

# Homework1

Sitian Qian

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## 设置路径

```
setwd("~/codes/R")  
dataPath="rData"
```

## 读入数据

```
WL <- read.table(paste(dataPath,"AQ_FSPMC_WanLiu.csv",sep="/"),skip = 3,header = TRUE  
, sep = ",")  
USE <- read.table(paste(dataPath,"AQ_FSPMC_USEmbassy.csv",sep="/"),skip = 3,header =  
TRUE, sep = ",")  
PRE <- read.table(paste(dataPath,"A_PRE.csv",sep = "/"),skip = 3,header = TRUE, sep =  
,")  
TEMP <- read.table(paste(dataPath,"A_TEMP.csv",sep = "/"),skip = 5,header = TRUE, sep  
= ",",  
                    col.names = c("Date","Time","Height","DegreeCelsius","Source","Err  
Flag","Details"),  
                    colClasses = c("character","character",NA,NA,NA,NA,NA))  
RH <- read.table(paste(dataPath,"A_RH.csv",sep = "/"),skip = 3,header = TRUE, sep =  
,")  
WIND <- read.table(paste(dataPath,"A_WIND.csv",sep = "/"),skip = 3,header = TRUE, sep  
= ",")
```

## 绘制PRE: 气压（按月平均）

## 转换时间

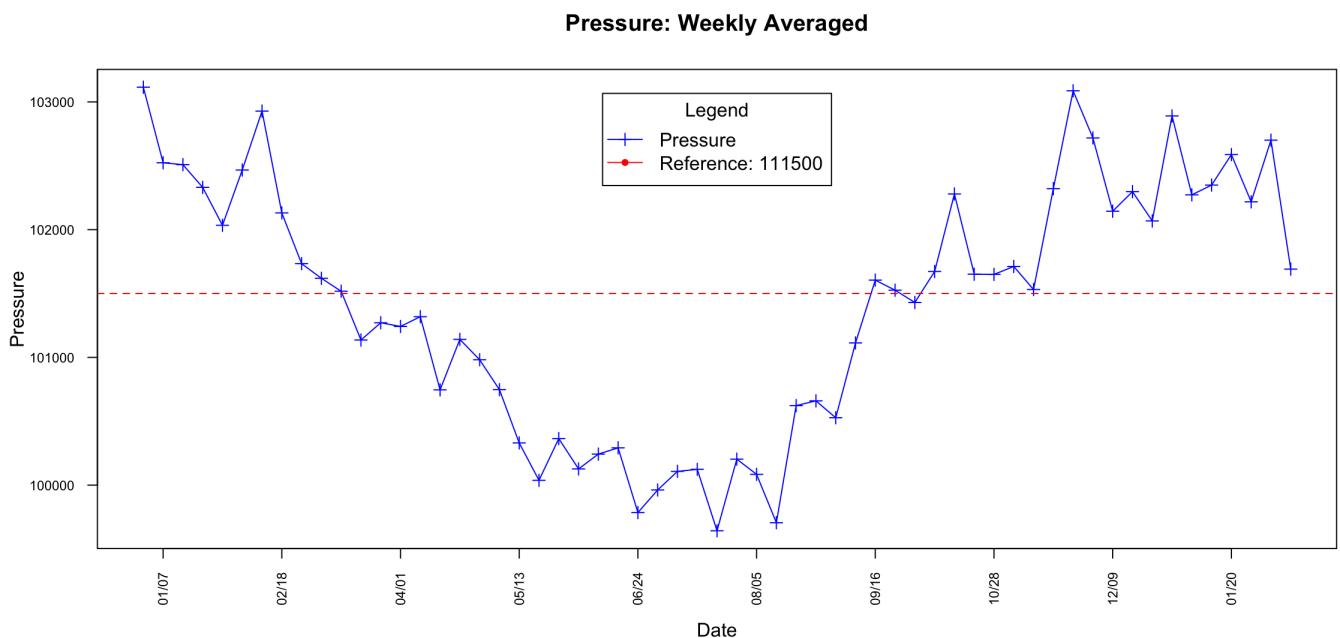
```
PRE$TimeST <- strptime(as.character(PRE$Time),format = "%Y/%m/%d %H:%M:%S")  
PRE_Weekly_Mean <- aggregate(Pascal ~ cut(TimeST,"1 week"), PRE, mean)  
colnames(PRE_Weekly_Mean)[1] <- "WeeklyTime"  
PRE_Weekly_Mean$WeeklyTimeST <- strptime(as.character(PRE_Weekly_Mean$WeeklyTime),for  
mat = "%Y-%m-%d")
```

## 绘图

```

plot(PRE_Weekly_Mean$WeeklyTimeST,PRE_Weekly_Mean$Pascal,pch=3,lty=1,xaxt="n",yaxt=
"n",cex.lab=1, type = "o",xlab = "Date",ylab = "Pressure",
      main = "Pressure: Weekly Averaged",col="blue")
xpos <- c(1:10)
xpos <- (xpos-1)*6 + 2
labelPRE = strptime(PRE_Weekly_Mean$WeeklyTimeST
                    [xpos],"%m/%d")
axis(1, at=as.numeric(PRE_Weekly_Mean$WeeklyTimeST[xpos]), labels=labelPRE, col.axis=
"black", las=2, cex.axis=0.7, tck=-0.02)
i <- c(1:6)
ypos <- (i-1)*1000+100000
axis(2, at=ypos, col.axis="black", las=1, cex.axis=0.7, tck=-0.02)
abline(h=c(101500), lty=2, col="red")
legend("top", inset=0.05,c("Pressure","Reference: 111500"),title = "Legend", lty=c(1,
1), pch=c(3,20), col=c("blue","red") )

```



## 绘制TEMP: 温度（来自AAXX：按周平均）

### 转换时间

```

selTEMP <- subset(TEMP, Source == "GTS_AAXX", select = c(Date,Time,DegreeCelsius , So
urce) )
selTEMP$FullTime <- paste(selTEMP$Date,selTEMP$Time,sep = " ")
selTEMP$TimeST <- strptime(as.character(selTEMP$FullTime),format = "%Y%m%d %H%M%S")
TEMP_Weekly_Mean <- aggregate(DegreeCelsius ~ cut(TimeST,"1 week"), selTEMP, mean)
colnames(TEMP_Weekly_Mean)[1] <- "WeeklyTime"
TEMP_Weekly_Mean$WeeklyTimeST <- strptime(as.character(TEMP_Weekly_Mean$WeeklyTime),f
ormat = "%Y-%m-%d")

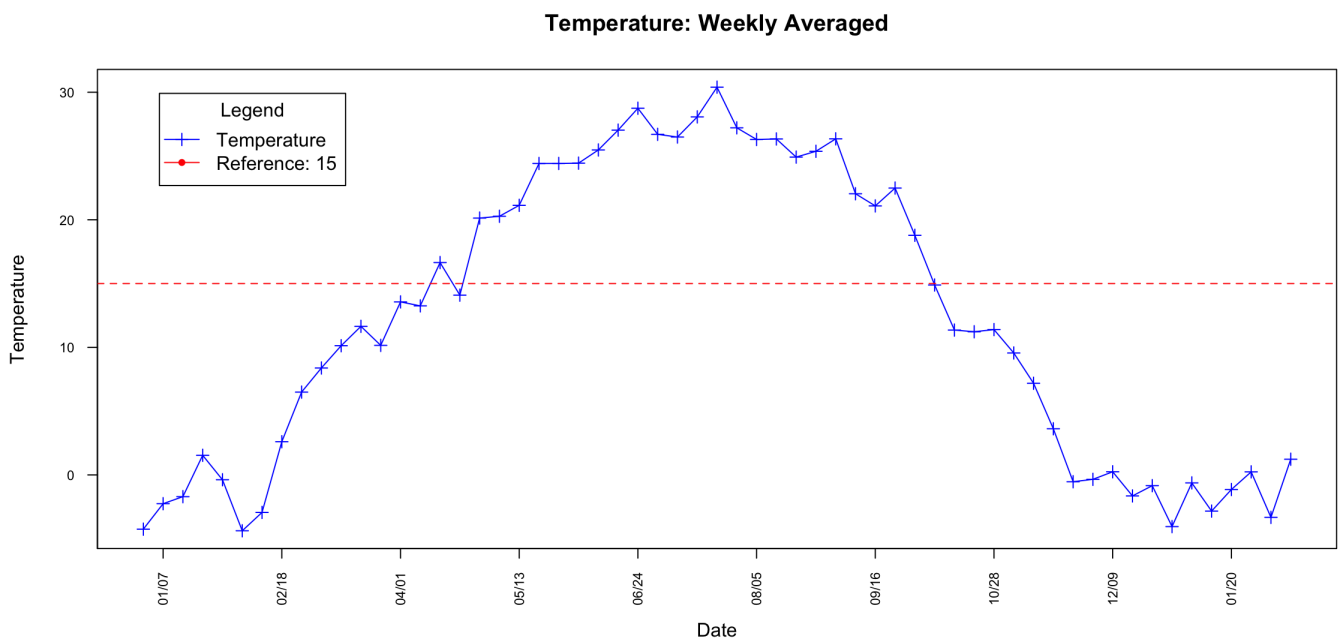
```

### 绘图

```

plot(TEMP_Weekly_Mean$WeeklyTimeST,TEMP_Weekly_Mean$DegreeCelsius,pch=3,lty=1,xaxt=
"n",yaxt="n",cex.lab=1, type = "o",xlab = "Date",ylab = "Temperature",
      main = "Temperature: Weekly Averaged",col="blue")
xpos <- c(1:10)
xpos <- (xpos-1)*6 + 2
labelTEMP = strptime(TEMP_Weekly_Mean$WeeklyTimeST
                      [xpos],"%m/%d")
axis(1, at=as.numeric(TEMP_Weekly_Mean$WeeklyTimeST[xpos]), labels=labelTEMP, col.axis=
"black", las=2, cex.axis=0.7, tck=-0.02)
i <- c(1:6)
ypos <- (i-1)*10 -20
axis(2, at=ypos, col.axis="black", las=1, cex.axis=0.7, tck=-0.02)
abline(h=c(15), lty=2, col="red")
legend("topleft", inset=0.05,c("Temperature","Reference: 15"),title = "Legend", lty=c
(1,1), pch=c(3,20), col=c("blue","red") )

```



## 绘制RH: 相对湿度（来自：AAXX，按周平均）

### 转换时间

```

selRH <- subset(RH, Source == "GTS_AAXX", select = c(Time,X. , Source) )
selRH$TimeST <- strptime(as.character(selRH$Time),format = "%Y/%m/%d %H:%M:%S")
RH_Weekly_Mean <- aggregate(X. ~ cut(TimeST,"1 week"), selRH, mean)
colnames(RH_Weekly_Mean)[1] <- "WeeklyTime"
RH_Weekly_Mean$WeeklyTimeST <- strptime(as.character(RH_Weekly_Mean$WeeklyTime),forma
t = "%Y-%m-%d")

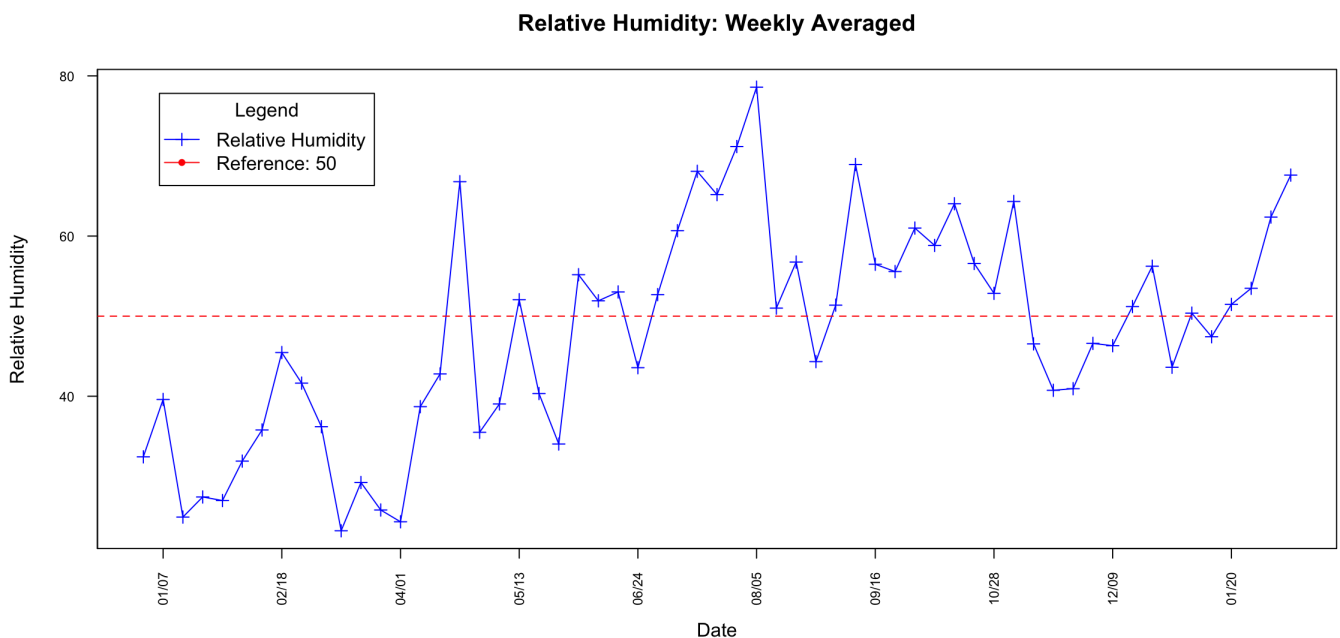
```

### 绘图

```

plot(RH_Weekly_Mean$WeeklyTimeST,RH_Weekly_Mean$X.,pch=3,lty=1,xaxt="n",yaxt="n",cex.
lab=1, type = "o",xlab = "Date",ylab = "Relative Humidity",
      main = "Relative Humidity: Weekly Averaged",col="blue")
xpos <- c(1:10)
xpos <- (xpos-1)*6 + 2
labelRH = strptime(RH_Weekly_Mean$WeeklyTimeST
                    [xpos],"%m/%d")
axis(1, at=as.numeric(RH_Weekly_Mean$WeeklyTimeST[xpos]), labels=labelRH, col.axis="black", las=2, cex.axis=0.7, tck=-0.02)
i <- c(1:6)
ypos <- (i-1)*20
axis(2, at=ypos, col.axis="black", las=1, cex.axis=0.7, tck=-0.02)
abline(h=c(50), lty=2, col="red")
legend("topleft", inset=0.05,c("Relative Humidity","Reference: 50"),title = "Legend",
lty=c(1,1), pch=c(3,20), col=c("blue","red") )

```



## 绘制WIND： 风向与风速（来自： AAXX， 按周平均）

### 转换时间&矢量平均

```

selWIND <- subset(WIND, Source == "GTS_AAXX", select = c(Time,m.s,Degree , Source) )
selWIND$TimeST <- strptime(as.character(selWIND$Time),format = "%Y/%m/%d %H:%M:%S")
selWIND$X <- cos(selWIND$Degree)*selWIND$m.s
selWIND$Y <- sin(selWIND$Degree)*selWIND$m.s
SpeedX_Weekly <- aggregate(X ~ cut(TimeST,"1 week"), selWIND, mean)
colnames(SpeedX_Weekly)[1] <- "WeeklyTime"
SpeedX_Weekly$WeeklyTimeST <- strptime(as.character(SpeedX_Weekly$WeeklyTime),format
= "%Y-%m-%d")
SpeedY_Weekly <- aggregate(Y ~ cut(TimeST,"1 week"), selWIND, mean)
colnames(SpeedY_Weekly)[1] <- "WeeklyTime"
SpeedY_Weekly$WeeklyTimeST <- strptime(as.character(SpeedY_Weekly$WeeklyTime),format
= "%Y-%m-%d")
Speed_Weekly <- subset(SpeedY_Weekly,select = WeeklyTimeST)
Speed_Weekly$m.s <- sqrt(SpeedY_Weekly$Y^2+SpeedX_Weekly$X^2)
Direct_Weekly <- subset(SpeedX_Weekly,select = WeeklyTimeST)
Direct_Weekly$Degree <- atan2(SpeedY_Weekly$Y,SpeedX_Weekly$X)/pi*180 + 180

```

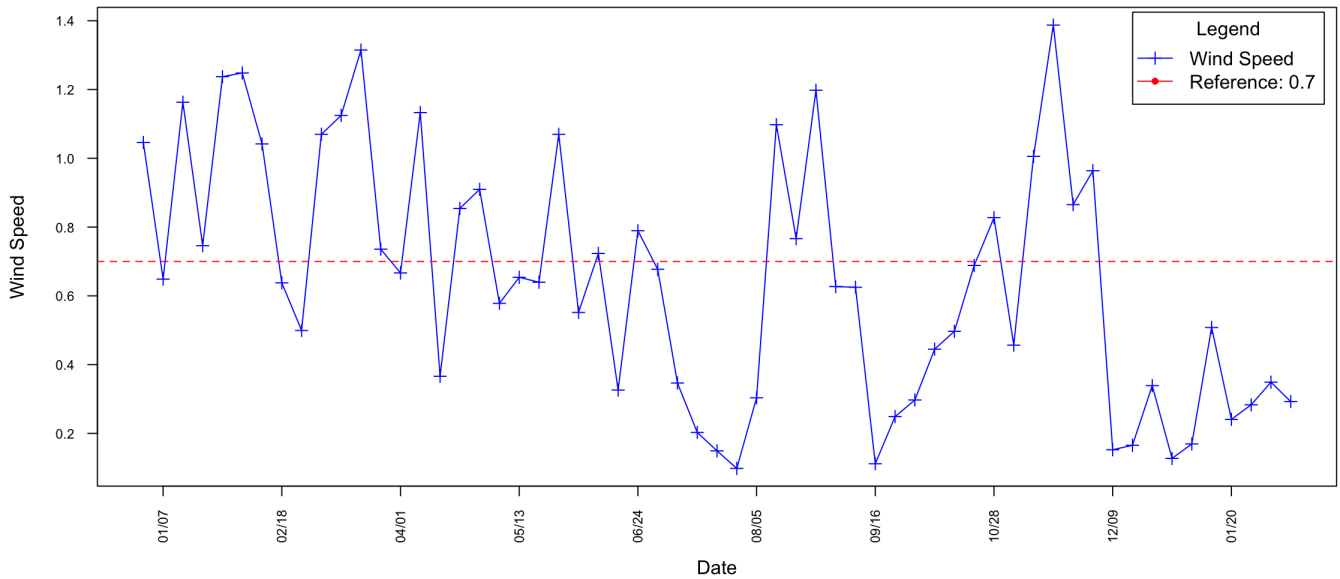
## 绘图

```

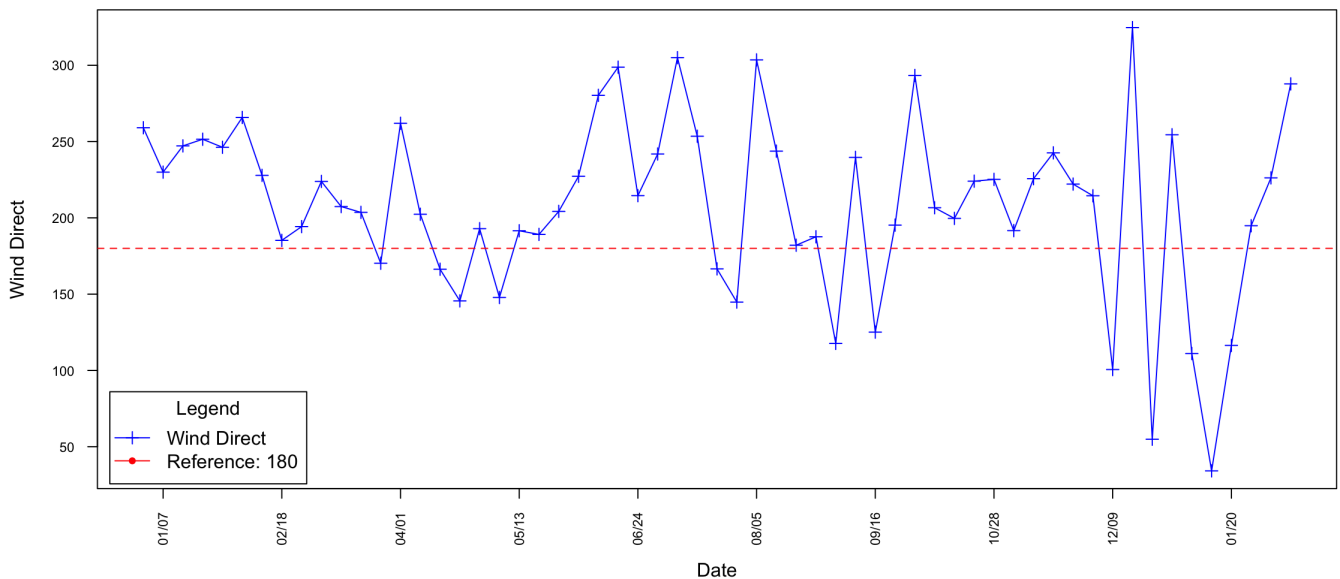
par(mfrow=c(2,1))
plot(Speed_Weekly$WeeklyTimeST,Speed_Weekly$m.s,pch=3,lty=1,xaxt="n",yaxt="n",cex.lab
=1, type = "o",xlab = "Date",ylab = "Wind Speed",
      main = "Wind Speed: Weekly Averaged",col="blue")
xpos <- c(1:10)
xpos <- (xpos-1)*6 + 2
labelRH = strptime(Speed_Weekly$WeeklyTimeST
                    [xpos],"%m/%d")
axis(1, at=as.numeric(Speed_Weekly$WeeklyTimeST[xpos]), labels=labelRH, col.axis="black",
las=2, cex.axis=0.7, tck=-0.02)
i <- c(1:7)
ypos <- (i)*0.2
axis(2, at=ypos, col.axis="black", las=1, cex.axis=0.7, tck=-0.02)
abline(h=c(0.7), lty=2, col="red")
legend("topright", inset=0.01,c("Wind Speed","Reference: 0.7"),title = "Legend", lty=
c(1,1), pch=c(3,20), col=c("blue","red") )
plot(Direct_Weekly$WeeklyTimeST,Direct_Weekly$Degree,pch=3,lty=1,xaxt="n",yaxt="n",ce
x.lab=1, type = "o",xlab = "Date",ylab = "Wind Direct",
      main = "Wind Direct: Weekly Averaged",col="blue")
xpos <- c(1:10)
xpos <- (xpos-1)*6 + 2
labelRH = strptime(Direct_Weekly$WeeklyTimeST
                    [xpos],"%m/%d")
axis(1, at=as.numeric(Direct_Weekly$WeeklyTimeST[xpos]), labels=labelRH, col.axis="black",
las=2, cex.axis=0.7, tck=-0.02)
i <- c(1:6)
ypos <- (i)*50
axis(2, at=ypos, col.axis="black", las=1, cex.axis=0.7, tck=-0.02)
abline(h=c(180), lty=2, col="red")
legend("bottomleft", inset=0.01,c("Wind Direct","Reference: 180"),title = "Legend", l
ty=c(1,1), pch=c(3,20), col=c("blue","red") )

```

Wind Speed: Weekly Averaged



Wind Direct: Weekly Averaged



绘制两站PM2.5: USE & WL (来自:  
AAXX, 按周平均)

转换时间

```
USE$TimeST <- strptime(as.character(USE$Time),format = "%Y/%m/%d %H:%M:%S")
USE_Weekly_Mean <- aggregate(ug.m3 ~ cut(TimeST,"1 week"), USE, mean)
colnames(USE_Weekly_Mean)[1] <- "WeeklyTime"
USE_Weekly_Mean$WeeklyTimeST <- strptime(as.character(USE_Weekly_Mean$WeeklyTime),for
mat = "%Y-%m-%d")
WL$TimeST <- strptime(as.character(WL$Time),format = "%Y/%m/%d %H:%M:%S")
WL_Weekly_Mean <- aggregate(ug.m3 ~ cut(TimeST,"1 week"), WL, mean)
colnames(WL_Weekly_Mean)[1] <- "WeeklyTime"
WL_Weekly_Mean$WeeklyTimeST <- strptime(as.character(WL_Weekly_Mean$WeeklyTime),forma
t = "%Y-%m-%d")
```

# 绘图

```
plot(USE_Weekly_Mean$WeeklyTimeST,USE_Weekly_Mean$ug.m3,pch=3,lty=1,xaxt="n",yaxt="n",
,cex.lab=1, type = "o",xlab = "Date",ylab = "PM2.5 Level",
      main = "PM2.5: Weekly Averaged",col="blue")
points(WL_Weekly_Mean$WeeklyTimeST,WL_Weekly_Mean$ug.m3,pch=3,col="yellow")
lines(WL_Weekly_Mean$WeeklyTimeST,WL_Weekly_Mean$ug.m3,lty=1,col="yellow",type = "o")
xpos <- c(1:10)
xpos <- (xpos-1)*6 + 2
labelRH = strftime(USE_Weekly_Mean$WeeklyTimeST
                    [xpos],"%m/%d")
axis(1, at=as.numeric(USE_Weekly_Mean$WeeklyTimeST[xpos]), labels=labelRH, col.axis=
"black", las=2, cex.axis=0.7, tck=-0.02)
i <- c(1:6)
ypos <- (i)*20
axis(2, at=ypos, col.axis="black", las=1, cex.axis=0.7, tck=-0.02)
abline(h=c(50), lty=2, col="red")

legend("topright", inset=0.1,c("USE","WL","Reference: 40"),title = "Legend", lty=c(1,
1,1), pch=c(3,3,20), col=c("blue","yellow","red") )
```

