =",K2_15_S0304))
```

```{r}
plot(Hora,S0304H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2015 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp15_S0304,lwd="4",col="red")
abline(h=max(S0304H15min),lwd="3",col="black",lty=2)
abline(h=min(S0304H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh15_S0304=min(S0304H15min)
Kmính15_S0304=Qminh15_S0304/Qp15_S0304
print(paste("Kmính =",Kmính15_S0304))
```

### Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
```

```
S0304H16max=S0304H[1:24,18]
S0304H16min=S0304H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0304 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=116.51,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=109.51,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0304=68.69080677
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0304,lwd="4",col="red")
abline(h=max(S0304H16max),lwd="3",col="black",lty=2)
abline(h=min(S0304H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax16_S0304=max(S0304H16max)
K2_16_S0304=Qmax16_S0304/Qp16_S0304
print(paste("K2 =",K2_16_S0304))
```

```{r}
plot(Hora,S0304H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2016 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp16_S0304,lwd="4",col="red")
abline(h=max(S0304H16min),lwd="3",col="black",lty=2)
abline(h=min(S0304H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh16_S0304=min(S0304H16min)
Kmính16_S0304=Qminh16_S0304/Qp16_S0304
print(paste("Kmính =",Kmính16_S0304))
```

### Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0304H17max=S0304H[1:24,22]
S0304H17min=S0304H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0304 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0304=65.4112867016438
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0304,lwd="4",col="red")
abline(h=max(S0304H17max),lwd="3",col="black",lty=2)
abline(h=min(S0304H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
```

```
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax17_S0304=max(S0304H17max)
K2_17_S0304=Qmax17_S0304/Qp17_S0304
print(paste("K2 =",K2_17_S0304))
```

```{r}
plot(Hora,S0304H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2017 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp17_S0304,lwd="4",col="red")
abline(h=max(S0304H17min),lwd="3",col="black",lty=2)
abline(h=min(S0304H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh17_S0304=min(S0304H17min)
Kmính17_S0304=Qminh17_S0304/Qp17_S0304
print(paste("Kmính =",Kmính17_S0304))
```

### Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0304H18max=S0304H[1:24,26]
S0304H18min=S0304H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0304 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=111,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=104,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0304=67.4920631451781
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0304,lwd="4",col="red")
abline(h=max(S0304H18max),lwd="3",col="black",lty=2)
abline(h=min(S0304H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax18_S0304=max(S0304H18max)
K2_18_S0304=Qmax18_S0304/Qp18_S0304
print(paste("K2 =",K2_18_S0304))
```

```{r}
plot(Hora,S0304H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2018 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp18_S0304,lwd="4",col="red")
abline(h=max(S0304H18min),lwd="3",col="black",lty=2)
abline(h=min(S0304H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh18_S0304=min(S0304H18min)
Kmính18_S0304=Qminh18_S0304/Qp18_S0304
```

```
print(paste("Kmính =",Kmính18_S0304))
```

### Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0304H19max=S0304H[1:24,30]
S0304H19min=S0304H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0304 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=118,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=111,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0304=67.0303295322466
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0304,lwd="4",col="red")
abline(h=max(S0304H19max),lwd="3",col="black",lty=2)
abline(h=min(S0304H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax19_S0304=max(S0304H19max)
K2_19_S0304=Qmax19_S0304/Qp19_S0304
print(paste("K2 =",K2_19_S0304))
```

```{r}
plot(Hora,S0304H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2019 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp19_S0304,lwd="4",col="red")
abline(h=max(S0304H19min),lwd="3",col="black",lty=2)
abline(h=min(S0304H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh19_S0304=min(S0304H19min)
Kmính19_S0304=Qminh19_S0304/Qp19_S0304
print(paste("Kmính =",Kmính19_S0304))
```

### Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0304H23max=S0304H[1:24,46]
S0304H23min=S0304H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0304H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0304 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0304H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=118,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=109,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0304H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
Qp23_S0304=65.0863529076712
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0304,lwd="4",col="red")
abline(h=max(S0304H23max),lwd="3",col="black",lty=2)
abline(h=min(S0304H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K2
Qmax23_S0304=max(S0304H23max)
K2_23_S0304=Qmax23_S0304/Qp23_S0304
print(paste("K2 =",K2_23_S0304))
```

```{r}
plot(Hora,S0304H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0304 - 2023 (Día de mínimo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
axis(1,at=seq(0,23,by=5),tck=1,lty=2,lwd=1,col="black")
axis(2,tck=1,lty=2,lwd=1,col="black")
abline(h=Qp23_S0304,lwd="4",col="red")
abline(h=max(S0304H23min),lwd="3",col="black",lty=2)
abline(h=min(S0304H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio horario (Qh)","Promedio anual (Qp)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente Kmính
Qminh23_S0304=min(S0304H23min)
Kmính23_S0304=Qminh23_S0304/Qp23_S0304
print(paste("Kmính =",Kmính23_S0304))
```

### Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0304,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0304,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0304,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0304,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0304,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0304,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0304,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0304,"l/s",": Si"))
```

### Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0304,": Si"))
print(paste("K2_14 =",K2_14_S0304,": Si"))
print(paste("K2_15 =",K2_15_S0304,": Si"))
print(paste("K2_16 =",K2_16_S0304,": Si"))
print(paste("K2_17 =",K2_17_S0304,": Si"))
print(paste("K2_18 =",K2_18_S0304,": Si"))
print(paste("K2_19 =",K2_19_S0304,": Si"))
print(paste("K2_23 =",K2_23_S0304,": Si"))
```

```{r}
K2S0304m=c(K2_13_S0304,K2_14_S0304,K2_15_S0304,K2_16_S0304,K2_17_S0304,
K2_18_S0304,K2_19_S0304,K2_23_S0304)
K2S0304=mean(K2S0304m)
summary(K2S0304m)
K2S0304m
print(paste("K2_S0304 =",K2S0304))
```

### Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0304,": Si"))
print(paste("Kmính_14 =",Kmính14_S0304,": Si"))
print(paste("Kmính_15 =",Kmính15_S0304,": Si"))
print(paste("Kmính_16 =",Kmính16_S0304,": Si"))
print(paste("Kmính_17 =",Kmính17_S0304,": Si"))
print(paste("Kmính_18 =",Kmính18_S0304,": Si"))
print(paste("Kmính_19 =",Kmính19_S0304,": Si"))
print(paste("Kmính_23 =",Kmính23_S0304,": Si"))
```

```{r}
KmínhS0304m=c(Kmính13_S0304,Kmính14_S0304,Kmính15_S0304,Kmính16_S0304,
Kmính17_S0304,Kmính18_S0304,Kmính19_S0304,Kmính23_S0304)
KmínhS0304=mean(KmínhS0304m)
summary(KmínhS0304m)
KmínhS0304m
print(paste("Kmính_S0304 =",KmínhS0304))
```

# Determinación del coeficiente K2 del estrato agrupado consolidado 1

```{r}
print(paste("K2_S0003 =",K2S0003))
print(paste("K2_S0007 =",K2S0007))
print(paste("K2_S0008 =",K2S0008))
print(paste("K2_S0010 =",K2S0010))
print(paste("K2_S0012 =",K2S0012))
print(paste("K2_S0013 =",K2S0013))
print(paste("K2_S0014 =",K2S0014))
print(paste("K2_S0015 =",K2S0015))
print(paste("K2_S0016 =",K2S0016))
print(paste("K2_S0017 =",K2S0017))
print(paste("K2_S0018 =",K2S0018))
print(paste("K2_S0019 =",K2S0019))
print(paste("K2_S0028 =",K2S0028))
print(paste("K2_S0029 =",K2S0029))
print(paste("K2_S0033 =",K2S0033))
print(paste("K2_S0035 =",K2S0035))
print(paste("K2_S0036 =",K2S0036))
print(paste("K2_S0039 =",K2S0039))
print(paste("K2_S0042 =",K2S0042))
print(paste("K2_S0043 =",K2S0043))
print(paste("K2_S0047 =",K2S0047))
print(paste("K2_S0048 =",K2S0048))
print(paste("K2_S0049 =",K2S0049))
print(paste("K2_S0054 =",K2S0054))
print(paste("K2_S0056 =",K2S0056))
print(paste("K2_S0057 =",K2S0057))
print(paste("K2_S0063 =",K2S0063))
print(paste("K2_S0065 =",K2S0065))
print(paste("K2_S0066 =",K2S0066))
print(paste("K2_S0067 =",K2S0067))
print(paste("K2_S0068 =",K2S0068))
print(paste("K2_S0069 =",K2S0069))
print(paste("K2_S0071 =",K2S0071))
print(paste("K2_S0073 =",K2S0073))
print(paste("K2_S0081 =",K2S0081))
print(paste("K2_S0082 =",K2S0082))
print(paste("K2_S0083 =",K2S0083))
print(paste("K2_S0095 =",K2S0095))
print(paste("K2_S0116 =",K2S0116))
print(paste("K2_S0200 =",K2S0200))
print(paste("K2_S0202 =",K2S0202))
print(paste("K2_S0204 =",K2S0204))
print(paste("K2_S0205 =",K2S0205))
print(paste("K2_S0302 =",K2S0302))
print(paste("K2_S0304 =",K2S0304))
```

```{r}
K2EAC1DF=c(K2S0003,K2S0007,K2S0008,K2S0010,K2S0012,K2S0013,K2S0014,K2S0015,
K2S0016,K2S0017,K2S0018,K2S0019,K2S0028,K2S0029,K2S0033,K2S0035,
K2S0036,K2S0039,K2S0042,K2S0043,K2S0047,K2S0048,K2S0049,K2S0054,
K2S0056,K2S0057,K2S0063,K2S0065,K2S0066,K2S0067,K2S0068,K2S0069,
K2S0071,K2S0073,K2S0081,K2S0082,K2S0083,K2S0095,K2S0116,K2S0200,
K2S0202,K2S0204,K2S0205,K2S0302,K2S0304)
K2EAC1DF=data.frame(K2EAC1DF)
K2EAC1_13_19_23=ggplot(data=K2EAC1DF,aes(x="",y=K2EAC1DF))+
stat_boxplot(geom="errorbar",
width=0.2)+
geom_boxplot(fill="#999999",
outlier.colour="red",
alpha=0.5)+
geom_point(shape=21,fill="white",size=2.5,stroke=1,
colour="blue")+
stat_summary(fun=mean,geom="point",shape=20,size=5)+
# ggtitle("Coeficiente de variación horaria (K2) del estrato
# agrupado consolidado 1 en el periodo del 2013 al 2019 y 2023")+
theme(plot.title=element_text(hjust=0.5),
axis.text.y=element_text(size=14),
axis.title.x=element_text(size=15),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 1")+
ylab("K2 (2013 - 2019 y 2023)")
summary(K2EAC1DF)
K2EAC1=c(K2S0003,K2S0007,K2S0008,K2S0010,K2S0012,K2S0013,K2S0014,K2S0015,
K2S0016,K2S0017,K2S0018,K2S0019,K2S0028,K2S0029,K2S0033,K2S0035,
K2S0036,K2S0039,K2S0042,K2S0043,K2S0047,K2S0048,K2S0049,K2S0054,
K2S0056,K2S0057,K2S0063,K2S0065,K2S0066,K2S0067,K2S0068,K2S0069,
K2S0071,K2S0073,K2S0081,K2S0082,K2S0083,K2S0095,K2S0116,K2S0200,
K2S0202,K2S0204,K2S0205,K2S0302,K2S0304)
K2EAC1=mean(K2EAC1)
print(paste("K2_EAC1 =",K2EAC1))
```

```{r}
K2EAC1DF=c(K2S0003,K2S0007,K2S0008,K2S0010,K2S0012,K2S0013,K2S0014,K2S0015,
K2S0016,K2S0017,K2S0018,K2S0019,K2S0028,K2S0029,K2S0033,K2S0035,
K2S0036,K2S0039,K2S0042,K2S0047,K2S0048,K2S0054,K2S0056,K2S0057,
K2S0063,K2S0065,K2S0066,K2S0067,K2S0068,K2S0069,K2S0071,K2S0081,
K2S0082,K2S0083,K2S0095,K2S0116,K2S0200,K2S0202,K2S0204,K2S0205,
K2S0304)
K2EAC1DF=data.frame(K2EAC1DF)
K2EAC1_13_19_23=ggplot(data=K2EAC1DF,aes(x="",y=K2EAC1DF))+
stat_boxplot(geom="errorbar",
width=0.2)+
```

```
geom_boxplot(fill="#999999",
outlier.colour="red",
alpha=0.5)+
geom_point(shape=21,fill="white",size=2.5,stroke=1,
colour="blue")+
stat_summary(fun=mean,geom="point",shape=20,size=5)+
# ggtitle("Coeficiente de variación horaria (K2) del estrato
# agrupado consolidado 1 en el periodo del 2013 al 2019 y 2023")+
theme(plot.title=element_text(hjust=0.5),
axis.text.y=element_text(size=14),
axis.title.x=element_text(size=15),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 1")+
ylab("K2 (2013 - 2019 y 2023)")
summary(K2EAC1DF)
K2EAC1=c(K2S0003,K2S0007,K2S0008,K2S0010,K2S0012,K2S0013,K2S0014,K2S0015,
K2S0016,K2S0017,K2S0018,K2S0019,K2S0028,K2S0029,K2S0033,K2S0035,
K2S0036,K2S0039,K2S0042,K2S0047,K2S0048,K2S0054,K2S0056,K2S0057,
K2S0063,K2S0065,K2S0066,K2S0067,K2S0068,K2S0069,K2S0071,K2S0081,
K2S0082,K2S0083,K2S0095,K2S0116,K2S0200,K2S0202,K2S0204,K2S0205,
K2S0304)
K2EAC1=mean(K2EAC1)
print(paste("K2_EAC1 =",K2EAC1))
```

# Determinación del coeficiente Kmính del estrato agrupado consolidado 1

```{r}
print(paste("Kmính_S0003 =",KmínhS0003))
print(paste("Kmính_S0007 =",KmínhS0007))
print(paste("Kmính_S0008 =",KmínhS0008))
print(paste("Kmính_S0010 =",KmínhS0010))
print(paste("Kmính_S0012 =",KmínhS0012))
print(paste("Kmính_S0013 =",KmínhS0013))
print(paste("Kmính_S0014 =",KmínhS0014))
print(paste("Kmính_S0015 =",KmínhS0015))
print(paste("Kmính_S0016 =",KmínhS0016))
print(paste("Kmính_S0017 =",KmínhS0017))
print(paste("Kmính_S0018 =",KmínhS0018))
print(paste("Kmính_S0019 =",KmínhS0019))
print(paste("Kmính_S0028 =",KmínhS0028))
print(paste("Kmính_S0029 =",KmínhS0029))
print(paste("Kmính_S0033 =",KmínhS0033))
print(paste("Kmính_S0035 =",KmínhS0035))
print(paste("Kmính_S0036 =",KmínhS0036))
print(paste("Kmính_S0039 =",KmínhS0039))
print(paste("Kmính_S0042 =",KmínhS0042))
print(paste("Kmính_S0043 =",KmínhS0043)) # No
print(paste("Kmính_S0047 =",KmínhS0047))
print(paste("Kmính_S0048 =",KmínhS0048))
print(paste("Kmính_S0049 =",KmínhS0049))
print(paste("Kmính_S0054 =",KmínhS0054))
print(paste("Kmính_S0056 =",KmínhS0056))
print(paste("Kmính_S0057 =",KmínhS0057))
print(paste("Kmính_S0063 =",KmínhS0063))
print(paste("Kmính_S0065 =",KmínhS0065))
print(paste("Kmính_S0066 =",KmínhS0066))
print(paste("Kmính_S0067 =",KmínhS0067))
print(paste("Kmính_S0068 =",KmínhS0068))
print(paste("Kmính_S0069 =",KmínhS0069))
print(paste("Kmính_S0071 =",KmínhS0071))
print(paste("Kmính_S0073 =",KmínhS0073))
print(paste("Kmính_S0081 =",KmínhS0081))
print(paste("Kmính_S0082 =",KmínhS0082))
print(paste("Kmính_S0083 =",KmínhS0083))
print(paste("Kmính_S0095 =",KmínhS0095))
print(paste("Kmính_S0116 =",KmínhS0116))
print(paste("Kmính_S0200 =",KmínhS0200))
print(paste("Kmính_S0202 =",KmínhS0202))
print(paste("Kmính_S0204 =",KmínhS0204))
print(paste("Kmính_S0205 =",KmínhS0205))
print(paste("Kmính_S0302 =",KmínhS0302))
print(paste("Kmính_S0304 =",KmínhS0304))
```

```{r}
KmínhEAC1DF=c(KmínhS0003,KmínhS0007,KmínhS0008,KmínhS0010,KmínhS0012,KmínhS0013,
KmínhS0014,KmínhS0015,KmínhS0016,KmínhS0017,KmínhS0018,KmínhS0019,
KmínhS0028,KmínhS0029,KmínhS0033,KmínhS0035,KmínhS0036,KmínhS0039,
KmínhS0042,KmínhS0047,KmínhS0048,KmínhS0049,KmínhS0054,KmínhS0056,
KmínhS0057,KmínhS0063,KmínhS0065,KmínhS0066,KmínhS0067,KmínhS0068,
KmínhS0069,KmínhS0071,KmínhS0073,KmínhS0081,KmínhS0082,KmínhS0083,
KmínhS0095,KmínhS0116,KmínhS0200,KmínhS0202,KmínhS0204,KmínhS0205,
KmínhS0302,KmínhS0304)
KmínhEAC1DF=data.frame(KmínhEAC1DF)
KmínhEAC1_13_19_23=ggplot(data=KmínhEAC1DF,aes(x="",y=KmínhEAC1DF))+
stat_boxplot(geom="errorbar",
width=0.2)+
geom_boxplot(fill="#999999",
outlier.colour="red",
alpha=0.5)+
geom_point(shape=21,fill="white",size=2.5,stroke=1,
colour="blue")+
stat_summary(fun=mean,geom="point",shape=20,size=5)+
# ggtitle("Coeficiente de variación mínima horaria (Kmính) del estrato
# agrupado consolidado 1 en el periodo del 2013 al 2019 y 2023")+
theme(plot.title=element_text(hjust=0.5),
```

```
axis.text.y=element_text(size=14),
axis.title.x=element_text(size=15),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 1")+
ylab("Kmính (2013 - 2019 y 2023)")
summary(KmínhEAC1DF)
KmínhEAC1=c(KmínhS0003,KmínhS0007,KmínhS0008,KmínhS0010,KmínhS0012,KmínhS0013,
KmínhS0014,KmínhS0015,KmínhS0016,KmínhS0017,KmínhS0018,KmínhS0019,
KmínhS0028,KmínhS0029,KmínhS0033,KmínhS0035,KmínhS0036,KmínhS0039,
KmínhS0042,KmínhS0047,KmínhS0048,KmínhS0049,KmínhS0054,KmínhS0056,
KmínhS0057,KmínhS0063,KmínhS0065,KmínhS0066,KmínhS0067,KmínhS0068,
KmínhS0069,KmínhS0071,KmínhS0073,KmínhS0081,KmínhS0082,KmínhS0083,
KmínhS0095,KmínhS0116,KmínhS0200,KmínhS0202,KmínhS0204,KmínhS0205,
KmínhS0302,KmínhS0304)
KmínhEAC1=mean(KmínhEAC1)
print(paste("Kmính_EAC1 =",KmínhEAC1))
```

```{r}
KmínhEAC1DF=c(KmínhS0003,KmínhS0007,KmínhS0008,KmínhS0010,KmínhS0012,KmínhS0013,
KmínhS0014,KmínhS0015,KmínhS0016,KmínhS0017,KmínhS0018,KmínhS0019,
KmínhS0028,KmínhS0029,KmínhS0033,KmínhS0035,KmínhS0036,KmínhS0039,
KmínhS0042,KmínhS0048,KmínhS0049,KmínhS0054,KmínhS0057,KmínhS0063,
KmínhS0065,KmínhS0066,KmínhS0067,KmínhS0068,KmínhS0069,KmínhS0071,
KmínhS0073,KmínhS0081,KmínhS0082,KmínhS0083,KmínhS0095,KmínhS0116,
KmínhS0200,KmínhS0202,KmínhS0204,KmínhS0205,KmínhS0304)
KmínhEAC1DF=data.frame(KmínhEAC1DF)
KmínhEAC1_13_19_23=ggplot(data=KmínhEAC1DF,aes(x="",y=KmínhEAC1DF))+
stat_boxplot(geom="errorbar",
width=0.2)+
geom_boxplot(fill="#999999",
outlier.colour="red",
alpha=0.5)+
geom_point(shape=21,fill="white",size=2.5,stroke=1,
colour="blue")+
stat_summary(fun=mean,geom="point",shape=20,size=5)+
# ggtitle("Coeficiente de variación mínima horaria (Kmính) del estrato
# agrupado consolidado 1 en el periodo del 2013 al 2019 y 2023")+
theme(plot.title=element_text(hjust=0.5),
axis.text.y=element_text(size=14),
axis.title.x=element_text(size=15),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 1")+
ylab("Kmính (2013 - 2019 y 2023)")
summary(KmínhEAC1DF)
KmínhEAC1=c(KmínhS0003,KmínhS0007,KmínhS0008,KmínhS0010,KmínhS0012,KmínhS0013,
KmínhS0014,KmínhS0015,KmínhS0016,KmínhS0017,KmínhS0018,KmínhS0019,
KmínhS0028,KmínhS0029,KmínhS0033,KmínhS0035,KmínhS0036,KmínhS0039,
KmínhS0042,KmínhS0048,KmínhS0049,KmínhS0054,KmínhS0057,KmínhS0063,
KmínhS0065,KmínhS0066,KmínhS0067,KmínhS0068,KmínhS0069,KmínhS0071,
KmínhS0073,KmínhS0081,KmínhS0082,KmínhS0083,KmínhS0095,KmínhS0116,
KmínhS0200,KmínhS0202,KmínhS0204,KmínhS0205,KmínhS0304)
KmínhEAC1=mean(KmínhEAC1)
print(paste("Kmính_EAC1 =",KmínhEAC1))
```

```
# Diagrama de caja del coeficientes K2 y Kmính del estrato
# agrupado consolidado 1 en el periodo del 2013 al 2019 y 2023
```

```{r}
K2EAC1_13_19_23+KmínhEAC1_13_19_23
```