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 III
(ANEXOS II)

PARA OBTENER EL TÍTULO PROFESIONAL DE INGENIERO CIVIL

ELABORADO POR

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LIMA – PERÚ

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Anexos

Anexo 3.2: Estrato agrupado consolidado 2

```
---
title: "K1_Kmínd_EAC2"
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 2

Estación S0002 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0002D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0002D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0002D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0002D13=S0002D[1:365,6]
```

```{r}
plot(Fecha13,S0002D13,type="l",lwd="2",col="blue",
     main="ESTACIÓN S0002 - 2013",
     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(S0002D13),lwd="3",col="red")
abline(h=max(S0002D13),lwd="3",col="black",lty=2)
abline(h=min(S0002D13),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
Qmax13_S0002=max(S0002D13)
Qp13_S0002=mean(S0002D13)
K1_13_S0002=Qmax13_S0002/Qp13_S0002
print(paste("K1 =",K1_13_S0002))

# Cálculo del coeficiente Kmínd
Qmind13_S0002=min(S0002D13)
Kmínd13_S0002=Qmind13_S0002/Qp13_S0002
print(paste("Kmínd =",Kmínd13_S0002))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0002D14=S0002D[1:365,8]
```

```{r}
plot(Fecha14,S0002D14,type="l",lwd="2",col="blue",
     main="ESTACIÓN S0002 - 2014",
     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(S0002D14),lwd="3",col="red")
abline(h=max(S0002D14),lwd="3",col="black",lty=2)
abline(h=min(S0002D14),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
Qmax14_S0002=max(S0002D14)
Qp14_S0002=mean(S0002D14)
K1_14_S0002=Qmax14_S0002/Qp14_S0002
print(paste("K1 =",K1_14_S0002))

# Cálculo del coeficiente Kmínd
Qmind14_S0002=min(S0002D14)
Kmínd14_S0002=Qmind14_S0002/Qp14_S0002
print(paste("Kmínd =",Kmínd14_S0002))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0002D15=S0002D[1:365,10]
```

```{r}
plot(Fecha15,S0002D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0002 - 2015",
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(S0002D15),lwd="3",col="red")
abline(h=max(S0002D15),lwd="3",col="black",lty=2)
abline(h=min(S0002D15),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
Qmax15_S0002=max(S0002D15)
Qp15_S0002=mean(S0002D15)
K1_15_S0002=Qmax15_S0002/Qp15_S0002
print(paste("K1 =",K1_15_S0002))

# Cálculo del coeficiente Kmínd
Qmind15_S0002=min(S0002D15)
Kmínd15_S0002=Qmind15_S0002/Qp15_S0002
print(paste("Kmínd =",Kmínd15_S0002))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0002D16=S0002D[1:366,12]
```

```{r}
plot(Fecha16,S0002D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0002 - 2016",
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(S0002D16),lwd="3",col="red")
abline(h=max(S0002D16),lwd="3",col="black",lty=2)
abline(h=min(S0002D16),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
Qmax16_S0002=max(S0002D16)
Qp16_S0002=mean(S0002D16)
K1_16_S0002=Qmax16_S0002/Qp16_S0002
print(paste("K1 =",K1_16_S0002))

# Cálculo del coeficiente Kmínd
Qmind16_S0002=min(S0002D16)
Kmínd16_S0002=Qmind16_S0002/Qp16_S0002
print(paste("Kmínd =",Kmínd16_S0002))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0002D17=S0002D[1:365,14]
```

```{r}
plot(Fecha17,S0002D17,type="l",lwd="2",col="blue",
```

```
main="ESTACIÓN S0002 - 2017",
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(S0002D17),lwd="3",col="red")
abline(h=max(S0002D17),lwd="3",col="black",lty=2)
abline(h=min(S0002D17),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
Qmax17_S0002=max(S0002D17)
Qp17_S0002=mean(S0002D17)
K1_17_S0002=Qmax17_S0002/Qp17_S0002
print(paste("K1 =",K1_17_S0002))

# Cálculo del coeficiente Kmínd
Qmind17_S0002=min(S0002D17)
Kmínd17_S0002=Qmind17_S0002/Qp17_S0002
print(paste("Kmínd =",Kmínd17_S0002))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0002D18=S0002D[1:365,16]
```

```{r}
plot(Fecha18,S0002D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0002 - 2018",
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(S0002D18),lwd="3",col="red")
abline(h=max(S0002D18),lwd="3",col="black",lty=2)
abline(h=min(S0002D18),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
Qmax18_S0002=max(S0002D18)
Qp18_S0002=mean(S0002D18)
K1_18_S0002=Qmax18_S0002/Qp18_S0002
print(paste("K1 =",K1_18_S0002))

# Cálculo del coeficiente Kmínd
Qmind18_S0002=min(S0002D18)
Kmínd18_S0002=Qmind18_S0002/Qp18_S0002
print(paste("Kmínd =",Kmínd18_S0002))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0002D19=S0002D[1:365,18]
```

```{r}
plot(Fecha19,S0002D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0002 - 2019",
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(S0002D19),lwd="3",col="red")
abline(h=max(S0002D19),lwd="3",col="black",lty=2)
abline(h=min(S0002D19),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
Qmax19_S0002=max(S0002D19)
Qp19_S0002=mean(S0002D19)
K1_19_S0002=Qmax19_S0002/Qp19_S0002
print(paste("K1 =",K1_19_S0002))

# Cálculo del coeficiente Kmínd
Qmind19_S0002=min(S0002D19)
Kmínd19_S0002=Qmind19_S0002/Qp19_S0002
print(paste("Kmínd =",Kmínd19_S0002))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0002D23=S0002D[1:365,26]
```

```{r}
plot(Fecha23,S0002D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0002 - 2023",
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(S0002D23),lwd="3",col="red")
abline(h=max(S0002D23),lwd="3",col="black",lty=2)
abline(h=min(S0002D23),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
Qmax23_S0002=max(S0002D23)
Qp23_S0002=mean(S0002D23)
K1_23_S0002=Qmax23_S0002/Qp23_S0002
print(paste("K1 =",K1_23_S0002))

# Cálculo del coeficiente Kmínd
Qmind23_S0002=min(S0002D23)
Kmínd23_S0002=Qmind23_S0002/Qp23_S0002
print(paste("Kmínd =",Kmínd23_S0002))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0002,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0002,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0002,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0002,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0002,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0002,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0002,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0002,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0002,": No"))
print(paste("K1_14 =",K1_14_S0002,": Si"))
print(paste("K1_15 =",K1_15_S0002,": No"))
print(paste("K1_16 =",K1_16_S0002,": No"))
print(paste("K1_17 =",K1_17_S0002,": No"))
print(paste("K1_18 =",K1_18_S0002,": No"))
print(paste("K1_19 =",K1_19_S0002,": Si"))
print(paste("K1_23 =",K1_23_S0002,": Si"))
```

```{r}
K1S0002m=c(K1_14_S0002,K1_19_S0002,K1_23_S0002)
K1S0002=mean(K1S0002m)
summary(K1S0002m)
K1S0002m
print(paste("K1_S0002 =",K1S0002))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0002,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0002,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0002,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0002,": No"))
print(paste("Kmínd_17 =",Kmínd17_S0002,": No"))
print(paste("Kmínd_18 =",Kmínd18_S0002,": No"))
print(paste("Kmínd_19 =",Kmínd19_S0002,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0002,": Si"))
```

```{r}
KmíndS0002m=c(Kmínd14_S0002,Kmínd19_S0002,Kmínd23_S0002)
KmíndS0002=mean(KmíndS0002m)
summary(KmíndS0002m)
KmíndS0002m
print(paste("Kmínd_S0002 =",KmíndS0002))
```

Estación S0011 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0011D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0011D.csv",sep=";")
```

Visualización de la base de datos

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

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0011D13=S0011D[1:365,6]
```

```{r}
plot(Fecha13,S0011D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2013",
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(S0011D13),lwd="3",col="red")
abline(h=max(S0011D13),lwd="3",col="black",lty=2)
abline(h=min(S0011D13),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 de K1
Qmax13_S0011=max(S0011D13)
Qp13_S0011=mean(S0011D13)
K1_13_S0011=Qmax13_S0011/Qp13_S0011
print(paste("K1 =",K1_13_S0011))

# Cálculo de Kmínd
Qmind13_S0011=min(S0011D13)
Kmínd13_S0011=Qmind13_S0011/Qp13_S0011
print(paste("Kmínd =",Kmínd13_S0011))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0011D14=S0011D[1:365,8]
```

```{r}
plot(Fecha14,S0011D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2014",
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(S0011D14),lwd="3",col="red")
abline(h=max(S0011D14),lwd="3",col="black",lty=2)
abline(h=min(S0011D14),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
Qmax14_S0011=max(S0011D14)
Qp14_S0011=mean(S0011D14)
K1_14_S0011=Qmax14_S0011/Qp14_S0011
print(paste("K1 =",K1_14_S0011))

# Cálculo del coeficiente Kmínd
Qmind14_S0011=min(S0011D14)
Kmínd14_S0011=Qmind14_S0011/Qp14_S0011
print(paste("Kmínd =",Kmínd14_S0011))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0011D15=S0011D[1:365,10]
```

```{r}
plot(Fecha15,S0011D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2015",
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(S0011D15),lwd="3",col="red")
abline(h=max(S0011D15),lwd="3",col="black",lty=2)
abline(h=min(S0011D15),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
Qmax15_S0011=max(S0011D15)
Qp15_S0011=mean(S0011D15)
K1_15_S0011=Qmax15_S0011/Qp15_S0011
print(paste("K1 =",K1_15_S0011))

# Cálculo del coeficiente Kmínd
Qmind15_S0011=min(S0011D15)
Kmínd15_S0011=Qmind15_S0011/Qp15_S0011
print(paste("Kmínd =",Kmínd15_S0011))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0011D16=S0011D[1:366,12]
```

```{r}
plot(Fecha16,S0011D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2016",
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(S0011D16),lwd="3",col="red")
abline(h=max(S0011D16),lwd="3",col="black",lty=2)
abline(h=min(S0011D16),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
Qmax16_S0011=max(S0011D16)
Qp16_S0011=mean(S0011D16)
K1_16_S0011=Qmax16_S0011/Qp16_S0011
print(paste("K1 =",K1_16_S0011))

# Cálculo del coeficiente Kmínd
Qmind16_S0011=min(S0011D16)
Kmínd16_S0011=Qmind16_S0011/Qp16_S0011
print(paste("Kmínd =",Kmínd16_S0011))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0011D17=S0011D[1:365,14]
```

```{r}
plot(Fecha17,S0011D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2017",
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(S0011D17),lwd="3",col="red")
abline(h=max(S0011D17),lwd="3",col="black",lty=2)
abline(h=min(S0011D17),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
Qmax17_S0011=max(S0011D17)
Qp17_S0011=mean(S0011D17)
K1_17_S0011=Qmax17_S0011/Qp17_S0011
print(paste("K1 =",K1_17_S0011))

# Cálculo del coeficiente Kmínd
Qmind17_S0011=min(S0011D17)
Kmínd17_S0011=Qmind17_S0011/Qp17_S0011
print(paste("Kmínd =",Kmínd17_S0011))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0011D18=S0011D[1:365,16]
```

```{r}
plot(Fecha18,S0011D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2018",
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(S0011D18),lwd="3",col="red")
abline(h=max(S0011D18),lwd="3",col="black",lty=2)
abline(h=min(S0011D18),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
Qmax18_S0011=max(S0011D18)
Qp18_S0011=mean(S0011D18)
K1_18_S0011=Qmax18_S0011/Qp18_S0011
print(paste("K1 =",K1_18_S0011))

# Cálculo del coeficiente Kmínd
Qmind18_S0011=min(S0011D18)
Kmínd18_S0011=Qmind18_S0011/Qp18_S0011
print(paste("Kmínd =",Kmínd18_S0011))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0011D19=S0011D[1:365,18]
```

```{r}
plot(Fecha19,S0011D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2019",
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(S0011D19),lwd="3",col="red")
abline(h=max(S0011D19),lwd="3",col="black",lty=2)
abline(h=min(S0011D19),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
Qmax19_S0011=max(S0011D19)
Qp19_S0011=mean(S0011D19)
K1_19_S0011=Qmax19_S0011/Qp19_S0011
print(paste("K1 =",K1_19_S0011))

# Cálculo del coeficiente Kmínd
Qmind19_S0011=min(S0011D19)
Kmínd19_S0011=Qmind19_S0011/Qp19_S0011
print(paste("Kmínd =",Kmínd19_S0011))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0011D23=S0011D[1:365,26]
```

```{r}
plot(Fecha23,S0011D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0011 - 2023",
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(S0011D23),lwd="3",col="red")
abline(h=max(S0011D23),lwd="3",col="black",lty=2)
abline(h=min(S0011D23),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
Qmax23_S0011=max(S0011D23)
Qp23_S0011=mean(S0011D23)
K1_23_S0011=Qmax23_S0011/Qp23_S0011
print(paste("K1 =",K1_23_S0011))

# Cálculo del coeficiente Kmínd
Qmind23_S0011=min(S0011D23)
Kmínd23_S0011=Qmind23_S0011/Qp23_S0011
print(paste("Kmínd =",Kmínd23_S0011))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0011,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0011,"l/s",": Si"))
```

```
print(paste("Qp_15 =",Qp15_S0011,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0011,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0011,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0011,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0011,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0011,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0011,": No"))
print(paste("K1_14 =",K1_14_S0011,": Si"))
print(paste("K1_15 =",K1_15_S0011,": Si"))
print(paste("K1_16 =",K1_16_S0011,": No"))
print(paste("K1_17 =",K1_17_S0011,": Si"))
print(paste("K1_18 =",K1_18_S0011,": No"))
print(paste("K1_19 =",K1_19_S0011,": No"))
print(paste("K1_23 =",K1_23_S0011,": Si"))
```

```{r}
K1S0011m=c(K1_14_S0011,K1_15_S0011,K1_17_S0011,K1_23_S0011)
K1S0011=mean(K1S0011m)
summary(K1S0011m)
K1S0011m
print(paste("K1_S0011 =",K1S0011))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0011,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0011,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0011,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0011,": No"))
print(paste("Kmínd_17 =",Kmínd17_S0011,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0011,": No"))
print(paste("Kmínd_19 =",Kmínd19_S0011,": No"))
print(paste("Kmínd_23 =",Kmínd23_S0011,": Si"))
```

```{r}
KmíndS0011m=c(Kmínd14_S0011,Kmínd15_S0011,Kmínd17_S0011,Kmínd23_S0011)
KmíndS0011=mean(KmíndS0011m)
summary(KmíndS0011m)
KmíndS0011m
print(paste("Kmínd_S0011 =",KmíndS0011))
```

Estación S0080 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0080D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0080D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0080D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0080D13=S0080D[1:365,6]
```

```{r}
plot(Fecha13,S0080D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2013",
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(S0080D13),lwd="3",col="red")
abline(h=max(S0080D13),lwd="3",col="black",lty=2)
abline(h=min(S0080D13),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
Qmax13_S0080=max(S0080D13)
Qp13_S0080=mean(S0080D13)
K1_13_S0080=Qmax13_S0080/Qp13_S0080
print(paste("K1 =",K1_13_S0080))

# Cálculo del coeficiente Kmínd
Qmind13_S0080=min(S0080D13)
Kmínd13_S0080=Qmind13_S0080/Qp13_S0080
print(paste("Kmínd =",Kmínd13_S0080))
```

```
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0080D14=S0080D[1:365,8]
```

```{r}
plot(Fecha14,S0080D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2014",
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(S0080D14),lwd="3",col="red")
abline(h=max(S0080D14),lwd="3",col="black",lty=2)
abline(h=min(S0080D14),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
Qmax14_S0080=max(S0080D14)
Qp14_S0080=mean(S0080D14)
K1_14_S0080=Qmax14_S0080/Qp14_S0080
print(paste("K1 =",K1_14_S0080))

# Cálculo del coeficiente Kmínd
Qmind14_S0080=min(S0080D14)
Kmínd14_S0080=Qmind14_S0080/Qp14_S0080
print(paste("Kmínd =",Kmínd14_S0080))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0080D15=S0080D[1:365,10]
```

```{r}
plot(Fecha15,S0080D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2015",
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(S0080D15),lwd="3",col="red")
abline(h=max(S0080D15),lwd="3",col="black",lty=2)
abline(h=min(S0080D15),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
Qmax15_S0080=max(S0080D15)
Qp15_S0080=mean(S0080D15)
K1_15_S0080=Qmax15_S0080/Qp15_S0080
print(paste("K1 =",K1_15_S0080))

# Cálculo del coeficiente Kmínd
Qmind15_S0080=min(S0080D15)
Kmínd15_S0080=Qmind15_S0080/Qp15_S0080
print(paste("Kmínd =",Kmínd15_S0080))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0080D16=S0080D[1:366,12]
```

```{r}
plot(Fecha16,S0080D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2016",
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(S0080D16),lwd="3",col="red")
abline(h=max(S0080D16),lwd="3",col="black",lty=2)
abline(h=min(S0080D16),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
Qmax16_S0080=max(S0080D16)
```

```
Qp16_S0080=mean(S0080D16)
K1_16_S0080=Qmax16_S0080/Qp16_S0080
print(paste("K1 =",K1_16_S0080))

# Cálculo del coeficiente Kmínd
Qmind16_S0080=min(S0080D16)
Kmínd16_S0080=Qmind16_S0080/Qp16_S0080
print(paste("Kmínd =",Kmínd16_S0080))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0080D17=S0080D[1:365,14]
```

```{r}
plot(Fecha17,S0080D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2017",
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(S0080D17),lwd="3",col="red")
abline(h=max(S0080D17),lwd="3",col="black",lty=2)
abline(h=min(S0080D17),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
Qmax17_S0080=max(S0080D17)
Qp17_S0080=mean(S0080D17)
K1_17_S0080=Qmax17_S0080/Qp17_S0080
print(paste("K1 =",K1_17_S0080))

# Cálculo del coeficiente Kmínd
Qmind17_S0080=min(S0080D17)
Kmínd17_S0080=Qmind17_S0080/Qp17_S0080
print(paste("Kmínd =",Kmínd17_S0080))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0080D18=S0080D[1:365,16]
```

```{r}
plot(Fecha18,S0080D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2018",
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(S0080D18),lwd="3",col="red")
abline(h=max(S0080D18),lwd="3",col="black",lty=2)
abline(h=min(S0080D18),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
Qmax18_S0080=max(S0080D18)
Qp18_S0080=mean(S0080D18)
K1_18_S0080=Qmax18_S0080/Qp18_S0080
print(paste("K1 =",K1_18_S0080))

# Cálculo del coeficiente Kmínd
Qmind18_S0080=min(S0080D18)
Kmínd18_S0080=Qmind18_S0080/Qp18_S0080
print(paste("Kmínd =",Kmínd18_S0080))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0080D19=S0080D[1:365,18]
```

```{r}
plot(Fecha19,S0080D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2019",
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(S0080D19),lwd="3",col="red")
abline(h=max(S0080D19),lwd="3",col="black",lty=2)
abline(h=min(S0080D19),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
Qmax19_S0080=max(S0080D19)
Qp19_S0080=mean(S0080D19)
K1_19_S0080=Qmax19_S0080/Qp19_S0080
print(paste("K1 =",K1_19_S0080))

# Cálculo del coeficiente Kmínd
Qmind19_S0080=min(S0080D19)
Kmínd19_S0080=Qmind19_S0080/Qp19_S0080
print(paste("Kmínd =",Kmínd19_S0080))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0080D23=S0080D[1:365,26]
```

```{r}
plot(Fecha23,S0080D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0080 - 2023",
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(S0080D23),lwd="3",col="red")
abline(h=max(S0080D23),lwd="3",col="black",lty=2)
abline(h=min(S0080D23),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
Qmax23_S0080=max(S0080D23)
Qp23_S0080=mean(S0080D23)
K1_23_S0080=Qmax23_S0080/Qp23_S0080
print(paste("K1 =",K1_23_S0080))

# Cálculo del coeficiente Kmínd
Qmind23_S0080=min(S0080D23)
Kmínd23_S0080=Qmind23_S0080/Qp23_S0080
print(paste("Kmínd =",Kmínd23_S0080))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0080,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0080,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0080,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0080,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0080,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0080,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0080,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0080,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0080,": Si"))
print(paste("K1_14 =",K1_14_S0080,": Si"))
print(paste("K1_15 =",K1_15_S0080,": No"))
print(paste("K1_16 =",K1_16_S0080,": No"))
print(paste("K1_17 =",K1_17_S0080,": Si"))
print(paste("K1_18 =",K1_18_S0080,": No"))
print(paste("K1_19 =",K1_19_S0080,": Si"))
print(paste("K1_23 =",K1_23_S0080,": Si"))
```

```{r}
K1S0080m=c(K1_13_S0080,K1_14_S0080,K1_17_S0080,K1_19_S0080,K1_23_S0080)
K1S0080=mean(K1S0080m)
summary(K1S0080m)
K1S0080m
print(paste("K1_S0080 =",K1S0080))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0080,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0080,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0080,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0080,": No"))
print(paste("Kmínd_17 =",Kmínd17_S0080,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0080,": No"))
print(paste("Kmínd_19 =",Kmínd19_S0080,": Si"))
```

```
print(paste("Kmínd_23 =",Kmínd23_S0080,": Si"))
```

```{r}
KmíndS0080m=c(Kmínd13_S0080,Kmínd14_S0080,Kmínd17_S0080,Kmínd19_S0080,
Kmínd23_S0080)
KmíndS0080=mean(KmíndS0080m)
summary(KmíndS0080m)
KmíndS0080m
print(paste("Kmínd_S0080 =",KmíndS0080))
```

Estación S0092 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0092D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0092D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0092D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0092D13=S0092D[1:365,6]
```

```{r}
plot(Fecha13,S0092D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2013",
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(S0092D13),lwd="3",col="red")
abline(h=max(S0092D13),lwd="3",col="black",lty=2)
abline(h=min(S0092D13),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
Qmax13_S0092=max(S0092D13)
Qp13_S0092=mean(S0092D13)
K1_13_S0092=Qmax13_S0092/Qp13_S0092
print(paste("K1 =",K1_13_S0092))

# Cálculo del coeficiente Kmínd
Qmind13_S0092=min(S0092D13)
Kmínd13_S0092=Qmind13_S0092/Qp13_S0092
print(paste("Kmínd =",Kmínd13_S0092))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0092D14=S0092D[1:365,8]
```

```{r}
plot(Fecha14,S0092D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2014",
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(S0092D14),lwd="3",col="red")
abline(h=max(S0092D14),lwd="3",col="black",lty=2)
abline(h=min(S0092D14),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
Qmax14_S0092=max(S0092D14)
Qp14_S0092=mean(S0092D14)
K1_14_S0092=Qmax14_S0092/Qp14_S0092
print(paste("K1 =",K1_14_S0092))

# Cálculo del coeficiente Kmínd
Qmind14_S0092=min(S0092D14)
Kmínd14_S0092=Qmind14_S0092/Qp14_S0092
print(paste("Kmínd =",Kmínd14_S0092))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0092D15=S0092D[1:365,10]
```

```{r}
plot(Fecha15,S0092D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2015",
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(S0092D15),lwd="3",col="red")
abline(h=max(S0092D15),lwd="3",col="black",lty=2)
abline(h=min(S0092D15),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
Qmax15_S0092=max(S0092D15)
Qp15_S0092=mean(S0092D15)
K1_15_S0092=Qmax15_S0092/Qp15_S0092
print(paste("K1 =",K1_15_S0092))

# Cálculo del coeficiente Kmínd
Qmind15_S0092=min(S0092D15)
Kmínd15_S0092=Qmind15_S0092/Qp15_S0092
print(paste("Kmínd =",Kmínd15_S0092))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0092D16=S0092D[1:366,12]
```

```{r}
plot(Fecha16,S0092D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2016",
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(S0092D16),lwd="3",col="red")
abline(h=max(S0092D16),lwd="3",col="black",lty=2)
abline(h=min(S0092D16),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
Qmax16_S0092=max(S0092D16)
Qp16_S0092=mean(S0092D16)
K1_16_S0092=Qmax16_S0092/Qp16_S0092
print(paste("K1 =",K1_16_S0092))

# Cálculo del coeficiente Kmínd
Qmind16_S0092=min(S0092D16)
Kmínd16_S0092=Qmind16_S0092/Qp16_S0092
print(paste("Kmínd =",Kmínd16_S0092))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0092D17=S0092D[1:365,14]
```

```{r}
plot(Fecha17,S0092D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2017",
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(S0092D17),lwd="3",col="red")
abline(h=max(S0092D17),lwd="3",col="black",lty=2)
abline(h=min(S0092D17),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
Qmax17_S0092=max(S0092D17)
Qp17_S0092=mean(S0092D17)
K1_17_S0092=Qmax17_S0092/Qp17_S0092
print(paste("K1 =",K1_17_S0092))
```

```
# Cálculo del coeficiente Kmínd
Qmind17_S0092=min(S0092D17)
Kmínd17_S0092=Qmind17_S0092/Qp17_S0092
print(paste("Kmínd =",Kmínd17_S0092))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0092D18=S0092D[1:365,16]
```

```{r}
plot(Fecha18,S0092D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2018",
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(S0092D18),lwd="3",col="red")
abline(h=max(S0092D18),lwd="3",col="black",lty=2)
abline(h=min(S0092D18),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
Qmax18_S0092=max(S0092D18)
Qp18_S0092=mean(S0092D18)
K1_18_S0092=Qmax18_S0092/Qp18_S0092
print(paste("K1 =",K1_18_S0092))

# Cálculo del coeficiente Kmínd
Qmind18_S0092=min(S0092D18)
Kmínd18_S0092=Qmind18_S0092/Qp18_S0092
print(paste("Kmínd =",Kmínd18_S0092))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0092D19=S0092D[1:365,18]
```

```{r}
plot(Fecha19,S0092D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2019",
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(S0092D19),lwd="3",col="red")
abline(h=max(S0092D19),lwd="3",col="black",lty=2)
abline(h=min(S0092D19),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
Qmax19_S0092=max(S0092D19)
Qp19_S0092=mean(S0092D19)
K1_19_S0092=Qmax19_S0092/Qp19_S0092
print(paste("K1 =",K1_19_S0092))

# Cálculo del coeficiente Kmínd
Qmind19_S0092=min(S0092D19)
Kmínd19_S0092=Qmind19_S0092/Qp19_S0092
print(paste("Kmínd =",Kmínd19_S0092))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0092D23=S0092D[1:365,26]
```

```{r}
plot(Fecha23,S0092D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0092 - 2023",
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(S0092D23),lwd="3",col="red")
abline(h=max(S0092D23),lwd="3",col="black",lty=2)
abline(h=min(S0092D23),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
Qmax23_S0092=max(S0092D23)
Qp23_S0092=mean(S0092D23)
K1_23_S0092=Qmax23_S0092/Qp23_S0092
print(paste("K1 =",K1_23_S0092))

# Cálculo del coeficiente Kmínd
Qmind23_S0092=min(S0092D23)
Kmínd23_S0092=Qmind23_S0092/Qp23_S0092
print(paste("Kmínd =",Kmínd23_S0092))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0092,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0092,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0092,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0092,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0092,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0092,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0092,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0092,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0092,": Si"))
print(paste("K1_14 =",K1_14_S0092,": Si"))
print(paste("K1_15 =",K1_15_S0092,": No"))
print(paste("K1_16 =",K1_16_S0092,": Si"))
print(paste("K1_17 =",K1_17_S0092,": Si"))
print(paste("K1_18 =",K1_18_S0092,": Si"))
print(paste("K1_19 =",K1_19_S0092,": Si"))
print(paste("K1_23 =",K1_23_S0092,": Si"))
```

```{r}
K1S0092m=c(K1_13_S0092,K1_14_S0092,K1_16_S0092,K1_17_S0092,K1_18_S0092,
K1_19_S0092,K1_23_S0092)
K1S0092=mean(K1S0092m)
summary(K1S0092m)
K1S0092m
print(paste("K1_S0092 =",K1S0092))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0092,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0092,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0092,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0092,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0092,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0092,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0092,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0092,": Si"))
```

```{r}
KmíndS0092m=c(Kmínd13_S0092,Kmínd14_S0092,Kmínd16_S0092,Kmínd17_S0092,
Kmínd18_S0092,Kmínd19_S0092,Kmínd23_S0092)
KmíndS0092=mean(KmíndS0092m)
summary(KmíndS0092m)
KmíndS0092m
print(paste("Kmínd_S0092 =",KmíndS0092))
```

Estación S0096 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0096D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0096D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0096D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0096D13=S0096D[1:365,6]
```

```{r}
plot(Fecha13,S0096D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2013",
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(S0096D13),lwd="3",col="red")
abline(h=max(S0096D13),lwd="3",col="black",lty=2)
abline(h=min(S0096D13),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
Qmax13_S0096=max(S0096D13)
Qp13_S0096=mean(S0096D13)
K1_13_S0096=Qmax13_S0096/Qp13_S0096
print(paste("K1 =",K1_13_S0096))

# Cálculo del coeficiente Kmínd
Qmind13_S0096=min(S0096D13)
Kmínd13_S0096=Qmind13_S0096/Qp13_S0096
print(paste("Kmínd =",Kmínd13_S0096))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0096D14=S0096D[1:365,8]
```

```{r}
plot(Fecha14,S0096D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2014",
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(S0096D14),lwd="3",col="red")
abline(h=max(S0096D14),lwd="3",col="black",lty=2)
abline(h=min(S0096D14),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
Qmax14_S0096=max(S0096D14)
Qp14_S0096=mean(S0096D14)
K1_14_S0096=Qmax14_S0096/Qp14_S0096
print(paste("K1 =",K1_14_S0096))

# Cálculo del coeficiente Kmínd
Qmind14_S0096=min(S0096D14)
Kmínd14_S0096=Qmind14_S0096/Qp14_S0096
print(paste("Kmínd =",Kmínd14_S0096))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0096D15=S0096D[1:365,10]
```

```{r}
plot(Fecha15,S0096D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2015",
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(S0096D15),lwd="3",col="red")
abline(h=max(S0096D15),lwd="3",col="black",lty=2)
abline(h=min(S0096D15),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
Qmax15_S0096=max(S0096D15)
Qp15_S0096=mean(S0096D15)
K1_15_S0096=Qmax15_S0096/Qp15_S0096
print(paste("K1 =",K1_15_S0096))

# Cálculo del coeficiente Kmínd
Qmind15_S0096=min(S0096D15)
Kmínd15_S0096=Qmind15_S0096/Qp15_S0096
print(paste("Kmínd =",Kmínd15_S0096))
```

Extracción y análisis de datos del año 2016

```{r}


```

```
Fecha16=c(1:366)
S0096D16=S0096D[1:366,12]
```

```{r}
plot(Fecha16,S0096D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2016",
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(S0096D16),lwd="3",col="red")
abline(h=max(S0096D16),lwd="3",col="black",lty=2)
abline(h=min(S0096D16),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
Qmax16_S0096=max(S0096D16)
Qp16_S0096=mean(S0096D16)
K1_16_S0096=Qmax16_S0096/Qp16_S0096
print(paste("K1 =",K1_16_S0096))

# Cálculo del coeficiente Kmínd
Qmind16_S0096=min(S0096D16)
Kmínd16_S0096=Qmind16_S0096/Qp16_S0096
print(paste("Kmínd =",Kmínd16_S0096))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0096D17=S0096D[1:365,14]
```

```{r}
plot(Fecha17,S0096D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2017",
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(S0096D17),lwd="3",col="red")
abline(h=max(S0096D17),lwd="3",col="black",lty=2)
abline(h=min(S0096D17),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
Qmax17_S0096=max(S0096D17)
Qp17_S0096=mean(S0096D17)
K1_17_S0096=Qmax17_S0096/Qp17_S0096
print(paste("K1 =",K1_17_S0096))

# Cálculo del coeficiente Kmínd
Qmind17_S0096=min(S0096D17)
Kmínd17_S0096=Qmind17_S0096/Qp17_S0096
print(paste("Kmínd =",Kmínd17_S0096))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0096D18=S0096D[1:365,16]
```

```{r}
plot(Fecha18,S0096D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2018",
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(S0096D18),lwd="3",col="red")
abline(h=max(S0096D18),lwd="3",col="black",lty=2)
abline(h=min(S0096D18),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
Qmax18_S0096=max(S0096D18)
Qp18_S0096=mean(S0096D18)
K1_18_S0096=Qmax18_S0096/Qp18_S0096
print(paste("K1 =",K1_18_S0096))

# Cálculo del coeficiente Kmínd
```

```
Qmind18_S0096=min(S0096D18)
Kmínd18_S0096=Qmind18_S0096/Qp18_S0096
print(paste("Kmínd =",Kmínd18_S0096))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0096D19=S0096D[1:365,18]
```

```{r}
plot(Fecha19,S0096D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2019",
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(S0096D19),lwd="3",col="red")
abline(h=max(S0096D19),lwd="3",col="black",lty=2)
abline(h=min(S0096D19),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
Qmax19_S0096=max(S0096D19)
Qp19_S0096=mean(S0096D19)
K1_19_S0096=Qmax19_S0096/Qp19_S0096
print(paste("K1 =",K1_19_S0096))

# Cálculo del coeficiente Kmínd
Qmind19_S0096=min(S0096D19)
Kmínd19_S0096=Qmind19_S0096/Qp19_S0096
print(paste("Kmínd =",Kmínd19_S0096))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0096D23=S0096D[1:365,26]
```

```{r}
plot(Fecha23,S0096D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0096 - 2023",
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(S0096D23),lwd="3",col="red")
abline(h=max(S0096D23),lwd="3",col="black",lty=2)
abline(h=min(S0096D23),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
Qmax23_S0096=max(S0096D23)
Qp23_S0096=mean(S0096D23)
K1_23_S0096=Qmax23_S0096/Qp23_S0096
print(paste("K1 =",K1_23_S0096))

# Cálculo del coeficiente Kmínd
Qmind23_S0096=min(S0096D23)
Kmínd23_S0096=Qmind23_S0096/Qp23_S0096
print(paste("Kmínd =",Kmínd23_S0096))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0096,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0096,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0096,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0096,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0096,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0096,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0096,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0096,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0096,": No"))
print(paste("K1_14 =",K1_14_S0096,": Si"))
print(paste("K1_15 =",K1_15_S0096,": No"))
print(paste("K1_16 =",K1_16_S0096,": No"))
print(paste("K1_17 =",K1_17_S0096,": Si"))
print(paste("K1_18 =",K1_18_S0096,": No"))
```

```
print(paste("K1_19 =",K1_19_S0096,": No"))
print(paste("K1_23 =",K1_23_S0096,": Si"))
```

```{r}
K1S0096m=c(K1_14_S0096,K1_17_S0096,K1_23_S0096)
K1S0096=mean(K1S0096m)
summary(K1S0096m)
K1S0096m
print(paste("K1_S0096 =",K1S0096))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0096,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0096,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0096,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0096,": No"))
print(paste("Kmínd_17 =",Kmínd17_S0096,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0096,": No"))
print(paste("Kmínd_19 =",Kmínd19_S0096,": No"))
print(paste("Kmínd_23 =",Kmínd23_S0096,": Si"))
```

```{r}
KmíndS0096m=c(Kmínd14_S0096,Kmínd17_S0096,Kmínd23_S0096)
KmíndS0096=mean(KmíndS0096m)
summary(KmíndS0096m)
KmíndS0096m
print(paste("Kmínd_S0096 =",KmíndS0096))
```

Estación S0206 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0206D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0206D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0206D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0206D13=S0206D[1:365,6]
```

```{r}
plot(Fecha13,S0206D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2013",
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(S0206D13),lwd="3",col="red")
abline(h=max(S0206D13),lwd="3",col="black",lty=2)
abline(h=min(S0206D13),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
Qmax13_S0206=max(S0206D13)
Qp13_S0206=mean(S0206D13)
K1_13_S0206=Qmax13_S0206/Qp13_S0206
print(paste("K1 =",K1_13_S0206))

# Cálculo del coeficiente Kmínd
Qmind13_S0206=min(S0206D13)
Kmínd13_S0206=Qmind13_S0206/Qp13_S0206
print(paste("Kmínd =",Kmínd13_S0206))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0206D14=S0206D[1:365,8]
```

```{r}
plot(Fecha14,S0206D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2014",
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(S0206D14),lwd="3",col="red")
```

```
abline(h=max(S0206D14),lwd="3",col="black",lty=2)
abline(h=min(S0206D14),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
Qmax14_S0206=max(S0206D14)
Qp14_S0206=mean(S0206D14)
K1_14_S0206=Qmax14_S0206/Qp14_S0206
print(paste("K1 =",K1_14_S0206))

# Cálculo del coeficiente Kmínd
Qmind14_S0206=min(S0206D14)
Kmínd14_S0206=Qmind14_S0206/Qp14_S0206
print(paste("Kmínd =",Kmínd14_S0206))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0206D15=S0206D[1:365,10]
```

```{r}
plot(Fecha15,S0206D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2015",
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(S0206D15),lwd="3",col="red")
abline(h=max(S0206D15),lwd="3",col="black",lty=2)
abline(h=min(S0206D15),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
Qmax15_S0206=max(S0206D15)
Qp15_S0206=mean(S0206D15)
K1_15_S0206=Qmax15_S0206/Qp15_S0206
print(paste("K1 =",K1_15_S0206))

# Cálculo del coeficiente Kmínd
Qmind15_S0206=min(S0206D15)
Kmínd15_S0206=Qmind15_S0206/Qp15_S0206
print(paste("Kmínd =",Kmínd15_S0206))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0206D16=S0206D[1:366,12]
```

```{r}
plot(Fecha16,S0206D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2016",
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(S0206D16),lwd="3",col="red")
abline(h=max(S0206D16),lwd="3",col="black",lty=2)
abline(h=min(S0206D16),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
Qmax16_S0206=max(S0206D16)
Qp16_S0206=mean(S0206D16)
K1_16_S0206=Qmax16_S0206/Qp16_S0206
print(paste("K1 =",K1_16_S0206))

# Cálculo del coeficiente Kmínd
Qmind16_S0206=min(S0206D16)
Kmínd16_S0206=Qmind16_S0206/Qp16_S0206
print(paste("Kmínd =",Kmínd16_S0206))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0206D17=S0206D[1:365,14]
```

```{r}
plot(Fecha17,S0206D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2017",
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(S0206D17),lwd="3",col="red")
abline(h=max(S0206D17),lwd="3",col="black",lty=2)
abline(h=min(S0206D17),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
Qmax17_S0206=max(S0206D17)
Qp17_S0206=mean(S0206D17)
K1_17_S0206=Qmax17_S0206/Qp17_S0206
print(paste("K1 =",K1_17_S0206))

# Cálculo del coeficiente Kmínd
Qmind17_S0206=min(S0206D17)
Kmínd17_S0206=Qmind17_S0206/Qp17_S0206
print(paste("Kmínd =",Kmínd17_S0206))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0206D18=S0206D[1:365,16]
```

```{r}
plot(Fecha18,S0206D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2018",
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(S0206D18),lwd="3",col="red")
abline(h=max(S0206D18),lwd="3",col="black",lty=2)
abline(h=min(S0206D18),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
Qmax18_S0206=max(S0206D18)
Qp18_S0206=mean(S0206D18)
K1_18_S0206=Qmax18_S0206/Qp18_S0206
print(paste("K1 =",K1_18_S0206))

# Cálculo del coeficiente Kmínd
Qmind18_S0206=min(S0206D18)
Kmínd18_S0206=Qmind18_S0206/Qp18_S0206
print(paste("Kmínd =",Kmínd18_S0206))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0206D19=S0206D[1:365,18]
```

```{r}
plot(Fecha19,S0206D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2019",
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(S0206D19),lwd="3",col="red")
abline(h=max(S0206D19),lwd="3",col="black",lty=2)
abline(h=min(S0206D19),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
Qmax19_S0206=max(S0206D19)
Qp19_S0206=mean(S0206D19)
K1_19_S0206=Qmax19_S0206/Qp19_S0206
print(paste("K1 =",K1_19_S0206))

# Cálculo del coeficiente Kmínd
Qmind19_S0206=min(S0206D19)
Kmínd19_S0206=Qmind19_S0206/Qp19_S0206
print(paste("Kmínd =",Kmínd19_S0206))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0206D23=S0206D[1:365,26]
```

```{r}
plot(Fecha23,S0206D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0206 - 2023",
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(S0206D23),lwd="3",col="red")
abline(h=max(S0206D23),lwd="3",col="black",lty=2)
abline(h=min(S0206D23),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
Qmax23_S0206=max(S0206D23)
Qp23_S0206=mean(S0206D23)
K1_23_S0206=Qmax23_S0206/Qp23_S0206
print(paste("K1 =",K1_23_S0206))

# Cálculo del coeficiente Kmínd
Qmind23_S0206=min(S0206D23)
Kmínd23_S0206=Qmind23_S0206/Qp23_S0206
print(paste("Kmínd =",Kmínd23_S0206))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0206,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0206,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0206,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0206,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0206,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0206,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0206,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0206,"l/s",": No"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0206,": Si"))
print(paste("K1_14 =",K1_14_S0206,": No"))
print(paste("K1_15 =",K1_15_S0206,": No"))
print(paste("K1_15 =",K1_16_S0206,": No"))
print(paste("K1_17 =",K1_17_S0206,": No"))
print(paste("K1_18 =",K1_18_S0206,": No"))
print(paste("K1_19 =",K1_19_S0206,": Si"))
print(paste("K1_23 =",K1_23_S0206,": No"))
```

```{r}
K1S0206m=c(K1_13_S0206,K1_19_S0206)
K1S0206=mean(K1S0206m)
summary(K1S0206m)
K1S0206m
print(paste("K1_S0206 =",K1S0206))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0206,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0206,": No"))
print(paste("Kmínd_15 =",Kmínd15_S0206,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0206,": No"))
print(paste("Kmínd_17 =",Kmínd17_S0206,": No"))
print(paste("Kmínd_18 =",Kmínd18_S0206,": No"))
print(paste("Kmínd_19 =",Kmínd19_S0206,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0206,": No"))
```

```{r}
KmíndS0206m=c(Kmínd13_S0206,Kmínd19_S0206)
KmíndS0206=mean(KmíndS0206m)
summary(KmíndS0206m)
KmíndS0206m
print(paste("Kmínd_S0206 =",KmíndS0206))
```

Estación S0213 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0213D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0213D.csv",sep=";")
```

```
```

Visualización de la base de datos

```{r}
# View(S0213D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0213D13=S0213D[1:365,6]
```

```{r}
plot(Fecha13,S0213D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2013",
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(S0213D13),lwd="3",col="red")
abline(h=max(S0213D13),lwd="3",col="black",lty=2)
abline(h=min(S0213D13),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
Qmax13_S0213=max(S0213D13)
Qp13_S0213=mean(S0213D13)
K1_13_S0213=Qmax13_S0213/Qp13_S0213
print(paste("K1 =",K1_13_S0213))

# Cálculo del coeficiente Kmínd
Qmind13_S0213=min(S0213D13)
Kmínd13_S0213=Qmind13_S0213/Qp13_S0213
print(paste("Kmínd =",Kmínd13_S0213))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0213D14=S0213D[1:365,8]
```

```{r}
plot(Fecha14,S0213D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2014",
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(S0213D14),lwd="3",col="red")
abline(h=max(S0213D14),lwd="3",col="black",lty=2)
abline(h=min(S0213D14),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
Qmax14_S0213=max(S0213D14)
Qp14_S0213=mean(S0213D14)
K1_14_S0213=Qmax14_S0213/Qp14_S0213
print(paste("K1 =",K1_14_S0213))

# Cálculo del coeficiente Kmínd
Qmind14_S0213=min(S0213D14)
Kmínd14_S0213=Qmind14_S0213/Qp14_S0213
print(paste("Kmínd =",Kmínd14_S0213))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0213D15=S0213D[1:365,10]
```

```{r}
plot(Fecha15,S0213D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2015",
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(S0213D15),lwd="3",col="red")
abline(h=max(S0213D15),lwd="3",col="black",lty=2)
abline(h=min(S0213D15),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
Qmax15_S0213=max(S0213D15)
Qp15_S0213=mean(S0213D15)
K1_15_S0213=Qmax15_S0213/Qp15_S0213
print(paste("K1 =",K1_15_S0213))

# Cálculo del coeficiente Kmínd
Qmind15_S0213=min(S0213D15)
Kmínd15_S0213=Qmind15_S0213/Qp15_S0213
print(paste("Kmínd =",Kmínd15_S0213))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0213D16=S0213D[1:366,12]
```

```{r}
plot(Fecha16,S0213D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2016",
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(S0213D16),lwd="3",col="red")
abline(h=max(S0213D16),lwd="3",col="black",lty=2)
abline(h=min(S0213D16),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
Qmax16_S0213=max(S0213D16)
Qp16_S0213=mean(S0213D16)
K1_16_S0213=Qmax16_S0213/Qp16_S0213
print(paste("K1 =",K1_16_S0213))

# Cálculo del coeficiente Kmínd
Qmind16_S0213=min(S0213D16)
Kmínd16_S0213=Qmind16_S0213/Qp16_S0213
print(paste("Kmínd =",Kmínd16_S0213))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0213D17=S0213D[1:365,14]
```

```{r}
plot(Fecha17,S0213D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2017",
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(S0213D17),lwd="3",col="red")
abline(h=max(S0213D17),lwd="3",col="black",lty=2)
abline(h=min(S0213D17),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
Qmax17_S0213=max(S0213D17)
Qp17_S0213=mean(S0213D17)
K1_17_S0213=Qmax17_S0213/Qp17_S0213
print(paste("K1 =",K1_17_S0213))

# Cálculo del coeficiente Kmínd
Qmind17_S0213=min(S0213D17)
Kmínd17_S0213=Qmind17_S0213/Qp17_S0213
print(paste("Kmínd =",Kmínd17_S0213))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0213D18=S0213D[1:365,16]
```

```{r}
plot(Fecha18,S0213D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2018",
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(S0213D18),lwd="3",col="red")
abline(h=max(S0213D18),lwd="3",col="black",lty=2)
abline(h=min(S0213D18),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
Qmax18_S0213=max(S0213D18)
Qp18_S0213=mean(S0213D18)
K1_18_S0213=Qmax18_S0213/Qp18_S0213
print(paste("K1 =",K1_18_S0213))

# Cálculo del coeficiente Kmínd
Qmind18_S0213=min(S0213D18)
Kmínd18_S0213=Qmind18_S0213/Qp18_S0213
print(paste("Kmínd =",Kmínd18_S0213))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0213D19=S0213D[1:365,18]
```

```{r}
plot(Fecha19,S0213D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2019",
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(S0213D19),lwd="3",col="red")
abline(h=max(S0213D19),lwd="3",col="black",lty=2)
abline(h=min(S0213D19),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
Qmax19_S0213=max(S0213D19)
Qp19_S0213=mean(S0213D19)
K1_19_S0213=Qmax19_S0213/Qp19_S0213
print(paste("K1 =",K1_19_S0213))

# Cálculo del coeficiente Kmínd
Qmind19_S0213=min(S0213D19)
Kmínd19_S0213=Qmind19_S0213/Qp19_S0213
print(paste("Kmínd =",Kmínd19_S0213))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0213D23=S0213D[1:365,26]
```

```{r}
plot(Fecha23,S0213D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0213 - 2023",
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(S0213D23),lwd="3",col="red")
abline(h=max(S0213D23),lwd="3",col="black",lty=2)
abline(h=min(S0213D23),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
Qmax23_S0213=max(S0213D23)
Qp23_S0213=mean(S0213D23)
K1_23_S0213=Qmax23_S0213/Qp23_S0213
print(paste("K1 =",K1_23_S0213))

# Cálculo del coeficiente Kmínd
Qmind23_S0213=min(S0213D23)
Kmínd23_S0213=Qmind23_S0213/Qp23_S0213
print(paste("Kmínd =",Kmínd23_S0213))
```

Caudales promedio del sector

```{r}


```

```
print(paste("Qp_13 =",Qp13_S0213,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0213,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0213,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0213,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0213,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0213,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0213,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0213,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0213,": No"))
print(paste("K1_14 =",K1_14_S0213,": No"))
print(paste("K1_15 =",K1_15_S0213,": No"))
print(paste("K1_15 =",K1_16_S0213,": No"))
print(paste("K1_17 =",K1_17_S0213,": Si"))
print(paste("K1_18 =",K1_18_S0213,": No"))
print(paste("K1_19 =",K1_19_S0213,": Si"))
print(paste("K1_23 =",K1_23_S0213,": Si"))
```

```{r}
K1S0213m=c(K1_17_S0213,K1_19_S0213,K1_23_S0213)
K1S0213=mean(K1S0213m)
summary(K1S0213m)
K1S0213m
print(paste("K1_S0213 =",K1S0213))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0213,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0213,": No"))
print(paste("Kmínd_15 =",Kmínd15_S0213,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0213,": No"))
print(paste("Kmínd_17 =",Kmínd17_S0213,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0213,": No"))
print(paste("Kmínd_19 =",Kmínd19_S0213,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0213,": Si"))
```

```{r}
KmíndS0213m=c(Kmínd17_S0213,Kmínd19_S0213,Kmínd23_S0213)
KmíndS0213=mean(KmíndS0213m)
summary(KmíndS0213m)
KmíndS0213m
print(paste("Kmínd_S0213 =",KmíndS0213))
```

Estación S0300 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0300D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0300D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0300D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0300D13=S0300D[1:365,6]
```

```{r}
plot(Fecha13,S0300D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2013",
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(S0300D13),lwd="3",col="red")
abline(h=max(S0300D13),lwd="3",col="black",lty=2)
abline(h=min(S0300D13),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 de K1
Qmax13_S0300=max(S0300D13)
Qp13_S0300=mean(S0300D13)
K1_13_S0300=Qmax13_S0300/Qp13_S0300
print(paste("K1 =",K1_13_S0300))

# Cálculo de Kmínd
Qmind13_S0300=min(S0300D13)
```

```
Kmínd13_S0300=Qmind13_S0300/Qp13_S0300
print(paste("Kmínd =",Kmínd13_S0300))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0300D14=S0300D[1:365,8]
```

```{r}
plot(Fecha14,S0300D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2014",
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(S0300D14),lwd="3",col="red")
abline(h=max(S0300D14),lwd="3",col="black",lty=2)
abline(h=min(S0300D14),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
Qmax14_S0300=max(S0300D14)
Qp14_S0300=mean(S0300D14)
K1_14_S0300=Qmax14_S0300/Qp14_S0300
print(paste("K1 =",K1_14_S0300))

# Cálculo del coeficiente Kmínd
Qmind14_S0300=min(S0300D14)
Kmínd14_S0300=Qmind14_S0300/Qp14_S0300
print(paste("Kmínd =",Kmínd14_S0300))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0300D15=S0300D[1:365,10]
```

```{r}
plot(Fecha15,S0300D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2015",
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(S0300D15),lwd="3",col="red")
abline(h=max(S0300D15),lwd="3",col="black",lty=2)
abline(h=min(S0300D15),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
Qmax15_S0300=max(S0300D15)
Qp15_S0300=mean(S0300D15)
K1_15_S0300=Qmax15_S0300/Qp15_S0300
print(paste("K1 =",K1_15_S0300))

# Cálculo del coeficiente Kmínd
Qmind15_S0300=min(S0300D15)
Kmínd15_S0300=Qmind15_S0300/Qp15_S0300
print(paste("Kmínd =",Kmínd15_S0300))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0300D16=S0300D[1:366,12]
```

```{r}
plot(Fecha16,S0300D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2016",
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(S0300D16),lwd="3",col="red")
abline(h=max(S0300D16),lwd="3",col="black",lty=2)
abline(h=min(S0300D16),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
Qmax16_S0300=max(S0300D16)
Qp16_S0300=mean(S0300D16)
K1_16_S0300=Qmax16_S0300/Qp16_S0300
print(paste("K1 =",K1_16_S0300))

# Cálculo del coeficiente Kmínd
Qmind16_S0300=min(S0300D16)
Kmínd16_S0300=Qmind16_S0300/Qp16_S0300
print(paste("Kmínd =",Kmínd16_S0300))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0300D17=S0300D[1:365,14]
```

```{r}
plot(Fecha17,S0300D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2017",
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(S0300D17),lwd="3",col="red")
abline(h=max(S0300D17),lwd="3",col="black",lty=2)
abline(h=min(S0300D17),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
Qmax17_S0300=max(S0300D17)
Qp17_S0300=mean(S0300D17)
K1_17_S0300=Qmax17_S0300/Qp17_S0300
print(paste("K1 =",K1_17_S0300))

# Cálculo del coeficiente Kmínd
Qmind17_S0300=min(S0300D17)
Kmínd17_S0300=Qmind17_S0300/Qp17_S0300
print(paste("Kmínd =",Kmínd17_S0300))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0300D18=S0300D[1:365,16]
```

```{r}
plot(Fecha18,S0300D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2018",
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(S0300D18),lwd="3",col="red")
abline(h=max(S0300D18),lwd="3",col="black",lty=2)
abline(h=min(S0300D18),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
Qmax18_S0300=max(S0300D18)
Qp18_S0300=mean(S0300D18)
K1_18_S0300=Qmax18_S0300/Qp18_S0300
print(paste("K1 =",K1_18_S0300))

# Cálculo del coeficiente Kmínd
Qmind18_S0300=min(S0300D18)
Kmínd18_S0300=Qmind18_S0300/Qp18_S0300
print(paste("Kmínd =",Kmínd18_S0300))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0300D19=S0300D[1:365,18]
```

```{r}
plot(Fecha19,S0300D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2019",
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(S0300D19),lwd="3",col="red")
```

```
abline(h=max(S0300D19),lwd="3",col="black",lty=2)
abline(h=min(S0300D19),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
Qmax19_S0300=max(S0300D19)
Qp19_S0300=mean(S0300D19)
K1_19_S0300=Qmax19_S0300/Qp19_S0300
print(paste("K1 =",K1_19_S0300))

# Cálculo del coeficiente Kmínd
Qmind19_S0300=min(S0300D19)
Kmínd19_S0300=Qmind19_S0300/Qp19_S0300
print(paste("Kmínd =",Kmínd19_S0300))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0300D23=S0300D[1:365,26]
```

```{r}
plot(Fecha23,S0300D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0300 - 2023",
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(S0300D23),lwd="3",col="red")
abline(h=max(S0300D23),lwd="3",col="black",lty=2)
abline(h=min(S0300D23),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
Qmax23_S0300=max(S0300D23)
Qp23_S0300=mean(S0300D23)
K1_23_S0300=Qmax23_S0300/Qp23_S0300
print(paste("K1 =",K1_23_S0300))

# Cálculo del coeficiente Kmínd
Qmind23_S0300=min(S0300D23)
Kmínd23_S0300=Qmind23_S0300/Qp23_S0300
print(paste("Kmínd =",Kmínd23_S0300))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0300,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0300,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0300,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0300,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0300,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0300,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0300,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0300,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0300,": Si"))
print(paste("K1_14 =",K1_14_S0300,": Si"))
print(paste("K1_15 =",K1_15_S0300,": Si"))
print(paste("K1_16 =",K1_16_S0300,": Si"))
print(paste("K1_17 =",K1_17_S0300,": Si"))
print(paste("K1_18 =",K1_18_S0300,": Si"))
print(paste("K1_19 =",K1_19_S0300,": Si"))
print(paste("K1_23 =",K1_23_S0300,": Si"))
```

```{r}
K1S0300m=c(K1_13_S0300,K1_14_S0300,K1_15_S0300,K1_16_S0300,K1_17_S0300,
K1_18_S0300,K1_19_S0300,K1_23_S0300)
K1S0300=mean(K1S0300m)
summary(K1S0300m)
K1S0300m
print(paste("K1_S0300 =",K1S0300))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0300,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0300,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0300,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0300,": Si"))
```

```
print(paste("Kmínd_17 =",Kmínd17_S0300,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0300,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0300,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0300,": Si"))
```

```{r}
KmíndS0300m=c(Kmínd13_S0300,Kmínd14_S0300,Kmínd15_S0300,Kmínd16_S0300,
Kmínd17_S0300,Kmínd18_S0300,Kmínd19_S0300,Kmínd23_S0300)
KmíndS0300=mean(KmíndS0300m)
summary(KmíndS0300m)
KmíndS0300m
print(paste("Kmínd_S0300 =",KmíndS0300))
```

Estación S0301 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0301D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0301D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0301D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0301D13=S0301D[1:365,6]
```

```{r}
plot(Fecha13,S0301D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2013",
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(S0301D13),lwd="3",col="red")
abline(h=max(S0301D13),lwd="3",col="black",lty=2)
abline(h=min(S0301D13),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
Qmax13_S0301=max(S0301D13)
Qp13_S0301=mean(S0301D13)
K1_13_S0301=Qmax13_S0301/Qp13_S0301
print(paste("K1 =",K1_13_S0301))

# Cálculo del coeficiente Kmínd
Qmind13_S0301=min(S0301D13)
Kmínd13_S0301=Qmind13_S0301/Qp13_S0301
print(paste("Kmínd =",Kmínd13_S0301))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0301D14=S0301D[1:365,8]
```

```{r}
plot(Fecha14,S0301D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2014",
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(S0301D14),lwd="3",col="red")
abline(h=max(S0301D14),lwd="3",col="black",lty=2)
abline(h=min(S0301D14),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
Qmax14_S0301=max(S0301D14)
Qp14_S0301=mean(S0301D14)
K1_14_S0301=Qmax14_S0301/Qp14_S0301
print(paste("K1 =",K1_14_S0301))

# Cálculo del coeficiente Kmínd
Qmind14_S0301=min(S0301D14)
Kmínd14_S0301=Qmind14_S0301/Qp14_S0301
print(paste("Kmínd =",Kmínd14_S0301))
```

```
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0301D15=S0301D[1:365,10]
```

```{r}
plot(Fecha15,S0301D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2015",
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(S0301D15),lwd="3",col="red")
abline(h=max(S0301D15),lwd="3",col="black",lty=2)
abline(h=min(S0301D15),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
Qmax15_S0301=max(S0301D15)
Qp15_S0301=mean(S0301D15)
K1_15_S0301=Qmax15_S0301/Qp15_S0301
print(paste("K1 =",K1_15_S0301))

# Cálculo del coeficiente Kmínd
Qmind15_S0301=min(S0301D15)
Kmínd15_S0301=Qmind15_S0301/Qp15_S0301
print(paste("Kmínd =",Kmínd15_S0301))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0301D16=S0301D[1:366,12]
```

```{r}
plot(Fecha16,S0301D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2016",
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(S0301D16),lwd="3",col="red")
abline(h=max(S0301D16),lwd="3",col="black",lty=2)
abline(h=min(S0301D16),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
Qmax16_S0301=max(S0301D16)
Qp16_S0301=mean(S0301D16)
K1_16_S0301=Qmax16_S0301/Qp16_S0301
print(paste("K1 =",K1_16_S0301))

# Cálculo del coeficiente Kmínd
Qmind16_S0301=min(S0301D16)
Kmínd16_S0301=Qmind16_S0301/Qp16_S0301
print(paste("Kmínd =",Kmínd16_S0301))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0301D17=S0301D[1:365,14]
```

```{r}
plot(Fecha17,S0301D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2017",
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(S0301D17),lwd="3",col="red")
abline(h=max(S0301D17),lwd="3",col="black",lty=2)
abline(h=min(S0301D17),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
Qmax17_S0301=max(S0301D17)
```

```
Qp17_S0301=mean(S0301D17)
K1_17_S0301=Qmax17_S0301/Qp17_S0301
print(paste("K1 =",K1_17_S0301))

# Cálculo del coeficiente Kmínd
Qmind17_S0301=min(S0301D17)
Kmínd17_S0301=Qmind17_S0301/Qp17_S0301
print(paste("Kmínd =",Kmínd17_S0301))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0301D18=S0301D[1:365,16]
```

```{r}
plot(Fecha18,S0301D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2018",
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(S0301D18),lwd="3",col="red")
abline(h=max(S0301D18),lwd="3",col="black",lty=2)
abline(h=min(S0301D18),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
Qmax18_S0301=max(S0301D18)
Qp18_S0301=mean(S0301D18)
K1_18_S0301=Qmax18_S0301/Qp18_S0301
print(paste("K1 =",K1_18_S0301))

# Cálculo del coeficiente Kmínd
Qmind18_S0301=min(S0301D18)
Kmínd18_S0301=Qmind18_S0301/Qp18_S0301
print(paste("Kmínd =",Kmínd18_S0301))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0301D19=S0301D[1:365,18]
```

```{r}
plot(Fecha19,S0301D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2019",
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(S0301D19),lwd="3",col="red")
abline(h=max(S0301D19),lwd="3",col="black",lty=2)
abline(h=min(S0301D19),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
Qmax19_S0301=max(S0301D19)
Qp19_S0301=mean(S0301D19)
K1_19_S0301=Qmax19_S0301/Qp19_S0301
print(paste("K1 =",K1_19_S0301))

# Cálculo del coeficiente Kmínd
Qmind19_S0301=min(S0301D19)
Kmínd19_S0301=Qmind19_S0301/Qp19_S0301
print(paste("Kmínd =",Kmínd19_S0301))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0301D23=S0301D[1:365,26]
```

```{r}
plot(Fecha23,S0301D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0301 - 2023",
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(S0301D23),lwd="3",col="red")
abline(h=max(S0301D23),lwd="3",col="black",lty=2)
abline(h=min(S0301D23),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
Qmax23_S0301=max(S0301D23)
Qp23_S0301=mean(S0301D23)
K1_23_S0301=Qmax23_S0301/Qp23_S0301
print(paste("K1 =",K1_23_S0301))

# Cálculo del coeficiente Kmínd
Qmind23_S0301=min(S0301D23)
Kmínd23_S0301=Qmind23_S0301/Qp23_S0301
print(paste("Kmínd =",Kmínd23_S0301))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0301,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0301,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0301,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0301,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0301,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0301,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0301,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0301,"l/s",": No"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0301,": Si"))
print(paste("K1_14 =",K1_14_S0301,": Si"))
print(paste("K1_15 =",K1_15_S0301,": Si"))
print(paste("K1_16 =",K1_16_S0301,": No"))
print(paste("K1_17 =",K1_17_S0301,": No"))
print(paste("K1_18 =",K1_18_S0301,": Si"))
print(paste("K1_19 =",K1_19_S0301,": No"))
print(paste("K1_23 =",K1_23_S0301,": No"))
```

```{r}
K1S0301m=c(K1_13_S0301,K1_14_S0301,K1_15_S0301,K1_18_S0301)
K1S0301=mean(K1S0301m)
summary(K1S0301m)
K1S0301m
print(paste("K1_S0301 =",K1S0301))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0301,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0301,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0301,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0301,": No"))
print(paste("Kmínd_17 =",Kmínd17_S0301,": No"))
print(paste("Kmínd_18 =",Kmínd18_S0301,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0301,": No"))
print(paste("Kmínd_23 =",Kmínd23_S0301,": No"))
```

```{r}
KmíndS0301m=c(Kmínd13_S0301,Kmínd14_S0301,Kmínd15_S0301,Kmínd18_S0301)
KmíndS0301=mean(KmíndS0301m)
summary(KmíndS0301m)
KmíndS0301m
print(paste("Kmínd_S0301 =",KmíndS0301))
```

Estación S0305 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0305D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0305D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0305D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0305D13=S0305D[1:365,6]
```

```{r}
plot(Fecha13,S0305D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2013",
```

```
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(S0305D13),lwd="3",col="red")
abline(h=max(S0305D13),lwd="3",col="black",lty=2)
abline(h=min(S0305D13),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
Qmax13_S0305=max(S0305D13)
Qp13_S0305=mean(S0305D13)
K1_13_S0305=Qmax13_S0305/Qp13_S0305
print(paste("K1 =",K1_13_S0305))

# Cálculo del coeficiente Kmínd
Qmind13_S0305=min(S0305D13)
Kmínd13_S0305=Qmind13_S0305/Qp13_S0305
print(paste("Kmínd =",Kmínd13_S0305))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0305D14=S0305D[1:365,8]
```

```{r}
plot(Fecha14,S0305D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2014",
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(S0305D14),lwd="3",col="red")
abline(h=max(S0305D14),lwd="3",col="black",lty=2)
abline(h=min(S0305D14),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
Qmax14_S0305=max(S0305D14)
Qp14_S0305=mean(S0305D14)
K1_14_S0305=Qmax14_S0305/Qp14_S0305
print(paste("K1 =",K1_14_S0305))

# Cálculo del coeficiente Kmínd
Qmind14_S0305=min(S0305D14)
Kmínd14_S0305=Qmind14_S0305/Qp14_S0305
print(paste("Kmínd =",Kmínd14_S0305))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0305D15=S0305D[1:365,10]
```

```{r}
plot(Fecha15,S0305D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2015",
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(S0305D15),lwd="3",col="red")
abline(h=max(S0305D15),lwd="3",col="black",lty=2)
abline(h=min(S0305D15),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
Qmax15_S0305=max(S0305D15)
Qp15_S0305=mean(S0305D15)
K1_15_S0305=Qmax15_S0305/Qp15_S0305
print(paste("K1 =",K1_15_S0305))

# Cálculo del coeficiente Kmínd
Qmind15_S0305=min(S0305D15)
Kmínd15_S0305=Qmind15_S0305/Qp15_S0305
print(paste("Kmínd =",Kmínd15_S0305))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0305D16=S0305D[1:366,12]
```

```{r}
plot(Fecha16,S0305D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2016",
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(S0305D16),lwd="3",col="red")
abline(h=max(S0305D16),lwd="3",col="black",lty=2)
abline(h=min(S0305D16),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
Qmax16_S0305=max(S0305D16)
Qp16_S0305=mean(S0305D16)
K1_16_S0305=Qmax16_S0305/Qp16_S0305
print(paste("K1 =",K1_16_S0305))

# Cálculo del coeficiente Kmínd
Qmind16_S0305=min(S0305D16)
Kmínd16_S0305=Qmind16_S0305/Qp16_S0305
print(paste("Kmínd =",Kmínd16_S0305))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0305D17=S0305D[1:365,14]
```

```{r}
plot(Fecha17,S0305D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2017",
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(S0305D17),lwd="3",col="red")
abline(h=max(S0305D17),lwd="3",col="black",lty=2)
abline(h=min(S0305D17),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
Qmax17_S0305=max(S0305D17)
Qp17_S0305=mean(S0305D17)
K1_17_S0305=Qmax17_S0305/Qp17_S0305
print(paste("K1 =",K1_17_S0305))

# Cálculo del coeficiente Kmínd
Qmind17_S0305=min(S0305D17)
Kmínd17_S0305=Qmind17_S0305/Qp17_S0305
print(paste("Kmínd =",Kmínd17_S0305))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0305D18=S0305D[1:365,16]
```

```{r}
plot(Fecha18,S0305D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2018",
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(S0305D18),lwd="3",col="red")
abline(h=max(S0305D18),lwd="3",col="black",lty=2)
abline(h=min(S0305D18),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
Qmax18_S0305=max(S0305D18)
Qp18_S0305=mean(S0305D18)
K1_18_S0305=Qmax18_S0305/Qp18_S0305
print(paste("K1 =",K1_18_S0305))
```

```
# Cálculo del coeficiente Kmínd
Qmind18_S0305=min(S0305D18)
Kmínd18_S0305=Qmind18_S0305/Qp18_S0305
print(paste("Kmínd =",Kmínd18_S0305))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0305D19=S0305D[1:365,18]
```

```{r}
plot(Fecha19,S0305D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2019",
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(S0305D19),lwd="3",col="red")
abline(h=max(S0305D19),lwd="3",col="black",lty=2)
abline(h=min(S0305D19),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
Qmax19_S0305=max(S0305D19)
Qp19_S0305=mean(S0305D19)
K1_19_S0305=Qmax19_S0305/Qp19_S0305
print(paste("K1 =",K1_19_S0305))

# Cálculo del coeficiente Kmínd
Qmind19_S0305=min(S0305D19)
Kmínd19_S0305=Qmind19_S0305/Qp19_S0305
print(paste("Kmínd =",Kmínd19_S0305))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0305D23=S0305D[1:365,26]
```

```{r}
plot(Fecha23,S0305D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0305 - 2023",
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(S0305D23),lwd="3",col="red")
abline(h=max(S0305D23),lwd="3",col="black",lty=2)
abline(h=min(S0305D23),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
Qmax23_S0305=max(S0305D23)
Qp23_S0305=mean(S0305D23)
K1_23_S0305=Qmax23_S0305/Qp23_S0305
print(paste("K1 =",K1_23_S0305))

# Cálculo del coeficiente Kmínd
Qmind23_S0305=min(S0305D23)
Kmínd23_S0305=Qmind23_S0305/Qp23_S0305
print(paste("Kmínd =",Kmínd23_S0305))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0305,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0305,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0305,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0305,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0305,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0305,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0305,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0305,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0305,": Si"))
print(paste("K1_14 =",K1_14_S0305,": Si"))
print(paste("K1_15 =",K1_15_S0305,": Si"))
print(paste("K1_16 =",K1_16_S0305,": Si"))
print(paste("K1_17 =",K1_17_S0305,": Si"))
```

```
print(paste("K1_18 =",K1_18_S0305,": Si"))
print(paste("K1_19 =",K1_19_S0305,": Si"))
print(paste("K1_23 =",K1_23_S0305,": Si"))
```

```{r}
K1S0305m=c(K1_13_S0305,K1_14_S0305,K1_15_S0305,K1_16_S0305,K1_17_S0305,
K1_18_S0305,K1_19_S0305,K1_23_S0305)
K1S0305=mean(K1S0305m)
summary(K1S0305m)
K1S0305m
print(paste("K1_S0305 =",K1S0305))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0305,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0305,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0305,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0305,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0305,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0305,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0305,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0305,": Si"))
```

```{r}
KmíndS0305m=c(Kmínd13_S0305,Kmínd14_S0305,Kmínd15_S0305,Kmínd16_S0305,
Kmínd17_S0305,Kmínd18_S0305,Kmínd19_S0305,Kmínd23_S0305)
KmíndS0305=mean(KmíndS0305m)
summary(KmíndS0305m)
KmíndS0305m
print(paste("Kmínd_S0305 =",KmíndS0305))
```

Estación S0306 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0306D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0306D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0306D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0306D13=S0306D[1:365,6]
```

```{r}
plot(Fecha13,S0306D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2013",
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(S0306D13),lwd="3",col="red")
abline(h=max(S0306D13),lwd="3",col="black",lty=2)
abline(h=min(S0306D13),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
Qmax13_S0306=max(S0306D13)
Qp13_S0306=mean(S0306D13)
K1_13_S0306=Qmax13_S0306/Qp13_S0306
print(paste("K1 =",K1_13_S0306))

# Cálculo del coeficiente Kmínd
Qmind13_S0306=min(S0306D13)
Kmínd13_S0306=Qmind13_S0306/Qp13_S0306
print(paste("Kmínd =",Kmínd13_S0306))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0306D14=S0306D[1:365,8]
```

```{r}
plot(Fecha14,S0306D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2014",
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(S0306D14),lwd="3",col="red")
abline(h=max(S0306D14),lwd="3",col="black",lty=2)
abline(h=min(S0306D14),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
Qmax14_S0306=max(S0306D14)
Qp14_S0306=mean(S0306D14)
K1_14_S0306=Qmax14_S0306/Qp14_S0306
print(paste("K1 =",K1_14_S0306))

# Cálculo del coeficiente Kmínd
Qmind14_S0306=min(S0306D14)
Kmínd14_S0306=Qmind14_S0306/Qp14_S0306
print(paste("Kmínd =",Kmínd14_S0306))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0306D15=S0306D[1:365,10]
```

```{r}
plot(Fecha15,S0306D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2015",
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(S0306D15),lwd="3",col="red")
abline(h=max(S0306D15),lwd="3",col="black",lty=2)
abline(h=min(S0306D15),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
Qmax15_S0306=max(S0306D15)
Qp15_S0306=mean(S0306D15)
K1_15_S0306=Qmax15_S0306/Qp15_S0306
print(paste("K1 =",K1_15_S0306))

# Cálculo del coeficiente Kmínd
Qmind15_S0306=min(S0306D15)
Kmínd15_S0306=Qmind15_S0306/Qp15_S0306
print(paste("Kmínd =",Kmínd15_S0306))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0306D16=S0306D[1:366,12]
```

```{r}
plot(Fecha16,S0306D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2016",
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(S0306D16),lwd="3",col="red")
abline(h=max(S0306D16),lwd="3",col="black",lty=2)
abline(h=min(S0306D16),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
Qmax16_S0306=max(S0306D16)
Qp16_S0306=mean(S0306D16)
K1_16_S0306=Qmax16_S0306/Qp16_S0306
print(paste("K1 =",K1_16_S0306))

# Cálculo del coeficiente Kmínd
Qmind16_S0306=min(S0306D16)
Kmínd16_S0306=Qmind16_S0306/Qp16_S0306
print(paste("Kmínd =",Kmínd16_S0306))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
```

```
S0306D17=S0306D[1:365,14]
```
```

```{r}
plot(Fecha17,S0306D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2017",
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(S0306D17),lwd="3",col="red")
abline(h=max(S0306D17),lwd="3",col="black",lty=2)
abline(h=min(S0306D17),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
Qmax17_S0306=max(S0306D17)
Qp17_S0306=mean(S0306D17)
K1_17_S0306=Qmax17_S0306/Qp17_S0306
print(paste("K1 =",K1_17_S0306))

# Cálculo del coeficiente Kmínd
Qmind17_S0306=min(S0306D17)
Kmínd17_S0306=Qmind17_S0306/Qp17_S0306
print(paste("Kmínd =",Kmínd17_S0306))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0306D18=S0306D[1:365,16]
```

```{r}
plot(Fecha18,S0306D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2018",
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(S0306D18),lwd="3",col="red")
abline(h=max(S0306D18),lwd="3",col="black",lty=2)
abline(h=min(S0306D18),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
Qmax18_S0306=max(S0306D18)
Qp18_S0306=mean(S0306D18)
K1_18_S0306=Qmax18_S0306/Qp18_S0306
print(paste("K1 =",K1_18_S0306))

# Cálculo del coeficiente Kmínd
Qmind18_S0306=min(S0306D18)
Kmínd18_S0306=Qmind18_S0306/Qp18_S0306
print(paste("Kmínd =",Kmínd18_S0306))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0306D19=S0306D[1:365,18]
```

```{r}
plot(Fecha19,S0306D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2019",
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(S0306D19),lwd="3",col="red")
abline(h=max(S0306D19),lwd="3",col="black",lty=2)
abline(h=min(S0306D19),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
Qmax19_S0306=max(S0306D19)
Qp19_S0306=mean(S0306D19)
K1_19_S0306=Qmax19_S0306/Qp19_S0306
print(paste("K1 =",K1_19_S0306))

# Cálculo del coeficiente Kmínd
Qmind19_S0306=min(S0306D19)
```
```

```
Kmínd19_S0306=Qmind19_S0306/Qp19_S0306
print(paste("Kmínd =",Kmínd19_S0306))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0306D23=S0306D[1:365,26]
```

```{r}
plot(Fecha23,S0306D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0306 - 2023",
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(S0306D23),lwd="3",col="red")
abline(h=max(S0306D23),lwd="3",col="black",lty=2)
abline(h=min(S0306D23),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
Qmax23_S0306=max(S0306D23)
Qp23_S0306=mean(S0306D23)
K1_23_S0306=Qmax23_S0306/Qp23_S0306
print(paste("K1 =",K1_23_S0306))

# Cálculo del coeficiente Kmínd
Qmind23_S0306=min(S0306D23)
Kmínd23_S0306=Qmind23_S0306/Qp23_S0306
print(paste("Kmínd =",Kmínd23_S0306))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0306,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0306,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0306,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0306,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0306,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0306,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0306,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0306,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0306,": No"))
print(paste("K1_14 =",K1_14_S0306,": Si"))
print(paste("K1_15 =",K1_15_S0306,": Si"))
print(paste("K1_16 =",K1_16_S0306,": Si"))
print(paste("K1_17 =",K1_17_S0306,": Si"))
print(paste("K1_18 =",K1_18_S0306,": Si"))
print(paste("K1_19 =",K1_19_S0306,": Si"))
print(paste("K1_23 =",K1_23_S0306,": Si"))
```

```{r}
K1S0306m=c(K1_14_S0306,K1_15_S0306,K1_16_S0306,K1_17_S0306,K1_18_S0306,
K1_19_S0306,K1_23_S0306)
K1S0306=mean(K1S0306m)
summary(K1S0306m)
K1S0306m
print(paste("K1_S0306 =",K1S0306))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0306,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0306,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0306,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0306,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0306,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0306,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0306,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0306,": Si"))
```

```{r}
KmíndS0306m=c(Kmínd14_S0306,Kmínd15_S0306,Kmínd16_S0306,Kmínd17_S0306,
Kmínd18_S0306,Kmínd19_S0306,Kmínd23_S0306)
KmíndS0306=mean(KmíndS0306m)
summary(KmíndS0306m)
KmíndS0306m
print(paste("Kmínd_S0306 =",KmíndS0306))
```

Estación S0309 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0309D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0309D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0309D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0309D13=S0309D[1:365,6]
```

```{r}
plot(Fecha13,S0309D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2013",
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(S0309D13),lwd="3",col="red")
abline(h=max(S0309D13),lwd="3",col="black",lty=2)
abline(h=min(S0309D13),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
Qmax13_S0309=max(S0309D13)
Qp13_S0309=mean(S0309D13)
K1_13_S0309=Qmax13_S0309/Qp13_S0309
print(paste("K1 =",K1_13_S0309))

# Cálculo del coeficiente Kmínd
Qmind13_S0309=min(S0309D13)
Kmínd13_S0309=Qmind13_S0309/Qp13_S0309
print(paste("Kmínd =",Kmínd13_S0309))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0309D14=S0309D[1:365,8]
```

```{r}
plot(Fecha14,S0309D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2014",
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(S0309D14),lwd="3",col="red")
abline(h=max(S0309D14),lwd="3",col="black",lty=2)
abline(h=min(S0309D14),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
Qmax14_S0309=max(S0309D14)
Qp14_S0309=mean(S0309D14)
K1_14_S0309=Qmax14_S0309/Qp14_S0309
print(paste("K1 =",K1_14_S0309))

# Cálculo del coeficiente Kmínd
Qmind14_S0309=min(S0309D14)
Kmínd14_S0309=Qmind14_S0309/Qp14_S0309
print(paste("Kmínd =",Kmínd14_S0309))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0309D15=S0309D[1:365,10]
```

```{r}
plot(Fecha15,S0309D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2015",
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(S0309D15),lwd="3",col="red")
abline(h=max(S0309D15),lwd="3",col="black",lty=2)
abline(h=min(S0309D15),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
Qmax15_S0309=max(S0309D15)
Qp15_S0309=mean(S0309D15)
K1_15_S0309=Qmax15_S0309/Qp15_S0309
print(paste("K1 =",K1_15_S0309))

# Cálculo del coeficiente Kmínd
Qmind15_S0309=min(S0309D15)
Kmínd15_S0309=Qmind15_S0309/Qp15_S0309
print(paste("Kmínd =",Kmínd15_S0309))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0309D16=S0309D[1:366,12]
```

```{r}
plot(Fecha16,S0309D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2016",
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(S0309D16),lwd="3",col="red")
abline(h=max(S0309D16),lwd="3",col="black",lty=2)
abline(h=min(S0309D16),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
Qmax16_S0309=max(S0309D16)
Qp16_S0309=mean(S0309D16)
K1_16_S0309=Qmax16_S0309/Qp16_S0309
print(paste("K1 =",K1_16_S0309))

# Cálculo del coeficiente Kmínd
Qmind16_S0309=min(S0309D16)
Kmínd16_S0309=Qmind16_S0309/Qp16_S0309
print(paste("Kmínd =",Kmínd16_S0309))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0309D17=S0309D[1:365,14]
```

```{r}
plot(Fecha17,S0309D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2017",
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(S0309D17),lwd="3",col="red")
abline(h=max(S0309D17),lwd="3",col="black",lty=2)
abline(h=min(S0309D17),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
Qmax17_S0309=max(S0309D17)
Qp17_S0309=mean(S0309D17)
K1_17_S0309=Qmax17_S0309/Qp17_S0309
print(paste("K1 =",K1_17_S0309))

# Cálculo del coeficiente Kmínd
Qmind17_S0309=min(S0309D17)
Kmínd17_S0309=Qmind17_S0309/Qp17_S0309
print(paste("Kmínd =",Kmínd17_S0309))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0309D18=S0309D[1:365,16]
```

```{r}
plot(Fecha18,S0309D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2018",
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(S0309D18),lwd="3",col="red")
abline(h=max(S0309D18),lwd="3",col="black",lty=2)
abline(h=min(S0309D18),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
Qmax18_S0309=max(S0309D18)
Qp18_S0309=mean(S0309D18)
K1_18_S0309=Qmax18_S0309/Qp18_S0309
print(paste("K1 =",K1_18_S0309))

# Cálculo del coeficiente Kmínd
Qmind18_S0309=min(S0309D18)
Kmínd18_S0309=Qmind18_S0309/Qp18_S0309
print(paste("Kmínd =",Kmínd18_S0309))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0309D19=S0309D[1:365,18]
```

```{r}
plot(Fecha19,S0309D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2019",
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(S0309D19),lwd="3",col="red")
abline(h=max(S0309D19),lwd="3",col="black",lty=2)
abline(h=min(S0309D19),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
Qmax19_S0309=max(S0309D19)
Qp19_S0309=mean(S0309D19)
K1_19_S0309=Qmax19_S0309/Qp19_S0309
print(paste("K1 =",K1_19_S0309))

# Cálculo del coeficiente Kmínd
Qmind19_S0309=min(S0309D19)
Kmínd19_S0309=Qmind19_S0309/Qp19_S0309
print(paste("Kmínd =",Kmínd19_S0309))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0309D23=S0309D[1:365,26]
```

```{r}
plot(Fecha23,S0309D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0309 - 2023",
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(S0309D23),lwd="3",col="red")
abline(h=max(S0309D23),lwd="3",col="black",lty=2)
abline(h=min(S0309D23),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
Qmax23_S0309=max(S0309D23)
Qp23_S0309=mean(S0309D23)
K1_23_S0309=Qmax23_S0309/Qp23_S0309
print(paste("K1 =",K1_23_S0309))

# Cálculo del coeficiente Kmínd
Qmind23_S0309=min(S0309D23)
Kmínd23_S0309=Qmind23_S0309/Qp23_S0309
print(paste("Kmínd =",Kmínd23_S0309))
```

```
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0309,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0309,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0309,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0309,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0309,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0309,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0309,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0309,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0309,": Si"))
print(paste("K1_14 =",K1_14_S0309,": Si"))
print(paste("K1_15 =",K1_15_S0309,": Si"))
print(paste("K1_16 =",K1_16_S0309,": Si"))
print(paste("K1_17 =",K1_17_S0309,": Si"))
print(paste("K1_18 =",K1_18_S0309,": Si"))
print(paste("K1_19 =",K1_19_S0309,": Si"))
print(paste("K1_23 =",K1_23_S0309,": Si"))
```

```{r}
K1S0309m=c(K1_13_S0309,K1_14_S0309,K1_15_S0309,K1_16_S0309,K1_17_S0309,
K1_18_S0309,K1_19_S0309,K1_23_S0309)
K1S0309=mean(K1S0309m)
summary(K1S0309m)
K1S0309m
print(paste("K1_S0309 =",K1S0309))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0309,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0309,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0309,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0309,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0309,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0309,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0309,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0309,": Si"))
```

```{r}
KmíndS0309m=c(Kmínd13_S0309,Kmínd14_S0309,Kmínd15_S0309,Kmínd16_S0309,
Kmínd17_S0309,Kmínd18_S0309,Kmínd19_S0309,Kmínd23_S0309)
KmíndS0309=mean(KmíndS0309m)
summary(KmíndS0309m)
KmíndS0309m
print(paste("Kmínd_S0309 =",KmíndS0309))
```

Estación S0311 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0311D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0311D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0311D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0311D13=S0311D[1:365,6]
```

```{r}
plot(Fecha13,S0311D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2013",
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(S0311D13),lwd="3",col="red")
abline(h=max(S0311D13),lwd="3",col="black",lty=2)
abline(h=min(S0311D13),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
```

```
Qmax13_S0311=max(S0311D13)
Qp13_S0311=mean(S0311D13)
K1_13_S0311=Qmax13_S0311/Qp13_S0311
print(paste("K1 =",K1_13_S0311))

# Cálculo del coeficiente Kmínd
Qmind13_S0311=min(S0311D13)
Kmínd13_S0311=Qmind13_S0311/Qp13_S0311
print(paste("Kmínd =",Kmínd13_S0311))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0311D14=S0311D[1:365,8]
```

```{r}
plot(Fecha14,S0311D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2014",
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(S0311D14),lwd="3",col="red")
abline(h=max(S0311D14),lwd="3",col="black",lty=2)
abline(h=min(S0311D14),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
Qmax14_S0311=max(S0311D14)
Qp14_S0311=mean(S0311D14)
K1_14_S0311=Qmax14_S0311/Qp14_S0311
print(paste("K1 =",K1_14_S0311))

# Cálculo del coeficiente Kmínd
Qmind14_S0311=min(S0311D14)
Kmínd14_S0311=Qmind14_S0311/Qp14_S0311
print(paste("Kmínd =",Kmínd14_S0311))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0311D15=S0311D[1:365,10]
```

```{r}
plot(Fecha15,S0311D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2015",
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(S0311D15),lwd="3",col="red")
abline(h=max(S0311D15),lwd="3",col="black",lty=2)
abline(h=min(S0311D15),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
Qmax15_S0311=max(S0311D15)
Qp15_S0311=mean(S0311D15)
K1_15_S0311=Qmax15_S0311/Qp15_S0311
print(paste("K1 =",K1_15_S0311))

# Cálculo del coeficiente Kmínd
Qmind15_S0311=min(S0311D15)
Kmínd15_S0311=Qmind15_S0311/Qp15_S0311
print(paste("Kmínd =",Kmínd15_S0311))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0311D16=S0311D[1:366,12]
```

```{r}
plot(Fecha16,S0311D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2016",
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(S0311D16),lwd="3",col="red")
abline(h=max(S0311D16),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0311D16),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
Qmax16_S0311=max(S0311D16)
Qp16_S0311=mean(S0311D16)
K1_16_S0311=Qmax16_S0311/Qp16_S0311
print(paste("K1 =",K1_16_S0311))

# Cálculo del coeficiente Kmínd
Qmind16_S0311=min(S0311D16)
Kmínd16_S0311=Qmind16_S0311/Qp16_S0311
print(paste("Kmínd =",Kmínd16_S0311))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0311D17=S0311D[1:365,14]
```

```{r}
plot(Fecha17,S0311D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2017",
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(S0311D17),lwd="3",col="red")
abline(h=max(S0311D17),lwd="3",col="black",lty=2)
abline(h=min(S0311D17),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
Qmax17_S0311=max(S0311D17)
Qp17_S0311=mean(S0311D17)
K1_17_S0311=Qmax17_S0311/Qp17_S0311
print(paste("K1 =",K1_17_S0311))

# Cálculo del coeficiente Kmínd
Qmind17_S0311=min(S0311D17)
Kmínd17_S0311=Qmind17_S0311/Qp17_S0311
print(paste("Kmínd =",Kmínd17_S0311))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0311D18=S0311D[1:365,16]
```

```{r}
plot(Fecha18,S0311D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2018",
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(S0311D18),lwd="3",col="red")
abline(h=max(S0311D18),lwd="3",col="black",lty=2)
abline(h=min(S0311D18),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
Qmax18_S0311=max(S0311D18)
Qp18_S0311=mean(S0311D18)
K1_18_S0311=Qmax18_S0311/Qp18_S0311
print(paste("K1 =",K1_18_S0311))

# Cálculo del coeficiente Kmínd
Qmind18_S0311=min(S0311D18)
Kmínd18_S0311=Qmind18_S0311/Qp18_S0311
print(paste("Kmínd =",Kmínd18_S0311))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0311D19=S0311D[1:365,18]
```

```{r}
```

```
plot(Fecha19,S0311D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2019",
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(S0311D19),lwd="3",col="red")
abline(h=max(S0311D19),lwd="3",col="black",lty=2)
abline(h=min(S0311D19),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
Qmax19_S0311=max(S0311D19)
Qp19_S0311=mean(S0311D19)
K1_19_S0311=Qmax19_S0311/Qp19_S0311
print(paste("K1 =",K1_19_S0311))

# Cálculo del coeficiente Kmínd
Qmind19_S0311=min(S0311D19)
Kmínd19_S0311=Qmind19_S0311/Qp19_S0311
print(paste("Kmínd =",Kmínd19_S0311))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0311D23=S0311D[1:365,26]
```

```{r}
plot(Fecha23,S0311D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0311 - 2023",
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(S0311D23),lwd="3",col="red")
abline(h=max(S0311D23),lwd="3",col="black",lty=2)
abline(h=min(S0311D23),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
Qmax23_S0311=max(S0311D23)
Qp23_S0311=mean(S0311D23)
K1_23_S0311=Qmax23_S0311/Qp23_S0311
print(paste("K1 =",K1_23_S0311))

# Cálculo del coeficiente Kmínd
Qmind23_S0311=min(S0311D23)
Kmínd23_S0311=Qmind23_S0311/Qp23_S0311
print(paste("Kmínd =",Kmínd23_S0311))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0311,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0311,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0311,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0311,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0311,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0311,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0311,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0311,"l/s",": No"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0311,": No"))
print(paste("K1_14 =",K1_14_S0311,": Si"))
print(paste("K1_15 =",K1_15_S0311,": Si"))
print(paste("K1_16 =",K1_16_S0311,": Si"))
print(paste("K1_17 =",K1_17_S0311,": Si"))
print(paste("K1_18 =",K1_18_S0311,": Si"))
print(paste("K1_19 =",K1_19_S0311,": Si"))
print(paste("K1_23 =",K1_23_S0311,": No"))
```

```{r}
K1S0311m=c(K1_14_S0311,K1_15_S0311,K1_16_S0311,K1_17_S0311,K1_18_S0311,
K1_19_S0311)
K1S0311=mean(K1S0311m)
summary(K1S0311m)
K1S0311m
print(paste("K1_S0311 =",K1S0311))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0311,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0311,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0311,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0311,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0311,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0311,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0311,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0311,": No"))
```

```{r}
KmíndS0311m=c(Kmínd14_S0311,Kmínd15_S0311,Kmínd16_S0311,Kmínd17_S0311,
Kmínd18_S0311,Kmínd19_S0311)
KmíndS0311=mean(KmíndS0311m)
summary(KmíndS0311m)
KmíndS0311m
print(paste("Kmínd_S0311 =",KmíndS0311))
```

Estación S0312 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0312D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0312D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0312D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0312D13=S0312D[1:365,6]
```

```{r}
plot(Fecha13,S0312D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2013",
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(S0312D13),lwd="3",col="red")
abline(h=max(S0312D13),lwd="3",col="black",lty=2)
abline(h=min(S0312D13),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
Qmax13_S0312=max(S0312D13)
Qp13_S0312=mean(S0312D13)
K1_13_S0312=Qmax13_S0312/Qp13_S0312
print(paste("K1 =",K1_13_S0312))

# Cálculo del coeficiente Kmínd
Qmind13_S0312=min(S0312D13)
Kmínd13_S0312=Qmind13_S0312/Qp13_S0312
print(paste("Kmínd =",Kmínd13_S0312))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0312D14=S0312D[1:365,8]
```

```{r}
plot(Fecha14,S0312D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2014",
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(S0312D14),lwd="3",col="red")
abline(h=max(S0312D14),lwd="3",col="black",lty=2)
abline(h=min(S0312D14),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
Qmax14_S0312=max(S0312D14)
Qp14_S0312=mean(S0312D14)
```

```
K1_14_S0312=Qmax14_S0312/Qp14_S0312
print(paste("K1 =",K1_14_S0312))

# Cálculo del coeficiente Kmínd
Qmind14_S0312=min(S0312D14)
Kmínd14_S0312=Qmind14_S0312/Qp14_S0312
print(paste("Kmínd =",Kmínd14_S0312))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0312D15=S0312D[1:365,10]
```

```{r}
plot(Fecha15,S0312D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2015",
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(S0312D15),lwd="3",col="red")
abline(h=max(S0312D15),lwd="3",col="black",lty=2)
abline(h=min(S0312D15),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
Qmax15_S0312=max(S0312D15)
Qp15_S0312=mean(S0312D15)
K1_15_S0312=Qmax15_S0312/Qp15_S0312
print(paste("K1 =",K1_15_S0312))

# Cálculo del coeficiente Kmínd
Qmind15_S0312=min(S0312D15)
Kmínd15_S0312=Qmind15_S0312/Qp15_S0312
print(paste("Kmínd =",Kmínd15_S0312))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0312D16=S0312D[1:366,12]
```

```{r}
plot(Fecha16,S0312D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2016",
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(S0312D16),lwd="3",col="red")
abline(h=max(S0312D16),lwd="3",col="black",lty=2)
abline(h=min(S0312D16),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
Qmax16_S0312=max(S0312D16)
Qp16_S0312=mean(S0312D16)
K1_16_S0312=Qmax16_S0312/Qp16_S0312
print(paste("K1 =",K1_16_S0312))

# Cálculo del coeficiente Kmínd
Qmind16_S0312=min(S0312D16)
Kmínd16_S0312=Qmind16_S0312/Qp16_S0312
print(paste("Kmínd =",Kmínd16_S0312))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0312D17=S0312D[1:365,14]
```

```{r}
plot(Fecha17,S0312D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2017",
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(S0312D17),lwd="3",col="red")
abline(h=max(S0312D17),lwd="3",col="black",lty=2)
abline(h=min(S0312D17),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
Qmax17_S0312=max(S0312D17)
Qp17_S0312=mean(S0312D17)
K1_17_S0312=Qmax17_S0312/Qp17_S0312
print(paste("K1 =",K1_17_S0312))

# Cálculo del coeficiente Kmínd
Qmind17_S0312=min(S0312D17)
Kmínd17_S0312=Qmind17_S0312/Qp17_S0312
print(paste("Kmínd =",Kmínd17_S0312))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0312D18=S0312D[1:365,16]
```

```{r}
plot(Fecha18,S0312D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2018",
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(S0312D18),lwd="3",col="red")
abline(h=max(S0312D18),lwd="3",col="black",lty=2)
abline(h=min(S0312D18),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qd)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax18_S0312=max(S0312D18)
Qp18_S0312=mean(S0312D18)
K1_18_S0312=Qmax18_S0312/Qp18_S0312
print(paste("K1 =",K1_18_S0312))

# Cálculo del coeficiente Kmínd
Qmind18_S0312=min(S0312D18)
Kmínd18_S0312=Qmind18_S0312/Qp18_S0312
print(paste("Kmínd =",Kmínd18_S0312))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0312D19=S0312D[1:365,18]
```

```{r}
plot(Fecha19,S0312D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2019",
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(S0312D19),lwd="3",col="red")
abline(h=max(S0312D19),lwd="3",col="black",lty=2)
abline(h=min(S0312D19),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
Qmax19_S0312=max(S0312D19)
Qp19_S0312=mean(S0312D19)
K1_19_S0312=Qmax19_S0312/Qp19_S0312
print(paste("K1 =",K1_19_S0312))

# Cálculo del coeficiente Kmínd
Qmind19_S0312=min(S0312D19)
Kmínd19_S0312=Qmind19_S0312/Qp19_S0312
print(paste("Kmínd =",Kmínd19_S0312))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0312D23=S0312D[1:365,26]
```

```{r}
plot(Fecha23,S0312D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0312 - 2023",
```

```
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(S0312D23),lwd="3",col="red")
abline(h=max(S0312D23),lwd="3",col="black",lty=2)
abline(h=min(S0312D23),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
Qmax23_S0312=max(S0312D23)
Qp23_S0312=mean(S0312D23)
K1_23_S0312=Qmax23_S0312/Qp23_S0312
print(paste("K1 =",K1_23_S0312))

# Cálculo del coeficiente Kmínd
Qmind23_S0312=min(S0312D23)
Kmínd23_S0312=Qmind23_S0312/Qp23_S0312
print(paste("Kmínd =",Kmínd23_S0312))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0312,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0312,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0312,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0312,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0312,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0312,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0312,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0312,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0312,": Si"))
print(paste("K1_14 =",K1_14_S0312,": Si"))
print(paste("K1_15 =",K1_15_S0312,": Si"))
print(paste("K1_16 =",K1_16_S0312,": Si"))
print(paste("K1_17 =",K1_17_S0312,": No"))
print(paste("K1_18 =",K1_18_S0312,": Si"))
print(paste("K1_19 =",K1_19_S0312,": No"))
print(paste("K1_23 =",K1_23_S0312,": Si"))
```

```{r}
K1S0312m=c(K1_13_S0312,K1_14_S0312,K1_15_S0312,K1_16_S0312,K1_18_S0312,
K1_23_S0312)
K1S0312=mean(K1S0312m)
summary(K1S0312m)
K1S0312m
print(paste("K1_S0312 =",K1S0312))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0312,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0312,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0312,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0312,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0312,": No"))
print(paste("Kmínd_18 =",Kmínd18_S0312,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0312,": No"))
print(paste("Kmínd_23 =",Kmínd23_S0312,": Si"))
```

```{r}
KmíndS0312m=c(Kmínd13_S0312,Kmínd14_S0312,Kmínd15_S0312,Kmínd16_S0312,
Kmínd18_S0312,Kmínd23_S0312)
KmíndS0312=mean(KmíndS0312m)
summary(KmíndS0312m)
KmíndS0312m
print(paste("Kmínd_S0312 =",KmíndS0312))
```

Estación S0316 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0316D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0316D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0316D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0316D13=S0316D[1:365,6]
```

```{r}
plot(Fecha13,S0316D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2013",
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(S0316D13),lwd="3",col="red")
abline(h=max(S0316D13),lwd="3",col="black",lty=2)
abline(h=min(S0316D13),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
Qmax13_S0316=max(S0316D13)
Qp13_S0316=mean(S0316D13)
K1_13_S0316=Qmax13_S0316/Qp13_S0316
print(paste("K1 =",K1_13_S0316))

# Cálculo del coeficiente Kmínd
Qmind13_S0316=min(S0316D13)
Kmínd13_S0316=Qmind13_S0316/Qp13_S0316
print(paste("Kmínd =",Kmínd13_S0316))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0316D14=S0316D[1:365,8]
```

```{r}
plot(Fecha14,S0316D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2014",
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(S0316D14),lwd="3",col="red")
abline(h=max(S0316D14),lwd="3",col="black",lty=2)
abline(h=min(S0316D14),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
Qmax14_S0316=max(S0316D14)
Qp14_S0316=mean(S0316D14)
K1_14_S0316=Qmax14_S0316/Qp14_S0316
print(paste("K1 =",K1_14_S0316))

# Cálculo del coeficiente Kmínd
Qmind14_S0316=min(S0316D14)
Kmínd14_S0316=Qmind14_S0316/Qp14_S0316
print(paste("Kmínd =",Kmínd14_S0316))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0316D15=S0316D[1:365,10]
```

```{r}
plot(Fecha15,S0316D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2015",
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(S0316D15),lwd="3",col="red")
abline(h=max(S0316D15),lwd="3",col="black",lty=2)
abline(h=min(S0316D15),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
Qmax15_S0316=max(S0316D15)
Qp15_S0316=mean(S0316D15)
K1_15_S0316=Qmax15_S0316/Qp15_S0316
print(paste("K1 =",K1_15_S0316))
```

```
# Cálculo del coeficiente Kmínd
Qmind15_S0316=min(S0316D15)
Kmínd15_S0316=Qmind15_S0316/Qp15_S0316
print(paste("Kmínd =",Kmínd15_S0316))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0316D16=S0316D[1:366,12]
```

```{r}
plot(Fecha16,S0316D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2016",
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(S0316D16),lwd="3",col="red")
abline(h=max(S0316D16),lwd="3",col="black",lty=2)
abline(h=min(S0316D16),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
Qmax16_S0316=max(S0316D16)
Qp16_S0316=mean(S0316D16)
K1_16_S0316=Qmax16_S0316/Qp16_S0316
print(paste("K1 =",K1_16_S0316))

# Cálculo del coeficiente Kmínd
Qmind16_S0316=min(S0316D16)
Kmínd16_S0316=Qmind16_S0316/Qp16_S0316
print(paste("Kmínd =",Kmínd16_S0316))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0316D17=S0316D[1:365,14]
```

```{r}
plot(Fecha17,S0316D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2017",
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(S0316D17),lwd="3",col="red")
abline(h=max(S0316D17),lwd="3",col="black",lty=2)
abline(h=min(S0316D17),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
Qmax17_S0316=max(S0316D17)
Qp17_S0316=mean(S0316D17)
K1_17_S0316=Qmax17_S0316/Qp17_S0316
print(paste("K1 =",K1_17_S0316))

# Cálculo del coeficiente Kmínd
Qmind17_S0316=min(S0316D17)
Kmínd17_S0316=Qmind17_S0316/Qp17_S0316
print(paste("Kmínd =",Kmínd17_S0316))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0316D18=S0316D[1:365,16]
```

```{r}
plot(Fecha18,S0316D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2018",
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(S0316D18),lwd="3",col="red")
abline(h=max(S0316D18),lwd="3",col="black",lty=2)
abline(h=min(S0316D18),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
Qmax18_S0316=max(S0316D18)
Qp18_S0316=mean(S0316D18)
K1_18_S0316=Qmax18_S0316/Qp18_S0316
print(paste("K1 =",K1_18_S0316))

# Cálculo del coeficiente Kmínd
Qmind18_S0316=min(S0316D18)
Kmínd18_S0316=Qmind18_S0316/Qp18_S0316
print(paste("Kmínd =",Kmínd18_S0316))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0316D19=S0316D[1:365,18]
```

```{r}
plot(Fecha19,S0316D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2019",
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(S0316D19),lwd="3",col="red")
abline(h=max(S0316D19),lwd="3",col="black",lty=2)
abline(h=min(S0316D19),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
Qmax19_S0316=max(S0316D19)
Qp19_S0316=mean(S0316D19)
K1_19_S0316=Qmax19_S0316/Qp19_S0316
print(paste("K1 =",K1_19_S0316))

# Cálculo del coeficiente Kmínd
Qmind19_S0316=min(S0316D19)
Kmínd19_S0316=Qmind19_S0316/Qp19_S0316
print(paste("Kmínd =",Kmínd19_S0316))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0316D23=S0316D[1:365,26]
```

```{r}
plot(Fecha23,S0316D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0316 - 2023",
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(S0316D23),lwd="3",col="red")
abline(h=max(S0316D23),lwd="3",col="black",lty=2)
abline(h=min(S0316D23),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
Qmax23_S0316=max(S0316D23)
Qp23_S0316=mean(S0316D23)
K1_23_S0316=Qmax23_S0316/Qp23_S0316
print(paste("K1 =",K1_23_S0316))

# Cálculo del coeficiente Kmínd
Qmind23_S0316=min(S0316D23)
Kmínd23_S0316=Qmind23_S0316/Qp23_S0316
print(paste("Kmínd =",Kmínd23_S0316))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0316,"l/s,": Si"))
print(paste("Qp_14 =",Qp14_S0316,"l/s,": Si"))
print(paste("Qp_15 =",Qp15_S0316,"l/s,": Si"))
print(paste("Qp_16 =",Qp16_S0316,"l/s,": Si"))
print(paste("Qp_17 =",Qp17_S0316,"l/s,": No"))
print(paste("Qp_18 =",Qp18_S0316,"l/s,": Si"))
print(paste("Qp_19 =",Qp19_S0316,"l/s,": Si"))
print(paste("Qp_23 =",Qp23_S0316,"l/s,": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0316,": Si"))
print(paste("K1_14 =",K1_14_S0316,": Si"))
print(paste("K1_15 =",K1_15_S0316,": Si"))
print(paste("K1_16 =",K1_16_S0316,": Si"))
print(paste("K1_17 =",K1_17_S0316,": No"))
print(paste("K1_18 =",K1_18_S0316,": Si"))
print(paste("K1_19 =",K1_19_S0316,": Si"))
print(paste("K1_23 =",K1_23_S0316,": Si"))
```

```{r}
K1S0316m=c(K1_13_S0316,K1_14_S0316,K1_15_S0316,K1_16_S0316,K1_18_S0316,
K1_19_S0316,K1_23_S0316)
K1S0316=mean(K1S0316m)
summary(K1S0316m)
K1S0316m
print(paste("K1_S0316 =",K1S0316))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0316,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0316,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0316,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0316,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0316,": No"))
print(paste("Kmínd_18 =",Kmínd18_S0316,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0316,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0316,": Si"))
```

```{r}
KmíndS0316m=c(Kmínd13_S0316,Kmínd14_S0316,Kmínd15_S0316,Kmínd16_S0316,
Kmínd18_S0316,Kmínd19_S0316,Kmínd23_S0316)
KmíndS0316=mean(KmíndS0316m)
summary(KmíndS0316m)
KmíndS0316m
print(paste("Kmínd_S0316 =",KmíndS0316))
```

Estación S0317 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0317D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0317D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0317D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0317D13=S0317D[1:365,6]
```

```{r}
plot(Fecha13,S0317D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2013",
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(S0317D13),lwd="3",col="red")
abline(h=max(S0317D13),lwd="3",col="black",lty=2)
abline(h=min(S0317D13),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
Qmax13_S0317=max(S0317D13)
Qp13_S0317=mean(S0317D13)
K1_13_S0317=Qmax13_S0317/Qp13_S0317
print(paste("K1 =",K1_13_S0317))

# Cálculo del coeficiente Kmínd
Qmind13_S0317=min(S0317D13)
Kmínd13_S0317=Qmind13_S0317/Qp13_S0317
print(paste("Kmínd =",Kmínd13_S0317))
```

Extracción y análisis de datos del año 2014

```{r}
```

```
Fecha14=c(1:365)
S0317D14=S0317D[1:365,8]
```

```{r}
plot(Fecha14,S0317D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2014",
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(S0317D14),lwd="3",col="red")
abline(h=max(S0317D14),lwd="3",col="black",lty=2)
abline(h=min(S0317D14),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
Qmax14_S0317=max(S0317D14)
Qp14_S0317=mean(S0317D14)
K1_14_S0317=Qmax14_S0317/Qp14_S0317
print(paste("K1 =",K1_14_S0317))

# Cálculo del coeficiente Kmínd
Qmind14_S0317=min(S0317D14)
Kmínd14_S0317=Qmind14_S0317/Qp14_S0317
print(paste("Kmínd =",Kmínd14_S0317))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0317D15=S0317D[1:365,10]
```

```{r}
plot(Fecha15,S0317D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2015",
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(S0317D15),lwd="3",col="red")
abline(h=max(S0317D15),lwd="3",col="black",lty=2)
abline(h=min(S0317D15),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
Qmax15_S0317=max(S0317D15)
Qp15_S0317=mean(S0317D15)
K1_15_S0317=Qmax15_S0317/Qp15_S0317
print(paste("K1 =",K1_15_S0317))

# Cálculo del coeficiente Kmínd
Qmind15_S0317=min(S0317D15)
Kmínd15_S0317=Qmind15_S0317/Qp15_S0317
print(paste("Kmínd =",Kmínd15_S0317))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0317D16=S0317D[1:366,12]
```

```{r}
plot(Fecha16,S0317D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2016",
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(S0317D16),lwd="3",col="red")
abline(h=max(S0317D16),lwd="3",col="black",lty=2)
abline(h=min(S0317D16),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
Qmax16_S0317=max(S0317D16)
Qp16_S0317=mean(S0317D16)
K1_16_S0317=Qmax16_S0317/Qp16_S0317
print(paste("K1 =",K1_16_S0317))

# Cálculo del coeficiente Kmínd
```

```
Qmind16_S0317=min(S0317D16)
Kmínd16_S0317=Qmind16_S0317/Qp16_S0317
print(paste("Kmínd =",Kmínd16_S0317))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0317D17=S0317D[1:365,14]
```

```{r}
plot(Fecha17,S0317D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2017",
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(S0317D17),lwd="3",col="red")
abline(h=max(S0317D17),lwd="3",col="black",lty=2)
abline(h=min(S0317D17),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
Qmax17_S0317=max(S0317D17)
Qp17_S0317=mean(S0317D17)
K1_17_S0317=Qmax17_S0317/Qp17_S0317
print(paste("K1 =",K1_17_S0317))

# Cálculo del coeficiente Kmínd
Qmind17_S0317=min(S0317D17)
Kmínd17_S0317=Qmind17_S0317/Qp17_S0317
print(paste("Kmínd =",Kmínd17_S0317))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0317D18=S0317D[1:365,16]
```

```{r}
plot(Fecha18,S0317D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2018",
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(S0317D18),lwd="3",col="red")
abline(h=max(S0317D18),lwd="3",col="black",lty=2)
abline(h=min(S0317D18),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qd)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax18_S0317=max(S0317D18)
Qp18_S0317=mean(S0317D18)
K1_18_S0317=Qmax18_S0317/Qp18_S0317
print(paste("K1 =",K1_18_S0317))

# Cálculo del coeficiente Kmínd
Qmind18_S0317=min(S0317D18)
Kmínd18_S0317=Qmind18_S0317/Qp18_S0317
print(paste("Kmínd =",Kmínd18_S0317))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0317D19=S0317D[1:365,18]
```

```{r}
plot(Fecha19,S0317D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2019",
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(S0317D19),lwd="3",col="red")
abline(h=max(S0317D19),lwd="3",col="black",lty=2)
abline(h=min(S0317D19),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
Qmax19_S0317=max(S0317D19)
Qp19_S0317=mean(S0317D19)
K1_19_S0317=Qmax19_S0317/Qp19_S0317
print(paste("K1 =",K1_19_S0317))

# Cálculo del coeficiente Kmínd
Qmind19_S0317=min(S0317D19)
Kmínd19_S0317=Qmind19_S0317/Qp19_S0317
print(paste("Kmínd =",Kmínd19_S0317))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0317D23=S0317D[1:365,26]
```

```{r}
plot(Fecha23,S0317D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0317 - 2023",
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(S0317D23),lwd="3",col="red")
abline(h=max(S0317D23),lwd="3",col="black",lty=2)
abline(h=min(S0317D23),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
Qmax23_S0317=max(S0317D23)
Qp23_S0317=mean(S0317D23)
K1_23_S0317=Qmax23_S0317/Qp23_S0317
print(paste("K1 =",K1_23_S0317))

# Cálculo del coeficiente Kmínd
Qmind23_S0317=min(S0317D23)
Kmínd23_S0317=Qmind23_S0317/Qp23_S0317
print(paste("Kmínd =",Kmínd23_S0317))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0317,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0317,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0317,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0317,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0317,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0317,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0317,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0317,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0317,": Si"))
print(paste("K1_14 =",K1_14_S0317,": Si"))
print(paste("K1_15 =",K1_15_S0317,": No"))
print(paste("K1_16 =",K1_16_S0317,": Si"))
print(paste("K1_17 =",K1_17_S0317,": Si"))
print(paste("K1_18 =",K1_18_S0317,": Si"))
print(paste("K1_19 =",K1_19_S0317,": Si"))
print(paste("K1_23 =",K1_23_S0317,": Si"))
```

```{r}
K1S0317m=c(K1_13_S0317,K1_14_S0317,K1_16_S0317,K1_17_S0317,K1_18_S0317,
K1_19_S0317,K1_23_S0317)
K1S0317=mean(K1S0317m)
summary(K1S0317m)
K1S0317m
print(paste("K1_S0317 =",K1S0317))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0317,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0317,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0317,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0317,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0317,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0317,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0317,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0317,": Si"))
```

```{r}
```

```
KmíndS0317m=c(Kmínd13_S0317,Kmínd14_S0317,Kmínd16_S0317,Kmínd17_S0317,
Kmínd18_S0317,Kmínd19_S0317,Kmínd23_S0317)
KmíndS0317=mean(KmíndS0317m)
summary(KmíndS0317m)
KmíndS0317m
print(paste("Kmínd_S0317 =",KmíndS0317))
```

Estación S0318 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0318D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0318D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0318D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0318D13=S0318D[1:365,6]
```

```{r}
plot(Fecha13,S0318D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2013",
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(S0318D13),lwd="3",col="red")
abline(h=max(S0318D13),lwd="3",col="black",lty=2)
abline(h=min(S0318D13),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
Qmax13_S0318=max(S0318D13)
Qp13_S0318=mean(S0318D13)
K1_13_S0318=Qmax13_S0318/Qp13_S0318
print(paste("K1 =",K1_13_S0318))

# Cálculo del coeficiente Kmínd
Qmind13_S0318=min(S0318D13)
Kmínd13_S0318=Qmind13_S0318/Qp13_S0318
print(paste("Kmínd =",Kmínd13_S0318))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0318D14=S0318D[1:365,8]
```

```{r}
plot(Fecha14,S0318D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2014",
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(S0318D14),lwd="3",col="red")
abline(h=max(S0318D14),lwd="3",col="black",lty=2)
abline(h=min(S0318D14),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
Qmax14_S0318=max(S0318D14)
Qp14_S0318=mean(S0318D14)
K1_14_S0318=Qmax14_S0318/Qp14_S0318
print(paste("K1 =",K1_14_S0318))

# Cálculo del coeficiente Kmínd
Qmind14_S0318=min(S0318D14)
Kmínd14_S0318=Qmind14_S0318/Qp14_S0318
print(paste("Kmínd =",Kmínd14_S0318))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0318D15=S0318D[1:365,10]
```

```
```

```{r}
plot(Fecha15,S0318D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2015",
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(S0318D15),lwd="3",col="red")
abline(h=max(S0318D15),lwd="3",col="black",lty=2)
abline(h=min(S0318D15),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
Qmax15_S0318=max(S0318D15)
Qp15_S0318=mean(S0318D15)
K1_15_S0318=Qmax15_S0318/Qp15_S0318
print(paste("K1 =",K1_15_S0318))

# Cálculo del coeficiente Kmínd
Qmind15_S0318=min(S0318D15)
Kmínd15_S0318=Qmind15_S0318/Qp15_S0318
print(paste("Kmínd =",Kmínd15_S0318))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0318D16=S0318D[1:366,12]
```

```{r}
plot(Fecha16,S0318D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2016",
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(S0318D16),lwd="3",col="red")
abline(h=max(S0318D16),lwd="3",col="black",lty=2)
abline(h=min(S0318D16),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
Qmax16_S0318=max(S0318D16)
Qp16_S0318=mean(S0318D16)
K1_16_S0318=Qmax16_S0318/Qp16_S0318
print(paste("K1 =",K1_16_S0318))

# Cálculo del coeficiente Kmínd
Qmind16_S0318=min(S0318D16)
Kmínd16_S0318=Qmind16_S0318/Qp16_S0318
print(paste("Kmínd =",Kmínd16_S0318))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0318D17=S0318D[1:365,14]
```

```{r}
plot(Fecha17,S0318D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2017",
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(S0318D17),lwd="3",col="red")
abline(h=max(S0318D17),lwd="3",col="black",lty=2)
abline(h=min(S0318D17),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
Qmax17_S0318=max(S0318D17)
Qp17_S0318=mean(S0318D17)
K1_17_S0318=Qmax17_S0318/Qp17_S0318
print(paste("K1 =",K1_17_S0318))

# Cálculo del coeficiente Kmínd
Qmind17_S0318=min(S0318D17)
Kmínd17_S0318=Qmind17_S0318/Qp17_S0318
```

```
print(paste("Kmínd =",Kmínd17_S0318))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0318D18=S0318D[1:365,16]
```

```{r}
plot(Fecha18,S0318D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2018",
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(S0318D18),lwd="3",col="red")
abline(h=max(S0318D18),lwd="3",col="black",lty=2)
abline(h=min(S0318D18),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(0,-0.34),
legend=c("Promedio diario (Qd)","Promedio anual (Qd)"),
lwd=3,col=c("blue","red"),xpd=TRUE)
```

```{r}
# Cálculo del coeficiente K1
Qmax18_S0318=max(S0318D18)
Qp18_S0318=mean(S0318D18)
K1_18_S0318=Qmax18_S0318/Qp18_S0318
print(paste("K1 =",K1_18_S0318))

# Cálculo del coeficiente Kmínd
Qmind18_S0318=min(S0318D18)
Kmínd18_S0318=Qmind18_S0318/Qp18_S0318
print(paste("Kmínd =",Kmínd18_S0318))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0318D19=S0318D[1:365,18]
```

```{r}
plot(Fecha19,S0318D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2019",
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(S0318D19),lwd="3",col="red")
abline(h=max(S0318D19),lwd="3",col="black",lty=2)
abline(h=min(S0318D19),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
Qmax19_S0318=max(S0318D19)
Qp19_S0318=mean(S0318D19)
K1_19_S0318=Qmax19_S0318/Qp19_S0318
print(paste("K1 =",K1_19_S0318))

# Cálculo del coeficiente Kmínd
Qmind19_S0318=min(S0318D19)
Kmínd19_S0318=Qmind19_S0318/Qp19_S0318
print(paste("Kmínd =",Kmínd19_S0318))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0318D23=S0318D[1:365,26]
```

```{r}
plot(Fecha23,S0318D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0318 - 2023",
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(S0318D23),lwd="3",col="red")
abline(h=max(S0318D23),lwd="3",col="black",lty=2)
abline(h=min(S0318D23),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
```

```
Qmax23_S0318=max(S0318D23)
Qp23_S0318=mean(S0318D23)
K1_23_S0318=Qmax23_S0318/Qp23_S0318
print(paste("K1 =",K1_23_S0318))

# Cálculo del coeficiente Kmínd
Qmind23_S0318=min(S0318D23)
Kmínd23_S0318=Qmind23_S0318/Qp23_S0318
print(paste("Kmínd =",Kmínd23_S0318))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0318,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0318,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0318,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0318,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0318,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0318,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0318,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0318,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0318,": Si"))
print(paste("K1_14 =",K1_14_S0318,": Si"))
print(paste("K1_15 =",K1_15_S0318,": Si"))
print(paste("K1_16 =",K1_16_S0318,": Si"))
print(paste("K1_17 =",K1_17_S0318,": Si"))
print(paste("K1_18 =",K1_18_S0318,": Si"))
print(paste("K1_19 =",K1_19_S0318,": No"))
print(paste("K1_23 =",K1_23_S0318,": Si"))
```

```{r}
K1S0318m=c(K1_13_S0318,K1_14_S0318,K1_15_S0318,K1_16_S0318,K1_17_S0318,
K1_18_S0318,K1_23_S0318)
K1S0318=mean(K1S0318m)
summary(K1S0318m)
K1S0318m
print(paste("K1_S0318 =",K1S0318))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0318,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0318,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0318,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0318,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0318,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0318,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0318,": No"))
print(paste("Kmínd_23 =",Kmínd23_S0318,": Si"))
```

```{r}
KmíndS0318m=c(Kmínd13_S0318,Kmínd14_S0318,Kmínd15_S0318,Kmínd16_S0318,
Kmínd17_S0318,Kmínd18_S0318,Kmínd23_S0318)
KmíndS0318=mean(KmíndS0318m)
summary(KmíndS0318m)
KmíndS0318m
print(paste("Kmínd_S0318 =",KmíndS0318))
```

Estación S0319 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0319D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0319D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0319D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0319D13=S0319D[1:365,6]
```

```{r}
plot(Fecha13,S0319D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2013",
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(S0319D13),lwd="3",col="red")
```

```
abline(h=max(S0319D13),lwd="3",col="black",lty=2)
abline(h=min(S0319D13),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
Qmax13_S0319=max(S0319D13)
Qp13_S0319=mean(S0319D13)
K1_13_S0319=Qmax13_S0319/Qp13_S0319
print(paste("K1 =",K1_13_S0319))

# Cálculo del coeficiente Kmínd
Qmind13_S0319=min(S0319D13)
Kmínd13_S0319=Qmind13_S0319/Qp13_S0319
print(paste("Kmínd =",Kmínd13_S0319))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0319D14=S0319D[1:365,8]
```

```{r}
plot(Fecha14,S0319D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2014",
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(S0319D14),lwd="3",col="red")
abline(h=max(S0319D14),lwd="3",col="black",lty=2)
abline(h=min(S0319D14),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
Qmax14_S0319=max(S0319D14)
Qp14_S0319=mean(S0319D14)
K1_14_S0319=Qmax14_S0319/Qp14_S0319
print(paste("K1 =",K1_14_S0319))

# Cálculo del coeficiente Kmínd
Qmind14_S0319=min(S0319D14)
Kmínd14_S0319=Qmind14_S0319/Qp14_S0319
print(paste("Kmínd =",Kmínd14_S0319))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0319D15=S0319D[1:365,10]
```

```{r}
plot(Fecha15,S0319D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2015",
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(S0319D15),lwd="3",col="red")
abline(h=max(S0319D15),lwd="3",col="black",lty=2)
abline(h=min(S0319D15),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
Qmax15_S0319=max(S0319D15)
Qp15_S0319=mean(S0319D15)
K1_15_S0319=Qmax15_S0319/Qp15_S0319
print(paste("K1 =",K1_15_S0319))

# Cálculo del coeficiente Kmínd
Qmind15_S0319=min(S0319D15)
Kmínd15_S0319=Qmind15_S0319/Qp15_S0319
print(paste("Kmínd =",Kmínd15_S0319))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0319D16=S0319D[1:366,12]
```

```{r}
plot(Fecha16,S0319D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2016",
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(S0319D16),lwd="3",col="red")
abline(h=max(S0319D16),lwd="3",col="black",lty=2)
abline(h=min(S0319D16),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
Qmax16_S0319=max(S0319D16)
Qp16_S0319=mean(S0319D16)
K1_16_S0319=Qmax16_S0319/Qp16_S0319
print(paste("K1 =",K1_16_S0319))

# Cálculo del coeficiente Kmínd
Qmind16_S0319=min(S0319D16)
Kmínd16_S0319=Qmind16_S0319/Qp16_S0319
print(paste("Kmínd =",Kmínd16_S0319))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0319D17=S0319D[1:365,14]
```

```{r}
plot(Fecha17,S0319D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2017",
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(S0319D17),lwd="3",col="red")
abline(h=max(S0319D17),lwd="3",col="black",lty=2)
abline(h=min(S0319D17),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
Qmax17_S0319=max(S0319D17)
Qp17_S0319=mean(S0319D17)
K1_17_S0319=Qmax17_S0319/Qp17_S0319
print(paste("K1 =",K1_17_S0319))

# Cálculo del coeficiente Kmínd
Qmind17_S0319=min(S0319D17)
Kmínd17_S0319=Qmind17_S0319/Qp17_S0319
print(paste("Kmínd =",Kmínd17_S0319))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0319D18=S0319D[1:365,16]
```

```{r}
plot(Fecha18,S0319D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2018",
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(S0319D18),lwd="3",col="red")
abline(h=max(S0319D18),lwd="3",col="black",lty=2)
abline(h=min(S0319D18),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
Qmax18_S0319=max(S0319D18)
Qp18_S0319=mean(S0319D18)
K1_18_S0319=Qmax18_S0319/Qp18_S0319
print(paste("K1 =",K1_18_S0319))

# Cálculo del coeficiente Kmínd
Qmind18_S0319=min(S0319D18)
Kmínd18_S0319=Qmind18_S0319/Qp18_S0319
print(paste("Kmínd =",Kmínd18_S0319))
```

Extracción y análisis de datos del año 2019

```{r}
# Año con datos incompletos en el sistema SCADA de SEDAPAL
Fecha19=c(1:365)
S0319D19=S0319D[1:365,18]
```

```{r}
plot(Fecha19,S0319D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2019",
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(S0319D19),lwd="3",col="red")
abline(h=max(S0319D19),lwd="3",col="black",lty=2)
abline(h=min(S0319D19),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
Qmax19_S0319=max(S0319D19)
Qp19_S0319=mean(S0319D19)
K1_19_S0319=Qmax19_S0319/Qp19_S0319
print(paste("K1 =",K1_19_S0319))

# Cálculo del coeficiente Kmínd
Qmind19_S0319=min(S0319D19)
Kmínd19_S0319=Qmind19_S0319/Qp19_S0319
print(paste("Kmínd =",Kmínd19_S0319))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0319D23=S0319D[1:365,26]
```

```{r}
plot(Fecha23,S0319D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0319 - 2023",
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(S0319D23),lwd="3",col="red")
abline(h=max(S0319D23),lwd="3",col="black",lty=2)
abline(h=min(S0319D23),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
Qmax23_S0319=max(S0319D23)
Qp23_S0319=mean(S0319D23)
K1_23_S0319=Qmax23_S0319/Qp23_S0319
print(paste("K1 =",K1_23_S0319))

# Cálculo del coeficiente Kmínd
Qmind23_S0319=min(S0319D23)
Kmínd23_S0319=Qmind23_S0319/Qp23_S0319
print(paste("Kmínd =",Kmínd23_S0319))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0319,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0319,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0319,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0319,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0319,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0319,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0319,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0319,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0319,": Si"))
print(paste("K1_14 =",K1_14_S0319,": Si"))
print(paste("K1_15 =",K1_15_S0319,": Si"))
print(paste("K1_16 =",K1_16_S0319,": Si"))
print(paste("K1_17 =",K1_17_S0319,": Si"))
print(paste("K1_18 =",K1_18_S0319,": Si"))
print(paste("K1_19 =",K1_19_S0319,": No"))
print(paste("K1_23 =",K1_23_S0319,": Si"))
```

```{r}
K1S0319m=c(K1_13_S0319,K1_14_S0319,K1_15_S0319,K1_16_S0319,K1_17_S0319,
K1_18_S0319,K1_23_S0319)
K1S0319=mean(K1S0319m)
summary(K1S0319m)
K1S0319m
print(paste("K1_S0319 =",K1S0319))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0319,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0319,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0319,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0319,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0319,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0319,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0319,": No"))
print(paste("Kmínd_23 =",Kmínd23_S0319,": Si"))
```

```{r}
KmíndS0319m=c(Kmínd13_S0319,Kmínd14_S0319,Kmínd15_S0319,Kmínd16_S0319,
Kmínd17_S0319,Kmínd18_S0319,Kmínd23_S0319)
KmíndS0319=mean(KmíndS0319m)
summary(KmíndS0319m)
KmíndS0319m
print(paste("Kmínd_S0319 =",KmíndS0319))
```

Estación S0320 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0320D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0320D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0320D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0320D13=S0320D[1:365,6]
```

```{r}
plot(Fecha13,S0320D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2013",
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(S0320D13),lwd="3",col="red")
abline(h=max(S0320D13),lwd="3",col="black",lty=2)
abline(h=min(S0320D13),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
Qmax13_S0320=max(S0320D13)
Qp13_S0320=mean(S0320D13)
K1_13_S0320=Qmax13_S0320/Qp13_S0320
print(paste("K1 =",K1_13_S0320))

# Cálculo del coeficiente Kmínd
Qmind13_S0320=min(S0320D13)
Kmínd13_S0320=Qmind13_S0320/Qp13_S0320
print(paste("Kmínd =",Kmínd13_S0320))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0320D14=S0320D[1:365,8]
```

```{r}
plot(Fecha14,S0320D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2014",
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(S0320D14),lwd="3",col="red")
abline(h=max(S0320D14),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0320D14),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
Qmax14_S0320=max(S0320D14)
Qp14_S0320=mean(S0320D14)
K1_14_S0320=Qmax14_S0320/Qp14_S0320
print(paste("K1 =",K1_14_S0320))

# Cálculo del coeficiente Kmínd
Qmind14_S0320=min(S0320D14)
Kmínd14_S0320=Qmind14_S0320/Qp14_S0320
print(paste("Kmínd =",Kmínd14_S0320))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0320D15=S0320D[1:365,10]
```

```{r}
plot(Fecha15,S0320D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2015",
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(S0320D15),lwd="3",col="red")
abline(h=max(S0320D15),lwd="3",col="black",lty=2)
abline(h=min(S0320D15),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
Qmax15_S0320=max(S0320D15)
Qp15_S0320=mean(S0320D15)
K1_15_S0320=Qmax15_S0320/Qp15_S0320
print(paste("K1 =",K1_15_S0320))

# Cálculo del coeficiente Kmínd
Qmind15_S0320=min(S0320D15)
Kmínd15_S0320=Qmind15_S0320/Qp15_S0320
print(paste("Kmínd =",Kmínd15_S0320))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0320D16=S0320D[1:366,12]
```

```{r}
plot(Fecha16,S0320D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2016",
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(S0320D16),lwd="3",col="red")
abline(h=max(S0320D16),lwd="3",col="black",lty=2)
abline(h=min(S0320D16),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
Qmax16_S0320=max(S0320D16)
Qp16_S0320=mean(S0320D16)
K1_16_S0320=Qmax16_S0320/Qp16_S0320
print(paste("K1 =",K1_16_S0320))

# Cálculo del coeficiente Kmínd
Qmind16_S0320=min(S0320D16)
Kmínd16_S0320=Qmind16_S0320/Qp16_S0320
print(paste("Kmínd =",Kmínd16_S0320))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0320D17=S0320D[1:365,14]
```

```{r}
```

```
plot(Fecha17,S0320D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2017",
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(S0320D17),lwd="3",col="red")
abline(h=max(S0320D17),lwd="3",col="black",lty=2)
abline(h=min(S0320D17),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
Qmax17_S0320=max(S0320D17)
Qp17_S0320=mean(S0320D17)
K1_17_S0320=Qmax17_S0320/Qp17_S0320
print(paste("K1 =",K1_17_S0320))

# Cálculo del coeficiente Kmínd
Qmind17_S0320=min(S0320D17)
Kmínd17_S0320=Qmind17_S0320/Qp17_S0320
print(paste("Kmínd =",Kmínd17_S0320))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0320D18=S0320D[1:365,16]
```

```{r}
plot(Fecha18,S0320D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2018",
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(S0320D18),lwd="3",col="red")
abline(h=max(S0320D18),lwd="3",col="black",lty=2)
abline(h=min(S0320D18),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
Qmax18_S0320=max(S0320D18)
Qp18_S0320=mean(S0320D18)
K1_18_S0320=Qmax18_S0320/Qp18_S0320
print(paste("K1 =",K1_18_S0320))

# Cálculo del coeficiente Kmínd
Qmind18_S0320=min(S0320D18)
Kmínd18_S0320=Qmind18_S0320/Qp18_S0320
print(paste("Kmínd =",Kmínd18_S0320))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0320D19=S0320D[1:365,18]
```

```{r}
plot(Fecha19,S0320D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2019",
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(S0320D19),lwd="3",col="red")
abline(h=max(S0320D19),lwd="3",col="black",lty=2)
abline(h=min(S0320D19),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
Qmax19_S0320=max(S0320D19)
Qp19_S0320=mean(S0320D19)
K1_19_S0320=Qmax19_S0320/Qp19_S0320
print(paste("K1 =",K1_19_S0320))

# Cálculo del coeficiente Kmínd
Qmind19_S0320=min(S0320D19)
Kmínd19_S0320=Qmind19_S0320/Qp19_S0320
print(paste("Kmínd =",Kmínd19_S0320))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0320D23=S0320D[1:365,26]
```

```{r}
plot(Fecha23,S0320D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0320 - 2023",
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(S0320D23),lwd="3",col="red")
abline(h=max(S0320D23),lwd="3",col="black",lty=2)
abline(h=min(S0320D23),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
Qmax23_S0320=max(S0320D23)
Qp23_S0320=mean(S0320D23)
K1_23_S0320=Qmax23_S0320/Qp23_S0320
print(paste("K1 =",K1_23_S0320))

# Cálculo del coeficiente Kmínd
Qmind23_S0320=min(S0320D23)
Kmínd23_S0320=Qmind23_S0320/Qp23_S0320
print(paste("Kmínd =",Kmínd23_S0320))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0320,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0320,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0320,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0320,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0320,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0320,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0320,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0320,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0320,": Si"))
print(paste("K1_14 =",K1_14_S0320,": Si"))
print(paste("K1_15 =",K1_15_S0320,": Si"))
print(paste("K1_16 =",K1_16_S0320,": Si"))
print(paste("K1_17 =",K1_17_S0320,": Si"))
print(paste("K1_18 =",K1_18_S0320,": Si"))
print(paste("K1_19 =",K1_19_S0320,": Si"))
print(paste("K1_23 =",K1_23_S0320,": Si"))
```

```{r}
K1S0320m=c(K1_13_S0320,K1_14_S0320,K1_15_S0320,K1_16_S0320,K1_17_S0320,
K1_18_S0320,K1_19_S0320,K1_23_S0320)
K1S0320=mean(K1S0320m)
summary(K1S0320m)
K1S0320m
print(paste("K1_S0320 =",K1S0320))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0320,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0320,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0320,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0320,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0320,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0320,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0320,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0320,": Si"))
```

```{r}
KmíndS0320m=c(Kmínd13_S0320,Kmínd14_S0320,Kmínd15_S0320,Kmínd16_S0320,
Kmínd17_S0320,Kmínd18_S0320,Kmínd19_S0320,Kmínd23_S0320)
KmíndS0320=mean(KmíndS0320m)
summary(KmíndS0320m)
KmíndS0320m
print(paste("Kmínd_S0320 =",KmíndS0320))
```

Estación S0322 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
```

S0322D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0322D.csv",sep=";")
```

### Visualización de la base de datos

```{r}
# View(S0322D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0322D13=S0322D[1:365,6]
```

```{r}
plot(Fecha13,S0322D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2013",
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(S0322D13),lwd="3",col="red")
abline(h=max(S0322D13),lwd="3",col="black",lty=2)
abline(h=min(S0322D13),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 de K1
Qmax13_S0322=max(S0322D13)
Qp13_S0322=mean(S0322D13)
K1_13_S0322=Qmax13_S0322/Qp13_S0322
print(paste("K1 =",K1_13_S0322))

# Cálculo de Kmínd
Qmind13_S0322=min(S0322D13)
Kmínd13_S0322=Qmind13_S0322/Qp13_S0322
print(paste("Kmínd =",Kmínd13_S0322))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0322D14=S0322D[1:365,8]
```

```{r}
plot(Fecha14,S0322D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2014",
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(S0322D14),lwd="3",col="red")
abline(h=max(S0322D14),lwd="3",col="black",lty=2)
abline(h=min(S0322D14),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
Qmax14_S0322=max(S0322D14)
Qp14_S0322=mean(S0322D14)
K1_14_S0322=Qmax14_S0322/Qp14_S0322
print(paste("K1 =",K1_14_S0322))

# Cálculo del coeficiente Kmínd
Qmind14_S0322=min(S0322D14)
Kmínd14_S0322=Qmind14_S0322/Qp14_S0322
print(paste("Kmínd =",Kmínd14_S0322))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0322D15=S0322D[1:365,10]
```

```{r}
plot(Fecha15,S0322D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2015",
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(S0322D15),lwd="3",col="red")
abline(h=max(S0322D15),lwd="3",col="black",lty=2)
abline(h=min(S0322D15),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
Qmax15_S0322=max(S0322D15)
Qp15_S0322=mean(S0322D15)
K1_15_S0322=Qmax15_S0322/Qp15_S0322
print(paste("K1 =",K1_15_S0322))

# Cálculo del coeficiente Kmínd
Qmind15_S0322=min(S0322D15)
Kmínd15_S0322=Qmind15_S0322/Qp15_S0322
print(paste("Kmínd =",Kmínd15_S0322))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0322D16=S0322D[1:366,12]
```

```{r}
plot(Fecha16,S0322D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2016",
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(S0322D16),lwd="3",col="red")
abline(h=max(S0322D16),lwd="3",col="black",lty=2)
abline(h=min(S0322D16),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
Qmax16_S0322=max(S0322D16)
Qp16_S0322=mean(S0322D16)
K1_16_S0322=Qmax16_S0322/Qp16_S0322
print(paste("K1 =",K1_16_S0322))

# Cálculo del coeficiente Kmínd
Qmind16_S0322=min(S0322D16)
Kmínd16_S0322=Qmind16_S0322/Qp16_S0322
print(paste("Kmínd =",Kmínd16_S0322))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0322D17=S0322D[1:365,14]
```

```{r}
plot(Fecha17,S0322D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2017",
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(S0322D17),lwd="3",col="red")
abline(h=max(S0322D17),lwd="3",col="black",lty=2)
abline(h=min(S0322D17),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
Qmax17_S0322=max(S0322D17)
Qp17_S0322=mean(S0322D17)
K1_17_S0322=Qmax17_S0322/Qp17_S0322
print(paste("K1 =",K1_17_S0322))

# Cálculo del coeficiente Kmínd
Qmind17_S0322=min(S0322D17)
Kmínd17_S0322=Qmind17_S0322/Qp17_S0322
print(paste("Kmínd =",Kmínd17_S0322))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0322D18=S0322D[1:365,16]
```

```{r}
plot(Fecha18,S0322D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2018",
```

```
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(S0322D18),lwd="3",col="red")
abline(h=max(S0322D18),lwd="3",col="black",lty=2)
abline(h=min(S0322D18),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
Qmax18_S0322=max(S0322D18)
Qp18_S0322=mean(S0322D18)
K1_18_S0322=Qmax18_S0322/Qp18_S0322
print(paste("K1 =",K1_18_S0322))

# Cálculo del coeficiente Kmínd
Qmind18_S0322=min(S0322D18)
Kmínd18_S0322=Qmind18_S0322/Qp18_S0322
print(paste("Kmínd =",Kmínd18_S0322))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0322D19=S0322D[1:365,18]
```

```{r}
plot(Fecha19,S0322D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2019",
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(S0322D19),lwd="3",col="red")
abline(h=max(S0322D19),lwd="3",col="black",lty=2)
abline(h=min(S0322D19),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
Qmax19_S0322=max(S0322D19)
Qp19_S0322=mean(S0322D19)
K1_19_S0322=Qmax19_S0322/Qp19_S0322
print(paste("K1 =",K1_19_S0322))

# Cálculo del coeficiente Kmínd
Qmind19_S0322=min(S0322D19)
Kmínd19_S0322=Qmind19_S0322/Qp19_S0322
print(paste("Kmínd =",Kmínd19_S0322))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0322D23=S0322D[1:365,26]
```

```{r}
plot(Fecha23,S0322D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0322 - 2023",
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(S0322D23),lwd="3",col="red")
abline(h=max(S0322D23),lwd="3",col="black",lty=2)
abline(h=min(S0322D23),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
Qmax23_S0322=max(S0322D23)
Qp23_S0322=mean(S0322D23)
K1_23_S0322=Qmax23_S0322/Qp23_S0322
print(paste("K1 =",K1_23_S0322))

# Cálculo del coeficiente Kmínd
Qmind23_S0322=min(S0322D23)
Kmínd23_S0322=Qmind23_S0322/Qp23_S0322
print(paste("Kmínd =",Kmínd23_S0322))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0322,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0322,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0322,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0322,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0322,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0322,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0322,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0322,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0322,": Si"))
print(paste("K1_14 =",K1_14_S0322,": Si"))
print(paste("K1_15 =",K1_15_S0322,": Si"))
print(paste("K1_16 =",K1_16_S0322,": Si"))
print(paste("K1_17 =",K1_17_S0322,": No"))
print(paste("K1_18 =",K1_18_S0322,": Si"))
print(paste("K1_19 =",K1_19_S0322,": Si"))
print(paste("K1_23 =",K1_23_S0322,": Si"))
```

```{r}
K1S0322m=c(K1_13_S0322,K1_14_S0322,K1_15_S0322,K1_16_S0322,K1_18_S0322,
K1_19_S0322,K1_23_S0322)
K1S0322=mean(K1S0322m)
summary(K1S0322m)
K1S0322m
print(paste("K1_S0322 =",K1S0322))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0322,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0322,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0322,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0322,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0322,": No"))
print(paste("Kmínd_18 =",Kmínd18_S0322,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0322,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0322,": Si"))
```

```{r}
KmíndS0322m=c(Kmínd13_S0322,Kmínd14_S0322,Kmínd15_S0322,Kmínd16_S0322,
Kmínd18_S0322,Kmínd19_S0322,Kmínd23_S0322)
KmíndS0322=mean(KmíndS0322m)
summary(KmíndS0322m)
KmíndS0322m
print(paste("Kmínd_S0322 =",KmíndS0322))
```

Estación S0324 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0324D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0324D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0324D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0324D13=S0324D[1:365,6]
```

```{r}
plot(Fecha13,S0324D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2013",
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(S0324D13),lwd="3",col="red")
abline(h=max(S0324D13),lwd="3",col="black",lty=2)
abline(h=min(S0324D13),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
Qmax13_S0324=max(S0324D13)
Qp13_S0324=mean(S0324D13)
K1_13_S0324=Qmax13_S0324/Qp13_S0324
print(paste("K1 =",K1_13_S0324))
```

```
# Cálculo del coeficiente Kmínd
Qmind13_S0324=min(S0324D13)
Kmínd13_S0324=Qmind13_S0324/Qp13_S0324
print(paste("Kmínd =",Kmínd13_S0324))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0324D14=S0324D[1:365,8]
```

```{r}
plot(Fecha14,S0324D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2014",
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(S0324D14),lwd="3",col="red")
abline(h=max(S0324D14),lwd="3",col="black",lty=2)
abline(h=min(S0324D14),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
Qmax14_S0324=max(S0324D14)
Qp14_S0324=mean(S0324D14)
K1_14_S0324=Qmax14_S0324/Qp14_S0324
print(paste("K1 =",K1_14_S0324))

# Cálculo del coeficiente Kmínd
Qmind14_S0324=min(S0324D14)
Kmínd14_S0324=Qmind14_S0324/Qp14_S0324
print(paste("Kmínd =",Kmínd14_S0324))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0324D15=S0324D[1:365,10]
```

```{r}
plot(Fecha15,S0324D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2015",
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(S0324D15),lwd="3",col="red")
abline(h=max(S0324D15),lwd="3",col="black",lty=2)
abline(h=min(S0324D15),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
Qmax15_S0324=max(S0324D15)
Qp15_S0324=mean(S0324D15)
K1_15_S0324=Qmax15_S0324/Qp15_S0324
print(paste("K1 =",K1_15_S0324))

# Cálculo del coeficiente Kmínd
Qmind15_S0324=min(S0324D15)
Kmínd15_S0324=Qmind15_S0324/Qp15_S0324
print(paste("Kmínd =",Kmínd15_S0324))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0324D16=S0324D[1:366,12]
```

```{r}
plot(Fecha16,S0324D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2016",
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(S0324D16),lwd="3",col="red")
abline(h=max(S0324D16),lwd="3",col="black",lty=2)
abline(h=min(S0324D16),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
Qmax16_S0324=max(S0324D16)
Qp16_S0324=mean(S0324D16)
K1_16_S0324=Qmax16_S0324/Qp16_S0324
print(paste("K1 =",K1_16_S0324))

# Cálculo del coeficiente Kmínd
Qmind16_S0324=min(S0324D16)
Kmínd16_S0324=Qmind16_S0324/Qp16_S0324
print(paste("Kmínd =",Kmínd16_S0324))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0324D17=S0324D[1:365,14]
```

```{r}
plot(Fecha17,S0324D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2017",
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(S0324D17),lwd="3",col="red")
abline(h=max(S0324D17),lwd="3",col="black",lty=2)
abline(h=min(S0324D17),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
Qmax17_S0324=max(S0324D17)
Qp17_S0324=mean(S0324D17)
K1_17_S0324=Qmax17_S0324/Qp17_S0324
print(paste("K1 =",K1_17_S0324))

# Cálculo del coeficiente Kmínd
Qmind17_S0324=min(S0324D17)
Kmínd17_S0324=Qmind17_S0324/Qp17_S0324
print(paste("Kmínd =",Kmínd17_S0324))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0324D18=S0324D[1:365,16]
```

```{r}
plot(Fecha18,S0324D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2018",
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(S0324D18),lwd="3",col="red")
abline(h=max(S0324D18),lwd="3",col="black",lty=2)
abline(h=min(S0324D18),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
Qmax18_S0324=max(S0324D18)
Qp18_S0324=mean(S0324D18)
K1_18_S0324=Qmax18_S0324/Qp18_S0324
print(paste("K1 =",K1_18_S0324))

# Cálculo del coeficiente Kmínd
Qmind18_S0324=min(S0324D18)
Kmínd18_S0324=Qmind18_S0324/Qp18_S0324
print(paste("Kmínd =",Kmínd18_S0324))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0324D19=S0324D[1:365,18]
```

```{r}
plot(Fecha19,S0324D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2019",
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(S0324D19),lwd="3",col="red")
abline(h=max(S0324D19),lwd="3",col="black",lty=2)
abline(h=min(S0324D19),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
Qmax19_S0324=max(S0324D19)
Qp19_S0324=mean(S0324D19)
K1_19_S0324=Qmax19_S0324/Qp19_S0324
print(paste("K1 =",K1_19_S0324))

# Cálculo del coeficiente Kmínd
Qmind19_S0324=min(S0324D19)
Kmínd19_S0324=Qmind19_S0324/Qp19_S0324
print(paste("Kmínd =",Kmínd19_S0324))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0324D23=S0324D[1:365,26]
```

```{r}
plot(Fecha23,S0324D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0324 - 2023",
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(S0324D23),lwd="3",col="red")
abline(h=max(S0324D23),lwd="3",col="black",lty=2)
abline(h=min(S0324D23),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
Qmax23_S0324=max(S0324D23)
Qp23_S0324=mean(S0324D23)
K1_23_S0324=Qmax23_S0324/Qp23_S0324
print(paste("K1 =",K1_23_S0324))

# Cálculo del coeficiente Kmínd
Qmind23_S0324=min(S0324D23)
Kmínd23_S0324=Qmind23_S0324/Qp23_S0324
print(paste("Kmínd =",Kmínd23_S0324))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0324,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0324,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0324,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0324,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0324,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0324,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0324,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0324,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0324,": No"))
print(paste("K1_14 =",K1_14_S0324,": Si"))
print(paste("K1_15 =",K1_15_S0324,": No"))
print(paste("K1_16 =",K1_16_S0324,": Si"))
print(paste("K1_17 =",K1_17_S0324,": Si"))
print(paste("K1_18 =",K1_18_S0324,": Si"))
print(paste("K1_19 =",K1_19_S0324,": No"))
print(paste("K1_23 =",K1_23_S0324,": Si"))
```

```{r}
K1S0324m=c(K1_14_S0324,K1_16_S0324,K1_17_S0324,K1_18_S0324,K1_23_S0324)
K1S0324=mean(K1S0324m)
summary(K1S0324m)
K1S0324m
print(paste("K1_S0324 =",K1S0324))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0324,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0324,": Si"))
```

```
print(paste("Kmínd_15 =",Kmínd15_S0324,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0324,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0324,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0324,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0324,": No"))
print(paste("Kmínd_23 =",Kmínd23_S0324,": Si"))
```

```{r}
KmíndS0324m=c(Kmínd14_S0324,Kmínd16_S0324,Kmínd17_S0324,Kmínd18_S0324,
Kmínd23_S0324)
KmíndS0324=mean(KmíndS0324m)
summary(KmíndS0324m)
KmíndS0324m
print(paste("Kmínd_S0324 =",KmíndS0324))
```

Estación S0325 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0325D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0325D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0325D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0325D13=S0325D[1:365,6]
```

```{r}
plot(Fecha13,S0325D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2013",
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(S0325D13),lwd="3",col="red")
abline(h=max(S0325D13),lwd="3",col="black",lty=2)
abline(h=min(S0325D13),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
Qmax13_S0325=max(S0325D13)
Qp13_S0325=mean(S0325D13)
K1_13_S0325=Qmax13_S0325/Qp13_S0325
print(paste("K1 =",K1_13_S0325))

# Cálculo del coeficiente Kmínd
Qmind13_S0325=min(S0325D13)
Kmínd13_S0325=Qmind13_S0325/Qp13_S0325
print(paste("Kmínd =",Kmínd13_S0325))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0325D14=S0325D[1:365,8]
```

```{r}
plot(Fecha14,S0325D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2014",
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(S0325D14),lwd="3",col="red")
abline(h=max(S0325D14),lwd="3",col="black",lty=2)
abline(h=min(S0325D14),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
Qmax14_S0325=max(S0325D14)
Qp14_S0325=mean(S0325D14)
K1_14_S0325=Qmax14_S0325/Qp14_S0325
print(paste("K1 =",K1_14_S0325))

# Cálculo del coeficiente Kmínd
Qmind14_S0325=min(S0325D14)
```

```
Kmínd14_S0325=Qmind14_S0325/Qp14_S0325
print(paste("Kmínd =",Kmínd14_S0325))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0325D15=S0325D[1:365,10]
```

```{r}
plot(Fecha15,S0325D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2015",
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(S0325D15),lwd="3",col="red")
abline(h=max(S0325D15),lwd="3",col="black",lty=2)
abline(h=min(S0325D15),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
Qmax15_S0325=max(S0325D15)
Qp15_S0325=mean(S0325D15)
K1_15_S0325=Qmax15_S0325/Qp15_S0325
print(paste("K1 =",K1_15_S0325))

# Cálculo del coeficiente Kmínd
Qmind15_S0325=min(S0325D15)
Kmínd15_S0325=Qmind15_S0325/Qp15_S0325
print(paste("Kmínd =",Kmínd15_S0325))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0325D16=S0325D[1:366,12]
```

```{r}
plot(Fecha16,S0325D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2016",
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(S0325D16),lwd="3",col="red")
abline(h=max(S0325D16),lwd="3",col="black",lty=2)
abline(h=min(S0325D16),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
Qmax16_S0325=max(S0325D16)
Qp16_S0325=mean(S0325D16)
K1_16_S0325=Qmax16_S0325/Qp16_S0325
print(paste("K1 =",K1_16_S0325))

# Cálculo del coeficiente Kmínd
Qmind16_S0325=min(S0325D16)
Kmínd16_S0325=Qmind16_S0325/Qp16_S0325
print(paste("Kmínd =",Kmínd16_S0325))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0325D17=S0325D[1:365,14]
```

```{r}
plot(Fecha17,S0325D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2017",
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(S0325D17),lwd="3",col="red")
abline(h=max(S0325D17),lwd="3",col="black",lty=2)
abline(h=min(S0325D17),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
Qmax17_S0325=max(S0325D17)
Qp17_S0325=mean(S0325D17)
K1_17_S0325=Qmax17_S0325/Qp17_S0325
print(paste("K1 =",K1_17_S0325))

# Cálculo del coeficiente Kmínd
Qmind17_S0325=min(S0325D17)
Kmínd17_S0325=Qmind17_S0325/Qp17_S0325
print(paste("Kmínd =",Kmínd17_S0325))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0325D18=S0325D[1:365,16]
```

```{r}
plot(Fecha18,S0325D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2018",
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(S0325D18),lwd="3",col="red")
abline(h=max(S0325D18),lwd="3",col="black",lty=2)
abline(h=min(S0325D18),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
Qmax18_S0325=max(S0325D18)
Qp18_S0325=mean(S0325D18)
K1_18_S0325=Qmax18_S0325/Qp18_S0325
print(paste("K1 =",K1_18_S0325))

# Cálculo del coeficiente Kmínd
Qmind18_S0325=min(S0325D18)
Kmínd18_S0325=Qmind18_S0325/Qp18_S0325
print(paste("Kmínd =",Kmínd18_S0325))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0325D19=S0325D[1:365,18]
```

```{r}
plot(Fecha19,S0325D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2019",
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(S0325D19),lwd="3",col="red")
abline(h=max(S0325D19),lwd="3",col="black",lty=2)
abline(h=min(S0325D19),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
Qmax19_S0325=max(S0325D19)
Qp19_S0325=mean(S0325D19)
K1_19_S0325=Qmax19_S0325/Qp19_S0325
print(paste("K1 =",K1_19_S0325))

# Cálculo del coeficiente Kmínd
Qmind19_S0325=min(S0325D19)
Kmínd19_S0325=Qmind19_S0325/Qp19_S0325
print(paste("Kmínd =",Kmínd19_S0325))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0325D23=S0325D[1:365,26]
```

```{r}
plot(Fecha23,S0325D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0325 - 2023",
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(S0325D23),lwd="3",col="red")
```

```
abline(h=max(S0325D23),lwd="3",col="black",lty=2)
abline(h=min(S0325D23),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
Qmax23_S0325=max(S0325D23)
Qp23_S0325=mean(S0325D23)
K1_23_S0325=Qmax23_S0325/Qp23_S0325
print(paste("K1 =",K1_23_S0325))

# Cálculo del coeficiente Kmínd
Qmind23_S0325=min(S0325D23)
Kmínd23_S0325=Qmind23_S0325/Qp23_S0325
print(paste("Kmínd =",Kmínd23_S0325))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0325,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0325,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0325,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0325,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0325,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0325,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0325,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0325,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0325,": Si"))
print(paste("K1_14 =",K1_14_S0325,": Si"))
print(paste("K1_15 =",K1_15_S0325,": Si"))
print(paste("K1_16 =",K1_16_S0325,": Si"))
print(paste("K1_17 =",K1_17_S0325,": Si"))
print(paste("K1_18 =",K1_18_S0325,": Si"))
print(paste("K1_19 =",K1_19_S0325,": Si"))
print(paste("K1_23 =",K1_23_S0325,": Si"))
```

```{r}
K1S0325m=c(K1_13_S0325,K1_14_S0325,K1_15_S0325,K1_16_S0325,K1_17_S0325,
K1_18_S0325,K1_19_S0325,K1_23_S0325)
K1S0325=mean(K1S0325m)
summary(K1S0325m)
K1S0325m
print(paste("K1_S0325 =",K1S0325))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0325,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0325,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0325,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0325,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0325,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0325,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0325,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0325,": Si"))
```

```{r}
KmíndS0325m=c(Kmínd13_S0325,Kmínd14_S0325,Kmínd15_S0325,Kmínd16_S0325,
Kmínd17_S0325,Kmínd18_S0325,Kmínd19_S0325,Kmínd23_S0325)
KmíndS0325=mean(KmíndS0325m)
summary(KmíndS0325m)
KmíndS0325m
print(paste("Kmínd_S0325 =",KmíndS0325))
```

Estación S0326 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0326D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0326D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0326D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0326D13=S0326D[1:365,6]
```

```{r}
plot(Fecha13,S0326D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2013",
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(S0326D13),lwd="3",col="red")
abline(h=max(S0326D13),lwd="3",col="black",lty=2)
abline(h=min(S0326D13),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
Qmax13_S0326=max(S0326D13)
Qp13_S0326=mean(S0326D13)
K1_13_S0326=Qmax13_S0326/Qp13_S0326
print(paste("K1 =",K1_13_S0326))

# Cálculo del coeficiente Kmínd
Qmind13_S0326=min(S0326D13)
Kmínd13_S0326=Qmind13_S0326/Qp13_S0326
print(paste("Kmínd =",Kmínd13_S0326))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0326D14=S0326D[1:365,8]
```

```{r}
plot(Fecha14,S0326D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2014",
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(S0326D14),lwd="3",col="red")
abline(h=max(S0326D14),lwd="3",col="black",lty=2)
abline(h=min(S0326D14),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
Qmax14_S0326=max(S0326D14)
Qp14_S0326=mean(S0326D14)
K1_14_S0326=Qmax14_S0326/Qp14_S0326
print(paste("K1 =",K1_14_S0326))

# Cálculo del coeficiente Kmínd
Qmind14_S0326=min(S0326D14)
Kmínd14_S0326=Qmind14_S0326/Qp14_S0326
print(paste("Kmínd =",Kmínd14_S0326))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0326D15=S0326D[1:365,10]
```

```{r}
plot(Fecha15,S0326D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2015",
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(S0326D15),lwd="3",col="red")
abline(h=max(S0326D15),lwd="3",col="black",lty=2)
abline(h=min(S0326D15),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
Qmax15_S0326=max(S0326D15)
Qp15_S0326=mean(S0326D15)
K1_15_S0326=Qmax15_S0326/Qp15_S0326
print(paste("K1 =",K1_15_S0326))

# Cálculo del coeficiente Kmínd
Qmind15_S0326=min(S0326D15)
Kmínd15_S0326=Qmind15_S0326/Qp15_S0326
print(paste("Kmínd =",Kmínd15_S0326))
```

```
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0326D16=S0326D[1:366,12]
```

```{r}
plot(Fecha16,S0326D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2016",
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(S0326D16),lwd="3",col="red")
abline(h=max(S0326D16),lwd="3",col="black",lty=2)
abline(h=min(S0326D16),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
Qmax16_S0326=max(S0326D16)
Qp16_S0326=mean(S0326D16)
K1_16_S0326=Qmax16_S0326/Qp16_S0326
print(paste("K1 =",K1_16_S0326))

# Cálculo del coeficiente Kmínd
Qmind16_S0326=min(S0326D16)
Kmínd16_S0326=Qmind16_S0326/Qp16_S0326
print(paste("Kmínd =",Kmínd16_S0326))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0326D17=S0326D[1:365,14]
```

```{r}
plot(Fecha17,S0326D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2017",
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(S0326D17),lwd="3",col="red")
abline(h=max(S0326D17),lwd="3",col="black",lty=2)
abline(h=min(S0326D17),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
Qmax17_S0326=max(S0326D17)
Qp17_S0326=mean(S0326D17)
K1_17_S0326=Qmax17_S0326/Qp17_S0326
print(paste("K1 =",K1_17_S0326))

# Cálculo del coeficiente Kmínd
Qmind17_S0326=min(S0326D17)
Kmínd17_S0326=Qmind17_S0326/Qp17_S0326
print(paste("Kmínd =",Kmínd17_S0326))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0326D18=S0326D[1:365,16]
```

```{r}
plot(Fecha18,S0326D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2018",
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(S0326D18),lwd="3",col="red")
abline(h=max(S0326D18),lwd="3",col="black",lty=2)
abline(h=min(S0326D18),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
Qmax18_S0326=max(S0326D18)
```

```
Qp18_S0326=mean(S0326D18)
K1_18_S0326=Qmax18_S0326/Qp18_S0326
print(paste("K1 =",K1_18_S0326))

# Cálculo del coeficiente Kmínd
Qmind18_S0326=min(S0326D18)
Kmínd18_S0326=Qmind18_S0326/Qp18_S0326
print(paste("Kmínd =",Kmínd18_S0326))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0326D19=S0326D[1:365,18]
```

```{r}
plot(Fecha19,S0326D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2019",
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(S0326D19),lwd="3",col="red")
abline(h=max(S0326D19),lwd="3",col="black",lty=2)
abline(h=min(S0326D19),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
Qmax19_S0326=max(S0326D19)
Qp19_S0326=mean(S0326D19)
K1_19_S0326=Qmax19_S0326/Qp19_S0326
print(paste("K1 =",K1_19_S0326))

# Cálculo del coeficiente Kmínd
Qmind19_S0326=min(S0326D19)
Kmínd19_S0326=Qmind19_S0326/Qp19_S0326
print(paste("Kmínd =",Kmínd19_S0326))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0326D23=S0326D[1:365,26]
```

```{r}
plot(Fecha23,S0326D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0326 - 2023",
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(S0326D23),lwd="3",col="red")
abline(h=max(S0326D23),lwd="3",col="black",lty=2)
abline(h=min(S0326D23),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
Qmax23_S0326=max(S0326D23)
Qp23_S0326=mean(S0326D23)
K1_23_S0326=Qmax23_S0326/Qp23_S0326
print(paste("K1 =",K1_23_S0326))

# Cálculo del coeficiente Kmínd
Qmind23_S0326=min(S0326D23)
Kmínd23_S0326=Qmind23_S0326/Qp23_S0326
print(paste("Kmínd =",Kmínd23_S0326))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0326,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0326,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0326,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0326,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0326,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0326,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0326,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0326,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0326,": Si"))
```

```
print(paste("K1_14 =",K1_14_S0326,": Si"))
print(paste("K1_15 =",K1_15_S0326,": Si"))
print(paste("K1_16 =",K1_16_S0326,": Si"))
print(paste("K1_17 =",K1_17_S0326,": Si"))
print(paste("K1_18 =",K1_18_S0326,": Si"))
print(paste("K1_19 =",K1_19_S0326,": Si"))
print(paste("K1_23 =",K1_23_S0326,": Si"))
```

```{r}
K1S0326m=c(K1_13_S0326,K1_14_S0326,K1_15_S0326,K1_16_S0326,K1_17_S0326,
K1_18_S0326,K1_19_S0326,K1_23_S0326)
K1S0326=mean(K1S0326m)
summary(K1S0326m)
K1S0326m
print(paste("K1_S0326 =",K1S0326))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0326,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0326,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0326,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0326,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0326,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0326,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0326,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0326,": Si"))
```

```{r}
KmíndS0326m=c(Kmínd13_S0326,Kmínd14_S0326,Kmínd15_S0326,Kmínd16_S0326,
Kmínd17_S0326,Kmínd18_S0326,Kmínd19_S0326,Kmínd23_S0326)
KmíndS0326=mean(KmíndS0326m)
summary(KmíndS0326m)
KmíndS0326m
print(paste("Kmínd_S0326 =",KmíndS0326))
```

Estación S0328 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0328D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0328D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0328D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0328D13=S0328D[1:365,6]
```

```{r}
plot(Fecha13,S0328D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2013",
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(S0328D13),lwd="3",col="red")
abline(h=max(S0328D13),lwd="3",col="black",lty=2)
abline(h=min(S0328D13),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
Qmax13_S0328=max(S0328D13)
Qp13_S0328=mean(S0328D13)
K1_13_S0328=Qmax13_S0328/Qp13_S0328
print(paste("K1 =",K1_13_S0328))

# Cálculo del coeficiente Kmínd
Qmind13_S0328=min(S0328D13)
Kmínd13_S0328=Qmind13_S0328/Qp13_S0328
print(paste("Kmínd =",Kmínd13_S0328))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0328D14=S0328D[1:365,8]
```

```{r}
```

```
plot(Fecha14,S0328D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2014",
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(S0328D14),lwd="3",col="red")
abline(h=max(S0328D14),lwd="3",col="black",lty=2)
abline(h=min(S0328D14),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
Qmax14_S0328=max(S0328D14)
Qp14_S0328=mean(S0328D14)
K1_14_S0328=Qmax14_S0328/Qp14_S0328
print(paste("K1 =",K1_14_S0328))

# Cálculo del coeficiente Kmínd
Qmind14_S0328=min(S0328D14)
Kmínd14_S0328=Qmind14_S0328/Qp14_S0328
print(paste("Kmínd =",Kmínd14_S0328))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0328D15=S0328D[1:365,10]
```

```{r}
plot(Fecha15,S0328D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2015",
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(S0328D15),lwd="3",col="red")
abline(h=max(S0328D15),lwd="3",col="black",lty=2)
abline(h=min(S0328D15),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
Qmax15_S0328=max(S0328D15)
Qp15_S0328=mean(S0328D15)
K1_15_S0328=Qmax15_S0328/Qp15_S0328
print(paste("K1 =",K1_15_S0328))

# Cálculo del coeficiente Kmínd
Qmind15_S0328=min(S0328D15)
Kmínd15_S0328=Qmind15_S0328/Qp15_S0328
print(paste("Kmínd =",Kmínd15_S0328))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0328D16=S0328D[1:366,12]
```

```{r}
plot(Fecha16,S0328D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2016",
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(S0328D16),lwd="3",col="red")
abline(h=max(S0328D16),lwd="3",col="black",lty=2)
abline(h=min(S0328D16),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
Qmax16_S0328=max(S0328D16)
Qp16_S0328=mean(S0328D16)
K1_16_S0328=Qmax16_S0328/Qp16_S0328
print(paste("K1 =",K1_16_S0328))

# Cálculo del coeficiente Kmínd
Qmind16_S0328=min(S0328D16)
Kmínd16_S0328=Qmind16_S0328/Qp16_S0328
print(paste("Kmínd =",Kmínd16_S0328))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0328D17=S0328D[1:365,14]
```

```{r}
plot(Fecha17,S0328D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2017",
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(S0328D17),lwd="3",col="red")
abline(h=max(S0328D17),lwd="3",col="black",lty=2)
abline(h=min(S0328D17),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
Qmax17_S0328=max(S0328D17)
Qp17_S0328=mean(S0328D17)
K1_17_S0328=Qmax17_S0328/Qp17_S0328
print(paste("K1 =",K1_17_S0328))

# Cálculo del coeficiente Kmínd
Qmind17_S0328=min(S0328D17)
Kmínd17_S0328=Qmind17_S0328/Qp17_S0328
print(paste("Kmínd =",Kmínd17_S0328))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0328D18=S0328D[1:365,16]
```

```{r}
plot(Fecha18,S0328D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2018",
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(S0328D18),lwd="3",col="red")
abline(h=max(S0328D18),lwd="3",col="black",lty=2)
abline(h=min(S0328D18),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
Qmax18_S0328=max(S0328D18)
Qp18_S0328=mean(S0328D18)
K1_18_S0328=Qmax18_S0328/Qp18_S0328
print(paste("K1 =",K1_18_S0328))

# Cálculo del coeficiente Kmínd
Qmind18_S0328=min(S0328D18)
Kmínd18_S0328=Qmind18_S0328/Qp18_S0328
print(paste("Kmínd =",Kmínd18_S0328))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0328D19=S0328D[1:365,18]
```

```{r}
plot(Fecha19,S0328D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2019",
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(S0328D19),lwd="3",col="red")
abline(h=max(S0328D19),lwd="3",col="black",lty=2)
abline(h=min(S0328D19),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
Qmax19_S0328=max(S0328D19)
Qp19_S0328=mean(S0328D19)
K1_19_S0328=Qmax19_S0328/Qp19_S0328
```

```
print(paste("K1 =",K1_19_S0328))

# Cálculo del coeficiente Kmínd
Qmind19_S0328=min(S0328D19)
Kmínd19_S0328=Qmind19_S0328/Qp19_S0328
print(paste("Kmínd =",Kmínd19_S0328))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0328D23=S0328D[1:365,26]
```

```{r}
plot(Fecha23,S0328D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0328 - 2023",
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(S0328D23),lwd="3",col="red")
abline(h=max(S0328D23),lwd="3",col="black",lty=2)
abline(h=min(S0328D23),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
Qmax23_S0328=max(S0328D23)
Qp23_S0328=mean(S0328D23)
K1_23_S0328=Qmax23_S0328/Qp23_S0328
print(paste("K1 =",K1_23_S0328))

# Cálculo del coeficiente Kmínd
Qmind23_S0328=min(S0328D23)
Kmínd23_S0328=Qmind23_S0328/Qp23_S0328
print(paste("Kmínd =",Kmínd23_S0328))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0328,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0328,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0328,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0328,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0328,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0328,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0328,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0328,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0328,": No"))
print(paste("K1_14 =",K1_14_S0328,": Si"))
print(paste("K1_15 =",K1_15_S0328,": Si"))
print(paste("K1_16 =",K1_16_S0328,": Si"))
print(paste("K1_17 =",K1_17_S0328,": No"))
print(paste("K1_18 =",K1_18_S0328,": Si"))
print(paste("K1_19 =",K1_19_S0328,": Si"))
print(paste("K1_23 =",K1_23_S0328,": Si"))
```

```{r}
K1S0328m=c(K1_14_S0328,K1_15_S0328,K1_16_S0328,K1_18_S0328,K1_19_S0328,
K1_23_S0328)
K1S0328=mean(K1S0328m)
summary(K1S0328m)
K1S0328m
print(paste("K1_S0328 =",K1S0328))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0328,": No"))
print(paste("Kmínd_14 =",Kmínd14_S0328,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0328,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0328,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0328,": No"))
print(paste("Kmínd_18 =",Kmínd18_S0328,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0328,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0328,": Si"))
```

```{r}
KmíndS0328m=c(Kmínd14_S0328,Kmínd15_S0328,Kmínd16_S0328,Kmínd18_S0328,
Kmínd19_S0328,Kmínd23_S0328)
KmíndS0328=mean(KmíndS0328m)
summary(KmíndS0328m)
KmíndS0328m
```

```
print(paste("Kmínd_S0328 =",KmíndS0328))
```

Estación S0329 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0329D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0329D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0329D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0329D13=S0329D[1:365,6]
```

```{r}
plot(Fecha13,S0329D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2013",
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(S0329D13),lwd="3",col="red")
abline(h=max(S0329D13),lwd="3",col="black",lty=2)
abline(h=min(S0329D13),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
Qmax13_S0329=max(S0329D13)
Qp13_S0329=mean(S0329D13)
K1_13_S0329=Qmax13_S0329/Qp13_S0329
print(paste("K1 =",K1_13_S0329))

# Cálculo del coeficiente Kmínd
Qmind13_S0329=min(S0329D13)
Kmínd13_S0329=Qmind13_S0329/Qp13_S0329
print(paste("Kmínd =",Kmínd13_S0329))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0329D14=S0329D[1:365,8]
```

```{r}
plot(Fecha14,S0329D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2014",
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(S0329D14),lwd="3",col="red")
abline(h=max(S0329D14),lwd="3",col="black",lty=2)
abline(h=min(S0329D14),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
Qmax14_S0329=max(S0329D14)
Qp14_S0329=mean(S0329D14)
K1_14_S0329=Qmax14_S0329/Qp14_S0329
print(paste("K1 =",K1_14_S0329))

# Cálculo del coeficiente Kmínd
Qmind14_S0329=min(S0329D14)
Kmínd14_S0329=Qmind14_S0329/Qp14_S0329
print(paste("Kmínd =",Kmínd14_S0329))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0329D15=S0329D[1:365,10]
```

```{r}
plot(Fecha15,S0329D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2015",
```

```
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(S0329D15),lwd="3",col="red")
abline(h=max(S0329D15),lwd="3",col="black",lty=2)
abline(h=min(S0329D15),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
Qmax15_S0329=max(S0329D15)
Qp15_S0329=mean(S0329D15)
K1_15_S0329=Qmax15_S0329/Qp15_S0329
print(paste("K1 =",K1_15_S0329))

# Cálculo del coeficiente Kmínd
Qmind15_S0329=min(S0329D15)
Kmínd15_S0329=Qmind15_S0329/Qp15_S0329
print(paste("Kmínd =",Kmínd15_S0329))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0329D16=S0329D[1:366,12]
```

```{r}
plot(Fecha16,S0329D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2016",
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(S0329D16),lwd="3",col="red")
abline(h=max(S0329D16),lwd="3",col="black",lty=2)
abline(h=min(S0329D16),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
Qmax16_S0329=max(S0329D16)
Qp16_S0329=mean(S0329D16)
K1_16_S0329=Qmax16_S0329/Qp16_S0329
print(paste("K1 =",K1_16_S0329))

# Cálculo del coeficiente Kmínd
Qmind16_S0329=min(S0329D16)
Kmínd16_S0329=Qmind16_S0329/Qp16_S0329
print(paste("Kmínd =",Kmínd16_S0329))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0329D17=S0329D[1:365,14]
```

```{r}
plot(Fecha17,S0329D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2017",
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(S0329D17),lwd="3",col="red")
abline(h=max(S0329D17),lwd="3",col="black",lty=2)
abline(h=min(S0329D17),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
Qmax17_S0329=max(S0329D17)
Qp17_S0329=mean(S0329D17)
K1_17_S0329=Qmax17_S0329/Qp17_S0329
print(paste("K1 =",K1_17_S0329))

# Cálculo del coeficiente Kmínd
Qmind17_S0329=min(S0329D17)
Kmínd17_S0329=Qmind17_S0329/Qp17_S0329
print(paste("Kmínd =",Kmínd17_S0329))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0329D18=S0329D[1:365,16]
```

```{r}
plot(Fecha18,S0329D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2018",
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(S0329D18),lwd="3",col="red")
abline(h=max(S0329D18),lwd="3",col="black",lty=2)
abline(h=min(S0329D18),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
Qmax18_S0329=max(S0329D18)
Qp18_S0329=mean(S0329D18)
K1_18_S0329=Qmax18_S0329/Qp18_S0329
print(paste("K1 =",K1_18_S0329))

# Cálculo del coeficiente Kmínd
Qmind18_S0329=min(S0329D18)
Kmínd18_S0329=Qmind18_S0329/Qp18_S0329
print(paste("Kmínd =",Kmínd18_S0329))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
S0329D19=S0329D[1:365,18]
```

```{r}
plot(Fecha19,S0329D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2019",
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(S0329D19),lwd="3",col="red")
abline(h=max(S0329D19),lwd="3",col="black",lty=2)
abline(h=min(S0329D19),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
Qmax19_S0329=max(S0329D19)
Qp19_S0329=mean(S0329D19)
K1_19_S0329=Qmax19_S0329/Qp19_S0329
print(paste("K1 =",K1_19_S0329))

# Cálculo del coeficiente Kmínd
Qmind19_S0329=min(S0329D19)
Kmínd19_S0329=Qmind19_S0329/Qp19_S0329
print(paste("Kmínd =",Kmínd19_S0329))
```

Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0329D23=S0329D[1:365,26]
```

```{r}
plot(Fecha23,S0329D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0329 - 2023",
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(S0329D23),lwd="3",col="red")
abline(h=max(S0329D23),lwd="3",col="black",lty=2)
abline(h=min(S0329D23),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
Qmax23_S0329=max(S0329D23)
Qp23_S0329=mean(S0329D23)
K1_23_S0329=Qmax23_S0329/Qp23_S0329
print(paste("K1 =",K1_23_S0329))
```

```
# Cálculo del coeficiente Kmínd
Qmind23_S0329=min(S0329D23)
Kmínd23_S0329=Qmind23_S0329/Qp23_S0329
print(paste("Kmínd =",Kmínd23_S0329))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0329,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0329,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0329,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0329,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0329,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0329,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0329,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0329,"l/s",": Si"))
```

Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0329,": Si"))
print(paste("K1_14 =",K1_14_S0329,": Si"))
print(paste("K1_15 =",K1_15_S0329,": No"))
print(paste("K1_16 =",K1_16_S0329,": Si"))
print(paste("K1_17 =",K1_17_S0329,": Si"))
print(paste("K1_18 =",K1_18_S0329,": Si"))
print(paste("K1_19 =",K1_19_S0329,": Si"))
print(paste("K1_23 =",K1_23_S0329,": Si"))
```

```{r}
K1S0329m=c(K1_13_S0329,K1_14_S0329,K1_16_S0329,K1_17_S0329,K1_18_S0329,
K1_19_S0329,K1_23_S0329)
K1S0329=mean(K1S0329m)
summary(K1S0329m)
K1S0329m
print(paste("K1_S0329 =",K1S0329))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0329,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0329,": Si"))
print(paste("Kmínd_15 =",Kmínd15_S0329,": No"))
print(paste("Kmínd_16 =",Kmínd16_S0329,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0329,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0329,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0329,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0329,": Si"))
```

```{r}
KmíndS0329m=c(Kmínd13_S0329,Kmínd14_S0329,Kmínd16_S0329,Kmínd17_S0329,
Kmínd18_S0329,Kmínd19_S0329,Kmínd23_S0329)
KmíndS0329=mean(KmíndS0329m)
summary(KmíndS0329m)
KmíndS0329m
print(paste("Kmínd_S0329 =",KmíndS0329))
```

Estación S0330 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0330D=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0330D.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0330D)
```

Extracción y análisis de datos del año 2013

```{r}
Fecha13=c(1:365)
S0330D13=S0330D[1:365,6]
```

```{r}
plot(Fecha13,S0330D13,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2013",
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(S0330D13),lwd="3",col="red")
abline(h=max(S0330D13),lwd="3",col="black",lty=2)
abline(h=min(S0330D13),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
Qmax13_S0330=max(S0330D13)
Qp13_S0330=mean(S0330D13)
K1_13_S0330=Qmax13_S0330/Qp13_S0330
print(paste("K1 =",K1_13_S0330))

# Cálculo del coeficiente Kmínd
Qmind13_S0330=min(S0330D13)
Kmínd13_S0330=Qmind13_S0330/Qp13_S0330
print(paste("Kmínd =",Kmínd13_S0330))
```

Extracción y análisis de datos del año 2014

```{r}
Fecha14=c(1:365)
S0330D14=S0330D[1:365,8]
```

```{r}
plot(Fecha14,S0330D14,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2014",
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(S0330D14),lwd="3",col="red")
abline(h=max(S0330D14),lwd="3",col="black",lty=2)
abline(h=min(S0330D14),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
Qmax14_S0330=max(S0330D14)
Qp14_S0330=mean(S0330D14)
K1_14_S0330=Qmax14_S0330/Qp14_S0330
print(paste("K1 =",K1_14_S0330))

# Cálculo del coeficiente Kmínd
Qmind14_S0330=min(S0330D14)
Kmínd14_S0330=Qmind14_S0330/Qp14_S0330
print(paste("Kmínd =",Kmínd14_S0330))
```

Extracción y análisis de datos del año 2015

```{r}
Fecha15=c(1:365)
S0330D15=S0330D[1:365,10]
```

```{r}
plot(Fecha15,S0330D15,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2015",
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(S0330D15),lwd="3",col="red")
abline(h=max(S0330D15),lwd="3",col="black",lty=2)
abline(h=min(S0330D15),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
Qmax15_S0330=max(S0330D15)
Qp15_S0330=mean(S0330D15)
K1_15_S0330=Qmax15_S0330/Qp15_S0330
print(paste("K1 =",K1_15_S0330))

# Cálculo del coeficiente Kmínd
Qmind15_S0330=min(S0330D15)
Kmínd15_S0330=Qmind15_S0330/Qp15_S0330
print(paste("Kmínd =",Kmínd15_S0330))
```

Extracción y análisis de datos del año 2016

```{r}
Fecha16=c(1:366)
S0330D16=S0330D[1:366,12]
```

```{r}
plot(Fecha16,S0330D16,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2016",
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(S0330D16),lwd="3",col="red")
abline(h=max(S0330D16),lwd="3",col="black",lty=2)
abline(h=min(S0330D16),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
Qmax16_S0330=max(S0330D16)
Qp16_S0330=mean(S0330D16)
K1_16_S0330=Qmax16_S0330/Qp16_S0330
print(paste("K1 =",K1_16_S0330))

# Cálculo del coeficiente Kmínd
Qmind16_S0330=min(S0330D16)
Kmínd16_S0330=Qmind16_S0330/Qp16_S0330
print(paste("Kmínd =",Kmínd16_S0330))
```

Extracción y análisis de datos del año 2017

```{r}
Fecha17=c(1:365)
S0330D17=S0330D[1:365,14]
```

```{r}
plot(Fecha17,S0330D17,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2017",
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(S0330D17),lwd="3",col="red")
abline(h=max(S0330D17),lwd="3",col="black",lty=2)
abline(h=min(S0330D17),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
Qmax17_S0330=max(S0330D17)
Qp17_S0330=mean(S0330D17)
K1_17_S0330=Qmax17_S0330/Qp17_S0330
print(paste("K1 =",K1_17_S0330))

# Cálculo del coeficiente Kmínd
Qmind17_S0330=min(S0330D17)
Kmínd17_S0330=Qmind17_S0330/Qp17_S0330
print(paste("Kmínd =",Kmínd17_S0330))
```

Extracción y análisis de datos del año 2018

```{r}
Fecha18=c(1:365)
S0330D18=S0330D[1:365,16]
```

```{r}
plot(Fecha18,S0330D18,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2018",
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(S0330D18),lwd="3",col="red")
abline(h=max(S0330D18),lwd="3",col="black",lty=2)
abline(h=min(S0330D18),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
Qmax18_S0330=max(S0330D18)
Qp18_S0330=mean(S0330D18)
K1_18_S0330=Qmax18_S0330/Qp18_S0330
print(paste("K1 =",K1_18_S0330))

# Cálculo del coeficiente Kmínd
Qmind18_S0330=min(S0330D18)
Kmínd18_S0330=Qmind18_S0330/Qp18_S0330
print(paste("Kmínd =",Kmínd18_S0330))
```

Extracción y análisis de datos del año 2019

```{r}
Fecha19=c(1:365)
```

```
S0330D19=S0330D[1:365,18]
```
```

```{r}
plot(Fecha19,S0330D19,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2019",
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(S0330D19),lwd="3",col="red")
abline(h=max(S0330D19),lwd="3",col="black",lty=2)
abline(h=min(S0330D19),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
Qmax19_S0330=max(S0330D19)
Qp19_S0330=mean(S0330D19)
K1_19_S0330=Qmax19_S0330/Qp19_S0330
print(paste("K1 =",K1_19_S0330))

# Cálculo del coeficiente Kmínd
Qmind19_S0330=min(S0330D19)
Kmínd19_S0330=Qmind19_S0330/Qp19_S0330
print(paste("Kmínd =",Kmínd19_S0330))
```
```

### Extracción y análisis de datos del año 2023

```{r}
Fecha23=c(1:365)
S0330D23=S0330D[1:365,26]
```
```

```{r}
plot(Fecha23,S0330D23,type="l",lwd="2",col="blue",
main="ESTACIÓN S0330 - 2023",
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(S0330D23),lwd="3",col="red")
abline(h=max(S0330D23),lwd="3",col="black",lty=2)
abline(h=min(S0330D23),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
Qmax23_S0330=max(S0330D23)
Qp23_S0330=mean(S0330D23)
K1_23_S0330=Qmax23_S0330/Qp23_S0330
print(paste("K1 =",K1_23_S0330))

# Cálculo del coeficiente Kmínd
Qmind23_S0330=min(S0330D23)
Kmínd23_S0330=Qmind23_S0330/Qp23_S0330
print(paste("Kmínd =",Kmínd23_S0330))
```
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0330,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0330,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0330,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0330,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0330,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0330,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0330,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0330,"l/s",": Si"))
```
```

### Determinación del coeficiente K1 del sector

```{r}
print(paste("K1_13 =",K1_13_S0330,": Si"))
print(paste("K1_14 =",K1_14_S0330,": No"))
print(paste("K1_15 =",K1_15_S0330,": Si"))
print(paste("K1_16 =",K1_16_S0330,": Si"))
print(paste("K1_17 =",K1_17_S0330,": Si"))
print(paste("K1_18 =",K1_18_S0330,": Si"))
print(paste("K1_19 =",K1_19_S0330,": Si"))
print(paste("K1_23 =",K1_23_S0330,": Si"))
```
```

```{r}
K1S0330m=c(K1_13_S0330,K1_15_S0330,K1_16_S0330,K1_17_S0330,K1_18_S0330,
K1_19_S0330,K1_23_S0330)
K1S0330=mean(K1S0330m)
summary(K1S0330m)
```

```
K1S0330m
print(paste("K1_S0330 =",K1S0330))
```

Determinación del coeficiente Kmínd del sector

```{r}
print(paste("Kmínd_13 =",Kmínd13_S0330,": Si"))
print(paste("Kmínd_14 =",Kmínd14_S0330,": No"))
print(paste("Kmínd_15 =",Kmínd15_S0330,": Si"))
print(paste("Kmínd_16 =",Kmínd16_S0330,": Si"))
print(paste("Kmínd_17 =",Kmínd17_S0330,": Si"))
print(paste("Kmínd_18 =",Kmínd18_S0330,": Si"))
print(paste("Kmínd_19 =",Kmínd19_S0330,": Si"))
print(paste("Kmínd_23 =",Kmínd23_S0330,": Si"))
```

```{r}
KmíndS0330m=c(Kmínd13_S0330,Kmínd15_S0330,Kmínd16_S0330,Kmínd17_S0330,
Kmínd18_S0330,Kmínd19_S0330,Kmínd23_S0330)
KmíndS0330=mean(KmíndS0330m)
summary(KmíndS0330m)
KmíndS0330m
print(paste("Kmínd_S0330 =",KmíndS0330))
```

Determinación del coeficiente K1 del estrato agrupado consolidado 2

```{r}
print(paste("K1_S0002 =",K1S0002))
print(paste("K1_S0011 =",K1S0011))
print(paste("K1_S0080 =",K1S0080))
print(paste("K1_S0092 =",K1S0092))
print(paste("K1_S0096 =",K1S0096))
print(paste("K1_S0206 =",K1S0206))
print(paste("K1_S0213 =",K1S0213))
print(paste("K1_S0300 =",K1S0300))
print(paste("K1_S0301 =",K1S0301))
print(paste("K1_S0305 =",K1S0305))
print(paste("K1_S0306 =",K1S0306))
print(paste("K1_S0309 =",K1S0309))
print(paste("K1_S0311 =",K1S0311))
print(paste("K1_S0312 =",K1S0312))
print(paste("K1_S0316 =",K1S0316))
print(paste("K1_S0317 =",K1S0317))
print(paste("K1_S0318 =",K1S0318))
print(paste("K1_S0319 =",K1S0319))
print(paste("K1_S0320 =",K1S0320))
print(paste("K1_S0322 =",K1S0322))
print(paste("K1_S0324 =",K1S0324))
print(paste("K1_S0325 =",K1S0325))
print(paste("K1_S0326 =",K1S0326))
print(paste("K1_S0328 =",K1S0328))
print(paste("K1_S0329 =",K1S0329))
print(paste("K1_S0330 =",K1S0330))
```

```{r}
K1EAC2DF=c(K1S0002,K1S0011,K1S0080,K1S0092,K1S0096,K1S0206,K1S0213,K1S0300,
K1S0301,K1S0305,K1S0306,K1S0309,K1S0311,K1S0312,K1S0316,K1S0317,
K1S0318,K1S0319,K1S0320,K1S0322,K1S0324,K1S0325,K1S0328,K1S0326,
K1S0329,K1S0330)
K1EAC2DF=data.frame(K1EAC2DF)
K1EAC2_13_19_23=ggplot(data=K1EAC2DF,aes(x="",y=K1EAC2DF))+
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 2 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=14.5),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 2")+
ylab("K1 (2013 - 2019 y 2023)")
summary(K1EAC2DF)
K1EAC2=c(K1S0002,K1S0011,K1S0080,K1S0092,K1S0096,K1S0206,K1S0213,K1S0300,
K1S0301,K1S0305,K1S0306,K1S0309,K1S0311,K1S0312,K1S0316,K1S0317,
K1S0318,K1S0319,K1S0320,K1S0322,K1S0324,K1S0325,K1S0328,K1S0326,
K1S0329,K1S0330)
K1EAC2=mean(K1EAC2)
print(paste("K1_EAC2 =",K1EAC2))
```

```{r}
K1EAC2DF=c(K1S0092,K1S0300,K1S0301,K1S0305,K1S0306,K1S0309,K1S0311,K1S0312,
K1S0316,K1S0317,K1S0318,K1S0319,K1S0320,K1S0322,K1S0324,K1S0325,
K1S0328,K1S0326,K1S0329,K1S0330)
K1EAC2DF=data.frame(K1EAC2DF)
K1EAC2_13_19_23=ggplot(data=K1EAC2DF,aes(x="",y=K1EAC2DF))+
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 2 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=14.5),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 2")+
ylab("K1 (2013 - 2019 y 2023)")
summary(K1EAC2DF)
K1EAC2=c(K1S0092,K1S0300,K1S0301,K1S0305,K1S0306,K1S0309,K1S0311,K1S0312,
K1S0316,K1S0317,K1S0318,K1S0319,K1S0320,K1S0322,K1S0324,K1S0325,
K1S0328,K1S0326,K1S0329,K1S0330)
K1EAC2=mean(K1EAC2)
print(paste("K1_EAC2 =",K1EAC2))
```

Determinación del coeficiente Kmínd del estrato agrupado consolidado 2

```{r}
print(paste("Kmínd_S0002 =",KmíndS0002))
print(paste("Kmínd_S0011 =",KmíndS0011))
print(paste("Kmínd_S0080 =",KmíndS0080))
print(paste("Kmínd_S0092 =",KmíndS0092))
print(paste("Kmínd_S0096 =",KmíndS0096))
print(paste("Kmínd_S0206 =",KmíndS0206))
print(paste("Kmínd_S0213 =",KmíndS0213))
print(paste("Kmínd_S0300 =",KmíndS0300))
print(paste("Kmínd_S0301 =",KmíndS0301))
print(paste("Kmínd_S0305 =",KmíndS0305))
print(paste("Kmínd_S0306 =",KmíndS0306))
print(paste("Kmínd_S0309 =",KmíndS0309))
print(paste("Kmínd_S0311 =",KmíndS0311))
print(paste("Kmínd_S0312 =",KmíndS0312))
print(paste("Kmínd_S0316 =",KmíndS0316))
print(paste("Kmínd_S0317 =",KmíndS0317))
print(paste("Kmínd_S0318 =",KmíndS0318))
print(paste("Kmínd_S0319 =",KmíndS0319))
print(paste("Kmínd_S0320 =",KmíndS0320))
print(paste("Kmínd_S0322 =",KmíndS0322))
print(paste("Kmínd_S0324 =",KmíndS0324))
print(paste("Kmínd_S0325 =",KmíndS0325))
print(paste("Kmínd_S0326 =",KmíndS0326))
print(paste("Kmínd_S0328 =",KmíndS0328))
print(paste("Kmínd_S0329 =",KmíndS0329))
print(paste("Kmínd_S0330 =",KmíndS0330))
```

```{r}
KmíndEAC2DF=c(KmíndS0002,KmíndS0011,KmíndS0080,KmíndS0092,KmíndS0096,KmíndS0206,
KmíndS0213,KmíndS0300,KmíndS0301,KmíndS0305,KmíndS0306,KmíndS0309,
KmíndS0311,KmíndS0312,KmíndS0316,KmíndS0317,KmíndS0318,KmíndS0319,
KmíndS0320,KmíndS0322,KmíndS0324,KmíndS0325,KmíndS0326,KmíndS0328,
KmíndS0329,KmíndS0330)
KmíndEAC2DF=data.frame(KmíndEAC2DF)
KmíndEAC2_13_19_23=ggplot(data=KmíndEAC2DF,aes(x="",y=KmíndEAC2DF))+
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 2 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=14.5),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 2")+
ylab("Kmínd (2013 - 2019 y 2023)")
summary(KmíndEAC2DF)
KmíndEAC2=c(KmíndS0002,KmíndS0011,KmíndS0080,KmíndS0092,KmíndS0096,KmíndS0206,
KmíndS0213,KmíndS0300,KmíndS0301,KmíndS0305,KmíndS0306,KmíndS0309,
KmíndS0311,KmíndS0312,KmíndS0316,KmíndS0317,KmíndS0318,KmíndS0319,
KmíndS0320,KmíndS0322,KmíndS0324,KmíndS0325,KmíndS0326,KmíndS0328,
KmíndS0329,KmíndS0330)
KmíndEAC2=mean(KmíndEAC2)
print(paste("Kmínd_EAC2 =",KmíndEAC2))
```

```{r}
KmíndEAC2DF=c(KmíndS0002,KmíndS0092,KmíndS0096,KmíndS0213,KmíndS0300,KmíndS0301,
KmíndS0305,KmíndS0306,KmíndS0309,KmíndS0311,KmíndS0312,KmíndS0316,
KmíndS0317,KmíndS0318,KmíndS0320,KmíndS0322,KmíndS0324,KmíndS0325,
KmíndS0326,KmíndS0328,KmíndS0329,KmíndS0330)
KmíndEAC2DF=data.frame(KmíndEAC2DF)
KmíndEAC2_13_19_23=ggplot(data=KmíndEAC2DF,aes(x="",y=KmíndEAC2DF))+
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 2 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=14.5),
axis.title.y=element_text(size=15))+
xlab("Estrato agrupado consolidado 2")+
ylab("Kmínd (2013 - 2019 y 2023)")
summary(KmíndEAC2DF)
KmíndEAC2=c(KmíndS0002,KmíndS0092,KmíndS0096,KmíndS0213,KmíndS0300,KmíndS0301,
KmíndS0305,KmíndS0306,KmíndS0309,KmíndS0311,KmíndS0312,KmíndS0316,
KmíndS0317,KmíndS0318,KmíndS0320,KmíndS0322,KmíndS0324,KmíndS0325,
KmíndS0326,KmíndS0328,KmíndS0329,KmíndS0330)
KmíndEAC2=mean(KmíndEAC2)
print(paste("Kmínd_EAC2 =",KmíndEAC2))
```

Diagrama de caja del coeficientes K1 y Kmínd de estrato
agrupado consolidado 2 en el periodo del 2013 al 2019 y 2023

```{r}
K1EAC2_13_19_23+KmíndEAC2_13_19_23
```

---
title: "K2_Kmính_EAC2"
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 2

Estación S0002 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0002H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0002H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0002H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0002H13max=S0002H[1:24,6]
S0002H13min=S0002H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H13min),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=103.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
```

```
plot(Hora,S0002H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0002=71.4388039290959
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H13max),lwd="3",col="black",lty=2)
abline(h=min(S0002H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H13max)
K2_13_S0002=Qmax13_S0002/Qp13_S0002
print(paste("K2 =",K2_13_S0002))
```

```{r}
plot(Hora,S0002H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
abline(h=max(S0002H13min),lwd="3",col="black",lty=2)
abline(h=min(S0002H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H13min)
Kmính13_S0002=Qminh13_S0002/Qp13_S0002
print(paste("Kmính =",Kmính13_S0002))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0002H14max=S0002H[1:24,10]
S0002H14min=S0002H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=108.5,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,S0002H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0002=70.3967597123014
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H14max),lwd="3",col="black",lty=2)
abline(h=min(S0002H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H14max)
K2_14_S0002=Qmax14_S0002/Qp14_S0002
print(paste("K2 =",K2_14_S0002))
```

```{r}
plot(Hora,S0002H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
```

```
abline(h=max(S0002H14min),lwd="3",col="black",lty=2)
abline(h=min(S0002H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H14min)
Kmính14_S0002=Qminh14_S0002/Qp14_S0002
print(paste("Kmính =",Kmính14_S0002))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0002H15max=S0002H[1:24,14]
S0002H15min=S0002H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H15min),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=103.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0002H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0002=77.7428256494795
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H15max),lwd="3",col="black",lty=2)
abline(h=min(S0002H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H15max)
K2_15_S0002=Qmax15_S0002/Qp15_S0002
print(paste("K2 =",K2_15_S0002))
```

```{r}
plot(Hora,S0002H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
abline(h=max(S0002H15min),lwd="3",col="black",lty=2)
abline(h=min(S0002H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H15min)
Kmính15_S0002=Qminh15_S0002/Qp15_S0002
print(paste("Kmính =",Kmính15_S0002))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0002H16max=S0002H[1:24,18]
S0002H16min=S0002H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H16min),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,S0002H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0002=79.0604629343443
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H16max),lwd="3",col="black",lty=2)
abline(h=min(S0002H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H16max)
K2_16_S0002=Qmax16_S0002/Qp16_S0002
print(paste("K2 =",K2_16_S0002))
```

```{r}
plot(Hora,S0002H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
abline(h=max(S0002H16min),lwd="3",col="black",lty=2)
abline(h=min(S0002H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H16min)
Kmính16_S0002=Qminh16_S0002/Qp16_S0002
print(paste("Kmính =",Kmính16_S0002))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0002H17max=S0002H[1:24,22]
S0002H17min=S0002H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H17min),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,S0002H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0002=78.9459891581644
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H17max),lwd="3",col="black",lty=2)
abline(h=min(S0002H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H17max)
K2_17_S0002=Qmax17_S0002/Qp17_S0002
print(paste("K2 =",K2_17_S0002))
```

```{r}


```

```
plot(Hora,S0002H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
abline(h=max(S0002H17min),lwd="3",col="black",lty=2)
abline(h=min(S0002H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H17min)
Kmính17_S0002=Qminh17_S0002/Qp17_S0002
print(paste("Kmính =",Kmính17_S0002))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0002H18max=S0002H[1:24,26]
S0002H18min=S0002H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H18min),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=103.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0002H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0002=82.0489025924658
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H18max),lwd="3",col="black",lty=2)
abline(h=min(S0002H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H18max)
K2_18_S0002=Qmax18_S0002/Qp18_S0002
print(paste("K2 =",K2_18_S0002))
```

```{r}
plot(Hora,S0002H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
abline(h=max(S0002H18min),lwd="3",col="black",lty=2)
abline(h=min(S0002H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H18min)
Kmính18_S0002=Qminh18_S0002/Qp18_S0002
print(paste("Kmính =",Kmính18_S0002))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0002H19max=S0002H[1:24,30]
S0002H19min=S0002H[1:24,32]
```

```{r}
```

```
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H19min),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=115.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0002H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0002=83.1703487091233
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H19max),lwd="3",col="black",lty=2)
abline(h=min(S0002H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H19max)
K2_19_S0002=Qmax19_S0002/Qp19_S0002
print(paste("K2 =",K2_19_S0002))
```

```{r}
plot(Hora,S0002H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
abline(h=max(S0002H19min),lwd="3",col="black",lty=2)
abline(h=min(S0002H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H19min)
Kmính19_S0002=Qminh19_S0002/Qp19_S0002
print(paste("Kmính =",Kmính19_S0002))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0002H23max=S0002H[1:24,46]
S0002H23min=S0002H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0002H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0002 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0002H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=135.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=128.1,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0002H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0002=84.1787029430411
axis(1,at=seq(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_S0002,lwd="4",col="red")
abline(h=max(S0002H23max),lwd="3",col="black",lty=2)
abline(h=min(S0002H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=max(S0002H23max)
K2_23_S0002=Qmax23_S0002/Qp23_S0002
print(paste("K2 =",K2_23_S0002))
```

```{r}
plot(Hora,S0002H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0002 - 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_S0002,lwd="4",col="red")
abline(h=max(S0002H23min),lwd="3",col="black",lty=2)
abline(h=min(S0002H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0002=min(S0002H23min)
Kmính23_S0002=Qminh23_S0002/Qp23_S0002
print(paste("Kmính =",Kmính23_S0002))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0002,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0002,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0002,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0002,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0002,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0002,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0002,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0002,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0002,": No"))
print(paste("K2_14 =",K2_14_S0002,": Si"))
print(paste("K2_15 =",K2_15_S0002,": No"))
print(paste("K2_16 =",K2_16_S0002,": No"))
print(paste("K2_17 =",K2_17_S0002,": No"))
print(paste("K2_18 =",K2_18_S0002,": No"))
print(paste("K2_19 =",K2_19_S0002,": Si"))
print(paste("K2_23 =",K2_23_S0002,": Si"))
```

```{r}
K2S0002m=c(K2_14_S0002,K2_19_S0002,K2_23_S0002)
K2S0002=mean(K2S0002m)
summary(K2S0002m)
K2S0002m
print(paste("K2_S0002 =",K2S0002))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0002,": No"))
print(paste("Kmính_14 =",Kmính14_S0002,": Si"))
print(paste("Kmính_15 =",Kmính15_S0002,": No"))
print(paste("Kmính_16 =",Kmính16_S0002,": No"))
print(paste("Kmính_17 =",Kmính17_S0002,": No"))
print(paste("Kmính_18 =",Kmính18_S0002,": No"))
print(paste("Kmính_19 =",Kmính19_S0002,": Si"))
print(paste("Kmính_23 =",Kmính23_S0002,": Si"))
```

```{r}
KmínhS0002m=c(Kmính14_S0002,Kmính19_S0002,Kmính23_S0002)
KmínhS0002=mean(KmínhS0002m)
summary(KmínhS0002m)
KmínhS0002m
print(paste("Kmính_S0002 =",KmínhS0002))
```

Estación S0011 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0011H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0011H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0011H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0011H13max=S0011H[1:24,6]
S0011H13min=S0011H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H13min),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,S0011H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0011=72.4013548069589
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H13max),lwd="3",col="black",lty=2)
abline(h=min(S0011H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H13max)
K2_13_S0011=Qmax13_S0011/Qp13_S0011
print(paste("K2 =",K2_13_S0011))
```

```{r}
plot(Hora,S0011H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
abline(h=max(S0011H13min),lwd="3",col="black",lty=2)
abline(h=min(S0011H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H13min)
Kmính13_S0011=Qminh13_S0011/Qp13_S0011
print(paste("Kmính =",Kmính13_S0011))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0011H14max=S0011H[1:24,10]
S0011H14min=S0011H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H14min),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,S0011H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0011=76.5056756559726
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H14max),lwd="3",col="black",lty=2)
abline(h=min(S0011H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H14max)
K2_14_S0011=Qmax14_S0011/Qp14_S0011
print(paste("K2 =",K2_14_S0011))
```

```{r}
plot(Hora,S0011H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
abline(h=max(S0011H14min),lwd="3",col="black",lty=2)
abline(h=min(S0011H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H14min)
Kmính14_S0011=Qminh14_S0011/Qp14_S0011
print(paste("Kmính =",Kmính14_S0011))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0011H15max=S0011H[1:24,14]
S0011H15min=S0011H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H15min),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,S0011H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0011=77.7251654844931
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H15max),lwd="3",col="black",lty=2)
abline(h=min(S0011H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H15max)
K2_15_S0011=Qmax15_S0011/Qp15_S0011
print(paste("K2 =",K2_15_S0011))
```

```{r}
plot(Hora,S0011H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
abline(h=max(S0011H15min),lwd="3",col="black",lty=2)
abline(h=min(S0011H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H15min)
Kmính15_S0011=Qminh15_S0011/Qp15_S0011
print(paste("Kmính =",Kmính15_S0011))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0011H16max=S0011H[1:24,18]
S0011H16min=S0011H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H16min),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=109,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0011H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0011=73.9759442295082
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H16max),lwd="3",col="black",lty=2)
abline(h=min(S0011H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H16max)
K2_16_S0011=Qmax16_S0011/Qp16_S0011
print(paste("K2 =",K2_16_S0011))
```

```{r}
plot(Hora,S0011H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
abline(h=max(S0011H16min),lwd="3",col="black",lty=2)
abline(h=min(S0011H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H16min)
Kmính16_S0011=Qminh16_S0011/Qp16_S0011
print(paste("Kmính =",Kmính16_S0011))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0011H17max=S0011H[1:24,22]
S0011H17min=S0011H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H17min),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,S0011H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0011=73.9999999595069
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H17max),lwd="3",col="black",lty=2)
abline(h=min(S0011H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H17max)
K2_17_S0011=Qmax17_S0011/Qp17_S0011
print(paste("K2 =",K2_17_S0011))
```

```{r}
plot(Hora,S0011H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
abline(h=max(S0011H17min),lwd="3",col="black",lty=2)
abline(h=min(S0011H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H17min)
Kmính17_S0011=Qminh17_S0011/Qp17_S0011
print(paste("Kmính =",Kmính17_S0011))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0011H18max=S0011H[1:24,26]
S0011H18min=S0011H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H18min),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,S0011H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0011=77.3885536350137
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H18max),lwd="3",col="black",lty=2)
abline(h=min(S0011H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H18max)
K2_18_S0011=Qmax18_S0011/Qp18_S0011
print(paste("K2 =",K2_18_S0011))
```

```{r}
plot(Hora,S0011H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
```

```
abline(h=max(S0011H18min),lwd="3",col="black",lty=2)
abline(h=min(S0011H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H18min)
Kmính18_S0011=Qminh18_S0011/Qp18_S0011
print(paste("Kmính =",Kmính18_S0011))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0011H19max=S0011H[1:24,30]
S0011H19min=S0011H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H19min),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,S0011H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0011=76.6095950544384
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H19max),lwd="3",col="black",lty=2)
abline(h=min(S0011H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H19max)
K2_19_S0011=Qmax19_S0011/Qp19_S0011
print(paste("K2 =",K2_19_S0011))
```

```{r}
plot(Hora,S0011H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
abline(h=max(S0011H19min),lwd="3",col="black",lty=2)
abline(h=min(S0011H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H19min)
Kmính19_S0011=Qminh19_S0011/Qp19_S0011
print(paste("Kmính =",Kmính19_S0011))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0011H23max=S0011H[1:24,46]
S0011H23min=S0011H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0011H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0011 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0011H23min),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,S0011H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0011=72.8354229105205
axis(1,at=seq(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_S0011,lwd="4",col="red")
abline(h=max(S0011H23max),lwd="3",col="black",lty=2)
abline(h=min(S0011H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=max(S0011H23max)
K2_23_S0011=Qmax23_S0011/Qp23_S0011
print(paste("K2 =",K2_23_S0011))
```

```{r}
plot(Hora,S0011H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0011 - 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_S0011,lwd="4",col="red")
abline(h=max(S0011H23min),lwd="3",col="black",lty=2)
abline(h=min(S0011H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0011=min(S0011H23min)
Kmính23_S0011=Qminh23_S0011/Qp23_S0011
print(paste("Kmính =",Kmính23_S0011))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0011,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0011,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0011,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0011,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0011,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0011,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0011,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0011,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0011,": No"))
print(paste("K2_14 =",K2_14_S0011,": Si"))
print(paste("K2_15 =",K2_15_S0011,": Si"))
print(paste("K2_16 =",K2_16_S0011,": No"))
print(paste("K2_17 =",K2_17_S0011,": Si"))
print(paste("K2_18 =",K2_18_S0011,": No"))
print(paste("K2_19 =",K2_19_S0011,": No"))
print(paste("K2_23 =",K2_23_S0011,": Si"))
```

```{r}
K2S0011m=c(K2_14_S0011,K2_15_S0011,K2_17_S0011,K2_23_S0011)
K2S0011=mean(K2S0011m)
summary(K2S0011m)
K2S0011m
print(paste("K2_S0011 =",K2S0011))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0011,": No"))
print(paste("Kmính_14 =",Kmính14_S0011,": Si"))
print(paste("Kmính_15 =",Kmính15_S0011,": Si"))
print(paste("Kmính_16 =",Kmính16_S0011,": No"))
print(paste("Kmính_17 =",Kmính17_S0011,": Si"))
print(paste("Kmính_18 =",Kmính18_S0011,": No"))
print(paste("Kmính_19 =",Kmính19_S0011,": No"))
print(paste("Kmính_23 =",Kmính23_S0011,": Si"))
```

```{r}
KmínhS0011m=c(Kmính14_S0011,Kmính15_S0011,Kmính17_S0011,Kmính23_S0011)
KmínhS0011=mean(KmínhS0011m)
summary(KmínhS0011m)
KmínhS0011m
print(paste("Kmính_S0011 =",KmínhS0011))
```

Estación S0080 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0080H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0080H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0080H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0080H13max=S0080H[1:24,6]
S0080H13min=S0080H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=361,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=341,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0080=287.198838078904
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H13max),lwd="3",col="black",lty=2)
abline(h=min(S0080H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H13max)
K2_13_S0080=Qmax13_S0080/Qp13_S0080
print(paste("K2 =",K2_13_S0080))
```

```{r}
plot(Hora,S0080H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H13min),lwd="3",col="black",lty=2)
abline(h=min(S0080H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H13min)
Kmính13_S0080=Qminh13_S0080/Qp13_S0080
print(paste("Kmính =",Kmính13_S0080))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0080H14max=S0080H[1:24,10]
S0080H14min=S0080H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=361,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=341,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0080=293.772403273151
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H14max),lwd="3",col="black",lty=2)
abline(h=min(S0080H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H14max)
K2_14_S0080=Qmax14_S0080/Qp14_S0080
print(paste("K2 =",K2_14_S0080))
```

```{r}
plot(Hora,S0080H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H14min),lwd="3",col="black",lty=2)
abline(h=min(S0080H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H14min)
Kmính14_S0080=Qminh14_S0080/Qp14_S0080
print(paste("Kmính =",Kmính14_S0080))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0080H15max=S0080H[1:24,14]
S0080H15min=S0080H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=361,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=341,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0080=298.12803989589
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H15max),lwd="3",col="black",lty=2)
abline(h=min(S0080H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H15max)
K2_15_S0080=Qmax15_S0080/Qp15_S0080
print(paste("K2 =",K2_15_S0080))
```

```{r}
plot(Hora,S0080H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H15min),lwd="3",col="black",lty=2)
abline(h=min(S0080H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H15min)
Kmính15_S0080=Qminh15_S0080/Qp15_S0080
print(paste("Kmính =",Kmính15_S0080))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0080H16max=S0080H[1:24,18]
S0080H16min=S0080H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=361,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=341,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0080=288.547041088525
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H16max),lwd="3",col="black",lty=2)
abline(h=min(S0080H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H16max)
K2_16_S0080=Qmax16_S0080/Qp16_S0080
print(paste("K2 =",K2_16_S0080))
```

```{r}
plot(Hora,S0080H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H16min),lwd="3",col="black",lty=2)
abline(h=min(S0080H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H16min)
Kmính16_S0080=Qminh16_S0080/Qp16_S0080
print(paste("Kmính =",Kmính16_S0080))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0080H17max=S0080H[1:24,22]
S0080H17min=S0080H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=361,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=341,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0080=287.556363567397
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H17max),lwd="3",col="black",lty=2)
abline(h=min(S0080H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H17max)
K2_17_S0080=Qmax17_S0080/Qp17_S0080
print(paste("K2 =",K2_17_S0080))
```

```{r}
plot(Hora,S0080H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H17min),lwd="3",col="black",lty=2)
abline(h=min(S0080H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H17min)
Kmính17_S0080=Qminh17_S0080/Qp17_S0080
print(paste("Kmính =",Kmính17_S0080))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0080H18max=S0080H[1:24,26]
S0080H18min=S0080H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=347.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=330,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0080=285.193605408493
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H18max),lwd="3",col="black",lty=2)
abline(h=min(S0080H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H18max)
K2_18_S0080=Qmax18_S0080/Qp18_S0080
print(paste("K2 =",K2_18_S0080))
```

```{r}
plot(Hora,S0080H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H18min),lwd="3",col="black",lty=2)
abline(h=min(S0080H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H18min)
Kmính18_S0080=Qminh18_S0080/Qp18_S0080
print(paste("Kmính =",Kmính18_S0080))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0080H19max=S0080H[1:24,30]
S0080H19min=S0080H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=347.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=330,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0080=287.522531931781
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H19max),lwd="3",col="black",lty=2)
abline(h=min(S0080H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H19max)
K2_19_S0080=Qmax19_S0080/Qp19_S0080
print(paste("K2 =",K2_19_S0080))
```

```{r}
plot(Hora,S0080H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H19min),lwd="3",col="black",lty=2)
abline(h=min(S0080H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H19min)
Kmính19_S0080=Qminh19_S0080/Qp19_S0080
print(paste("Kmính =",Kmính19_S0080))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0080H23max=S0080H[1:24,46]
S0080H23min=S0080H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0080H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0080 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0080H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=346,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=330,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0080H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0080=276.211897569863
axis(1,at=seq(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_S0080,lwd="4",col="red")
abline(h=max(S0080H23max),lwd="3",col="black",lty=2)
abline(h=min(S0080H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=max(S0080H23max)
K2_23_S0080=Qmax23_S0080/Qp23_S0080
print(paste("K2 =",K2_23_S0080))
```

```{r}
plot(Hora,S0080H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0080 - 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_S0080,lwd="4",col="red")
abline(h=max(S0080H23min),lwd="3",col="black",lty=2)
abline(h=min(S0080H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0080=min(S0080H23min)
Kmính23_S0080=Qminh23_S0080/Qp23_S0080
print(paste("Kmính =",Kmính23_S0080))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0080,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0080,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0080,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0080,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0080,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0080,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0080,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0080,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0080,": Si"))
print(paste("K2_14 =",K2_14_S0080,": Si"))
print(paste("K2_15 =",K2_15_S0080,": No"))
print(paste("K2_16 =",K2_16_S0080,": No"))
print(paste("K2_17 =",K2_17_S0080,": Si"))
print(paste("K2_18 =",K2_18_S0080,": No"))
print(paste("K2_19 =",K2_19_S0080,": Si"))
```

```
print(paste("K2_23 =",K2_23_S0080,": Si"))
```

```{r}
K2S0080m=c(K2_13_S0080,K2_14_S0080,K2_17_S0080,K2_19_S0080,K2_23_S0080)
K2S0080=mean(K2S0080m)
summary(K2S0080m)
K2S0080m
print(paste("K2_S0080 =",K2S0080))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0080,": Si"))
print(paste("Kmính_14 =",Kmính14_S0080,": Si"))
print(paste("Kmính_15 =",Kmính15_S0080,": No"))
print(paste("Kmính_16 =",Kmính16_S0080,": No"))
print(paste("Kmính_17 =",Kmính17_S0080,": Si"))
print(paste("Kmính_18 =",Kmính18_S0080,": No"))
print(paste("Kmính_19 =",Kmính19_S0080,": Si"))
print(paste("Kmính_23 =",Kmính23_S0080,": Si"))
```

```{r}
KmínhS0080m=c(Kmính13_S0080,Kmính14_S0080,Kmính17_S0080,Kmính19_S0080,
Kmính23_S0080)
KmínhS0080=mean(KmínhS0080m)
summary(KmínhS0080m)
KmínhS0080m
print(paste("Kmính_S0080 =",KmínhS0080))
```

Estación S0092 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0092H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0092H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0092H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0092H13max=S0092H[1:24,6]
S0092H13min=S0092H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0092=22.1519591117534
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H13max),lwd="3",col="black",lty=2)
abline(h=min(S0092H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=max(S0092H13max)
K2_13_S0092=Qmax13_S0092/Qp13_S0092
print(paste("K2 =",K2_13_S0092))
```

```{r}
plot(Hora,S0092H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H13min),lwd="3",col="black",lty=2)
abline(h=min(S0092H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=min(S0092H13min)
Kmính13_S0092=Qminh13_S0092/Qp13_S0092
print(paste("Kmính =",Kmính13_S0092))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0092H14max=S0092H[1:24,10]
S0092H14min=S0092H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0092=24.6058283736164
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H14max),lwd="3",col="black",lty=2)
abline(h=min(S0092H14max),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_S0092=max(S0092H14max)
K2_14_S0092=Qmax14_S0092/Qp14_S0092
print(paste("K2 =",K2_14_S0092))
```

```{r}
plot(Hora,S0092H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H14min),lwd="3",col="black",lty=2)
abline(h=min(S0092H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=min(S0092H14min)
Kmính14_S0092=Qminh14_S0092/Qp14_S0092
print(paste("Kmính =",Kmính14_S0092))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0092H15max=S0092H[1:24,14]
S0092H15min=S0092H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0092=27.193704805589
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H15max),lwd="3",col="black",lty=2)
abline(h=min(S0092H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=max(S0092H15max)
K2_15_S0092=Qmax15_S0092/Qp15_S0092
print(paste("K2 =",K2_15_S0092))
```

```{r}
plot(Hora,S0092H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H15min),lwd="3",col="black",lty=2)
abline(h=min(S0092H15min),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_S0092=min(S0092H15min)
Kmính15_S0092=Qminh15_S0092/Qp15_S0092
print(paste("Kmính =",Kmính15_S0092))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0092H16max=S0092H[1:24,18]
S0092H16min=S0092H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=49,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=46.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0092=29.4628418156831
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H16max),lwd="3",col="black",lty=2)
abline(h=min(S0092H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=max(S0092H16max)
K2_16_S0092=Qmax16_S0092/Qp16_S0092
print(paste("K2 =",K2_16_S0092))
```

```
```

```{r}
plot(Hora,S0092H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H16min),lwd="3",col="black",lty=2)
abline(h=min(S0092H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=min(S0092H16min)
Kmính16_S0092=Qminh16_S0092/Qp16_S0092
print(paste("Kmính =",Kmính16_S0092))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0092H17max=S0092H[1:24,22]
S0092H17min=S0092H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=52.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=48,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0092=30.6002865216164
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H17max),lwd="3",col="black",lty=2)
abline(h=min(S0092H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=max(S0092H17max)
K2_17_S0092=Qmax17_S0092/Qp17_S0092
print(paste("K2 =",K2_17_S0092))
```

```{r}
plot(Hora,S0092H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H17min),lwd="3",col="black",lty=2)
abline(h=min(S0092H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=min(S0092H17min)
Kmính17_S0092=Qminh17_S0092/Qp17_S0092
print(paste("Kmính =",Kmính17_S0092))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0092H18max=S0092H[1:24,26]
S0092H18min=S0092H[1:24,28]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H18min),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,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0092=34.1053923097808
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H18max),lwd="3",col="black",lty=2)
abline(h=min(S0092H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=max(S0092H18max)
K2_18_S0092=Qmax18_S0092/Qp18_S0092
print(paste("K2 =",K2_18_S0092))
```

```{r}
plot(Hora,S0092H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H18min),lwd="3",col="black",lty=2)
abline(h=min(S0092H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=min(S0092H18min)
Kmính18_S0092=Qminh18_S0092/Qp18_S0092
print(paste("Kmính =",Kmính18_S0092))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0092H19max=S0092H[1:24,30]
S0092H19min=S0092H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H19min),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,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0092=36.7440789507945
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H19max),lwd="3",col="black",lty=2)
abline(h=min(S0092H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=max(S0092H19max)
K2_19_S0092=Qmax19_S0092/Qp19_S0092
print(paste("K2 =",K2_19_S0092))
```

```{r}
plot(Hora,S0092H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H19min),lwd="3",col="black",lty=2)
abline(h=min(S0092H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=min(S0092H19min)
Kmính19_S0092=Qminh19_S0092/Qp19_S0092
print(paste("Kmính =",Kmính19_S0092))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0092H23max=S0092H[1:24,46]
S0092H23min=S0092H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0092H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0092 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0092H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0092H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0092=41.2050253370137
axis(1,at=seq(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_S0092,lwd="4",col="red")
abline(h=max(S0092H23max),lwd="3",col="black",lty=2)
abline(h=min(S0092H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=max(S0092H23max)
K2_23_S0092=Qmax23_S0092/Qp23_S0092
print(paste("K2 =",K2_23_S0092))
```

```{r}
plot(Hora,S0092H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0092 - 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_S0092,lwd="4",col="red")
abline(h=max(S0092H23min),lwd="3",col="black",lty=2)
abline(h=min(S0092H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0092=min(S0092H23min)
Kmính23_S0092=Qminh23_S0092/Qp23_S0092
print(paste("Kmính =",Kmính23_S0092))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0092,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0092,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0092,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0092,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0092,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0092,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0092,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0092,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0092,": Si"))
print(paste("K2_14 =",K2_14_S0092,": Si"))
print(paste("K2_15 =",K2_15_S0092,": No"))
print(paste("K2_16 =",K2_16_S0092,": Si"))
print(paste("K2_17 =",K2_17_S0092,": Si"))
print(paste("K2_18 =",K2_18_S0092,": Si"))
print(paste("K2_19 =",K2_19_S0092,": Si"))
print(paste("K2_23 =",K2_23_S0092,": Si"))
```

```{r}
K2S0092m=c(K2_13_S0092,K2_14_S0092,K2_16_S0092,K2_17_S0092,K2_18_S0092,
K2_19_S0092,K2_23_S0092)
K2S0092=mean(K2S0092m)
summary(K2S0092m)
K2S0092m
print(paste("K2_S0092 =",K2S0092))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0092,": Si"))
print(paste("Kmính_14 =",Kmính14_S0092,": Si"))
print(paste("Kmính_15 =",Kmính15_S0092,": No"))
print(paste("Kmính_16 =",Kmính16_S0092,": Si"))
print(paste("Kmính_17 =",Kmính17_S0092,": Si"))
print(paste("Kmính_18 =",Kmính18_S0092,": Si"))
print(paste("Kmính_19 =",Kmính19_S0092,": Si"))
print(paste("Kmính_23 =",Kmính23_S0092,": Si"))
```

```{r}
KmínhS0092m=c(Kmính13_S0092,Kmính14_S0092,Kmính16_S0092,Kmính17_S0092,
Kmính18_S0092,Kmính19_S0092,Kmính23_S0092)
KmínhS0092=mean(KmínhS0092m)
summary(KmínhS0092m)
KmínhS0092m
print(paste("Kmính_S0092 =",KmínhS0092))
```

Estación S0096 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0096H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0096H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0096H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0096H13max=S0096H[1:24,6]
S0096H13min=S0096H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0096 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0096H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2013 (Día de máximo consumo)",
```

```
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0096=41.5045472839452
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H13max),lwd="3",col="black",lty=2)
abline(h=min(S0096H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H13max)
K2_13_S0096=Qmax13_S0096/Qp13_S0096
print(paste("K2 =",K2_13_S0096))
```

```{r}
plot(Hora,S0096H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H13min),lwd="3",col="black",lty=2)
abline(h=min(S0096H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=min(S0096H13min)
Kmính13_S0096=Qminh13_S0096/Qp13_S0096
print(paste("Kmính =",Kmính13_S0096))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0096H14max=S0096H[1:24,10]
S0096H14min=S0096H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0096 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0096H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0096=41.2590304471233
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H14max),lwd="3",col="black",lty=2)
abline(h=min(S0096H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H14max)
K2_14_S0096=Qmax14_S0096/Qp14_S0096
print(paste("K2 =",K2_14_S0096))
```

```{r}
plot(Hora,S0096H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H14min),lwd="3",col="black",lty=2)
abline(h=min(S0096H14min),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(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_S0096=min(S0096H14min)
Kmính14_S0096=Qminh14_S0096/Qp14_S0096
print(paste("Kmính =",Kmính14_S0096))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0096H15max=S0096H[1:24,14]
S0096H15min=S0096H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0096 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H15min),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=56,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0096H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0096=45.2111642414247
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H15max),lwd="3",col="black",lty=2)
abline(h=min(S0096H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H15max)
K2_15_S0096=Qmax15_S0096/Qp15_S0096
print(paste("K2 =",K2_15_S0096))
```

```{r}
plot(Hora,S0096H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H15min),lwd="3",col="black",lty=2)
abline(h=min(S0096H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=min(S0096H15min)
Kmính15_S0096=Qminh15_S0096/Qp15_S0096
print(paste("Kmính =",Kmính15_S0096))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0096H16max=S0096H[1:24,18]
S0096H16min=S0096H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0096 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H16min),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,S0096H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0096=53.3817501691257
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H16max),lwd="3",col="black",lty=2)
abline(h=min(S0096H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H16max)
K2_16_S0096=Qmax16_S0096/Qp16_S0096
print(paste("K2 =",K2_16_S0096))
```

```{r}
plot(Hora,S0096H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H16min),lwd="3",col="black",lty=2)
abline(h=min(S0096H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=min(S0096H16min)
Kmính16_S0096=Qminh16_S0096/Qp16_S0096
print(paste("Kmính =",Kmính16_S0096))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0096H17max=S0096H[1:24,22]
S0096H17min=S0096H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0096 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0096H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0096=52.6363068644384
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H17max),lwd="3",col="black",lty=2)
abline(h=min(S0096H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H17max)
K2_17_S0096=Qmax17_S0096/Qp17_S0096
print(paste("K2 =",K2_17_S0096))
```

```{r}
plot(Hora,S0096H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H17min),lwd="3",col="black",lty=2)
abline(h=min(S0096H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=min(S0096H17min)
Kmính17_S0096=Qminh17_S0096/Qp17_S0096
print(paste("Kmính =",Kmính17_S0096))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0096H18max=S0096H[1:24,26]
S0096H18min=S0096H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0096 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0096H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0096=50.6176704136438
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H18max),lwd="3",col="black",lty=2)
abline(h=min(S0096H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H18max)
K2_18_S0096=Qmax18_S0096/Qp18_S0096
print(paste("K2 =",K2_18_S0096))
```

```{r}
plot(Hora,S0096H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H18min),lwd="3",col="black",lty=2)
abline(h=min(S0096H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=min(S0096H18min)
Kmính18_S0096=Qminh18_S0096/Qp18_S0096
print(paste("Kmính =",Kmính18_S0096))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0096H19max=S0096H[1:24,30]
S0096H19min=S0096H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H19max),color="red",lwd=1.2)+
```

```
ggtitle("ESTACIÓN S0096 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H19min),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,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0096H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0096=46.7495527500274
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H19max),lwd="3",col="black",lty=2)
abline(h=min(S0096H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H19max)
K2_19_S0096=Qmax19_S0096/Qp19_S0096
print(paste("K2 =",K2_19_S0096))
```

```{r}
plot(Hora,S0096H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H19min),lwd="3",col="black",lty=2)
abline(h=min(S0096H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=min(S0096H19min)
Kmính19_S0096=Qminh19_S0096/Qp19_S0096
print(paste("Kmính =",Kmính19_S0096))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0096H23max=S0096H[1:24,46]
S0096H23min=S0096H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0096H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0096 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0096H23min),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=66.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0096H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0096=51.7129719109041
axis(1,at=seq(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_S0096,lwd="4",col="red")
abline(h=max(S0096H23max),lwd="3",col="black",lty=2)
abline(h=min(S0096H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=max(S0096H23max)
```

```
K2_23_S0096=Qmax23_S0096/Qp23_S0096
print(paste("K2 =",K2_23_S0096))
```

```{r}
plot(Hora,S0096H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0096 - 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_S0096,lwd="4",col="red")
abline(h=max(S0096H23min),lwd="3",col="black",lty=2)
abline(h=min(S0096H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0096=min(S0096H23min)
Kmính23_S0096=Qminh23_S0096/Qp23_S0096
print(paste("Kmính =",Kmính23_S0096))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0096,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0096,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0096,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0096,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0096,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0096,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0096,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0096,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0096,": No"))
print(paste("K2_14 =",K2_14_S0096,": Si"))
print(paste("K2_15 =",K2_15_S0096,": No"))
print(paste("K2_16 =",K2_16_S0096,": No"))
print(paste("K2_17 =",K2_17_S0096,": Si"))
print(paste("K2_18 =",K2_18_S0096,": No"))
print(paste("K2_19 =",K2_19_S0096,": No"))
print(paste("K2_23 =",K2_23_S0096,": Si"))
```

```{r}
K2S0096m=c(K2_14_S0096,K2_17_S0096,K2_23_S0096)
K2S0096=mean(K2S0096m)
summary(K2S0096m)
K2S0096m
print(paste("K2_S0096 =",K2S0096))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0096,": No"))
print(paste("Kmính_14 =",Kmính14_S0096,": Si"))
print(paste("Kmính_15 =",Kmính15_S0096,": No"))
print(paste("Kmính_16 =",Kmính16_S0096,": No"))
print(paste("Kmính_17 =",Kmính17_S0096,": Si"))
print(paste("Kmính_18 =",Kmính18_S0096,": No"))
print(paste("Kmính_19 =",Kmính19_S0096,": No"))
print(paste("Kmính_23 =",Kmính23_S0096,": Si"))
```

```{r}
KmínhS0096m=c(Kmính14_S0096,Kmính17_S0096,Kmính23_S0096)
KmínhS0096=mean(KmínhS0096m)
summary(KmínhS0096m)
KmínhS0096m
print(paste("Kmính_S0096 =",KmínhS0096))
```

Estación S0206 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0206H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0206H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0206H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0206H13max=S0206H[1:24,6]
S0206H13min=S0206H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H13min),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=113,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0206H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0206=92.5083963420822
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H13max),lwd="3",col="black",lty=2)
abline(h=min(S0206H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H13max)
K2_13_S0206=Qmax13_S0206/Qp13_S0206
print(paste("K2 =",K2_13_S0206))
```

```{r}
plot(Hora,S0206H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H13min),lwd="3",col="black",lty=2)
abline(h=min(S0206H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=min(S0206H13min)
Kmính13_S0206=Qminh13_S0206/Qp13_S0206
print(paste("Kmính =",Kmính13_S0206))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0206H14max=S0206H[1:24,10]
S0206H14min=S0206H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110.2,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,S0206H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0206=92.7447644991781
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H14max),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0206H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H14max)
K2_14_S0206=Qmax14_S0206/Qp14_S0206
print(paste("K2 =",K2_14_S0206))
```

```{r}
plot(Hora,S0206H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H14min),lwd="3",col="black",lty=2)
abline(h=min(S0206H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=min(S0206H14min)
Kmính14_S0206=Qminh14_S0206/Qp14_S0206
print(paste("Kmính =",Kmính14_S0206))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0206H15max=S0206H[1:24,14]
S0206H15min=S0206H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H15min),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=108,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0206H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0206=97.5719061569863
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H15max),lwd="3",col="black",lty=2)
abline(h=min(S0206H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H15max)
K2_15_S0206=Qmax15_S0206/Qp15_S0206
print(paste("K2 =",K2_15_S0206))
```

```{r}
plot(Hora,S0206H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H15min),lwd="3",col="black",lty=2)
abline(h=min(S0206H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=min(S0206H15min)
Kmính15_S0206=Qminh15_S0206/Qp15_S0206
print(paste("Kmính =",Kmính15_S0206))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0206H16max=S0206H[1:24,18]
S0206H16min=S0206H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H16min),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,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0206H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0206=105.143373701885
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H16max),lwd="3",col="black",lty=2)
abline(h=min(S0206H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H16max)
K2_16_S0206=Qmax16_S0206/Qp16_S0206
print(paste("K2 =",K2_16_S0206))
```

```{r}
plot(Hora,S0206H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H16min),lwd="3",col="black",lty=2)
abline(h=min(S0206H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=min(S0206H16min)
Kmính16_S0206=Qminh16_S0206/Qp16_S0206
print(paste("Kmính =",Kmính16_S0206))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0206H17max=S0206H[1:24,22]
S0206H17min=S0206H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H17min),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,S0206H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2017 (Día de máximo consumo)",
```

```
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0206=108.041856377479
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H17max),lwd="3",col="black",lty=2)
abline(h=min(S0206H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H17max)
K2_17_S0206=Qmax17_S0206/Qp17_S0206
print(paste("K2 =",K2_17_S0206))
```

```{r}
plot(Hora,S0206H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H17min),lwd="3",col="black",lty=2)
abline(h=min(S0206H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=min(S0206H17min)
Kmính17_S0206=Qminh17_S0206/Qp17_S0206
print(paste("Kmính =",Kmính17_S0206))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0206H18max=S0206H[1:24,26]
S0206H18min=S0206H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H18min),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,S0206H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0206=105.287942584164
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H18max),lwd="3",col="black",lty=2)
abline(h=min(S0206H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H18max)
K2_18_S0206=Qmax18_S0206/Qp18_S0206
print(paste("K2 =",K2_18_S0206))
```

```{r}
plot(Hora,S0206H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H18min),lwd="3",col="black",lty=2)
abline(h=min(S0206H18min),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(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_S0206=min(S0206H18min)
Kmính18_S0206=Qminh18_S0206/Qp18_S0206
print(paste("Kmính =",Kmính18_S0206))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0206H19max=S0206H[1:24,30]
S0206H19min=S0206H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H19min),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=128,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0206H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0206=109.138626322822
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H19max),lwd="3",col="black",lty=2)
abline(h=min(S0206H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H19max)
K2_19_S0206=Qmax19_S0206/Qp19_S0206
print(paste("K2 =",K2_19_S0206))
```

```{r}
plot(Hora,S0206H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H19min),lwd="3",col="black",lty=2)
abline(h=min(S0206H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=min(S0206H19min)
Kmính19_S0206=Qminh19_S0206/Qp19_S0206
print(paste("Kmính =",Kmính19_S0206))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0206H23max=S0206H[1:24,46]
S0206H23min=S0206H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0206H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0206 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0206H23min),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=140,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0206H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0206=112.78200328811
axis(1,at=seq(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_S0206,lwd="4",col="red")
abline(h=max(S0206H23max),lwd="3",col="black",lty=2)
abline(h=min(S0206H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=max(S0206H23max)
K2_23_S0206=Qmax23_S0206/Qp23_S0206
print(paste("K2 =",K2_23_S0206))
```

```{r}
plot(Hora,S0206H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0206 - 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_S0206,lwd="4",col="red")
abline(h=max(S0206H23min),lwd="3",col="black",lty=2)
abline(h=min(S0206H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0206=min(S0206H23min)
Kmính23_S0206=Qminh23_S0206/Qp23_S0206
print(paste("Kmính =",Kmính23_S0206))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0206,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0206,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0206,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0206,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0206,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0206,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0206,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0206,"l/s",": No"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0206,": Si"))
print(paste("K2_14 =",K2_14_S0206,": No"))
print(paste("K2_15 =",K2_15_S0206,": No"))
print(paste("K2_16 =",K2_16_S0206,": No"))
print(paste("K2_17 =",K2_17_S0206,": No"))
print(paste("K2_18 =",K2_18_S0206,": No"))
print(paste("K2_19 =",K2_19_S0206,": Si"))
print(paste("K2_23 =",K2_23_S0206,": No"))
```

```{r}
K2S0206m=c(K2_13_S0206,K2_19_S0206)
K2S0206=mean(K2S0206m)
summary(K2S0206m)
K2S0206m
print(paste("K2_S0206 =",K2S0206))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0206,": Si"))
print(paste("Kmính_14 =",Kmính14_S0206,": No"))
print(paste("Kmính_15 =",Kmính15_S0206,": No"))
print(paste("Kmính_16 =",Kmính16_S0206,": No"))
print(paste("Kmính_17 =",Kmính17_S0206,": No"))
print(paste("Kmính_18 =",Kmính18_S0206,": No"))
print(paste("Kmính_19 =",Kmính19_S0206,": Si"))
print(paste("Kmính_23 =",Kmính23_S0206,": No"))
```

```{r}
```

```
KmínhS0206m=c(Kmính13_S0206,Kmính19_S0206)
KmínhS0206=mean(KmínhS0206m)
summary(KmínhS0206m)
KmínhS0206m
print(paste("Kmính_S0206 =",KmínhS0206))
```

Estación S0213 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0213H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0213H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0213H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0213H13max=S0213H[1:24,6]
S0213H13min=S0213H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H13min),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,S0213H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0213=63.4740328335068
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H13max),lwd="3",col="black",lty=2)
abline(h=min(S0213H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H13max)
K2_13_S0213=Qmax13_S0213/Qp13_S0213
print(paste("K2 =",K2_13_S0213))
```

```{r}
plot(Hora,S0213H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H13min),lwd="3",col="black",lty=2)
abline(h=min(S0213H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H13min)
Kmính13_S0213=Qminh13_S0213/Qp13_S0213
print(paste("Kmính =",Kmính13_S0213))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0213H14max=S0213H[1:24,10]
S0213H14min=S0213H[1:24,12]
```

```{r}
```

```
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H14min),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=102.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0213H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0213=67.2592461010959
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H14max),lwd="3",col="black",lty=2)
abline(h=min(S0213H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H14max)
K2_14_S0213=Qmax14_S0213/Qp14_S0213
print(paste("K2 =",K2_14_S0213))
```

```{r}
plot(Hora,S0213H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H14min),lwd="3",col="black",lty=2)
abline(h=min(S0213H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H14min)
Kmính14_S0213=Qminh14_S0213/Qp14_S0213
print(paste("Kmính =",Kmính14_S0213))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0213H15max=S0213H[1:24,14]
S0213H15min=S0213H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H15min),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=102.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0213H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0213=69.6142733647945
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H15max),lwd="3",col="black",lty=2)
abline(h=min(S0213H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H15max)
K2_15_S0213=Qmax15_S0213/Qp15_S0213
print(paste("K2 =",K2_15_S0213))
```

```{r}
plot(Hora,S0213H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H15min),lwd="3",col="black",lty=2)
abline(h=min(S0213H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H15min)
Kmính15_S0213=Qminh15_S0213/Qp15_S0213
print(paste("Kmính =",Kmính15_S0213))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0213H16max=S0213H[1:24,18]
S0213H16min=S0213H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H16min),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=102.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0213H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0213=65.8434688228415
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H16max),lwd="3",col="black",lty=2)
abline(h=min(S0213H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H16max)
K2_16_S0213=Qmax16_S0213/Qp16_S0213
print(paste("K2 =",K2_16_S0213))
```

```{r}
plot(Hora,S0213H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H16min),lwd="3",col="black",lty=2)
abline(h=min(S0213H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H16min)
Kmính16_S0213=Qminh16_S0213/Qp16_S0213
print(paste("Kmính =",Kmính16_S0213))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0213H17max=S0213H[1:24,22]
S0213H17min=S0213H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H17min),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=107.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0213H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0213=62.6604095459452
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H17max),lwd="3",col="black",lty=2)
abline(h=min(S0213H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H17max)
K2_17_S0213=Qmax17_S0213/Qp17_S0213
print(paste("K2 =",K2_17_S0213))
```

```{r}
plot(Hora,S0213H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H17min),lwd="3",col="black",lty=2)
abline(h=min(S0213H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H17min)
Kmính17_S0213=Qminh17_S0213/Qp17_S0213
print(paste("Kmính =",Kmính17_S0213))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0213H18max=S0213H[1:24,26]
S0213H18min=S0213H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=108.8,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,S0213H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0213=63.5463845869589
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H18max),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0213H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H18max)
K2_18_S0213=Qmax18_S0213/Qp18_S0213
print(paste("K2 =",K2_18_S0213))
```

```{r}
plot(Hora,S0213H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H18min),lwd="3",col="black",lty=2)
abline(h=min(S0213H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H18min)
Kmính18_S0213=Qminh18_S0213/Qp18_S0213
print(paste("Kmính =",Kmính18_S0213))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0213H19max=S0213H[1:24,30]
S0213H19min=S0213H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H19min),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=104,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0213H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0213=65.4622971779452
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H19max),lwd="3",col="black",lty=2)
abline(h=min(S0213H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H19max)
K2_19_S0213=Qmax19_S0213/Qp19_S0213
print(paste("K2 =",K2_19_S0213))
```

```{r}
plot(Hora,S0213H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H19min),lwd="3",col="black",lty=2)
abline(h=min(S0213H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H19min)
Kmính19_S0213=Qminh19_S0213/Qp19_S0213
print(paste("Kmính =",Kmính19_S0213))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0213H23max=S0213H[1:24,46]
S0213H23min=S0213H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0213H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0213 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0213H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=108.5,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,S0213H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0213=71.4661014435068
axis(1,at=seq(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_S0213,lwd="4",col="red")
abline(h=max(S0213H23max),lwd="3",col="black",lty=2)
abline(h=min(S0213H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=max(S0213H23max)
K2_23_S0213=Qmax23_S0213/Qp23_S0213
print(paste("K2 =",K2_23_S0213))
```

```{r}
plot(Hora,S0213H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0213 - 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_S0213,lwd="4",col="red")
abline(h=max(S0213H23min),lwd="3",col="black",lty=2)
abline(h=min(S0213H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0213=min(S0213H23min)
Kmính23_S0213=Qminh23_S0213/Qp23_S0213
print(paste("Kmính =",Kmính23_S0213))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0213,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0213,"l/s",": No"))
print(paste("Qp_15 =",Qp15_S0213,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0213,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0213,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0213,"l/s",": No"))
print(paste("Qp_19 =",Qp19_S0213,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0213,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0213,": No"))
print(paste("K2_14 =",K2_14_S0213,": No"))
print(paste("K2_15 =",K2_15_S0213,": No"))
print(paste("K2_16 =",K2_16_S0213,": No"))
print(paste("K2_17 =",K2_17_S0213,": Si"))
print(paste("K2_18 =",K2_18_S0213,": No"))
print(paste("K2_19 =",K2_19_S0213,": Si"))
print(paste("K2_23 =",K2_23_S0213,": Si"))
```

```{r}
K2S0213m=c(K2_17_S0213,K2_19_S0213,K2_23_S0213)
K2S0213=mean(K2S0213m)
summary(K2S0213m)
K2S0213m
print(paste("K2_S0213 =",K2S0213))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0213,": No"))
print(paste("Kmính_14 =",Kmính14_S0213,": No"))
print(paste("Kmính_15 =",Kmính15_S0213,": No"))
print(paste("Kmính_16 =",Kmính16_S0213,": No"))
print(paste("Kmính_17 =",Kmính17_S0213,": Si"))
print(paste("Kmính_18 =",Kmính18_S0213,": No"))
print(paste("Kmính_19 =",Kmính19_S0213,": Si"))
print(paste("Kmính_23 =",Kmính23_S0213,": Si"))
```

```{r}
KmínhS0213m=c(Kmính17_S0213,Kmính19_S0213,Kmính23_S0213)
KmínhS0213=mean(KmínhS0213m)
summary(KmínhS0213m)
KmínhS0213m
print(paste("Kmính_S0213 =",KmínhS0213))
```

Estación S0300 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0300H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0300H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0300H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0300H13max=S0300H[1:24,6]
S0300H13min=S0300H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H13min),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,S0300H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0300=34.4254853390411
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H13max),lwd="3",col="black",lty=2)
abline(h=min(S0300H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H13max)
K2_13_S0300=Qmax13_S0300/Qp13_S0300
print(paste("K2 =",K2_13_S0300))
```

```{r}
plot(Hora,S0300H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
```

```
abline(h=max(S0300H13min),lwd="3",col="black",lty=2)
abline(h=min(S0300H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H13min)
Kmính13_S0300=Qminh13_S0300/Qp13_S0300
print(paste("Kmính =",Kmính13_S0300))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0300H14max=S0300H[1:24,10]
S0300H14min=S0300H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H14min),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,S0300H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0300=36.0435770568767
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H14max),lwd="3",col="black",lty=2)
abline(h=min(S0300H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H14max)
K2_14_S0300=Qmax14_S0300/Qp14_S0300
print(paste("K2 =",K2_14_S0300))
```

```{r}
plot(Hora,S0300H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
abline(h=max(S0300H14min),lwd="3",col="black",lty=2)
abline(h=min(S0300H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H14min)
Kmính14_S0300=Qminh14_S0300/Qp14_S0300
print(paste("Kmính =",Kmính14_S0300))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0300H15max=S0300H[1:24,14]
S0300H15min=S0300H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H15min),color="blue",lwd=1.2)+
```

```
geom_text(aes(x=3,y=67.9,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62.9,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0300H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0300=37.4326487605753
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H15max),lwd="3",col="black",lty=2)
abline(h=min(S0300H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H15max)
K2_15_S0300=Qmax15_S0300/Qp15_S0300
print(paste("K2 =",K2_15_S0300))
```

```{r}
plot(Hora,S0300H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
abline(h=max(S0300H15min),lwd="3",col="black",lty=2)
abline(h=min(S0300H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H15min)
Kmính15_S0300=Qminh15_S0300/Qp15_S0300
print(paste("Kmính =",Kmính15_S0300))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0300H16max=S0300H[1:24,18]
S0300H16min=S0300H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H16min),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,S0300H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0300=34.7786387553825
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H16max),lwd="3",col="black",lty=2)
abline(h=min(S0300H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H16max)
K2_16_S0300=Qmax16_S0300/Qp16_S0300
print(paste("K2 =",K2_16_S0300))
```

```{r}
plot(Hora,S0300H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
abline(h=max(S0300H16min),lwd="3",col="black",lty=2)
abline(h=min(S0300H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H16min)
Kmính16_S0300=Qminh16_S0300/Qp16_S0300
print(paste("Kmính =",Kmính16_S0300))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0300H17max=S0300H[1:24,22]
S0300H17min=S0300H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=65.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=61.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0300H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0300=35.1368611952329
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H17max),lwd="3",col="black",lty=2)
abline(h=min(S0300H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H17max)
K2_17_S0300=Qmax17_S0300/Qp17_S0300
print(paste("K2 =",K2_17_S0300))
```

```{r}
plot(Hora,S0300H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
abline(h=max(S0300H17min),lwd="3",col="black",lty=2)
abline(h=min(S0300H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H17min)
Kmính17_S0300=Qminh17_S0300/Qp17_S0300
print(paste("Kmính =",Kmính17_S0300))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0300H18max=S0300H[1:24,26]
S0300H18min=S0300H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=53.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0300H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0300=35.0375633723836
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H18max),lwd="3",col="black",lty=2)
abline(h=min(S0300H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H18max)
K2_18_S0300=Qmax18_S0300/Qp18_S0300
print(paste("K2 =",K2_18_S0300))
```

```{r}
plot(Hora,S0300H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
abline(h=max(S0300H18min),lwd="3",col="black",lty=2)
abline(h=min(S0300H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H18min)
Kmính18_S0300=Qminh18_S0300/Qp18_S0300
print(paste("Kmính =",Kmính18_S0300))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0300H19max=S0300H[1:24,30]
S0300H19min=S0300H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=53.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0300H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0300=36.9528931116712
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H19max),lwd="3",col="black",lty=2)
abline(h=min(S0300H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H19max)
K2_19_S0300=Qmax19_S0300/Qp19_S0300
print(paste("K2 =",K2_19_S0300))
```

```{r}
plot(Hora,S0300H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
abline(h=max(S0300H19min),lwd="3",col="black",lty=2)
abline(h=min(S0300H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H19min)
Kmính19_S0300=Qminh19_S0300/Qp19_S0300
print(paste("Kmính =",Kmính19_S0300))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0300H23max=S0300H[1:24,46]
S0300H23min=S0300H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0300H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0300 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0300H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0300H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0300=40.9219583627397
axis(1,at=seq(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_S0300,lwd="4",col="red")
abline(h=max(S0300H23max),lwd="3",col="black",lty=2)
abline(h=min(S0300H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=max(S0300H23max)
K2_23_S0300=Qmax23_S0300/Qp23_S0300
print(paste("K2 =",K2_23_S0300))
```

```{r}
plot(Hora,S0300H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 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_S0300,lwd="4",col="red")
abline(h=max(S0300H23min),lwd="3",col="black",lty=2)
abline(h=min(S0300H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0300=min(S0300H23min)
Kmính23_S0300=Qminh23_S0300/Qp23_S0300
print(paste("Kmính =",Kmính23_S0300))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0300,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0300,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0300,"l/s",": si"))
print(paste("Qp_16 =",Qp16_S0300,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0300,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0300,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0300,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0300,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0300,": Si"))
print(paste("K2_14 =",K2_14_S0300,": Si"))
print(paste("K2_15 =",K2_15_S0300,": Si"))
print(paste("K2_16 =",K2_16_S0300,": Si"))
print(paste("K2_17 =",K2_17_S0300,": Si"))
print(paste("K2_18 =",K2_18_S0300,": Si"))
print(paste("K2_19 =",K2_19_S0300,": Si"))
print(paste("K2_23 =",K2_23_S0300,": Si"))
```

```{r}
K2S0300m=c(K2_13_S0300,K2_14_S0300,K2_15_S0300,K2_16_S0300,K2_17_S0300,
K2_18_S0300,K2_19_S0300,K2_23_S0300)
K2S0300=mean(K2S0300m)
summary(K2S0300m)
K2S0300m
print(paste("K2_S0300 =",K2S0300))
```

Determinación del coeficiente Kmính el sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0300,": Si"))
print(paste("Kmính_14 =",Kmính14_S0300,": Si"))
print(paste("Kmính_15 =",Kmính15_S0300,": Si"))
print(paste("Kmính_16 =",Kmính16_S0300,": Si"))
print(paste("Kmính_17 =",Kmính17_S0300,": Si"))
print(paste("Kmính_18 =",Kmính18_S0300,": Si"))
print(paste("Kmính_19 =",Kmính19_S0300,": Si"))
print(paste("Kmính_23 =",Kmính23_S0300,": Si"))
```

```{r}
KmínhS0300m=c(Kmính13_S0300,Kmính14_S0300,Kmính15_S0300,Kmính16_S0300,
Kmính17_S0300,Kmính18_S0300,Kmính19_S0300,Kmính23_S0300)
KmínhS0300=mean(KmínhS0300m)
summary(KmínhS0300m)
KmínhS0300m
print(paste("Kmính_S0300 =",KmínhS0300))
```

Estación S0301 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0301H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0301H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0301H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0301H13max=S0301H[1:24,6]
S0301H13min=S0301H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=135.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=125.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0301H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
Qp13_S0301=90.3720919751233
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H13max),lwd="3",col="black",lty=2)
abline(h=min(S0301H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H13max)
K2_13_S0301=Qmax13_S0301/Qp13_S0301
print(paste("K2 =",K2_13_S0301))
```

```{r}
plot(Hora,S0301H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H13min),lwd="3",col="black",lty=2)
abline(h=min(S0301H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H13min)
Kmính13_S0301=Qminh13_S0301/Qp13_S0301
print(paste("Kmính =",Kmính13_S0301))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0301H14max=S0301H[1:24,10]
S0301H14min=S0301H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=135.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=125.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0301H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0301=89.1436160221644
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H14max),lwd="3",col="black",lty=2)
abline(h=min(S0301H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H14max)
K2_14_S0301=Qmax14_S0301/Qp14_S0301
print(paste("K2 =",K2_14_S0301))
```

```{r}
plot(Hora,S0301H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H14min),lwd="3",col="black",lty=2)
abline(h=min(S0301H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H14min)
Kmính14_S0301=Qminh14_S0301/Qp14_S0301
print(paste("Kmính =",Kmính14_S0301))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0301H15max=S0301H[1:24,14]
S0301H15min=S0301H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H15min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0301H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0301=89.4525439956986
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H15max),lwd="3",col="black",lty=2)
abline(h=min(S0301H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H15max)
K2_15_S0301=Qmax15_S0301/Qp15_S0301
print(paste("K2 =",K2_15_S0301))
```

```{r}
plot(Hora,S0301H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H15min),lwd="3",col="black",lty=2)
abline(h=min(S0301H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H15min)
Kmính15_S0301=Qminh15_S0301/Qp15_S0301
print(paste("Kmính =",Kmính15_S0301))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0301H16max=S0301H[1:24,18]
S0301H16min=S0301H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H16min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```
```

```{r}
plot(Hora,S0301H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0301=89.8719701947814
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H16max),lwd="3",col="black",lty=2)
abline(h=min(S0301H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H16max)
K2_16_S0301=Qmax16_S0301/Qp16_S0301
print(paste("K2 =",K2_16_S0301))
```

```{r}
plot(Hora,S0301H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H16min),lwd="3",col="black",lty=2)
abline(h=min(S0301H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H16min)
Kmính16_S0301=Qminh16_S0301/Qp16_S0301
print(paste("Kmính =",Kmính16_S0301))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0301H17max=S0301H[1:24,22]
S0301H17min=S0301H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H17min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0301H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0301=91.4723583127397
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H17max),lwd="3",col="black",lty=2)
abline(h=min(S0301H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H17max)
K2_17_S0301=Qmax17_S0301/Qp17_S0301
print(paste("K2 =",K2_17_S0301))
```

```{r}
plot(Hora,S0301H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H17min),lwd="3",col="black",lty=2)
abline(h=min(S0301H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H17min)
Kmính17_S0301=Qminh17_S0301/Qp17_S0301
print(paste("Kmính =",Kmính17_S0301))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0301H18max=S0301H[1:24,26]
S0301H18min=S0301H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H18min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0301H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0301=96.6189480913151
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H18max),lwd="3",col="black",lty=2)
abline(h=min(S0301H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H18max)
K2_18_S0301=Qmax18_S0301/Qp18_S0301
print(paste("K2 =",K2_18_S0301))
```

```{r}
plot(Hora,S0301H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H18min),lwd="3",col="black",lty=2)
abline(h=min(S0301H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H18min)
Kmính18_S0301=Qminh18_S0301/Qp18_S0301
print(paste("Kmính =",Kmính18_S0301))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0301H19max=S0301H[1:24,30]
S0301H19min=S0301H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H19min),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,S0301H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0301=101.083512425205
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H19max),lwd="3",col="black",lty=2)
abline(h=min(S0301H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H19max)
K2_19_S0301=Qmax19_S0301/Qp19_S0301
print(paste("K2 =",K2_19_S0301))
```

```{r}
plot(Hora,S0301H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H19min),lwd="3",col="black",lty=2)
abline(h=min(S0301H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H19min)
Kmính19_S0301=Qminh19_S0301/Qp19_S0301
print(paste("Kmính =",Kmính19_S0301))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0301H23max=S0301H[1:24,46]
S0301H23min=S0301H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0301H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0301 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0301H23min),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=182,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0301H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0301=111.939779364685
axis(1,at=seq(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_S0301,lwd="4",col="red")
abline(h=max(S0301H23max),lwd="3",col="black",lty=2)
abline(h=min(S0301H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=max(S0301H23max)
K2_23_S0301=Qmax23_S0301/Qp23_S0301
print(paste("K2 =",K2_23_S0301))
```

```
```

```{r}
plot(Hora,S0301H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0301 - 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_S0301,lwd="4",col="red")
abline(h=max(S0301H23min),lwd="3",col="black",lty=2)
abline(h=min(S0301H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0301=min(S0301H23min)
Kmính23_S0301=Qminh23_S0301/Qp23_S0301
print(paste("Kmính =",Kmính23_S0301))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0301,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0301,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0301,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0301,"l/s",": No"))
print(paste("Qp_17 =",Qp17_S0301,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0301,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0301,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0301,"l/s",": No"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0301,": Si"))
print(paste("K2_14 =",K2_14_S0301,": Si"))
print(paste("K2_15 =",K2_15_S0301,": Si"))
print(paste("K2_16 =",K2_16_S0301,": No"))
print(paste("K2_17 =",K2_17_S0301,": No"))
print(paste("K2_18 =",K2_18_S0301,": Si"))
print(paste("K2_19 =",K2_19_S0301,": No"))
print(paste("K2_23 =",K2_23_S0301,": No"))
```

```{r}
K2S0301m=c(K2_13_S0301,K2_14_S0301,K2_15_S0301,K2_18_S0301)
K2S0301=mean(K2S0301m)
summary(K2S0301m)
K2S0301m
print(paste("K2_S0301 =",K2S0301))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0301,": Si"))
print(paste("Kmính_14 =",Kmính14_S0301,": Si"))
print(paste("Kmính_15 =",Kmính15_S0301,": Si"))
print(paste("Kmính_16 =",Kmính16_S0301,": No"))
print(paste("Kmính_17 =",Kmính17_S0301,": No"))
print(paste("Kmính_18 =",Kmính18_S0301,": Si"))
print(paste("Kmính_19 =",Kmính19_S0301,": No"))
print(paste("Kmính_23 =",Kmính23_S0301,": No"))
```

```{r}
KmínhS0301m=c(Kmính13_S0301,Kmính14_S0301,Kmính15_S0301,Kmính18_S0301)
KmínhS0301=mean(KmínhS0301m)
summary(KmínhS0301m)
KmínhS0301m
print(paste("Kmính_S0301 =",KmínhS0301))
```

Estación S0305 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0305H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0305H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0305H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
```

```
S0305H13max=S0305H[1:24,6]
S0305H13min=S0305H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=237,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,S0305H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0305=179.311946881096
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H13max),lwd="3",col="black",lty=2)
abline(h=min(S0305H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H13max)
K2_13_S0305=Qmax13_S0305/Qp13_S0305
print(paste("K2 =",K2_13_S0305))
```

```{r}
plot(Hora,S0305H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H13min),lwd="3",col="black",lty=2)
abline(h=min(S0305H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H13min)
Kmính13_S0305=Qminh13_S0305/Qp13_S0305
print(paste("Kmính =",Kmính13_S0305))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0305H14max=S0305H[1:24,10]
S0305H14min=S0305H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=237,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,S0305H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0305=180.612468700274
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H14max),lwd="3",col="black",lty=2)
abline(h=min(S0305H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H14max)
K2_14_S0305=Qmax14_S0305/Qp14_S0305
print(paste("K2 =",K2_14_S0305))
```

```{r}
plot(Hora,S0305H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H14min),lwd="3",col="black",lty=2)
abline(h=min(S0305H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H14min)
Kmính14_S0305=Qminh14_S0305/Qp14_S0305
print(paste("Kmính =",Kmính14_S0305))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0305H15max=S0305H[1:24,14]
S0305H15min=S0305H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=237,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,S0305H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0305=181.219338514247
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H15max),lwd="3",col="black",lty=2)
abline(h=min(S0305H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H15max)
K2_15_S0305=Qmax15_S0305/Qp15_S0305
print(paste("K2 =",K2_15_S0305))
```

```{r}
plot(Hora,S0305H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H15min),lwd="3",col="black",lty=2)
abline(h=min(S0305H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H15min)
Kmính15_S0305=Qminh15_S0305/Qp15_S0305
```

```
print(paste("Kmính =",Kmính15_S0305))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0305H16max=S0305H[1:24,18]
S0305H16min=S0305H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=237,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,S0305H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0305=187.947227937158
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H16max),lwd="3",col="black",lty=2)
abline(h=min(S0305H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H16max)
K2_16_S0305=Qmax16_S0305/Qp16_S0305
print(paste("K2 =",K2_16_S0305))
```

```{r}
plot(Hora,S0305H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H16min),lwd="3",col="black",lty=2)
abline(h=min(S0305H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H16min)
Kmính16_S0305=Qminh16_S0305/Qp16_S0305
print(paste("Kmính =",Kmính16_S0305))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0305H17max=S0305H[1:24,22]
S0305H17min=S0305H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=330,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=310,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0305H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
```

```
ylab="Caudal (l/s)")
Qp17_S0305=186.400124786301
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H17max),lwd="3",col="black",lty=2)
abline(h=min(S0305H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H17max)
K2_17_S0305=Qmax17_S0305/Qp17_S0305
print(paste("K2 =",K2_17_S0305))
```

```{r}
plot(Hora,S0305H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H17min),lwd="3",col="black",lty=2)
abline(h=min(S0305H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H17min)
Kmính17_S0305=Qminh17_S0305/Qp17_S0305
print(paste("Kmính =",Kmính17_S0305))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0305H18max=S0305H[1:24,26]
S0305H18min=S0305H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=290,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=265,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0305H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0305=195.88553390137
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H18max),lwd="3",col="black",lty=2)
abline(h=min(S0305H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H18max)
K2_18_S0305=Qmax18_S0305/Qp18_S0305
print(paste("K2 =",K2_18_S0305))
```

```{r}
plot(Hora,S0305H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H18min),lwd="3",col="black",lty=2)
abline(h=min(S0305H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H18min)
Kmính18_S0305=Qminh18_S0305/Qp18_S0305
print(paste("Kmính =",Kmính18_S0305))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0305H19max=S0305H[1:24,30]
S0305H19min=S0305H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=312,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=291.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0305H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0305=202.763293944932
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H19max),lwd="3",col="black",lty=2)
abline(h=min(S0305H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H19max)
K2_19_S0305=Qmax19_S0305/Qp19_S0305
print(paste("K2 =",K2_19_S0305))
```

```{r}
plot(Hora,S0305H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H19min),lwd="3",col="black",lty=2)
abline(h=min(S0305H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H19min)
Kmính19_S0305=Qminh19_S0305/Qp19_S0305
print(paste("Kmính =",Kmính19_S0305))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0305H23max=S0305H[1:24,46]
S0305H23min=S0305H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0305H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0305 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0305H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=338,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=314.5,label="- Día de mínimo consumo"),
```

```
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0305H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0305=216.861884906575
axis(1,at=seq(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_S0305,lwd="4",col="red")
abline(h=max(S0305H23max),lwd="3",col="black",lty=2)
abline(h=min(S0305H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=max(S0305H23max)
K2_23_S0305=Qmax23_S0305/Qp23_S0305
print(paste("K2 =",K2_23_S0305))
```

```{r}
plot(Hora,S0305H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0305 - 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_S0305,lwd="4",col="red")
abline(h=max(S0305H23min),lwd="3",col="black",lty=2)
abline(h=min(S0305H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0305=min(S0305H23min)
Kmính23_S0305=Qminh23_S0305/Qp23_S0305
print(paste("Kmính =",Kmính23_S0305))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0305,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0305,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0305,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0305,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0305,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0305,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0305,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0305,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0305,": Si"))
print(paste("K2_14 =",K2_14_S0305,": Si"))
print(paste("K2_15 =",K2_15_S0305,": Si"))
print(paste("K2_16 =",K2_16_S0305,": Si"))
print(paste("K2_17 =",K2_17_S0305,": Si"))
print(paste("K2_18 =",K2_18_S0305,": Si"))
print(paste("K2_19 =",K2_19_S0305,": Si"))
print(paste("K2_23 =",K2_23_S0305,": Si"))
```

```{r}
K2S0305m=c(K2_13_S0305,K2_14_S0305,K2_15_S0305,K2_16_S0305,K2_17_S0305,
K2_18_S0305,K2_19_S0305,K2_23_S0305)
K2S0305=mean(K2S0305m)
summary(K2S0305m)
K2S0305m
print(paste("K2_S0305 =",K2S0305))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0305,": Si"))
print(paste("Kmính_14 =",Kmính14_S0305,": Si"))
print(paste("Kmính_15 =",Kmính15_S0305,": Si"))
print(paste("Kmính_16 =",Kmính16_S0305,": Si"))
print(paste("Kmính_17 =",Kmính17_S0305,": Si"))
print(paste("Kmính_18 =",Kmính18_S0305,": Si"))
print(paste("Kmính_19 =",Kmính19_S0305,": Si"))
print(paste("Kmính_23 =",Kmính23_S0305,": Si"))
```

```{r}
```

```
KmínhS0305m=c(Kmính13_S0305,Kmính14_S0305,Kmính15_S0305,Kmính16_S0305,
Kmính17_S0305,Kmính18_S0305,Kmính19_S0305,Kmính23_S0305)
KmínhS0305=mean(KmínhS0305m)
summary(KmínhS0305m)
KmínhS0305m
print(paste("Kmính_S0305 =",KmínhS0305))
```

Estación S0306 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0306H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0306H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0306H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0306H13max=S0306H[1:24,6]
S0306H13min=S0306H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H13min),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=126,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0306H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0306=85.6055052062466
axis(1,at=seq(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_S0306,lwd="4",col="red")
abline(h=max(S0306H13max),lwd="3",col="black",lty=2)
abline(h=min(S0306H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H13max)
K2_13_S0306=Qmax13_S0306/Qp13_S0306
print(paste("K2 =",K2_13_S0306))
```

```{r}
plot(Hora,S0306H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H13min),lwd="3",col="black",lty=2)
abline(h=min(S0306H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H13min)
Kmính13_S0306=Qminh13_S0306/Qp13_S0306
print(paste("Kmính =",Kmính13_S0306))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0306H14max=S0306H[1:24,10]
S0306H14min=S0306H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H14min),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=126,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0306H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0306=90.0893095433425
axis(1,at=seq(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_S0306,lwd="4",col="red")
abline(h=max(S0306H14max),lwd="3",col="black",lty=2)
abline(h=min(S0306H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H14max)
K2_14_S0306=Qmax14_S0306/Qp14_S0306
print(paste("K2 =",K2_14_S0306))
```

```{r}
plot(Hora,S0306H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H14min),lwd="3",col="black",lty=2)
abline(h=min(S0306H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H14min)
Kmính14_S0306=Qminh14_S0306/Qp14_S0306
print(paste("Kmính =",Kmính14_S0306))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0306H15max=S0306H[1:24,14]
S0306H15min=S0306H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H15min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0306H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0306=90.894754335452
axis(1,at=seq(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_S0306,lwd="4",col="red")
abline(h=max(S0306H15max),lwd="3",col="black",lty=2)
abline(h=min(S0306H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H15max)
K2_15_S0306=Qmax15_S0306/Qp15_S0306
print(paste("K2 =",K2_15_S0306))
```

```{r}
plot(Hora,S0306H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H15min),lwd="3",col="black",lty=2)
abline(h=min(S0306H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H15min)
Kmính15_S0306=Qminh15_S0306/Qp15_S0306
print(paste("Kmính =",Kmính15_S0306))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0306H16max=S0306H[1:24,18]
S0306H16min=S0306H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=135.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=125.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0306H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0306=92.5861783941803
axis(1,at=seq(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_S0306,lwd="4",col="red")
abline(h=max(S0306H16max),lwd="3",col="black",lty=2)
abline(h=min(S0306H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H16max)
K2_16_S0306=Qmax16_S0306/Qp16_S0306
print(paste("K2 =",K2_16_S0306))
```

```{r}
plot(Hora,S0306H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H16min),lwd="3",col="black",lty=2)
abline(h=min(S0306H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H16min)
Kmính16_S0306=Qminh16_S0306/Qp16_S0306
print(paste("Kmính =",Kmính16_S0306))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0306H17max=S0306H[1:24,22]
S0306H17min=S0306H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H17min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0306H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0306=92.4397145965753
axis(1,at=seq(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_S0306,lwd="4",col="red")
abline(h=max(S0306H17max),lwd="3",col="black",lty=2)
abline(h=min(S0306H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H17max)
K2_17_S0306=Qmax17_S0306/Qp17_S0306
print(paste("K2 =",K2_17_S0306))
```

```{r}
plot(Hora,S0306H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H17min),lwd="3",col="black",lty=2)
abline(h=min(S0306H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H17min)
Kmính17_S0306=Qminh17_S0306/Qp17_S0306
print(paste("Kmính =",Kmính17_S0306))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0306H18max=S0306H[1:24,26]
S0306H18min=S0306H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H18min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0306H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0306=99.6218337333699
axis(1,at=seq(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_S0306,lwd="4",col="red")
```

```
abline(h=max(S0306H18max),lwd="3",col="black",lty=2)
abline(h=min(S0306H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H18max)
K2_18_S0306=Qmax18_S0306/Qp18_S0306
print(paste("K2 =",K2_18_S0306))
```

```{r}
plot(Hora,S0306H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H18min),lwd="3",col="black",lty=2)
abline(h=min(S0306H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H18min)
Kmính18_S0306=Qminh18_S0306/Qp18_S0306
print(paste("Kmính =",Kmính18_S0306))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0306H19max=S0306H[1:24,30]
S0306H19min=S0306H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H19min),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,S0306H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0306=104.100221968849
axis(1,at=seq(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_S0306,lwd="4",col="red")
abline(h=max(S0306H19max),lwd="3",col="black",lty=2)
abline(h=min(S0306H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H19max)
K2_19_S0306=Qmax19_S0306/Qp19_S0306
print(paste("K2 =",K2_19_S0306))
```

```{r}
plot(Hora,S0306H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H19min),lwd="3",col="black",lty=2)
abline(h=min(S0306H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H19min)
Kmính19_S0306=Qminh19_S0306/Qp19_S0306
print(paste("Kmính =",Kmính19_S0306))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0306H23max=S0306H[1:24,46]
S0306H23min=S0306H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0306H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0306 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0306H23min),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,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0306H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0306=107.172224533918
axis(1,at=seq(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_S0306,lwd="4",col="red")
abline(h=max(S0306H23max),lwd="3",col="black",lty=2)
abline(h=min(S0306H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=max(S0306H23max)
K2_23_S0306=Qmax23_S0306/Qp23_S0306
print(paste("K2 =",K2_23_S0306))
```

```{r}
plot(Hora,S0306H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0306 - 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_S0306,lwd="4",col="red")
abline(h=max(S0306H23min),lwd="3",col="black",lty=2)
abline(h=min(S0306H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0306=min(S0306H23min)
Kmính23_S0306=Qminh23_S0306/Qp23_S0306
print(paste("Kmính =",Kmính23_S0306))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0306,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0306,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0306,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0306,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0306,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0306,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0306,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0306,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0306,": No"))
print(paste("K2_14 =",K2_14_S0306,": Si"))
print(paste("K2_15 =",K2_15_S0306,": Si"))
print(paste("K2_16 =",K2_16_S0306,": Si"))
print(paste("K2_17 =",K2_17_S0306,": Si"))
print(paste("K2_18 =",K2_18_S0306,": Si"))
print(paste("K2_19 =",K2_19_S0306,": Si"))
print(paste("K2_23 =",K2_23_S0306,": Si"))
```

```
```

```{r}
K2S0306m=c(K2_14_S0306,K2_15_S0306,K2_16_S0306,K2_17_S0306,K2_18_S0306,
K2_19_S0306,K2_23_S0306)
K2S0306=mean(K2S0306m)
summary(K2S0306m)
K2S0306m
print(paste("K2_S0306 =",K2S0306))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0306,": No"))
print(paste("Kmính_14 =",Kmính14_S0306,": Si"))
print(paste("Kmính_15 =",Kmính15_S0306,": Si"))
print(paste("Kmính_16 =",Kmính16_S0306,": Si"))
print(paste("Kmính_17 =",Kmính17_S0306,": Si"))
print(paste("Kmính_18 =",Kmính18_S0306,": Si"))
print(paste("Kmính_19 =",Kmính19_S0306,": Si"))
print(paste("Kmính_23 =",Kmính23_S0306,": Si"))
```

```{r}
KmínhS0306m=c(Kmính14_S0306,Kmính15_S0306,Kmính16_S0306,Kmính17_S0306,
Kmính18_S0306,Kmính19_S0306,Kmính23_S0306)
KmínhS0306=mean(KmínhS0306m)
summary(KmínhS0306m)
KmínhS0306m
print(paste("Kmính_S0306 =",KmínhS0306))
```

Estación S0309 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0309H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0309H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0309H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0309H13max=S0309H[1:24,6]
S0309H13min=S0309H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H13min),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=109,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0309H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0309=72.5937524511507
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H13max),lwd="3",col="black",lty=2)
abline(h=min(S0309H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H13max)
K2_13_S0309=Qmax13_S0309/Qp13_S0309
print(paste("K2 =",K2_13_S0309))
```

```{r}
plot(Hora,S0309H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H13min),lwd="3",col="black",lty=2)
abline(h=min(S0309H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H13min)
Kmính13_S0309=Qminh13_S0309/Qp13_S0309
print(paste("Kmính =",Kmính13_S0309))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0309H14max=S0309H[1:24,10]
S0309H14min=S0309H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H14min),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,S0309H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0309=74.6390535855342
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H14max),lwd="3",col="black",lty=2)
abline(h=min(S0309H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H14max)
K2_14_S0309=Qmax14_S0309/Qp14_S0309
print(paste("K2 =",K2_14_S0309))
```

```{r}
plot(Hora,S0309H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H14min),lwd="3",col="black",lty=2)
abline(h=min(S0309H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H14min)
Kmính14_S0309=Qminh14_S0309/Qp14_S0309
print(paste("Kmính =",Kmính14_S0309))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0309H15max=S0309H[1:24,14]
S0309H15min=S0309H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
```

```
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H15min),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,S0309H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0309=76.4345154789041
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H15max),lwd="3",col="black",lty=2)
abline(h=min(S0309H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H15max)
K2_15_S0309=Qmax15_S0309/Qp15_S0309
print(paste("K2 =",K2_15_S0309))
```

```{r}
plot(Hora,S0309H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H15min),lwd="3",col="black",lty=2)
abline(h=min(S0309H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H15min)
Kmính15_S0309=Qminh15_S0309/Qp15_S0309
print(paste("Kmính =",Kmính15_S0309))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0309H16max=S0309H[1:24,18]
S0309H16min=S0309H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H16min),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=134,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0309H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0309=78.1097093469945
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H16max),lwd="3",col="black",lty=2)
abline(h=min(S0309H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H16max)
K2_16_S0309=Qmax16_S0309/Qp16_S0309
print(paste("K2 =",K2_16_S0309))
```

```
```

```{r}
plot(Hora,S0309H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H16min),lwd="3",col="black",lty=2)
abline(h=min(S0309H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H16min)
Kmính16_S0309=Qminh16_S0309/Qp16_S0309
print(paste("Kmính =",Kmính16_S0309))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0309H17max=S0309H[1:24,22]
S0309H17min=S0309H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=130.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=120.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0309H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0309=73.4570432094247
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H17max),lwd="3",col="black",lty=2)
abline(h=min(S0309H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H17max)
K2_17_S0309=Qmax17_S0309/Qp17_S0309
print(paste("K2 =",K2_17_S0309))
```

```{r}
plot(Hora,S0309H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H17min),lwd="3",col="black",lty=2)
abline(h=min(S0309H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H17min)
Kmính17_S0309=Qminh17_S0309/Qp17_S0309
print(paste("Kmính =",Kmính17_S0309))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0309H18max=S0309H[1:24,26]
S0309H18min=S0309H[1:24,28]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H18min),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,S0309H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0309=79.3698690632329
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H18max),lwd="3",col="black",lty=2)
abline(h=min(S0309H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H18max)
K2_18_S0309=Qmax18_S0309/Qp18_S0309
print(paste("K2 =",K2_18_S0309))
```

```{r}
plot(Hora,S0309H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H18min),lwd="3",col="black",lty=2)
abline(h=min(S0309H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H18min)
Kmính18_S0309=Qminh18_S0309/Qp18_S0309
print(paste("Kmính =",Kmính18_S0309))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0309H19max=S0309H[1:24,30]
S0309H19min=S0309H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=130.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=120.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0309H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0309=81.0752864570685
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H19max),lwd="3",col="black",lty=2)
abline(h=min(S0309H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H19max)
K2_19_S0309=Qmax19_S0309/Qp19_S0309
print(paste("K2 =",K2_19_S0309))
```

```{r}
plot(Hora,S0309H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H19min),lwd="3",col="black",lty=2)
abline(h=min(S0309H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H19min)
Kmính19_S0309=Qminh19_S0309/Qp19_S0309
print(paste("Kmính =",Kmính19_S0309))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0309H23max=S0309H[1:24,46]
S0309H23min=S0309H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0309H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0309 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0309H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=123.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=115.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0309H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0309=81.3195055759178
axis(1,at=seq(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_S0309,lwd="4",col="red")
abline(h=max(S0309H23max),lwd="3",col="black",lty=2)
abline(h=min(S0309H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=max(S0309H23max)
K2_23_S0309=Qmax23_S0309/Qp23_S0309
print(paste("K2 =",K2_23_S0309))
```

```{r}
plot(Hora,S0309H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0309 - 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_S0309,lwd="4",col="red")
abline(h=max(S0309H23min),lwd="3",col="black",lty=2)
abline(h=min(S0309H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0309=min(S0309H23min)
Kmính23_S0309=Qminh23_S0309/Qp23_S0309
print(paste("Kmính =",Kmính23_S0309))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0309,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0309,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0309,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0309,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0309,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0309,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0309,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0309,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0309,": Si"))
print(paste("K2_14 =",K2_14_S0309,": Si"))
print(paste("K2_15 =",K2_15_S0309,": Si"))
print(paste("K2_16 =",K2_16_S0309,": Si"))
print(paste("K2_17 =",K2_17_S0309,": Si"))
print(paste("K2_18 =",K2_18_S0309,": Si"))
print(paste("K2_19 =",K2_19_S0309,": Si"))
print(paste("K2_23 =",K2_23_S0309,": Si"))
```

```{r}
K2S0309m=c(K2_13_S0309,K2_14_S0309,K2_15_S0309,K2_16_S0309,K2_17_S0309,
K2_18_S0309,K2_19_S0309,K2_23_S0309)
K2S0309=mean(K2S0309m)
summary(K2S0309m)
K2S0309m
print(paste("K2_S0309 =",K2S0309))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0309,": Si"))
print(paste("Kmính_14 =",Kmính14_S0309,": Si"))
print(paste("Kmính_15 =",Kmính15_S0309,": Si"))
print(paste("Kmính_16 =",Kmính16_S0309,": si"))
print(paste("Kmính_17 =",Kmính17_S0309,": Si"))
print(paste("Kmính_18 =",Kmính18_S0309,": Si"))
print(paste("Kmính_19 =",Kmính19_S0309,": Si"))
print(paste("Kmính_23 =",Kmính23_S0309,": Si"))
```

```{r}
KmínhS0309m=c(Kmính13_S0309,Kmính14_S0309,Kmính15_S0309,Kmính16_S0309,
Kmính17_S0309,Kmính18_S0309,Kmính19_S0309,Kmính23_S0309)
KmínhS0309=mean(KmínhS0309m)
summary(KmínhS0309m)
KmínhS0309m
print(paste("Kmính_S0309 =",KmínhS0309))
```

Estación S0311 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0311H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0311H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0311H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0311H13max=S0311H[1:24,6]
S0311H13min=S0311H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0311 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H13min),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=181,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0311H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2013 (Día de máximo consumo)",
```

```
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0311=116.369211060301
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H13max),lwd="3",col="black",lty=2)
abline(h=min(S0311H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=max(S0311H13max)
K2_13_S0311=Qmax13_S0311/Qp13_S0311
print(paste("K2 =",K2_13_S0311))
```

```{r}
plot(Hora,S0311H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H13min),lwd="3",col="black",lty=2)
abline(h=min(S0311H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=min(S0311H13min)
Kmính13_S0311=Qminh13_S0311/Qp13_S0311
print(paste("Kmính =",Kmính13_S0311))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0311H14max=S0311H[1:24,10]
S0311H14min=S0311H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0311 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H14min),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=181,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0311H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0311=125.963085694795
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H14max),lwd="3",col="black",lty=2)
abline(h=min(S0311H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=max(S0311H14max)
K2_14_S0311=Qmax14_S0311/Qp14_S0311
print(paste("K2 =",K2_14_S0311))
```

```{r}
plot(Hora,S0311H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H14min),lwd="3",col="black",lty=2)
abline(h=min(S0311H14min),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(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_S0311=min(S0311H14min)
Kmính14_S0311=Qminh14_S0311/Qp14_S0311
print(paste("Kmính =",Kmính14_S0311))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0311H15max=S0311H[1:24,14]
S0311H15min=S0311H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0311 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H15min),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=181,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0311H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0311=125.552736164384
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H15max),lwd="3",col="black",lty=2)
abline(h=min(S0311H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=max(S0311H15max)
K2_15_S0311=Qmax15_S0311/Qp15_S0311
print(paste("K2 =",K2_15_S0311))
```

```{r}
plot(Hora,S0311H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H15min),lwd="3",col="black",lty=2)
abline(h=min(S0311H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=min(S0311H15min)
Kmính15_S0311=Qminh15_S0311/Qp15_S0311
print(paste("Kmính =",Kmính15_S0311))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0311H16max=S0311H[1:24,18]
S0311H16min=S0311H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0311 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H16min),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=181,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0311H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0311=124.503935810383
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H16max),lwd="3",col="black",lty=2)
abline(h=min(S0311H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=max(S0311H16max)
K2_16_S0311=Qmax16_S0311/Qp16_S0311
print(paste("K2 =",K2_16_S0311))
```

```{r}
plot(Hora,S0311H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H16min),lwd="3",col="black",lty=2)
abline(h=min(S0311H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=min(S0311H16min)
Kmính16_S0311=Qminh16_S0311/Qp16_S0311
print(paste("Kmính =",Kmính16_S0311))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0311H17max=S0311H[1:24,22]
S0311H17min=S0311H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0311 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H17min),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=181,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0311H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0311=120.372238899041
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H17max),lwd="3",col="black",lty=2)
abline(h=min(S0311H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=max(S0311H17max)
K2_17_S0311=Qmax17_S0311/Qp17_S0311
print(paste("K2 =",K2_17_S0311))
```

```{r}
plot(Hora,S0311H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H17min),lwd="3",col="black",lty=2)
abline(h=min(S0311H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=min(S0311H17min)
Kmính17_S0311=Qminh17_S0311/Qp17_S0311
print(paste("Kmính =",Kmính17_S0311))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0311H18max=S0311H[1:24,26]
S0311H18min=S0311H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0311 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H18min),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,S0311H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0311=115.81502284274
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H18max),lwd="3",col="black",lty=2)
abline(h=min(S0311H18max),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_S0311=max(S0311H18max)
K2_18_S0311=Qmax18_S0311/Qp18_S0311
print(paste("K2 =",K2_18_S0311))
```

```{r}
plot(Hora,S0311H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H18min),lwd="3",col="black",lty=2)
abline(h=min(S0311H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=min(S0311H18min)
Kmính18_S0311=Qminh18_S0311/Qp18_S0311
print(paste("Kmính =",Kmính18_S0311))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0311H19max=S0311H[1:24,30]
S0311H19min=S0311H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H19max),color="red",lwd=1.2)+
```

```
ggtitle("ESTACIÓN S0311 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H19min),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=181,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0311H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0311=122.172296837808
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H19max),lwd="3",col="black",lty=2)
abline(h=min(S0311H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=max(S0311H19max)
K2_19_S0311=Qmax19_S0311/Qp19_S0311
print(paste("K2 =",K2_19_S0311))
```

```{r}
plot(Hora,S0311H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H19min),lwd="3",col="black",lty=2)
abline(h=min(S0311H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=min(S0311H19min)
Kmính19_S0311=Qminh19_S0311/Qp19_S0311
print(paste("Kmính =",Kmính19_S0311))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0311H23max=S0311H[1:24,46]
S0311H23min=S0311H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0311H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0311 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0311H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=222,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,S0311H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0311=132.95924817589
axis(1,at=seq(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_S0311,lwd="4",col="red")
abline(h=max(S0311H23max),lwd="3",col="black",lty=2)
abline(h=min(S0311H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=max(S0311H23max)
```

```
K2_23_S0311=Qmax23_S0311/Qp23_S0311
print(paste("K2 =",K2_23_S0311))
```

```{r}
plot(Hora,S0311H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0311 - 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_S0311,lwd="4",col="red")
abline(h=max(S0311H23min),lwd="3",col="black",lty=2)
abline(h=min(S0311H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0311=min(S0311H23min)
Kmính23_S0311=Qminh23_S0311/Qp23_S0311
print(paste("Kmính =",Kmính23_S0311))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0311,"l/s",": No"))
print(paste("Qp_14 =",Qp14_S0311,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0311,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0311,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0311,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0311,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0311,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0311,"l/s",": No"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0311,": No"))
print(paste("K2_14 =",K2_14_S0311,": Si"))
print(paste("K2_15 =",K2_15_S0311,": Si"))
print(paste("K2_16 =",K2_16_S0311,": Si"))
print(paste("K2_17 =",K2_17_S0311,": Si"))
print(paste("K2_18 =",K2_18_S0311,": Si"))
print(paste("K2_19 =",K2_19_S0311,": Si"))
print(paste("K2_23 =",K2_23_S0311,": No"))
```

```{r}
K2S0311m=c(K2_14_S0311,K2_15_S0311,K2_16_S0311,K2_17_S0311,K2_18_S0311,
K2_19_S0311)
K2S0311=mean(K2S0311m)
summary(K2S0311m)
K2S0311m
print(paste("K2_S0311 =",K2S0311))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0311,": No"))
print(paste("Kmính_14 =",Kmính14_S0311,": Si"))
print(paste("Kmính_15 =",Kmính15_S0311,": Si"))
print(paste("Kmính_16 =",Kmính16_S0311,": Si"))
print(paste("Kmính_17 =",Kmính17_S0311,": Si"))
print(paste("Kmính_18 =",Kmính18_S0311,": Si"))
print(paste("Kmính_19 =",Kmính19_S0311,": Si"))
print(paste("Kmính_23 =",Kmính23_S0311,": No"))
```

```{r}
KmínhS0311m=c(Kmính14_S0311,Kmính15_S0311,Kmính16_S0311,Kmính17_S0311,
Kmính18_S0311,Kmính19_S0311)
KmínhS0311=mean(KmínhS0311m)
summary(KmínhS0311m)
KmínhS0311m
print(paste("Kmính_S0311 =",KmínhS0311))
```

Estación S0312 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0312H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0312H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0312H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0312H13max=S0312H[1:24,6]
S0312H13min=S0312H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H13min),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=71.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0312H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0312=48.0796099804932
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H13max),lwd="3",col="black",lty=2)
abline(h=min(S0312H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H13max)
K2_13_S0312=Qmax13_S0312/Qp13_S0312
print(paste("K2 =",K2_13_S0312))
```

```{r}
plot(Hora,S0312H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
abline(h=max(S0312H13min),lwd="3",col="black",lty=2)
abline(h=min(S0312H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H13min)
Kmính13_S0312=Qminh13_S0312/Qp13_S0312
print(paste("Kmính =",Kmính13_S0312))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0312H14max=S0312H[1:24,10]
S0312H14min=S0312H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H14min),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=71.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0312H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0312=50.3906497423288
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H14max),lwd="3",col="black",lty=2)
abline(h=min(S0312H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H14max)
K2_14_S0312=Qmax14_S0312/Qp14_S0312
print(paste("K2 =",K2_14_S0312))
```

```{r}
plot(Hora,S0312H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
abline(h=max(S0312H14min),lwd="3",col="black",lty=2)
abline(h=min(S0312H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H14min)
Kmính14_S0312=Qminh14_S0312/Qp14_S0312
print(paste("Kmính =",Kmính14_S0312))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0312H15max=S0312H[1:24,14]
S0312H15min=S0312H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H15min),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=71.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0312H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0312=54.0987009289315
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H15max),lwd="3",col="black",lty=2)
abline(h=min(S0312H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H15max)
K2_15_S0312=Qmax15_S0312/Qp15_S0312
print(paste("K2 =",K2_15_S0312))
```

```{r}
plot(Hora,S0312H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
abline(h=max(S0312H15min),lwd="3",col="black",lty=2)
abline(h=min(S0312H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H15min)
Kmính15_S0312=Qminh15_S0312/Qp15_S0312
print(paste("Kmính =",Kmính15_S0312))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0312H16max=S0312H[1:24,18]
S0312H16min=S0312H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=92,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=84,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0312H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0312=62.8935780898634
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H16max),lwd="3",col="black",lty=2)
abline(h=min(S0312H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H16max)
K2_16_S0312=Qmax16_S0312/Qp16_S0312
print(paste("K2 =",K2_16_S0312))
```

```{r}
plot(Hora,S0312H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
abline(h=max(S0312H16min),lwd="3",col="black",lty=2)
abline(h=min(S0312H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H16min)
Kmính16_S0312=Qminh16_S0312/Qp16_S0312
print(paste("Kmính =",Kmính16_S0312))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0312H17max=S0312H[1:24,22]
S0312H17min=S0312H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,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,S0312H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0312=56.2277267118082
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H17max),lwd="3",col="black",lty=2)
abline(h=min(S0312H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H17max)
K2_17_S0312=Qmax17_S0312/Qp17_S0312
print(paste("K2 =",K2_17_S0312))
```

```{r}
plot(Hora,S0312H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
abline(h=max(S0312H17min),lwd="3",col="black",lty=2)
abline(h=min(S0312H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H17min)
Kmính17_S0312=Qminh17_S0312/Qp17_S0312
print(paste("Kmính =",Kmính17_S0312))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0312H18max=S0312H[1:24,26]
S0312H18min=S0312H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,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,S0312H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0312=51.747005992274
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H18max),lwd="3",col="black",lty=2)
abline(h=min(S0312H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H18max)
K2_18_S0312=Qmax18_S0312/Qp18_S0312
print(paste("K2 =",K2_18_S0312))
```

```{r}
plot(Hora,S0312H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
```

```
abline(h=max(S0312H18min),lwd="3",col="black",lty=2)
abline(h=min(S0312H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H18min)
Kmính18_S0312=Qminh18_S0312/Qp18_S0312
print(paste("Kmính =",Kmính18_S0312))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0312H19max=S0312H[1:24,30]
S0312H19min=S0312H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0312H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0312=51.9889720379178
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H19max),lwd="3",col="black",lty=2)
abline(h=min(S0312H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H19max)
K2_19_S0312=Qmax19_S0312/Qp19_S0312
print(paste("K2 =",K2_19_S0312))
```

```{r}
plot(Hora,S0312H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
abline(h=max(S0312H19min),lwd="3",col="black",lty=2)
abline(h=min(S0312H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H19min)
Kmính19_S0312=Qminh19_S0312/Qp19_S0312
print(paste("Kmính =",Kmính19_S0312))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0312H23max=S0312H[1:24,46]
S0312H23min=S0312H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0312H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0312 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0312H23min),color="blue",lwd=1.2)+
```

```
geom_text(aes(x=3,y=86.2,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=80.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0312H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0312=55.0130245253973
axis(1,at=seq(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_S0312,lwd="4",col="red")
abline(h=max(S0312H23max),lwd="3",col="black",lty=2)
abline(h=min(S0312H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=max(S0312H23max)
K2_23_S0312=Qmax23_S0312/Qp23_S0312
print(paste("K2 =",K2_23_S0312))
```

```{r}
plot(Hora,S0312H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0312 - 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_S0312,lwd="4",col="red")
abline(h=max(S0312H23min),lwd="3",col="black",lty=2)
abline(h=min(S0312H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0312=min(S0312H23min)
Kmính23_S0312=Qminh23_S0312/Qp23_S0312
print(paste("Kmính =",Kmính23_S0312))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0312,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0312,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0312,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0312,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0312,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0312,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0312,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0312,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0312,": Si"))
print(paste("K2_14 =",K2_14_S0312,": Si"))
print(paste("K2_15 =",K2_15_S0312,": Si"))
print(paste("K2_16 =",K2_16_S0312,": Si"))
print(paste("K2_17 =",K2_17_S0312,": No"))
print(paste("K2_18 =",K2_18_S0312,": Si"))
print(paste("K2_19 =",K2_19_S0312,": No"))
print(paste("K2_23 =",K2_23_S0312,": Si"))
```

```{r}
K2S0312m=c(K2_13_S0312,K2_14_S0312,K2_15_S0312,K2_16_S0312,K2_18_S0312,
K2_23_S0312)
K2S0312=mean(K2S0312m)
summary(K2S0312m)
K2S0312m
print(paste("K2_S0312 =",K2S0312))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0312,": No"))
print(paste("Kmính_14 =",Kmính14_S0312,": No"))
print(paste("Kmính_15 =",Kmính15_S0312,": Si"))
print(paste("Kmính_16 =",Kmính16_S0312,": No"))
print(paste("Kmính_17 =",Kmính17_S0312,": No"))
print(paste("Kmính_18 =",Kmính18_S0312,": No"))
print(paste("Kmính_19 =",Kmính19_S0312,": No"))
print(paste("Kmính_23 =",Kmính23_S0312,": No"))
```

```
```

```{r}
KmínhS0312m=c(Kmính15_S0312)
KmínhS0312=mean(KmínhS0312m)
summary(KmínhS0312m)
KmínhS0312m
print(paste("Kmính_S0312 =",KmínhS0312))
```

Estación S0316 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0316H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0316H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0316H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0316H13max=S0316H[1:24,6]
S0316H13min=S0316H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=57.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0316H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0316=34.7342648068219
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H13max),lwd="3",col="black",lty=2)
abline(h=min(S0316H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H13max)
K2_13_S0316=Qmax13_S0316/Qp13_S0316
print(paste("K2 =",K2_13_S0316))
```

```{r}
plot(Hora,S0316H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H13min),lwd="3",col="black",lty=2)
abline(h=min(S0316H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H13min)
Kmính13_S0316=Qminh13_S0316/Qp13_S0316
print(paste("Kmính =",Kmính13_S0316))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0316H14max=S0316H[1:24,10]
S0316H14min=S0316H[1:24,12]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H14min),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,S0316H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0316=34.5410325506027
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H14max),lwd="3",col="black",lty=2)
abline(h=min(S0316H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H14max)
K2_14_S0316=Qmax14_S0316/Qp14_S0316
print(paste("K2 =",K2_14_S0316))
```

```{r}
plot(Hora,S0316H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H14min),lwd="3",col="black",lty=2)
abline(h=min(S0316H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H14min)
Kmính14_S0316=Qminh14_S0316/Qp14_S0316
print(paste("Kmính =",Kmính14_S0316))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0316H15max=S0316H[1:24,14]
S0316H15min=S0316H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0316H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0316=36.2380659973425
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H15max),lwd="3",col="black",lty=2)
abline(h=min(S0316H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H15max)
K2_15_S0316=Qmax15_S0316/Qp15_S0316
print(paste("K2 =",K2_15_S0316))
```

```{r}
plot(Hora,S0316H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H15min),lwd="3",col="black",lty=2)
abline(h=min(S0316H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H15min)
Kmính15_S0316=Qminh15_S0316/Qp15_S0316
print(paste("Kmính =",Kmính15_S0316))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0316H16max=S0316H[1:24,18]
S0316H16min=S0316H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H16min),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=58.2,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0316H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0316=37.0077501907924
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H16max),lwd="3",col="black",lty=2)
abline(h=min(S0316H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H16max)
K2_16_S0316=Qmax16_S0316/Qp16_S0316
print(paste("K2 =",K2_16_S0316))
```

```{r}
plot(Hora,S0316H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H16min),lwd="3",col="black",lty=2)
abline(h=min(S0316H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H16min)
Kmính16_S0316=Qminh16_S0316/Qp16_S0316
print(paste("Kmính =",Kmính16_S0316))
```

```
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0316H17max=S0316H[1:24,22]
S0316H17min=S0316H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=72.8,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=67.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0316H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0316=37.5905174055616
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H17max),lwd="3",col="black",lty=2)
abline(h=min(S0316H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H17max)
K2_17_S0316=Qmax17_S0316/Qp17_S0316
print(paste("K2 =",K2_17_S0316))
```

```{r}
plot(Hora,S0316H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H17min),lwd="3",col="black",lty=2)
abline(h=min(S0316H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H17min)
Kmính17_S0316=Qminh17_S0316/Qp17_S0316
print(paste("Kmính =",Kmính17_S0316))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0316H18max=S0316H[1:24,26]
S0316H18min=S0316H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68.8,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,S0316H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0316=40.7907879029315
```

```
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H18max),lwd="3",col="black",lty=2)
abline(h=min(S0316H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H18max)
K2_18_S0316=Qmax18_S0316/Qp18_S0316
print(paste("K2 =",K2_18_S0316))
```

```{r}
plot(Hora,S0316H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H18min),lwd="3",col="black",lty=2)
abline(h=min(S0316H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H18min)
Kmính18_S0316=Qminh18_S0316/Qp18_S0316
print(paste("Kmính =",Kmính18_S0316))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0316H19max=S0316H[1:24,30]
S0316H19min=S0316H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=72.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=67.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0316H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0316=40.7089033417808
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H19max),lwd="3",col="black",lty=2)
abline(h=min(S0316H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H19max)
K2_19_S0316=Qmax19_S0316/Qp19_S0316
print(paste("K2 =",K2_19_S0316))
```

```{r}
plot(Hora,S0316H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H19min),lwd="3",col="black",lty=2)
abline(h=min(S0316H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H19min)
Kmính19_S0316=Qminh19_S0316/Qp19_S0316
print(paste("Kmính =",Kmính19_S0316))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0316H23max=S0316H[1:24,46]
S0316H23min=S0316H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0316H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0316 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0316H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=72.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=67.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0316H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0316=42.0020040336438
axis(1,at=seq(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_S0316,lwd="4",col="red")
abline(h=max(S0316H23max),lwd="3",col="black",lty=2)
abline(h=min(S0316H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=max(S0316H23max)
K2_23_S0316=Qmax23_S0316/Qp23_S0316
print(paste("K2 =",K2_23_S0316))
```

```{r}
plot(Hora,S0316H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 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_S0316,lwd="4",col="red")
abline(h=max(S0316H23min),lwd="3",col="black",lty=2)
abline(h=min(S0316H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0316=min(S0316H23min)
Kmính23_S0316=Qminh23_S0316/Qp23_S0316
print(paste("Kmính =",Kmính23_S0316))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0316,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0316,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0316,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0316,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0316,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0316,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0316,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0316,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0316,": Si"))
print(paste("K2_14 =",K2_14_S0316,": Si"))
print(paste("K2_15 =",K2_15_S0316,": Si"))
print(paste("K2_16 =",K2_16_S0316,": Si"))
print(paste("K2_17 =",K2_17_S0316,": No"))
```

```
print(paste("K2_18 =",K2_18_S0316,": Si"))
print(paste("K2_19 =",K2_19_S0316,": Si"))
print(paste("K2_23 =",K2_23_S0316,": Si"))
```

```{r}
K2S0316m=c(K2_13_S0316,K2_14_S0316,K2_15_S0316,K2_16_S0316,K2_18_S0316,
K2_19_S0316,K2_23_S0316)
K2S0316=mean(K2S0316m)
summary(K2S0316m)
K2S0316m
print(paste("K2_S0316 =",K2S0316))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0316,": Si"))
print(paste("Kmính_14 =",Kmính14_S0316,": Si"))
print(paste("Kmính_15 =",Kmính15_S0316,": Si"))
print(paste("Kmính_16 =",Kmính16_S0316,": Si"))
print(paste("Kmính_17 =",Kmính17_S0316,": No"))
print(paste("Kmính_18 =",Kmính18_S0316,": Si"))
print(paste("Kmính_19 =",Kmính19_S0316,": Si"))
print(paste("Kmính_23 =",Kmính23_S0316,": Si"))
```

```{r}
KmínhS0316m=c(Kmính13_S0316,Kmính14_S0316,Kmính15_S0316,Kmính16_S0316,
Kmính18_S0316,Kmính19_S0316,Kmính23_S0316)
KmínhS0316=mean(KmínhS0316m)
summary(KmínhS0316m)
KmínhS0316m
print(paste("Kmính_S0316 =",KmínhS0316))
```

Estación S0317 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0317H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0317H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0317H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0317H13max=S0317H[1:24,6]
S0317H13min=S0317H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0317H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0317=46.7055041825753
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H13max),lwd="3",col="black",lty=2)
abline(h=min(S0317H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=max(S0317H13max)
K2_13_S0317=Qmax13_S0317/Qp13_S0317
print(paste("K2 =",K2_13_S0317))
```

```{r}
plot(Hora,S0317H13min,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H13min),lwd="3",col="black",lty=2)
abline(h=min(S0317H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H13min)
Kmính13_S0317=Qminh13_S0317/Qp13_S0317
print(paste("Kmính =",Kmính13_S0317))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0317H14max=S0317H[1:24,10]
S0317H14min=S0317H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0317H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0317=48.1776829401644
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H14max),lwd="3",col="black",lty=2)
abline(h=min(S0317H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=max(S0317H14max)
K2_14_S0317=Qmax14_S0317/Qp14_S0317
print(paste("K2 =",K2_14_S0317))
```

```{r}
plot(Hora,S0317H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H14min),lwd="3",col="black",lty=2)
abline(h=min(S0317H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H14min)
Kmính14_S0317=Qminh14_S0317/Qp14_S0317
print(paste("Kmính =",Kmính14_S0317))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0317H15max=S0317H[1:24,14]
S0317H15min=S0317H[1:24,16]
```

```{r}
ggplot()+
```

```
geom_line(mapping=aes(x=Hora,y=S0317H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0317=48.3139842107671
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H15max),lwd="3",col="black",lty=2)
abline(h=min(S0317H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=max(S0317H15max)
K2_15_S0317=Qmax15_S0317/Qp15_S0317
print(paste("K2 =",K2_15_S0317))
```

```{r}
plot(Hora,S0317H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H15min),lwd="3",col="black",lty=2)
abline(h=min(S0317H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H15min)
Kmính15_S0317=Qminh15_S0317/Qp15_S0317
print(paste("Kmính =",Kmính15_S0317))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0317H16max=S0317H[1:24,18]
S0317H16min=S0317H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0317H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0317=49.4295040774044
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H16max),lwd="3",col="black",lty=2)
abline(h=min(S0317H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=max(S0317H16max)
K2_16_S0317=Qmax16_S0317/Qp16_S0317
print(paste("K2 =",K2_16_S0317))
```

```{r}
plot(Hora,S0317H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H16min),lwd="3",col="black",lty=2)
abline(h=min(S0317H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H16min)
Kmính16_S0317=Qminh16_S0317/Qp16_S0317
print(paste("Kmính =",Kmính16_S0317))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0317H17max=S0317H[1:24,22]
S0317H17min=S0317H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0317H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0317=51.0683031416986
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H17max),lwd="3",col="black",lty=2)
abline(h=min(S0317H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=max(S0317H17max)
K2_17_S0317=Qmax17_S0317/Qp17_S0317
print(paste("K2 =",K2_17_S0317))
```

```{r}
plot(Hora,S0317H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H17min),lwd="3",col="black",lty=2)
abline(h=min(S0317H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H17min)
Kmính17_S0317=Qminh17_S0317/Qp17_S0317
print(paste("Kmính =",Kmính17_S0317))
```

Extracción y análisis de datos del año 2018

```{r}


```

```
Hora=c(00:23)
S0317H18max=S0317H[1:24,26]
S0317H18min=S0317H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0317H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0317=53.2597479035068
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H18max),lwd="3",col="black",lty=2)
abline(h=min(S0317H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=max(S0317H18max)
K2_18_S0317=Qmax18_S0317/Qp18_S0317
print(paste("K2 =",K2_18_S0317))
```

```{r}
plot(Hora,S0317H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H18min),lwd="3",col="black",lty=2)
abline(h=min(S0317H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H18min)
Kmính18_S0317=Qminh18_S0317/Qp18_S0317
print(paste("Kmính =",Kmính18_S0317))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0317H19max=S0317H[1:24,30]
S0317H19min=S0317H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0317H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H19min),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=79.35,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0317=53.418252048
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H19max),lwd="3",col="black",lty=2)
abline(h=min(S0317H19max),lwd="3",col="black",lty=2)
```

```
legend(x="bottomleft",inset=c(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_S0317=max(S0317H19max)
K2_19_S0317=Qmax19_S0317/Qp19_S0317
print(paste("K2 =",K2_19_S0317))
```

```{r}
plot(Hora,S0317H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H19min),lwd="3",col="black",lty=2)
abline(h=min(S0317H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H19min)
Kmính19_S0317=Qminh19_S0317/Qp19_S0317
print(paste("Kmính =",Kmính19_S0317))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0317H23max=S0317H[1:24,46]
S0317H23min=S0317H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0317H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0317 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0317H23min),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=90.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0317H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0317=56.0112155297534
axis(1,at=seq(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_S0317,lwd="4",col="red")
abline(h=max(S0317H23max),lwd="3",col="black",lty=2)
abline(h=min(S0317H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=max(S0317H23max)
K2_23_S0317=Qmax23_S0317/Qp23_S0317
print(paste("K2 =",K2_23_S0317))
```

```{r}
plot(Hora,S0317H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0317 - 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_S0317,lwd="4",col="red")
abline(h=max(S0317H23min),lwd="3",col="black",lty=2)
abline(h=min(S0317H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0317=min(S0317H23min)
```

```
Kmính23_S0317=Qminh23_S0317/Qp23_S0317
print(paste("Kmính =",Kmính23_S0317))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0317,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0317,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0317,"l/s",": No"))
print(paste("Qp_16 =",Qp16_S0317,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0317,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0317,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0317,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0317,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0317,": Si"))
print(paste("K2_14 =",K2_14_S0317,": Si"))
print(paste("K2_15 =",K2_15_S0317,": No"))
print(paste("K2_16 =",K2_16_S0317,": Si"))
print(paste("K2_17 =",K2_17_S0317,": Si"))
print(paste("K2_18 =",K2_18_S0317,": Si"))
print(paste("K2_19 =",K2_19_S0317,": Si"))
print(paste("K2_23 =",K2_23_S0317,": Si"))
```

```{r}
K2S0317m=c(K2_13_S0317,K2_14_S0317,K2_16_S0317,K2_17_S0317,K2_18_S0317,
K2_19_S0317,K2_23_S0317)
K2S0317=mean(K2S0317m)
summary(K2S0317m)
K2S0317m
print(paste("K2_S0317 =",K2S0317))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0317,": Si"))
print(paste("Kmính_14 =",Kmính14_S0317,": Si"))
print(paste("Kmính_15 =",Kmính15_S0317,": No"))
print(paste("Kmính_16 =",Kmính16_S0317,": Si"))
print(paste("Kmính_17 =",Kmính17_S0317,": Si"))
print(paste("Kmính_18 =",Kmính18_S0317,": Si"))
print(paste("Kmính_19 =",Kmính19_S0317,": Si"))
print(paste("Kmính_23 =",Kmính23_S0317,": Si"))
```

```{r}
KmínhS0317m=c(Kmính13_S0317,Kmính14_S0317,Kmính16_S0317,Kmính17_S0317,
Kmính18_S0317,Kmính19_S0317,Kmính23_S0317)
KmínhS0317=mean(KmínhS0317m)
summary(KmínhS0317m)
KmínhS0317m
print(paste("Kmính_S0317 =",KmínhS0317))
```

Estación S0318 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0318H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0318H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0318H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0318H13max=S0318H[1:24,6]
S0318H13min=S0318H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0318H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=52.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0318H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0318=35.9412014064658
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H13max),lwd="3",col="black",lty=2)
abline(h=min(S0318H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H13max)
K2_13_S0318=Qmax13_S0318/Qp13_S0318
print(paste("K2 =",K2_13_S0318))
```

```{r}
plot(Hora,S0318H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H13min),lwd="3",col="black",lty=2)
abline(h=min(S0318H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H13min)
Kmính13_S0318=Qminh13_S0318/Qp13_S0318
print(paste("Kmính =",Kmính13_S0318))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0318H14max=S0318H[1:24,10]
S0318H14min=S0318H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0318H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=52.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0318H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0318=40.4851639772055
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H14max),lwd="3",col="black",lty=2)
abline(h=min(S0318H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H14max)
K2_14_S0318=Qmax14_S0318/Qp14_S0318
print(paste("K2 =",K2_14_S0318))
```

```{r}
plot(Hora,S0318H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H14min),lwd="3",col="black",lty=2)
abline(h=min(S0318H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H14min)
Kmính14_S0318=Qminh14_S0318/Qp14_S0318
print(paste("Kmính =",Kmính14_S0318))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0318H15max=S0318H[1:24,14]
S0318H15min=S0318H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0318H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0318H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0318=41.8646467037808
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H15max),lwd="3",col="black",lty=2)
abline(h=min(S0318H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H15max)
K2_15_S0318=Qmax15_S0318/Qp15_S0318
print(paste("K2 =",K2_15_S0318))
```

```{r}
plot(Hora,S0318H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H15min),lwd="3",col="black",lty=2)
abline(h=min(S0318H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H15min)
Kmính15_S0318=Qminh15_S0318/Qp15_S0318
print(paste("Kmính =",Kmính15_S0318))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0318H16max=S0318H[1:24,18]
S0318H16min=S0318H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0318H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0318H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0318=42.1055708927869
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H16max),lwd="3",col="black",lty=2)
abline(h=min(S0318H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H16max)
K2_16_S0318=Qmax16_S0318/Qp16_S0318
print(paste("K2 =",K2_16_S0318))
```

```{r}
plot(Hora,S0318H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H16min),lwd="3",col="black",lty=2)
abline(h=min(S0318H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H16min)
Kmính16_S0318=Qminh16_S0318/Qp16_S0318
print(paste("Kmính =",Kmính16_S0318))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0318H17max=S0318H[1:24,22]
S0318H17min=S0318H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0318H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.7,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,S0318H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0318=36.7635535311233
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H17max),lwd="3",col="black",lty=2)
abline(h=min(S0318H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H17max)
K2_17_S0318=Qmax17_S0318/Qp17_S0318
print(paste("K2 =",K2_17_S0318))
```

```{r}
plot(Hora,S0318H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H17min),lwd="3",col="black",lty=2)
abline(h=min(S0318H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H17min)
Kmính17_S0318=Qminh17_S0318/Qp17_S0318
print(paste("Kmính =",Kmính17_S0318))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0318H18max=S0318H[1:24,26]
S0318H18min=S0318H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0318H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.7,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,S0318H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0318=39.3794690599726
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H18max),lwd="3",col="black",lty=2)
abline(h=min(S0318H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H18max)
K2_18_S0318=Qmax18_S0318/Qp18_S0318
print(paste("K2 =",K2_18_S0318))
```

```{r}
plot(Hora,S0318H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H18min),lwd="3",col="black",lty=2)
abline(h=min(S0318H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H18min)
Kmính18_S0318=Qminh18_S0318/Qp18_S0318
print(paste("Kmính =",Kmính18_S0318))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0318H19max=S0318H[1:24,30]
S0318H19min=S0318H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0318H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.8,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0318H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0318=44.091123709589
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H19max),lwd="3",col="black",lty=2)
abline(h=min(S0318H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H19max)
K2_19_S0318=Qmax19_S0318/Qp19_S0318
print(paste("K2 =",K2_19_S0318))
```

```{r}
plot(Hora,S0318H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H19min),lwd="3",col="black",lty=2)
abline(h=min(S0318H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H19min)
Kmính19_S0318=Qminh19_S0318/Qp19_S0318
print(paste("Kmính =",Kmính19_S0318))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0318H23max=S0318H[1:24,46]
S0318H23min=S0318H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0318H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0318 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0318H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0318H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0318=45.5466823827123
axis(1,at=seq(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_S0318,lwd="4",col="red")
abline(h=max(S0318H23max),lwd="3",col="black",lty=2)
abline(h=min(S0318H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=max(S0318H23max)
K2_23_S0318=Qmax23_S0318/Qp23_S0318
print(paste("K2 =",K2_23_S0318))
```

```{r}
plot(Hora,S0318H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0318 - 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_S0318,lwd="4",col="red")
abline(h=max(S0318H23min),lwd="3",col="black",lty=2)
abline(h=min(S0318H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0318=min(S0318H23min)
Kmính23_S0318=Qminh23_S0318/Qp23_S0318
print(paste("Kmính =",Kmính23_S0318))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0318,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0318,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0318,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0318,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0318,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0318,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0318,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0318,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0318,": Si"))
print(paste("K2_14 =",K2_14_S0318,": Si"))
print(paste("K2_15 =",K2_15_S0318,": Si"))
print(paste("K2_16 =",K2_16_S0318,": Si"))
print(paste("K2_17 =",K2_17_S0318,": Si"))
print(paste("K2_18 =",K2_18_S0318,": Si"))
print(paste("K2_19 =",K2_19_S0318,": No"))
print(paste("K2_23 =",K2_23_S0318,": Si"))
```

```{r}
K2S0318m=c(K2_13_S0318,K2_14_S0318,K2_15_S0318,K2_16_S0318,K2_17_S0318,
K2_18_S0318,K2_23_S0318)
K2S0318=mean(K2S0318m)
summary(K2S0318m)
K2S0318m
print(paste("K2_S0318 =",K2S0318))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0318,": Si"))
print(paste("Kmính_14 =",Kmính14_S0318,": Si"))
print(paste("Kmính_15 =",Kmính15_S0318,": Si"))
print(paste("Kmính_16 =",Kmính16_S0318,": Si"))
print(paste("Kmính_17 =",Kmính17_S0318,": Si"))
print(paste("Kmính_18 =",Kmính18_S0318,": Si"))
print(paste("Kmính_19 =",Kmính19_S0318,": No"))
print(paste("Kmính_23 =",Kmính23_S0318,": Si"))
```

```{r}
KmínhS0318m=c(Kmính13_S0318,Kmính14_S0318,Kmính15_S0318,Kmính16_S0318,
Kmính17_S0318,Kmính18_S0318,Kmính23_S0318)
KmínhS0318=mean(KmínhS0318m)
summary(KmínhS0318m)
KmínhS0318m
print(paste("Kmính_S0318 =",KmínhS0318))
```

Estación S0319 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0319H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0319H.csv",sep=";")
```

Visualización de la base de datos

```{r}
```

```
# View(S0319H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0319H13max=S0319H[1:24,6]
S0319H13min=S0319H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=34,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=31.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0319H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0319=19.9463695519178
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H13max),lwd="3",col="black",lty=2)
abline(h=min(S0319H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H13max)
K2_13_S0319=Qmax13_S0319/Qp13_S0319
print(paste("K2 =",K2_13_S0319))
```

```{r}
plot(Hora,S0319H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H13min),lwd="3",col="black",lty=2)
abline(h=min(S0319H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H13min)
Kmính13_S0319=Qminh13_S0319/Qp13_S0319
print(paste("Kmính =",Kmính13_S0319))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0319H14max=S0319H[1:24,10]
S0319H14min=S0319H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0319H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
Qp14_S0319=21.9786119966575
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H14max),lwd="3",col="black",lty=2)
abline(h=min(S0319H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H14max)
K2_14_S0319=Qmax14_S0319/Qp14_S0319
print(paste("K2 =",K2_14_S0319))
```

```{r}
plot(Hora,S0319H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H14min),lwd="3",col="black",lty=2)
abline(h=min(S0319H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H14min)
Kmính14_S0319=Qminh14_S0319/Qp14_S0319
print(paste("Kmính =",Kmính14_S0319))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0319H15max=S0319H[1:24,14]
S0319H15min=S0319H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0319H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0319=22.3375426132603
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H15max),lwd="3",col="black",lty=2)
abline(h=min(S0319H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H15max)
K2_15_S0319=Qmax15_S0319/Qp15_S0319
print(paste("K2 =",K2_15_S0319))
```

```{r}
plot(Hora,S0319H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H15min),lwd="3",col="black",lty=2)
abline(h=min(S0319H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H15min)
Kmính15_S0319=Qminh15_S0319/Qp15_S0319
print(paste("Kmính =",Kmính15_S0319))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0319H16max=S0319H[1:24,18]
S0319H16min=S0319H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0319H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0319=23.3841130062022
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H16max),lwd="3",col="black",lty=2)
abline(h=min(S0319H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H16max)
K2_16_S0319=Qmax16_S0319/Qp16_S0319
print(paste("K2 =",K2_16_S0319))
```

```{r}
plot(Hora,S0319H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H16min),lwd="3",col="black",lty=2)
abline(h=min(S0319H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H16min)
Kmính16_S0319=Qminh16_S0319/Qp16_S0319
print(paste("Kmính =",Kmính16_S0319))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0319H17max=S0319H[1:24,22]
S0319H17min=S0319H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.65,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```
```

```{r}
plot(Hora,S0319H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0319=22.4477295188493
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H17max),lwd="3",col="black",lty=2)
abline(h=min(S0319H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H17max)
K2_17_S0319=Qmax17_S0319/Qp17_S0319
print(paste("K2 =",K2_17_S0319))
```

```{r}
plot(Hora,S0319H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H17min),lwd="3",col="black",lty=2)
abline(h=min(S0319H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H17min)
Kmính17_S0319=Qminh17_S0319/Qp17_S0319
print(paste("Kmính =",Kmính17_S0319))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0319H18max=S0319H[1:24,26]
S0319H18min=S0319H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=38.9,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0319H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0319=23.1533832911507
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H18max),lwd="3",col="black",lty=2)
abline(h=min(S0319H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H18max)
K2_18_S0319=Qmax18_S0319/Qp18_S0319
print(paste("K2 =",K2_18_S0319))
```

```{r}
plot(Hora,S0319H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H18min),lwd="3",col="black",lty=2)
abline(h=min(S0319H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H18min)
Kmính18_S0319=Qminh18_S0319/Qp18_S0319
print(paste("Kmính =",Kmính18_S0319))
```

Extracción y análisis de datos del año 2019

```{r}
# Año con datos incompletos en el sistema SCADA de SEDAPAL
Hora=c(00:23)
S0319H19max=S0319H[1:24,30]
S0319H19min=S0319H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=37.25,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0319H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0319=25.5145995301918
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H19max),lwd="3",col="black",lty=2)
abline(h=min(S0319H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H19max)
K2_19_S0319=Qmax19_S0319/Qp19_S0319
print(paste("K2 =",K2_19_S0319))
```

```{r}
plot(Hora,S0319H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H19min),lwd="3",col="black",lty=2)
abline(h=min(S0319H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H19min)
Kmính19_S0319=Qminh19_S0319/Qp19_S0319
print(paste("Kmính =",Kmính19_S0319))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0319H23max=S0319H[1:24,46]
S0319H23min=S0319H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0319H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0319 - 2023")+
```

```
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0319H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=42,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=38.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0319H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0319=23.3404643944932
axis(1,at=seq(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_S0319,lwd="4",col="red")
abline(h=max(S0319H23max),lwd="3",col="black",lty=2)
abline(h=min(S0319H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=max(S0319H23max)
K2_23_S0319=Qmax23_S0319/Qp23_S0319
print(paste("K2 =",K2_23_S0319))
```

```{r}
plot(Hora,S0319H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0319 - 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_S0319,lwd="4",col="red")
abline(h=max(S0319H23min),lwd="3",col="black",lty=2)
abline(h=min(S0319H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0319=min(S0319H23min)
Kmính23_S0319=Qminh23_S0319/Qp23_S0319
print(paste("Kmính =",Kmính23_S0319))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0319,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0319,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0319,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0319,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0319,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0319,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0319,"l/s",": No"))
print(paste("Qp_23 =",Qp23_S0319,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0319,": Si"))
print(paste("K2_14 =",K2_14_S0319,": Si"))
print(paste("K2_15 =",K2_15_S0319,": Si"))
print(paste("K2_16 =",K2_16_S0319,": Si"))
print(paste("K2_17 =",K2_17_S0319,": Si"))
print(paste("K2_18 =",K2_18_S0319,": Si"))
print(paste("K2_19 =",K2_19_S0319,": No"))
print(paste("K2_23 =",K2_23_S0319,": Si"))
```

```{r}
K2S0319m=c(K2_13_S0319,K2_14_S0319,K2_15_S0319,K2_16_S0319,K2_17_S0319,
K2_18_S0319,K2_23_S0319)
K2S0319=mean(K2S0319m)
summary(K2S0319m)
K2S0319m
print(paste("K2_S0319 =",K2S0319))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0319,": Si"))
print(paste("Kmính_14 =",Kmính14_S0319,": Si"))
print(paste("Kmính_15 =",Kmính15_S0319,": Si"))
print(paste("Kmính_16 =",Kmính16_S0319,": Si"))
```

```
print(paste("Kmính_17 =",Kmính17_S0319,": Si"))
print(paste("Kmính_18 =",Kmính18_S0319,": Si"))
print(paste("Kmính_19 =",Kmính19_S0319,": No"))
print(paste("Kmính_23 =",Kmính23_S0319,": Si"))
```

```{r}
KmínhS0319m=c(Kmính13_S0319,Kmính14_S0319,Kmính15_S0319,Kmính16_S0319,
Kmính17_S0319,Kmính18_S0319,Kmính23_S0319)
KmínhS0319=mean(KmínhS0319m)
summary(KmínhS0319m)
KmínhS0319m
print(paste("Kmính_S0319 =",KmínhS0319))
```

Estación S0320 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0320H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0320H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0320H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0320H13max=S0320H[1:24,6]
S0320H13min=S0320H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H13min),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,S0320H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0320=86.5244579609041
axis(1,at=seq(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_S0320,lwd="4",col="red")
abline(h=max(S0320H13max),lwd="3",col="black",lty=2)
abline(h=min(S0320H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H13max)
K2_13_S0320=Qmax13_S0320/Qp13_S0320
print(paste("K2 =",K2_13_S0320))
```

```{r}
plot(Hora,S0320H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H13min),lwd="3",col="black",lty=2)
abline(h=min(S0320H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H13min)
Kmính13_S0320=Qminh13_S0320/Qp13_S0320
print(paste("Kmính =",Kmính13_S0320))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0320H14max=S0320H[1:24,10]
S0320H14min=S0320H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H14min),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,S0320H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0320=90.3577863533151
axis(1,at=seq(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_S0320,lwd="4",col="red")
abline(h=max(S0320H14max),lwd="3",col="black",lty=2)
abline(h=min(S0320H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H14max)
K2_14_S0320=Qmax14_S0320/Qp14_S0320
print(paste("K2 =",K2_14_S0320))
```

```{r}
plot(Hora,S0320H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H14min),lwd="3",col="black",lty=2)
abline(h=min(S0320H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H14min)
Kmính14_S0320=Qminh14_S0320/Qp14_S0320
print(paste("Kmính =",Kmính14_S0320))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0320H15max=S0320H[1:24,14]
S0320H15min=S0320H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H15min),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,S0320H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0320=91.9707174801918
axis(1,at=seq(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_S0320,lwd="4",col="red")
```

```
abline(h=max(S0320H15max),lwd="3",col="black",lty=2)
abline(h=min(S0320H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H15max)
K2_15_S0320=Qmax15_S0320/Qp15_S0320
print(paste("K2 =",K2_15_S0320))
```

```{r}
plot(Hora,S0320H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H15min),lwd="3",col="black",lty=2)
abline(h=min(S0320H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H15min)
Kmính15_S0320=Qminh15_S0320/Qp15_S0320
print(paste("Kmính =",Kmính15_S0320))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0320H16max=S0320H[1:24,18]
S0320H16min=S0320H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H16min),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,S0320H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0320=94.900218703306
axis(1,at=seq(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_S0320,lwd="4",col="red")
abline(h=max(S0320H16max),lwd="3",col="black",lty=2)
abline(h=min(S0320H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H16max)
K2_16_S0320=Qmax16_S0320/Qp16_S0320
print(paste("K2 =",K2_16_S0320))
```

```{r}
plot(Hora,S0320H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H16min),lwd="3",col="black",lty=2)
abline(h=min(S0320H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H16min)
Kmính16_S0320=Qminh16_S0320/Qp16_S0320
print(paste("Kmính =",Kmính16_S0320))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0320H17max=S0320H[1:24,22]
S0320H17min=S0320H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=162.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=153.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0320H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0320=93.9236567111233
axis(1,at=seq(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_S0320,lwd="4",col="red")
abline(h=max(S0320H17max),lwd="3",col="black",lty=2)
abline(h=min(S0320H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H17max)
K2_17_S0320=Qmax17_S0320/Qp17_S0320
print(paste("K2 =",K2_17_S0320))
```

```{r}
plot(Hora,S0320H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H17min),lwd="3",col="black",lty=2)
abline(h=min(S0320H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H17min)
Kmính17_S0320=Qminh17_S0320/Qp17_S0320
print(paste("Kmính =",Kmính17_S0320))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0320H18max=S0320H[1:24,26]
S0320H18min=S0320H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H18min),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=139,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0320H18max,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0320 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0320=97.7216201259452
axis(1,at=seq(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_S0320,lwd="4",col="red")
abline(h=max(S0320H18max),lwd="3",col="black",lty=2)
abline(h=min(S0320H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H18max)
K2_18_S0320=Qmax18_S0320/Qp18_S0320
print(paste("K2 =",K2_18_S0320))
```

```{r}
plot(Hora,S0320H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H18min),lwd="3",col="black",lty=2)
abline(h=min(S0320H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H18min)
Kmính18_S0320=Qminh18_S0320/Qp18_S0320
print(paste("Kmính =",Kmính18_S0320))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0320H19max=S0320H[1:24,30]
S0320H19min=S0320H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H19min),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,S0320H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0320=105.34168382937
axis(1,at=seq(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_S0320,lwd="4",col="red")
abline(h=max(S0320H19max),lwd="3",col="black",lty=2)
abline(h=min(S0320H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H19max)
K2_19_S0320=Qmax19_S0320/Qp19_S0320
print(paste("K2 =",K2_19_S0320))
```

```{r}
plot(Hora,S0320H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H19min),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0320H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H19min)
Kmính19_S0320=Qminh19_S0320/Qp19_S0320
print(paste("Kmính =",Kmính19_S0320))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0320H23max=S0320H[1:24,46]
S0320H23min=S0320H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0320H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0320 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0320H23min),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,S0320H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0320=109.028408767562
axis(1,at=seq(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_S0320,lwd="4",col="red")
abline(h=max(S0320H23max),lwd="3",col="black",lty=2)
abline(h=min(S0320H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=max(S0320H23max)
K2_23_S0320=Qmax23_S0320/Qp23_S0320
print(paste("K2 =",K2_23_S0320))
```

```{r}
plot(Hora,S0320H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0320 - 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_S0320,lwd="4",col="red")
abline(h=max(S0320H23min),lwd="3",col="black",lty=2)
abline(h=min(S0320H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0320=min(S0320H23min)
Kmính23_S0320=Qminh23_S0320/Qp23_S0320
print(paste("Kmính =",Kmính23_S0320))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0320,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0320,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0320,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0320,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0320,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0320,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0320,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0320,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0320,": Si"))
```

```
print(paste("K2_14 =",K2_14_S0320,": Si"))
print(paste("K2_15 =",K2_15_S0320,": Si"))
print(paste("K2_16 =",K2_16_S0320,": Si"))
print(paste("K2_17 =",K2_17_S0320,": Si"))
print(paste("K2_18 =",K2_18_S0320,": Si"))
print(paste("K2_19 =",K2_19_S0320,": Si"))
print(paste("K2_23 =",K2_23_S0320,": Si"))
```

```{r}
K2S0320m=c(K2_13_S0320,K2_14_S0320,K2_15_S0320,K2_16_S0320,K2_17_S0320,
K2_18_S0320,K2_19_S0320,K2_23_S0320)
K2S0320=mean(K2S0320m)
summary(K2S0320m)
K2S0320m
print(paste("K2_S0320 =",K2S0320))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0320,": Si"))
print(paste("Kmính_14 =",Kmính14_S0320,": Si"))
print(paste("Kmính_15 =",Kmính15_S0320,": Si"))
print(paste("Kmính_16 =",Kmính16_S0320,": Si"))
print(paste("Kmính_17 =",Kmính17_S0320,": Si"))
print(paste("Kmính_18 =",Kmính18_S0320,": Si"))
print(paste("Kmính_19 =",Kmính19_S0320,": Si"))
print(paste("Kmính_23 =",Kmính23_S0320,": Si"))
```

```{r}
KmínhS0320m=c(Kmính13_S0320,Kmính14_S0320,Kmính15_S0320,Kmính16_S0320,
Kmính17_S0320,Kmính18_S0320,Kmính19_S0320,Kmính23_S0320)
KmínhS0320=mean(KmínhS0320m)
summary(KmínhS0320m)
KmínhS0320m
print(paste("Kmính_S0320 =",KmínhS0320))
```

Estación S0322 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0322H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0322H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0322H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0322H13max=S0322H[1:24,6]
S0322H13min=S0322H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=95.7,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=89.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0322H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0322=51.484337046137
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H13max),lwd="3",col="black",lty=2)
abline(h=min(S0322H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H13max)
K2_13_S0322=Qmax13_S0322/Qp13_S0322
print(paste("K2 =",K2_13_S0322))
```

```
```

```{r}
plot(Hora,S0322H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H13min),lwd="3",col="black",lty=2)
abline(h=min(S0322H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H13min)
Kmính13_S0322=Qminh13_S0322/Qp13_S0322
print(paste("Kmính =",Kmính13_S0322))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0322H14max=S0322H[1:24,10]
S0322H14min=S0322H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=94,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=87,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0322H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0322=54.7904216068767
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H14max),lwd="3",col="black",lty=2)
abline(h=min(S0322H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H14max)
K2_14_S0322=Qmax14_S0322/Qp14_S0322
print(paste("K2 =",K2_14_S0322))
```

```{r}
plot(Hora,S0322H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H14min),lwd="3",col="black",lty=2)
abline(h=min(S0322H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H14min)
Kmính14_S0322=Qminh14_S0322/Qp14_S0322
print(paste("Kmính =",Kmính14_S0322))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0322H15max=S0322H[1:24,14]
S0322H15min=S0322H[1:24,16]
```

```
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H15min),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,S0322H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0322=57.6020104063562
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H15max),lwd="3",col="black",lty=2)
abline(h=min(S0322H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H15max)
K2_15_S0322=Qmax15_S0322/Qp15_S0322
print(paste("K2 =",K2_15_S0322))
```

```{r}
plot(Hora,S0322H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H15min),lwd="3",col="black",lty=2)
abline(h=min(S0322H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H15min)
Kmính15_S0322=Qminh15_S0322/Qp15_S0322
print(paste("Kmính =",Kmính15_S0322))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0322H16max=S0322H[1:24,18]
S0322H16min=S0322H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H16min),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,S0322H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0322=60.9523559917486
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H16max),lwd="3",col="black",lty=2)
abline(h=min(S0322H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H16max)
K2_16_S0322=Qmax16_S0322/Qp16_S0322
print(paste("K2 =",K2_16_S0322))
```

```{r}
plot(Hora,S0322H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H16min),lwd="3",col="black",lty=2)
abline(h=min(S0322H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H16min)
Kmính16_S0322=Qminh16_S0322/Qp16_S0322
print(paste("Kmính =",Kmính16_S0322))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0322H17max=S0322H[1:24,22]
S0322H17min=S0322H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=110.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=103.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0322H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0322=58.6852939919178
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H17max),lwd="3",col="black",lty=2)
abline(h=min(S0322H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H17max)
K2_17_S0322=Qmax17_S0322/Qp17_S0322
print(paste("K2 =",K2_17_S0322))
```

```{r}
plot(Hora,S0322H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H17min),lwd="3",col="black",lty=2)
abline(h=min(S0322H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H17min)
Kmính17_S0322=Qminh17_S0322/Qp17_S0322
print(paste("Kmính =",Kmính17_S0322))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0322H18max=S0322H[1:24,26]
S0322H18min=S0322H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=93,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=86,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0322H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0322=60.1294988593973
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H18max),lwd="3",col="black",lty=2)
abline(h=min(S0322H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H18max)
K2_18_S0322=Qmax18_S0322/Qp18_S0322
print(paste("K2 =",K2_18_S0322))
```

```{r}
plot(Hora,S0322H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H18min),lwd="3",col="black",lty=2)
abline(h=min(S0322H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H18min)
Kmính18_S0322=Qminh18_S0322/Qp18_S0322
print(paste("Kmính =",Kmính18_S0322))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0322H19max=S0322H[1:24,30]
S0322H19min=S0322H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=101.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=94.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0322H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0322=61.7829222958356
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H19max),lwd="3",col="black",lty=2)
abline(h=min(S0322H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H19max)
K2_19_S0322=Qmax19_S0322/Qp19_S0322
print(paste("K2 =",K2_19_S0322))
```

```{r}
plot(Hora,S0322H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H19min),lwd="3",col="black",lty=2)
abline(h=min(S0322H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H19min)
Kmính19_S0322=Qminh19_S0322/Qp19_S0322
print(paste("Kmính =",Kmính19_S0322))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0322H23max=S0322H[1:24,46]
S0322H23min=S0322H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0322H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0322 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0322H23min),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=121,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0322H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 20322 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0322=76.4193752621644
axis(1,at=seq(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_S0322,lwd="4",col="red")
abline(h=max(S0322H23max),lwd="3",col="black",lty=2)
abline(h=min(S0322H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=max(S0322H23max)
K2_23_S0322=Qmax23_S0322/Qp23_S0322
print(paste("K2 =",K2_23_S0322))
```

```{r}
plot(Hora,S0322H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 20322 - 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_S0322,lwd="4",col="red")
abline(h=max(S0322H23min),lwd="3",col="black",lty=2)
abline(h=min(S0322H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0322=min(S0322H23min)
Kmính23_S0322=Qminh23_S0322/Qp23_S0322
print(paste("Kmính =",Kmính23_S0322))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0322,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0322,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0322,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0322,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0322,"l/s",": No"))
print(paste("Qp_18 =",Qp18_S0322,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0322,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0322,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0322,": Si"))
print(paste("K2_14 =",K2_14_S0322,": Si"))
print(paste("K2_15 =",K2_15_S0322,": Si"))
print(paste("K2_16 =",K2_16_S0322,": Si"))
print(paste("K2_17 =",K2_17_S0322,": No"))
print(paste("K2_18 =",K2_18_S0322,": Si"))
print(paste("K2_19 =",K2_19_S0322,": Si"))
print(paste("K2_23 =",K2_23_S0322,": Si"))
```

```{r}
K2S0322m=c(K2_13_S0322,K2_14_S0322,K2_15_S0322,K2_16_S0322,K2_18_S0322,
K2_19_S0322,K2_23_S0322)
K2S0322=mean(K2S0322m)
summary(K2S0322m)
K2S0322m
print(paste("K2_S0322 =",K2S0322))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0322,": Si"))
print(paste("Kmính_14 =",Kmính14_S0322,": Si"))
print(paste("Kmính_15 =",Kmính15_S0322,": Si"))
print(paste("Kmính_16 =",Kmính16_S0322,": Si"))
print(paste("Kmính_17 =",Kmính17_S0322,": No"))
print(paste("Kmính_18 =",Kmính18_S0322,": Si"))
print(paste("Kmính_19 =",Kmính19_S0322,": Si"))
print(paste("Kmính_23 =",Kmính23_S0322,": Si"))
```

```{r}
KmínhS0322m=c(Kmính13_S0322,Kmính14_S0322,Kmính15_S0322,Kmính16_S0322,
Kmính18_S0322,Kmính19_S0322,Kmính23_S0322)
KmínhS0322=mean(KmínhS0322m)
summary(KmínhS0322m)
KmínhS0322m
print(paste("Kmính_S0322 =",KmínhS0322))
```

Estación S0324 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0324H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0324H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0324H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0324H13max=S0324H[1:24,6]
S0324H13min=S0324H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0324 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=73.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
```

```
geom_text(aes(x=3,y=67.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0324H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0324=33.6637222511233
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H13max),lwd="3",col="black",lty=2)
abline(h=min(S0324H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H13max)
K2_13_S0324=Qmax13_S0324/Qp13_S0324
print(paste("K2 =",K2_13_S0324))
```

```{r}
plot(Hora,S0324H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H13min),lwd="3",col="black",lty=2)
abline(h=min(S0324H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H13min)
Kmính13_S0324=Qminh13_S0324/Qp13_S0324
print(paste("Kmính =",Kmính13_S0324))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0324H14max=S0324H[1:24,10]
S0324H14min=S0324H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0324 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,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,S0324H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0324=43.8766297852329
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H14max),lwd="3",col="black",lty=2)
abline(h=min(S0324H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H14max)
K2_14_S0324=Qmax14_S0324/Qp14_S0324
print(paste("K2 =",K2_14_S0324))
```

```{r}
plot(Hora,S0324H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H14min),lwd="3",col="black",lty=2)
abline(h=min(S0324H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H14min)
Kmính14_S0324=Qminh14_S0324/Qp14_S0324
print(paste("Kmính =",Kmính14_S0324))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0324H15max=S0324H[1:24,14]
S0324H15min=S0324H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0324 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,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,S0324H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0324=37.6983261076986
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H15max),lwd="3",col="black",lty=2)
abline(h=min(S0324H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H15max)
K2_15_S0324=Qmax15_S0324/Qp15_S0324
print(paste("K2 =",K2_15_S0324))
```

```{r}
plot(Hora,S0324H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H15min),lwd="3",col="black",lty=2)
abline(h=min(S0324H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H15min)
Kmính15_S0324=Qminh15_S0324/Qp15_S0324
print(paste("Kmính =",Kmính15_S0324))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0324H16max=S0324H[1:24,18]
S0324H16min=S0324H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H16max),color="red",lwd=1.2)+
```

```
ggtitle("ESTACIÓN S0324 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H16min),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=58,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0324H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0324=31.7810816794536
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H16max),lwd="3",col="black",lty=2)
abline(h=min(S0324H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H16max)
K2_16_S0324=Qmax16_S0324/Qp16_S0324
print(paste("K2 =",K2_16_S0324))
```

```{r}
plot(Hora,S0324H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H16min),lwd="3",col="black",lty=2)
abline(h=min(S0324H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H16min)
Kmính16_S0324=Qminh16_S0324/Qp16_S0324
print(paste("Kmính =",Kmính16_S0324))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0324H17max=S0324H[1:24,22]
S0324H17min=S0324H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0324 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.64,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=57.64,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0324H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0324=33.0760265009041
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H17max),lwd="3",col="black",lty=2)
abline(h=min(S0324H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H17max)
```

```
K2_17_S0324=Qmax17_S0324/Qp17_S0324
print(paste("K2 =",K2_17_S0324))
```

```{r}
plot(Hora,S0324H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H17min),lwd="3",col="black",lty=2)
abline(h=min(S0324H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H17min)
Kmính17_S0324=Qminh17_S0324/Qp17_S0324
print(paste("Kmính =",Kmính17_S0324))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0324H18max=S0324H[1:24,26]
S0324H18min=S0324H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0324 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.4,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=58.4,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0324H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0324=34.5849880306575
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H18max),lwd="3",col="black",lty=2)
abline(h=min(S0324H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H18max)
K2_18_S0324=Qmax18_S0324/Qp18_S0324
print(paste("K2 =",K2_18_S0324))
```

```{r}
plot(Hora,S0324H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H18min),lwd="3",col="black",lty=2)
abline(h=min(S0324H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H18min)
Kmính18_S0324=Qminh18_S0324/Qp18_S0324
print(paste("Kmính =",Kmính18_S0324))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
```

```
S0324H19max=S0324H[1:24,30]
S0324H19min=S0324H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0324 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0324H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0324=34.4132210972877
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H19max),lwd="3",col="black",lty=2)
abline(h=min(S0324H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H19max)
K2_19_S0324=Qmax19_S0324/Qp19_S0324
print(paste("K2 =",K2_19_S0324))
```

```{r}
plot(Hora,S0324H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H19min),lwd="3",col="black",lty=2)
abline(h=min(S0324H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H19min)
Kmính19_S0324=Qminh19_S0324/Qp19_S0324
print(paste("Kmính =",Kmính19_S0324))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0324H23max=S0324H[1:24,46]
S0324H23min=S0324H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0324H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0324 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0324H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=62.5,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,S0324H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0324=36.2464623793425
axis(1,at=seq(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_S0324,lwd="4",col="red")
abline(h=max(S0324H23max),lwd="3",col="black",lty=2)
abline(h=min(S0324H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=max(S0324H23max)
K2_23_S0324=Qmax23_S0324/Qp23_S0324
print(paste("K2 =",K2_23_S0324))
```

```{r}
plot(Hora,S0324H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0324 - 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_S0324,lwd="4",col="red")
abline(h=max(S0324H23min),lwd="3",col="black",lty=2)
abline(h=min(S0324H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0324=min(S0324H23min)
Kmính23_S0324=Qminh23_S0324/Qp23_S0324
print(paste("Kmính =",Kmính23_S0324))
```

Caudales promedio del sector

```{r}
print(paste("Qp13 =",Qp13_S0324,"l/s",": No"))
print(paste("Qp14 =",Qp14_S0324,"l/s",": Si"))
print(paste("Qp15 =",Qp15_S0324,"l/s",": No"))
print(paste("Qp16 =",Qp16_S0324,"l/s",": Si"))
print(paste("Qp17 =",Qp17_S0324,"l/s",": Si"))
print(paste("Qp18 =",Qp18_S0324,"l/s",": Si"))
print(paste("Qp19 =",Qp19_S0324,"l/s",": No"))
print(paste("Qp23 =",Qp23_S0324,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0324,": No"))
print(paste("K2_14 =",K2_14_S0324,": Si"))
print(paste("K2_15 =",K2_15_S0324,": No"))
print(paste("K2_16 =",K2_16_S0324,": Si"))
print(paste("K2_17 =",K2_17_S0324,": Si"))
print(paste("K2_18 =",K2_18_S0324,": Si"))
print(paste("K2_19 =",K2_19_S0324,": No"))
print(paste("K2_23 =",K2_23_S0324,": Si"))
```

```{r}
K2S0324m=c(K2_14_S0324,K2_16_S0324,K2_17_S0324,K2_18_S0324,K2_23_S0324)
K2S0324=mean(K2S0324m)
summary(K2S0324m)
K2S0324m
print(paste("K2_S0324 =",K2S0324))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0324,": No"))
print(paste("Kmính_14 =",Kmính14_S0324,": Si"))
print(paste("Kmính_15 =",Kmính15_S0324,": No"))
print(paste("Kmính_16 =",Kmính16_S0324,": Si"))
print(paste("Kmính_17 =",Kmính17_S0324,": Si"))
print(paste("Kmính_18 =",Kmính18_S0324,": Si"))
print(paste("Kmính_19 =",Kmính19_S0324,": No"))
print(paste("Kmính_23 =",Kmính23_S0324,": Si"))
```

```{r}
KmínhS0324m=c(Kmính14_S0324,Kmính16_S0324,Kmính17_S0324,Kmính18_S0324,
Kmính23_S0324)
KmínhS0324=mean(KmínhS0324m)
summary(KmínhS0324m)
KmínhS0324m
print(paste("Kmính_S0324 =",KmínhS0324))
```

Estación S0325 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0325H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0325H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0325H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0325H13max=S0325H[1:24,6]
S0325H13min=S0325H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0325H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,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,S0325H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0325=44.946694599863
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H13max),lwd="3",col="black",lty=2)
abline(h=min(S0325H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H13max)
K2_13_S0325=Qmax13_S0325/Qp13_S0325
print(paste("K2 =",K2_13_S0325))
```

```{r}
plot(Hora,S0325H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H13min),lwd="3",col="black",lty=2)
abline(h=min(S0325H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H13min)
Kmính13_S0325=Qminh13_S0325/Qp13_S0325
print(paste("Kmính =",Kmính13_S0325))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0325H14max=S0325H[1:24,10]
S0325H14min=S0325H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0325H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H14min),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=72,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0325H14max,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0325 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0325=46.5402119578356
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H14max),lwd="3",col="black",lty=2)
abline(h=min(S0325H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H14max)
K2_14_S0325=Qmax14_S0325/Qp14_S0325
print(paste("K2 =",K2_14_S0325))
```

```{r}
plot(Hora,S0325H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H14min),lwd="3",col="black",lty=2)
abline(h=min(S0325H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H14min)
Kmính14_S0325=Qminh14_S0325/Qp14_S0325
print(paste("Kmính =",Kmính14_S0325))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0325H15max=S0325H[1:24,14]
S0325H15min=S0325H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0325H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0325H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0325=49.0928666372329
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H15max),lwd="3",col="black",lty=2)
abline(h=min(S0325H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H15max)
K2_15_S0325=Qmax15_S0325/Qp15_S0325
print(paste("K2 =",K2_15_S0325))
```

```{r}
plot(Hora,S0325H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H15min),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0325H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H15min)
Kmính15_S0325=Qminh15_S0325/Qp15_S0325
print(paste("Kmính =",Kmính15_S0325))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0325H16max=S0325H[1:24,18]
S0325H16min=S0325H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0325H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=85,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=78.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0325H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0325=50.4201523463934
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H16max),lwd="3",col="black",lty=2)
abline(h=min(S0325H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H16max)
K2_16_S0325=Qmax16_S0325/Qp16_S0325
print(paste("K2 =",K2_16_S0325))
```

```{r}
plot(Hora,S0325H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H16min),lwd="3",col="black",lty=2)
abline(h=min(S0325H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H16min)
Kmính16_S0325=Qminh16_S0325/Qp16_S0325
print(paste("Kmính =",Kmính16_S0325))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0325H17max=S0325H[1:24,22]
S0325H17min=S0325H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0325H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=83.5,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,S0325H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0325=52.3357058812877
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H17max),lwd="3",col="black",lty=2)
abline(h=min(S0325H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H17max)
K2_17_S0325=Qmax17_S0325/Qp17_S0325
print(paste("K2 =",K2_17_S0325))
```

```{r}
plot(Hora,S0325H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H17min),lwd="3",col="black",lty=2)
abline(h=min(S0325H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H17min)
Kmính17_S0325=Qminh17_S0325/Qp17_S0325
print(paste("Kmính =",Kmính17_S0325))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0325H18max=S0325H[1:24,26]
S0325H18min=S0325H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0325H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=83.5,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,S0325H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0325=53.7083415327945
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H18max),lwd="3",col="black",lty=2)
abline(h=min(S0325H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H18max)
K2_18_S0325=Qmax18_S0325/Qp18_S0325
print(paste("K2 =",K2_18_S0325))
```

```{r}
plot(Hora,S0325H18min,type="l",lwd="3",col="blue",
```

```
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H18min),lwd="3",col="black",lty=2)
abline(h=min(S0325H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H18min)
Kmính18_S0325=Qminh18_S0325/Qp18_S0325
print(paste("Kmính =",Kmính18_S0325))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0325H19max=S0325H[1:24,30]
S0325H19min=S0325H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0325H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=84.6,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,S0325H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0325=54.5658240900274
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H19max),lwd="3",col="black",lty=2)
abline(h=min(S0325H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H19max)
K2_19_S0325=Qmax19_S0325/Qp19_S0325
print(paste("K2 =",K2_19_S0325))
```

```{r}
plot(Hora,S0325H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H19min),lwd="3",col="black",lty=2)
abline(h=min(S0325H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H19min)
Kmính19_S0325=Qminh19_S0325/Qp19_S0325
print(paste("Kmính =",Kmính19_S0325))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0325H23max=S0325H[1:24,46]
S0325H23min=S0325H[1:24,48]
```

```{r}
ggplot()+
```

```
geom_line(mapping=aes(x=Hora,y=S0325H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0325 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0325H23min),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=91,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0325H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0325=57.9527774729589
axis(1,at=seq(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_S0325,lwd="4",col="red")
abline(h=max(S0325H23max),lwd="3",col="black",lty=2)
abline(h=min(S0325H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=max(S0325H23max)
K2_23_S0325=Qmax23_S0325/Qp23_S0325
print(paste("K2 =",K2_23_S0325))
```

```{r}
plot(Hora,S0325H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0325 - 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_S0325,lwd="4",col="red")
abline(h=max(S0325H23min),lwd="3",col="black",lty=2)
abline(h=min(S0325H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0325=min(S0325H23min)
Kmính23_S0325=Qminh23_S0325/Qp23_S0325
print(paste("Kmính =",Kmính23_S0325))
```

Caudales promedio del sector

```{r}
print(paste("Qp13 =",Qp13_S0325,"l/s",": Si"))
print(paste("Qp14 =",Qp14_S0325,"l/s",": Si"))
print(paste("Qp15 =",Qp15_S0325,"l/s",": Si"))
print(paste("Qp16 =",Qp16_S0325,"l/s",": Si"))
print(paste("Qp17 =",Qp17_S0325,"l/s",": Si"))
print(paste("Qp18 =",Qp18_S0325,"l/s",": Si"))
print(paste("Qp19 =",Qp19_S0325,"l/s",": Si"))
print(paste("Qp23 =",Qp23_S0325,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0325,": Si"))
print(paste("K2_14 =",K2_14_S0325,": Si"))
print(paste("K2_15 =",K2_15_S0325,": Si"))
print(paste("K2_16 =",K2_16_S0325,": Si"))
print(paste("K2_17 =",K2_17_S0325,": Si"))
print(paste("K2_18 =",K2_18_S0325,": Si"))
print(paste("K2_19 =",K2_19_S0325,": Si"))
print(paste("K2_23 =",K2_23_S0325,": Si"))
```

```{r}
K2S0325m=c(K2_13_S0325,K2_14_S0325,K2_15_S0325,K2_16_S0325,K2_17_S0325,
K2_18_S0325,K2_19_S0325,K2_23_S0325)
K2S0325=mean(K2S0325m)
summary(K2S0325m)
K2S0325m
print(paste("K2_S0325 =",K2S0325))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0325,": Si"))
print(paste("Kmính_14 =",Kmính14_S0325,": Si"))
```

```
print(paste("Kmính_15 =",Kmính15_S0325,": Si"))
print(paste("Kmính_16 =",Kmính16_S0325,": Si"))
print(paste("Kmính_17 =",Kmính17_S0325,": Si"))
print(paste("Kmính_18 =",Kmính18_S0325,": Si"))
print(paste("Kmính_19 =",Kmính19_S0325,": Si"))
print(paste("Kmính_23 =",Kmính23_S0325,": Si"))
```

```{r}
KmínhS0325m=c(Kmính13_S0325,Kmính14_S0325,Kmính15_S0325,Kmính16_S0325,
Kmính17_S0325,Kmính18_S0325,Kmính19_S0325,Kmính23_S0325)
KmínhS0325=mean(KmínhS0325m)
summary(KmínhS0325m)
KmínhS0325m
print(paste("Kmính_S0325 =",KmínhS0325))
```

Estación S0326 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0326H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0326H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0326H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0326H13max=S0326H[1:24,6]
S0326H13min=S0326H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=105.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=96.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0326H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0326=47.2242469026849
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H13max),lwd="3",col="black",lty=2)
abline(h=min(S0326H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H13max)
K2_13_S0326=Qmax13_S0326/Qp13_S0326
print(paste("K2 =",K2_13_S0326))
```

```{r}
plot(Hora,S0326H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H13min),lwd="3",col="black",lty=2)
abline(h=min(S0326H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H13min)
Kmính13_S0326=Qminh13_S0326/Qp13_S0326
print(paste("Kmính =",Kmính13_S0326))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0326H14max=S0326H[1:24,10]
S0326H14min=S0326H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H14min),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=106,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0326H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0326=55.8355157131233
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H14max),lwd="3",col="black",lty=2)
abline(h=min(S0326H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H14max)
K2_14_S0326=Qmax14_S0326/Qp14_S0326
print(paste("K2 =",K2_14_S0326))
```

```{r}
plot(Hora,S0326H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H14min),lwd="3",col="black",lty=2)
abline(h=min(S0326H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H14min)
Kmính14_S0326=Qminh14_S0326/Qp14_S0326
print(paste("Kmính =",Kmính14_S0326))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0326H15max=S0326H[1:24,14]
S0326H15min=S0326H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H15min),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=119,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0326H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0326=62.2335395920274
```

```
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H15max),lwd="3",col="black",lty=2)
abline(h=min(S0326H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H15max)
K2_15_S0326=Qmax15_S0326/Qp15_S0326
print(paste("K2 =",K2_15_S0326))
```

```{r}
plot(Hora,S0326H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H15min),lwd="3",col="black",lty=2)
abline(h=min(S0326H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H15min)
Kmính15_S0326=Qminh15_S0326/Qp15_S0326
print(paste("Kmính =",Kmính15_S0326))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0326H16max=S0326H[1:24,18]
S0326H16min=S0326H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=144.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=132.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0326H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0326=72.0631840001639
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H16max),lwd="3",col="black",lty=2)
abline(h=min(S0326H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H16max)
K2_16_S0326=Qmax16_S0326/Qp16_S0326
print(paste("K2 =",K2_16_S0326))
```

```{r}
plot(Hora,S0326H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H16min),lwd="3",col="black",lty=2)
abline(h=min(S0326H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H16min)
Kmính16_S0326=Qminh16_S0326/Qp16_S0326
print(paste("Kmính =",Kmính16_S0326))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0326H17max=S0326H[1:24,22]
S0326H17min=S0326H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H17min),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=119.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0326H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0316 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0326=74.776373998411
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H17max),lwd="3",col="black",lty=2)
abline(h=min(S0326H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H17max)
K2_17_S0326=Qmax17_S0326/Qp17_S0326
print(paste("K2 =",K2_17_S0326))
```

```{r}
plot(Hora,S0326H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H17min),lwd="3",col="black",lty=2)
abline(h=min(S0326H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H17min)
Kmính17_S0326=Qminh17_S0326/Qp17_S0326
print(paste("Kmính =",Kmính17_S0326))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0326H18max=S0326H[1:24,26]
S0326H18min=S0326H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H18min),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,S0326H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0326=76.5879714131781
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H18max),lwd="3",col="black",lty=2)
abline(h=min(S0326H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H18max)
K2_18_S0326=Qmax18_S0326/Qp18_S0326
print(paste("K2 =",K2_18_S0326))
```

```{r}
plot(Hora,S0326H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H18min),lwd="3",col="black",lty=2)
abline(h=min(S0326H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H18min)
Kmính18_S0326=Qminh18_S0326/Qp18_S0326
print(paste("Kmính =",Kmính18_S0326))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0326H19max=S0326H[1:24,30]
S0326H19min=S0326H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H19min),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=133,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0326H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0326=78.0285732827671
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H19max),lwd="3",col="black",lty=2)
abline(h=min(S0326H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H19max)
K2_19_S0326=Qmax19_S0326/Qp19_S0326
print(paste("K2 =",K2_19_S0326))
```

```{r}
plot(Hora,S0326H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H19min),lwd="3",col="black",lty=2)
abline(h=min(S0326H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H19min)
Kmính19_S0326=Qminh19_S0326/Qp19_S0326
print(paste("Kmính =",Kmính19_S0326))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0326H23max=S0326H[1:24,46]
S0326H23min=S0326H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0326H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0326 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0326H23min),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,S0326H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 20326 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0326=90.2712553629589
axis(1,at=seq(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_S0326,lwd="4",col="red")
abline(h=max(S0326H23max),lwd="3",col="black",lty=2)
abline(h=min(S0326H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=max(S0326H23max)
K2_23_S0326=Qmax23_S0326/Qp23_S0326
print(paste("K2 =",K2_23_S0326))
```

```{r}
plot(Hora,S0326H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0300 - 20326 - 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_S0326,lwd="4",col="red")
abline(h=max(S0326H23min),lwd="3",col="black",lty=2)
abline(h=min(S0326H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0326=min(S0326H23min)
Kmính23_S0326=Qminh23_S0326/Qp23_S0326
print(paste("Kmính =",Kmính23_S0326))
```

Caudales promedio del sector

```{r}
print(paste("Qp_13 =",Qp13_S0326,"l/s",": Si"))
print(paste("Qp_14 =",Qp14_S0326,"l/s",": Si"))
print(paste("Qp_15 =",Qp15_S0326,"l/s",": Si"))
print(paste("Qp_16 =",Qp16_S0326,"l/s",": Si"))
print(paste("Qp_17 =",Qp17_S0326,"l/s",": Si"))
print(paste("Qp_18 =",Qp18_S0326,"l/s",": Si"))
print(paste("Qp_19 =",Qp19_S0326,"l/s",": Si"))
print(paste("Qp_23 =",Qp23_S0326,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0326,": Si"))
print(paste("K2_14 =",K2_14_S0326,": Si"))
print(paste("K2_15 =",K2_15_S0326,": Si"))
print(paste("K2_16 =",K2_16_S0326,": Si"))
print(paste("K2_17 =",K2_17_S0326,": Si"))
print(paste("K2_18 =",K2_18_S0326,": Si"))
print(paste("K2_19 =",K2_19_S0326,": Si"))
print(paste("K2_23 =",K2_23_S0326,": Si"))
```

```{r}
K2S0326m=c(K2_13_S0326,K2_14_S0326,K2_15_S0326,K2_16_S0326,K2_17_S0326,
K2_18_S0326,K2_19_S0326,K2_23_S0326)
K2S0326=mean(K2S0326m)
summary(K2S0326m)
K2S0326m
print(paste("K2_S0326 =",K2S0326))
```

Determinación del coeficiente Kmính el sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0326,": No"))
print(paste("Kmính_14 =",Kmính14_S0326,": No"))
print(paste("Kmính_15 =",Kmính15_S0326,": No"))
print(paste("Kmính_16 =",Kmính16_S0326,": No"))
print(paste("Kmính_17 =",Kmính17_S0326,": No"))
print(paste("Kmính_18 =",Kmính18_S0326,": No"))
print(paste("Kmính_19 =",Kmính19_S0326,": No"))
print(paste("Kmính_23 =",Kmính23_S0326,": Si"))
```

```{r}
KmínhS0326m=c(Kmính23_S0326)
KmínhS0326=mean(KmínhS0326m)
summary(KmínhS0326m)
KmínhS0326m
print(paste("Kmính_S0326 =",KmínhS0326))
```

Estación S0328 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0328H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0328H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0328H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0328H13max=S0328H[1:24,6]
S0328H13min=S0328H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=58,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,S0328H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0328=26.9770800827945
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H13max),lwd="3",col="black",lty=2)
abline(h=min(S0328H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H13max)
```

```
K2_13_S0328=Qmax13_S0328/Qp13_S0328
print(paste("K2 =",K2_13_S0328))
```

```{r}
plot(Hora,S0328H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H13min),lwd="3",col="black",lty=2)
abline(h=min(S0328H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H13min)
Kmính13_S0328=Qminh13_S0328/Qp13_S0328
print(paste("Kmính =",Kmính13_S0328))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0328H14max=S0328H[1:24,10]
S0328H14min=S0328H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=58,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,S0328H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0328=33.0714578433973
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H14max),lwd="3",col="black",lty=2)
abline(h=min(S0328H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H14max)
K2_14_S0328=Qmax14_S0328/Qp14_S0328
print(paste("K2 =",K2_14_S0328))
```

```{r}
plot(Hora,S0328H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H14min),lwd="3",col="black",lty=2)
abline(h=min(S0328H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H14min)
Kmính14_S0328=Qminh14_S0328/Qp14_S0328
print(paste("Kmính =",Kmính14_S0328))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
```

```
S0328H15max=S0328H[1:24,14]
S0328H15min=S0328H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H15min),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,S0328H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0328=34.6784328093425
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H15max),lwd="3",col="black",lty=2)
abline(h=min(S0328H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H15max)
K2_15_S0328=Qmax15_S0328/Qp15_S0328
print(paste("K2 =",K2_15_S0328))
```

```{r}
plot(Hora,S0328H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H15min),lwd="3",col="black",lty=2)
abline(h=min(S0328H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H15min)
Kmính15_S0328=Qminh15_S0328/Qp15_S0328
print(paste("Kmính =",Kmính15_S0328))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0328H16max=S0328H[1:24,18]
S0328H16min=S0328H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H16min),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,S0328H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0328=35.9930453264481
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H16max),lwd="3",col="black",lty=2)
abline(h=min(S0328H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H16max)
K2_16_S0328=Qmax16_S0328/Qp16_S0328
print(paste("K2 =",K2_16_S0328))
```

```{r}
plot(Hora,S0328H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H16min),lwd="3",col="black",lty=2)
abline(h=min(S0328H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H16min)
Kmính16_S0328=Qminh16_S0328/Qp16_S0328
print(paste("Kmính =",Kmính16_S0328))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0328H17max=S0328H[1:24,22]
S0328H17min=S0328H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=63.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=57.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0328H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0328=36.1772163066849
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H17max),lwd="3",col="black",lty=2)
abline(h=min(S0328H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H17max)
K2_17_S0328=Qmax17_S0328/Qp17_S0328
print(paste("K2 =",K2_17_S0328))
```

```{r}
plot(Hora,S0328H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H17min),lwd="3",col="black",lty=2)
abline(h=min(S0328H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H17min)
Kmính17_S0328=Qminh17_S0328/Qp17_S0328
```

```
print(paste("Kmính =",Kmính17_S0328))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0328H18max=S0328H[1:24,26]
S0328H18min=S0328H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=53.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0328H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0328=37.8548354128493
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H18max),lwd="3",col="black",lty=2)
abline(h=min(S0328H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H18max)
K2_18_S0328=Qmax18_S0328/Qp18_S0328
print(paste("K2 =",K2_18_S0328))
```

```{r}
plot(Hora,S0328H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H18min),lwd="3",col="black",lty=2)
abline(h=min(S0328H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H18min)
Kmính18_S0328=Qminh18_S0328/Qp18_S0328
print(paste("Kmính =",Kmính18_S0328))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0328H19max=S0328H[1:24,30]
S0328H19min=S0328H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=57.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=53.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0328H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
```

```
Qp19_S0328=37.8907719815616
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H19max),lwd="3",col="black",lty=2)
abline(h=min(S0328H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H19max)
K2_19_S0328=Qmax19_S0328/Qp19_S0328
print(paste("K2 =",K2_19_S0328))
```

```{r}
plot(Hora,S0328H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H19min),lwd="3",col="black",lty=2)
abline(h=min(S0328H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H19min)
Kmính19_S0328=Qminh19_S0328/Qp19_S0328
print(paste("Kmính =",Kmính19_S0328))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0328H23max=S0328H[1:24,46]
S0328H23min=S0328H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0328H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0328 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0328H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.6,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0328H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0328=40.3786215552603
axis(1,at=seq(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_S0328,lwd="4",col="red")
abline(h=max(S0328H23max),lwd="3",col="black",lty=2)
abline(h=min(S0328H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=max(S0328H23max)
K2_23_S0328=Qmax23_S0328/Qp23_S0328
print(paste("K2 =",K2_23_S0328))
```

```{r}
plot(Hora,S0328H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0328 - 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_S0328,lwd="4",col="red")
abline(h=max(S0328H23min),lwd="3",col="black",lty=2)
abline(h=min(S0328H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0328=min(S0328H23min)
Kmính23_S0328=Qminh23_S0328/Qp23_S0328
print(paste("Kmính =",Kmính23_S0328))
```

Caudales promedio del sector

```{r}
print(paste("Qp13 =",Qp13_S0328,"l/s",": No"))
print(paste("Qp14 =",Qp14_S0328,"l/s",": Si"))
print(paste("Qp15 =",Qp15_S0328,"l/s",": Si"))
print(paste("Qp16 =",Qp16_S0328,"l/s",": Si"))
print(paste("Qp17 =",Qp17_S0328,"l/s",": No"))
print(paste("Qp18 =",Qp18_S0328,"l/s",": Si"))
print(paste("Qp19 =",Qp19_S0328,"l/s",": Si"))
print(paste("Qp23 =",Qp23_S0328,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0328,": No"))
print(paste("K2_14 =",K2_14_S0328,": Si"))
print(paste("K2_15 =",K2_15_S0328,": Si"))
print(paste("K2_16 =",K2_16_S0328,": Si"))
print(paste("K2_17 =",K2_17_S0328,": No"))
print(paste("K2_18 =",K2_18_S0328,": Si"))
print(paste("K2_19 =",K2_19_S0328,": Si"))
print(paste("K2_23 =",K2_23_S0328,": Si"))
```

```{r}
K2S0328m=c(K2_14_S0328,K2_15_S0328,K2_16_S0328,K2_18_S0328,K2_19_S0328,
K2_23_S0328)
K2S0328=mean(K2S0328m)
summary(K2S0328m)
K2S0328m
print(paste("K2_S0328 =",K2S0328))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0328,": No"))
print(paste("Kmính_14 =",Kmính14_S0328,": Si"))
print(paste("Kmính_15 =",Kmính15_S0328,": Si"))
print(paste("Kmính_16 =",Kmính16_S0328,": Si"))
print(paste("Kmính_17 =",Kmính17_S0328,": No"))
print(paste("Kmính_18 =",Kmính18_S0328,": Si"))
print(paste("Kmính_19 =",Kmính19_S0328,": Si"))
print(paste("Kmính_23 =",Kmính23_S0328,": Si"))
```

```{r}
KmínhS0328m=c(Kmính14_S0328,Kmính15_S0328,Kmính16_S0328,Kmính18_S0328,
Kmính19_S0328,Kmính23_S0328)
KmínhS0328=mean(KmínhS0328m)
summary(KmínhS0328m)
KmínhS0328m
print(paste("Kmính_S0328 =",KmínhS0328))
```

Estación S0329 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0329H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0329H.csv",sep=";")
```

Visualización de la base de datos

```{r}
# View(S0329H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0329H13max=S0329H[1:24,6]
S0329H13min=S0329H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H13min),color="blue",lwd=1.2)+
```

```
geom_text(aes(x=3,y=73.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=67.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0329=37.2632263457534
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H13max),lwd="3",col="black",lty=2)
abline(h=min(S0329H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H13max)
K2_13_S0329=Qmax13_S0329/Qp13_S0329
print(paste("K2 =",K2_13_S0329))
```

```{r}
plot(Hora,S0329H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H13min),lwd="3",col="black",lty=2)
abline(h=min(S0329H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H13min)
Kmính13_S0329=Qminh13_S0329/Qp13_S0329
print(paste("Kmính =",Kmính13_S0329))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0329H14max=S0329H[1:24,10]
S0329H14min=S0329H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.8,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62.8,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0329=38.1041068870685
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H14max),lwd="3",col="black",lty=2)
abline(h=min(S0329H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H14max)
K2_14_S0329=Qmax14_S0329/Qp14_S0329
print(paste("K2 =",K2_14_S0329))
```

```{r}
```

```
plot(Hora,S0329H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H14min),lwd="3",col="black",lty=2)
abline(h=min(S0329H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H14min)
Kmính14_S0329=Qminh14_S0329/Qp14_S0329
print(paste("Kmính =",Kmính14_S0329))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0329H15max=S0329H[1:24,14]
S0329H15min=S0329H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=67.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0329=41.4333357027945
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H15max),lwd="3",col="black",lty=2)
abline(h=min(S0329H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H15max)
K2_15_S0329=Qmax15_S0329/Qp15_S0329
print(paste("K2 =",K2_15_S0329))
```

```{r}
plot(Hora,S0329H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H15min),lwd="3",col="black",lty=2)
abline(h=min(S0329H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H15min)
Kmính15_S0329=Qminh15_S0329/Qp15_S0329
print(paste("Kmính =",Kmính15_S0329))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0329H16max=S0329H[1:24,18]
S0329H16min=S0329H[1:24,20]
```

```{r}
```

```
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=63,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0329=40.9639001061749
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H16max),lwd="3",col="black",lty=2)
abline(h=min(S0329H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H16max)
K2_16_S0329=Qmax16_S0329/Qp16_S0329
print(paste("K2 =",K2_16_S0329))
```

```{r}
plot(Hora,S0329H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H16min),lwd="3",col="black",lty=2)
abline(h=min(S0329H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H16min)
Kmính16_S0329=Qminh16_S0329/Qp16_S0329
print(paste("Kmính =",Kmính16_S0329))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0329H17max=S0329H[1:24,22]
S0329H17min=S0329H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62.6,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0329=37.8390622189315
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H17max),lwd="3",col="black",lty=2)
abline(h=min(S0329H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H17max)
K2_17_S0329=Qmax17_S0329/Qp17_S0329
print(paste("K2 =",K2_17_S0329))
```

```{r}
plot(Hora,S0329H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H17min),lwd="3",col="black",lty=2)
abline(h=min(S0329H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H17min)
Kmính17_S0329=Qminh17_S0329/Qp17_S0329
print(paste("Kmính =",Kmính17_S0329))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0329H18max=S0329H[1:24,26]
S0329H18min=S0329H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=68.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=62.5,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0329=43.4998275078904
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H18max),lwd="3",col="black",lty=2)
abline(h=min(S0329H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H18max)
K2_18_S0329=Qmax18_S0329/Qp18_S0329
print(paste("K2 =",K2_18_S0329))
```

```{r}
plot(Hora,S0329H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H18min),lwd="3",col="black",lty=2)
abline(h=min(S0329H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H18min)
Kmính18_S0329=Qminh18_S0329/Qp18_S0329
print(paste("Kmính =",Kmính18_S0329))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0329H19max=S0329H[1:24,30]
S0329H19min=S0329H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=72,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=67,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0329=48.9680379104932
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H19max),lwd="3",col="black",lty=2)
abline(h=min(S0329H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H19max)
K2_19_S0329=Qmax19_S0329/Qp19_S0329
print(paste("K2 =",K2_19_S0329))
```

```{r}
plot(Hora,S0329H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H19min),lwd="3",col="black",lty=2)
abline(h=min(S0329H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H19min)
Kmính19_S0329=Qminh19_S0329/Qp19_S0329
print(paste("Kmính =",Kmính19_S0329))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0329H23max=S0329H[1:24,46]
S0329H23min=S0329H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0329H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0329 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0329H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=78,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=73,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0329H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0329=50.7184958907123
axis(1,at=seq(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_S0329,lwd="4",col="red")
abline(h=max(S0329H23max),lwd="3",col="black",lty=2)
```

```
abline(h=min(S0329H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=max(S0329H23max)
K2_23_S0329=Qmax23_S0329/Qp23_S0329
print(paste("K2 =",K2_23_S0329))
```

```{r}
plot(Hora,S0329H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0329 - 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_S0329,lwd="4",col="red")
abline(h=max(S0329H23min),lwd="3",col="black",lty=2)
abline(h=min(S0329H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0329=min(S0329H23min)
Kmính23_S0329=Qminh23_S0329/Qp23_S0329
print(paste("Kmính =",Kmính23_S0329))
```

Caudales promedio del sector

```{r}
print(paste("Qp13 =",Qp13_S0329,"l/s",": Si"))
print(paste("Qp14 =",Qp14_S0329,"l/s",": Si"))
print(paste("Qp15 =",Qp15_S0329,"l/s",": No"))
print(paste("Qp16 =",Qp16_S0329,"l/s",": Si"))
print(paste("Qp17 =",Qp17_S0329,"l/s",": Si"))
print(paste("Qp18 =",Qp18_S0329,"l/s",": Si"))
print(paste("Qp19 =",Qp19_S0329,"l/s",": Si"))
print(paste("Qp23 =",Qp23_S0329,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0329,": Si"))
print(paste("K2_14 =",K2_14_S0329,": Si"))
print(paste("K2_15 =",K2_15_S0329,": No"))
print(paste("K2_16 =",K2_16_S0329,": Si"))
print(paste("K2_17 =",K2_17_S0329,": Si"))
print(paste("K2_18 =",K2_18_S0329,": Si"))
print(paste("K2_19 =",K2_19_S0329,": Si"))
print(paste("K2_23 =",K2_23_S0329,": Si"))
```

```{r}
K2S0329m=c(K2_13_S0329,K2_14_S0329,K2_16_S0329,K2_17_S0329,K2_18_S0329,
K2_19_S0329,K2_23_S0329)
K2S0329=mean(K2S0329m)
summary(K2S0329m)
K2S0329m
print(paste("K2_S0329 =",K2S0329))
```

Determinación del coeficiente Kmính del sector

```{r}
print(paste("Kmính_13 =",Kmính13_S0329,": No"))
print(paste("Kmính_14 =",Kmính14_S0329,": No"))
print(paste("Kmính_15 =",Kmính15_S0329,": No"))
print(paste("Kmính_16 =",Kmính16_S0329,": No"))
print(paste("Kmính_17 =",Kmính17_S0329,": No"))
print(paste("Kmính_18 =",Kmính18_S0329,": No"))
print(paste("Kmính_19 =",Kmính19_S0329,": Si"))
print(paste("Kmính_23 =",Kmính23_S0329,": Si"))
```

```{r}
KmínhS0329m=c(Kmính19_S0329,Kmính23_S0329)
KmínhS0329=mean(KmínhS0329m)
summary(KmínhS0329m)
KmínhS0329m
print(paste("Kmính_S0329 =",KmínhS0329))
```

Estación S0330 (2013 - 2019 y 2023)

Selección de la base de datos

```{r}
S0330H=read.csv("D:/ANEXOS/Anexo 3. Procesamiento de datos/03 Análisis/02 Estrato agrupado consolidado 2/S0330H.csv",sep=";")
```

```
```

Visualización de la base de datos

```{r}
# View(S0330H)
```

Extracción y análisis de datos del año 2013

```{r}
Hora=c(00:23)
S0330H13max=S0330H[1:24,6]
S0330H13min=S0330H[1:24,8]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H13max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2013")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0330H13min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39.5,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H13max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2013 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp13_S0330=20.1405079630959
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H13max),lwd="3",col="black",lty=2)
abline(h=min(S0330H13max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H13max)
K2_13_S0330=Qmax13_S0330/Qp13_S0330
print(paste("K2 =",K2_13_S0330))
```

```{r}
plot(Hora,S0330H13min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H13min),lwd="3",col="black",lty=2)
abline(h=min(S0330H13min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H13min)
Kmính13_S0330=Qminh13_S0330/Qp13_S0330
print(paste("Kmính =",Kmính13_S0330))
```

Extracción y análisis de datos del año 2014

```{r}
Hora=c(00:23)
S0330H14max=S0330H[1:24,10]
S0330H14min=S0330H[1:24,12]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H14max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2014")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0330H14min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=36.74,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=33.54,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H14max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2014 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp14_S0330=22.5020629686027
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H14max),lwd="3",col="black",lty=2)
abline(h=min(S0330H14max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H14max)
K2_14_S0330=Qmax14_S0330/Qp14_S0330
print(paste("K2 =",K2_14_S0330))
```

```{r}
plot(Hora,S0330H14min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H14min),lwd="3",col="black",lty=2)
abline(h=min(S0330H14min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H14min)
Kmính14_S0330=Qminh14_S0330/Qp14_S0330
print(paste("Kmính =",Kmính14_S0330))
```

Extracción y análisis de datos del año 2015

```{r}
Hora=c(00:23)
S0330H15max=S0330H[1:24,14]
S0330H15min=S0330H[1:24,16]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H15max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2015")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0330H15min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H15max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2015 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp15_S0330=23.606086466137
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H15max),lwd="3",col="black",lty=2)
abline(h=min(S0330H15max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H15max)
K2_15_S0330=Qmax15_S0330/Qp15_S0330
print(paste("K2 =",K2_15_S0330))
```

```{r}
plot(Hora,S0330H15min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H15min),lwd="3",col="black",lty=2)
abline(h=min(S0330H15min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H15min)
Kmính15_S0330=Qminh15_S0330/Qp15_S0330
print(paste("Kmính =",Kmính15_S0330))
```

Extracción y análisis de datos del año 2016

```{r}
Hora=c(00:23)
S0330H16max=S0330H[1:24,18]
S0330H16min=S0330H[1:24,20]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H16max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2016")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0330H16min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H16max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2016 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp16_S0330=26.0276348558197
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H16max),lwd="3",col="black",lty=2)
abline(h=min(S0330H16max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H16max)
K2_16_S0330=Qmax16_S0330/Qp16_S0330
print(paste("K2 =",K2_16_S0330))
```

```{r}
plot(Hora,S0330H16min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H16min),lwd="3",col="black",lty=2)
abline(h=min(S0330H16min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H16min)
Kmính16_S0330=Qminh16_S0330/Qp16_S0330
print(paste("Kmính =",Kmính16_S0330))
```

Extracción y análisis de datos del año 2017

```{r}
Hora=c(00:23)
S0330H17max=S0330H[1:24,22]
S0330H17min=S0330H[1:24,24]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H17max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2017")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
```

```
geom_line(mapping=aes(x=Hora,y=S0330H17min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=39.3,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=36.3,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H17max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2017 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp17_S0330=27.9856681060822
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H17max),lwd="3",col="black",lty=2)
abline(h=min(S0330H17max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H17max)
K2_17_S0330=Qmax17_S0330/Qp17_S0330
print(paste("K2 =",K2_17_S0330))
```

```{r}
plot(Hora,S0330H17min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H17min),lwd="3",col="black",lty=2)
abline(h=min(S0330H17min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H17min)
Kmính17_S0330=Qminh17_S0330/Qp17_S0330
print(paste("Kmính =",Kmính17_S0330))
```

Extracción y análisis de datos del año 2018

```{r}
Hora=c(00:23)
S0330H18max=S0330H[1:24,26]
S0330H18min=S0330H[1:24,28]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H18max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2018")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0330H18min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=47,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=43.7,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H18max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2018 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp18_S0330=29.443105851863
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H18max),lwd="3",col="black",lty=2)
abline(h=min(S0330H18max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H18max)
K2_18_S0330=Qmax18_S0330/Qp18_S0330
print(paste("K2 =",K2_18_S0330))
```

```{r}
plot(Hora,S0330H18min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H18min),lwd="3",col="black",lty=2)
abline(h=min(S0330H18min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H18min)
Kmính18_S0330=Qminh18_S0330/Qp18_S0330
print(paste("Kmính =",Kmính18_S0330))
```

Extracción y análisis de datos del año 2019

```{r}
Hora=c(00:23)
S0330H19max=S0330H[1:24,30]
S0330H19min=S0330H[1:24,32]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H19max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2019")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0330H19min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=47,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=43.62,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H19max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2019 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp19_S0330=30.4943643319178
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H19max),lwd="3",col="black",lty=2)
abline(h=min(S0330H19max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H19max)
K2_19_S0330=Qmax19_S0330/Qp19_S0330
print(paste("K2 =",K2_19_S0330))
```

```{r}
plot(Hora,S0330H19min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H19min),lwd="3",col="black",lty=2)
abline(h=min(S0330H19min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H19min)
Kmính19_S0330=Qminh19_S0330/Qp19_S0330
print(paste("Kmính =",Kmính19_S0330))
```

Extracción y análisis de datos del año 2023

```{r}
Hora=c(00:23)
S0330H23max=S0330H[1:24,46]
S0330H23min=S0330H[1:24,48]
```

```{r}
ggplot()+
geom_line(mapping=aes(x=Hora,y=S0330H23max),color="red",lwd=1.2)+
ggtitle("ESTACIÓN S0330 - 2023")+
theme(plot.title=element_text(hjust=0.5))+
xlab("Tiempo (horas)")+
ylab("Caudal (l/s)")+
geom_line(mapping=aes(x=Hora,y=S0330H23min),color="blue",lwd=1.2)+
geom_text(aes(x=3,y=49.1,label=" - Día de máximo consumo"),
stat="unique",size=4,color="red")+
geom_text(aes(x=3,y=46.25,label="- Día de mínimo consumo"),
stat="unique",size=4,color="blue")
```

```{r}
plot(Hora,S0330H23max,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 2023 (Día de máximo consumo)",
xlab="Tiempo (horas)",
ylab="Caudal (l/s)")
Qp23_S0330=31.910448072137
axis(1,at=seq(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_S0330,lwd="4",col="red")
abline(h=max(S0330H23max),lwd="3",col="black",lty=2)
abline(h=min(S0330H23max),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=max(S0330H23max)
K2_23_S0330=Qmax23_S0330/Qp23_S0330
print(paste("K2 =",K2_23_S0330))
```

```{r}
plot(Hora,S0330H23min,type="l",lwd="3",col="blue",
main="ESTACIÓN S0330 - 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_S0330,lwd="4",col="red")
abline(h=max(S0330H23min),lwd="3",col="black",lty=2)
abline(h=min(S0330H23min),lwd="3",col="black",lty=2)
legend(x="bottomleft",inset=c(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_S0330=min(S0330H23min)
Kmính23_S0330=Qminh23_S0330/Qp23_S0330
print(paste("Kmính =",Kmính23_S0330))
```

Caudales promedio del sector

```{r}
print(paste("Qp13 =",Qp13_S0330,"l/s",": Si"))
print(paste("Qp14 =",Qp14_S0330,"l/s",": No"))
print(paste("Qp15 =",Qp15_S0330,"l/s",": Si"))
print(paste("Qp16 =",Qp16_S0330,"l/s",": Si"))
print(paste("Qp17 =",Qp17_S0330,"l/s",": Si"))
print(paste("Qp18 =",Qp18_S0330,"l/s",": Si"))
print(paste("Qp19 =",Qp19_S0330,"l/s",": Si"))
print(paste("Qp23 =",Qp23_S0330,"l/s",": Si"))
```

Determinación del coeficiente K2 del sector

```{r}
print(paste("K2_13 =",K2_13_S0330,": Si"))
print(paste("K2_14 =",K2_14_S0330,": No"))
print(paste("K2_15 =",K2_15_S0330,": Si"))
print(paste("K2_16 =",K2_16_S0330,": Si"))
print(paste("K2_17 =",K2_17_S0330,": Si"))
print(paste("K2_18 =",K2_18_S0330,": Si"))
print(paste("K2_19 =",K2_19_S0330,": Si"))
print(paste("K2_23 =",K2_23_S0330,": Si"))
```

```{r}
K2S0330m=c(K2_13_S0330,K2_15_S0330,K2_16_S0330,K2_17_S0330,K2_18_S0330,
K2_19_S0330,K2_23_S0330)
K2S0330=mean(K2S0330m)
summary(K2S0330m)
K2S0330m
print(paste("K2_S0330 =",K2S0330))
```

Determinación del coeficiente Kmính del sector

```{r}
```

```
print(paste("Kmính_13 =",Kmính13_S0330,": No"))
print(paste("Kmính_14 =",Kmính14_S0330,": No"))
print(paste("Kmính_15 =",Kmính15_S0330,": No"))
print(paste("Kmính_16 =",Kmính16_S0330,": No"))
print(paste("Kmính_17 =",Kmính17_S0330,": No"))
print(paste("Kmính_18 =",Kmính18_S0330,": Si"))
print(paste("Kmính_19 =",Kmính19_S0330,": Si"))
print(paste("Kmính_23 =",Kmính23_S0330,": Si"))
```

```{r}
KmínhS0330m=c(Kmính18_S0330,Kmính19_S0330,Kmính23_S0330)
KmínhS0330=mean(KmínhS0330m)
summary(KmínhS0330m)
KmínhS0330m
print(paste("Kmính_S0330 =",KmínhS0330))
```

Determinación del coeficiente K2 del estrato agrupado consolidado 2

```{r}
print(paste("K2_S0002 =",K2S0002))
print(paste("K2_S0011 =",K2S0011))
print(paste("K2_S0080 =",K2S0080))
print(paste("K2_S0092 =",K2S0092))
print(paste("K2_S0096 =",K2S0096))
print(paste("K2_S0206 =",K2S0206))
print(paste("K2_S0213 =",K2S0213))
print(paste("K2_S0300 =",K2S0300))
print(paste("K2_S0301 =",K2S0301))
print(paste("K2_S0305 =",K2S0305))
print(paste("K2_S0306 =",K2S0306))
print(paste("K2_S0309 =",K2S0309))
print(paste("K2_S0311 =",K2S0311))
print(paste("K2_S0312 =",K2S0312))
print(paste("K2_S0316 =",K2S0316))
print(paste("K2_S0317 =",K2S0317))
print(paste("K2_S0318 =",K2S0318))
print(paste("K2_S0319 =",K2S0319))
print(paste("K2_S0320 =",K2S0320))
print(paste("K2_S0322 =",K2S0322))
print(paste("K2_S0324 =",K2S0324))
print(paste("K2_S0325 =",K2S0325))
print(paste("K2_S0326 =",K2S0326))
print(paste("K2_S0328 =",K2S0328))
print(paste("K2_S0329 =",K2S0329))
print(paste("K2_S0330 =",K2S0330))
```

```{r}
K2EAC2DF=c(K2S0002,K2S0011,K2S0080,K2S0092,K2S0096,K2S0206,K2S0213,K2S0300,
K2S0301,K2S0305,K2S0306,K2S0309,K2S0311,K2S0312,K2S0316,K2S0317,
K2S0318,K2S0319,K2S0320,K2S0322,K2S0324,K2S0325,K2S0326,K2S0328,
K2S0329,K2S0330)
K2EAC2DF=data.frame(K2EAC2DF)
K2EAC2_13_19_23=ggplot(data=K2EAC2DF,aes(x="",y=K2EAC2DF))+
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 2 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 2")+
ylab("K2 (2013 - 2019 y 2023)")
summary(K2EAC2DF)
K2EAC2=c(K2S0002,K2S0011,K2S0080,K2S0092,K2S0096,K2S0206,K2S0213,K2S0300,
K2S0301,K2S0305,K2S0306,K2S0309,K2S0311,K2S0312,K2S0316,K2S0317,
K2S0318,K2S0319,K2S0320,K2S0322,K2S0324,K2S0325,K2S0326,K2S0328,
K2S0329,K2S0330)
K2EAC2=mean(K2EAC2)
print(paste("K2_EAC2 =",K2EAC2))
```

```{r}
K2EAC2DF=c(K2S0002,K2S0011,K2S0092,K2S0096,K2S0213,K2S0300,K2S0301,K2S0305,
K2S0306,K2S0309,K2S0311,K2S0312,K2S0316,K2S0317,K2S0318,K2S0319,
K2S0320,K2S0322,K2S0324,K2S0325,K2S0326,K2S0328,K2S0329,K2S0330)
K2EAC2DF=data.frame(K2EAC2DF)
K2EAC2_13_19_23=ggplot(data=K2EAC2DF,aes(x="",y=K2EAC2DF))+
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 2 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 2")+
  ylab("K2 (2013 - 2019 y 2023)")
summary(K2EAC2DF)
K2EAC2=c(K2S0002,K2S0011,K2S0092,K2S0096,K2S0213,K2S0300,K2S0301,K2S0305,
K2S0306,K2S0309,K2S0311,K2S0312,K2S0316,K2S0317,K2S0318,K2S0319,
K2S0320,K2S0322,K2S0324,K2S0325,K2S0326,K2S0328,K2S0329,K2S0330)
K2EAC2=mean(K2EAC2)
print(paste("K2_EAC2 =",K2EAC2))
```

Determinación del coeficiente Kmính del estrato agrupado consolidado 2

```{r}
print(paste("Kmính_S0002 =",KmínhS0002))
print(paste("Kmính_S0011 =",KmínhS0011))
print(paste("Kmính_S0080 =",KmínhS0080))
print(paste("Kmính_S0092 =",KmínhS0092))
print(paste("Kmính_S0096 =",KmínhS0096))
print(paste("Kmính_S0206 =",KmínhS0206))
print(paste("Kmính_S0213 =",KmínhS0213))
print(paste("Kmính_S0300 =",KmínhS0300))
print(paste("Kmính_S0301 =",KmínhS0301))
print(paste("Kmính_S0305 =",KmínhS0305))
print(paste("Kmính_S0306 =",KmínhS0306))
print(paste("Kmính_S0309 =",KmínhS0309))
print(paste("Kmính_S0311 =",KmínhS0311))
print(paste("Kmính_S0312 =",KmínhS0312))
print(paste("Kmính_S0316 =",KmínhS0316))
print(paste("Kmính_S0317 =",KmínhS0317))
print(paste("Kmính_S0318 =",KmínhS0318))
print(paste("Kmính_S0319 =",KmínhS0319))
print(paste("Kmính_S0320 =",KmínhS0320))
print(paste("Kmính_S0322 =",KmínhS0322))
print(paste("Kmính_S0324 =",KmínhS0324))
print(paste("Kmính_S0325 =",KmínhS0325))
print(paste("Kmính_S0326 =",KmínhS0326))
print(paste("Kmính_S0328 =",KmínhS0328))
print(paste("Kmính_S0329 =",KmínhS0329))
print(paste("Kmính_S0330 =",KmínhS0330))
```

```{r}
KmínhEAC2DF=c(KmínhS0002,KmínhS0011,KmínhS0080,KmínhS0092,KmínhS0096,KmínhS0206,
KmínhS0213,KmínhS0300,KmínhS0301,KmínhS0305,KmínhS0306,KmínhS0309,
KmínhS0311,KmínhS0312,KmínhS0316,KmínhS0317,KmínhS0318,KmínhS0319,
KmínhS0320,KmínhS0322,KmínhS0324,KmínhS0325,KmínhS0326,KmínhS0328,
KmínhS0329,KmínhS0330)
KmínhEAC2DF=data.frame(KmínhEAC2DF)
KmínhEAC2_13_19_23=ggplot(data=KmínhEAC2DF,aes(x="",y=KmínhEAC2DF))+
  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 2 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 2")+
  ylab("Kmính (2013 - 2019 y 2023)")
summary(KmínhEAC2DF)
KmínhEAC2=c(KmínhS0002,KmínhS0011,KmínhS0080,KmínhS0092,KmínhS0096,KmínhS0206,
KmínhS0213,KmínhS0300,KmínhS0301,KmínhS0305,KmínhS0306,KmínhS0309,
KmínhS0311,KmínhS0312,KmínhS0316,KmínhS0317,KmínhS0318,KmínhS0319,
KmínhS0320,KmínhS0322,KmínhS0324,KmínhS0325,KmínhS0326,KmínhS0328,
KmínhS0329,KmínhS0330)
KmínhEAC2=mean(KmínhEAC2)
print(paste("Kmính_EAC2 =",KmínhEAC2))
```

```{r}
KmínhEAC2DF=c(KmínhS0011,KmínhS0092,KmínhS0213,KmínhS0300,KmínhS0301,KmínhS0305,
KmínhS0306,KmínhS0309,KmínhS0311,KmínhS0316,KmínhS0317,KmínhS0318,
KmínhS0319,KmínhS0320,KmínhS0322,KmínhS0324,KmínhS0325,KmínhS0326,
KmínhS0328,KmínhS0329,KmínhS0330)
KmínhEAC2DF=data.frame(KmínhEAC2DF)
KmínhEAC2_13_19_23=ggplot(data=KmínhEAC2DF,aes(x="",y=KmínhEAC2DF))+
  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 2 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 2")+
ylab("Kmính (2013 - 2019 y 2023)")
summary(KmínhEAC2DF)
KmínhEAC2=c(KmínhS0011,KmínhS0092,KmínhS0213,KmínhS0300,KmínhS0301,KmínhS0305,
KmínhS0306,KmínhS0309,KmínhS0311,KmínhS0316,KmínhS0317,KmínhS0318,
KmínhS0319,KmínhS0320,KmínhS0322,KmínhS0324,KmínhS0325,KmínhS0326,
KmínhS0328,KmínhS0329,KmínhS0330)
KmínhEAC2=mean(KmínhEAC2)
print(paste("Kmính_EAC2 =",KmínhEAC2))
```

Diagrama de caja del coeficientes K2 y Kmính del estrato
agrupado consolidado 2 en el periodo del 2013 al 2019 y 2023

```{r}
K2EAC2_13_19_23+KmínhEAC2_13_19_23
```

Anexo 4: Velocidades en la estación S0039 y S0068

```
---
title: "Velocidades en la estación S0039 y S0068"
author: "Víctor Raúl León Medina"
date: "28/01/2024"
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()
```

VELOCIDAD EN LAS ESTACIONES S0039 Y S0068

Selección de datos horarios

```{r}
SectoresVelH=read_excel("D:/ANEXOS/Anexo 5. Velocidades en la estación S0039 y S0068/SectoresVelH.xlsx")
# View(SectoresVelH)
```

Asignación de formato fecha horaria

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

Generación de gráficos a escala horaria

```{r}
VelS0039H=ggplot(SectoresVelH,aes(x=FECHA_HR,y=S0039))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
VelS0068H=ggplot(SectoresVelH,aes(x=FECHA_HR,y=S0068))+geom_line(color="blue3",lwd=0.001)+
theme(axis.title.x=element_blank())
```

Selección de datos diarios

```{r}
SectoresVelD=read_excel("D:/ANEXOS/Anexo 5. Velocidades en la estación S0039 y S0068/SectoresVelD.xlsx")
# View(SectoresVelD)
```

Asignación de formato fecha diaria

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

Generación de gráficos a escala diaria

```{r}
VelS0039D=ggplot(SectoresVelD,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())
VelS0068D=ggplot(SectoresVelD,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())
```

Ploteo de gráficos a escala horaria y diaria

```{r}
(VelS0039H|VelS0039D)/(VelS0068H|VelS0068D)
```
```