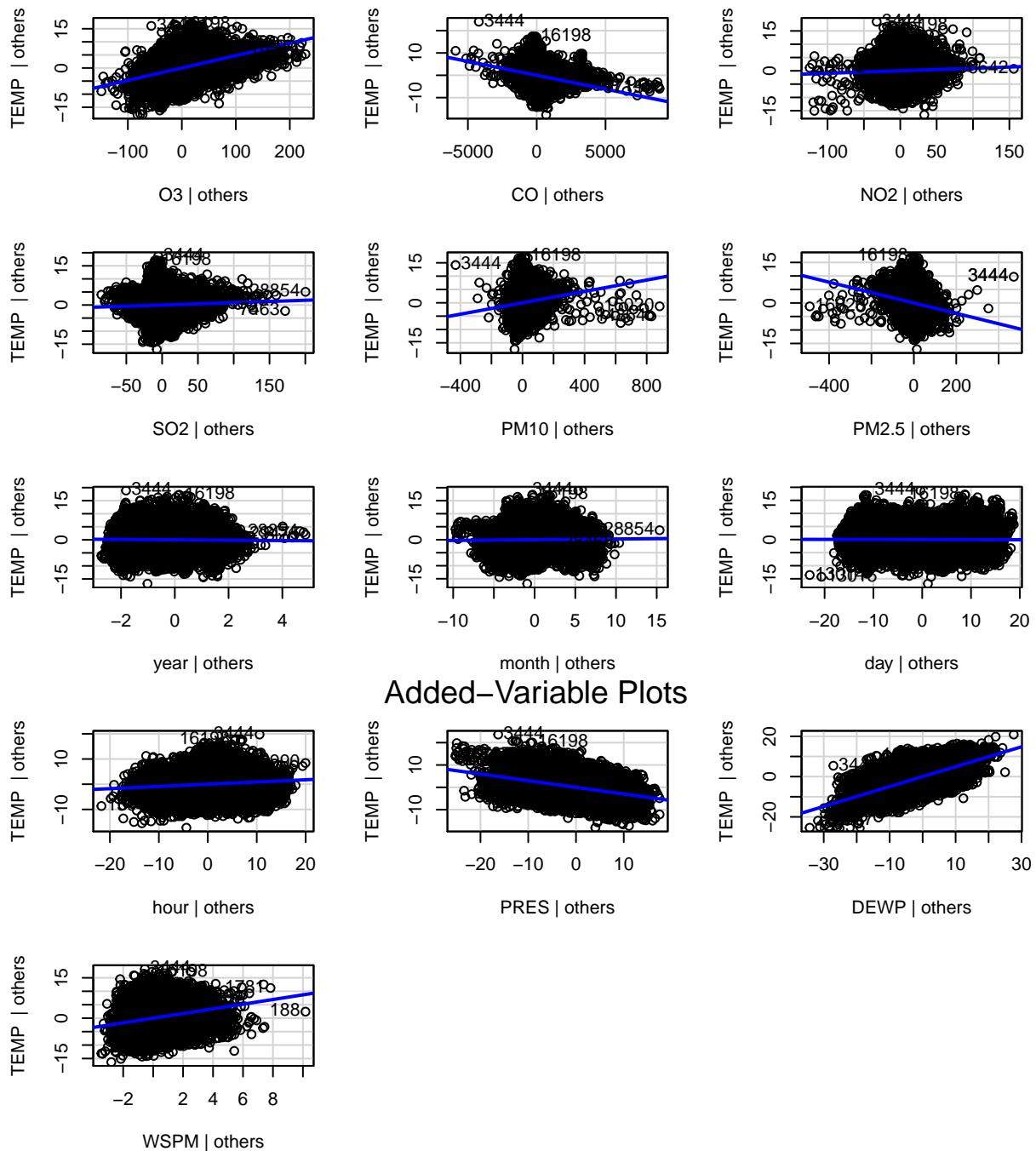


```

## day          1      107      107     6.8322  0.008957  **
## hour         1     4169     4169    266.8699 < 2.2e-16 *** 
## PRES        1 1230291 1230291 78761.4442 < 2.2e-16 *** 
## DEWP         1   374296   374296 23961.8729 < 2.2e-16 *** 
## WSPM         1   24923   24923  1595.5252 < 2.2e-16 *** 
## Residuals 30180  471426      16
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

avPlots(airquality.lm)

```



```

mod.red <- lm(TEMP ~ O3 + CO + NO2 + SO2 + PM10 + PM2.5 + year + month + hour + PRES + DEWP + WSPM, data = airquality)
mod.full <- lm(TEMP ~ O3 + CO + NO2 + SO2 + PM10 + PM2.5 + year + month + day + hour + PRES + DEWP + WSPM, data = airquality)
step(mod.full, scope = list(lower = mod.red, upper = mod.full), direction = 'backward')

## Start: AIC=83004.7
## TEMP ~ O3 + CO + NO2 + SO2 + PM10 + PM2.5 + year + month + day +
##       hour + PRES + DEWP + WSPM
##
##           Df Sum of Sq   RSS   AIC
## - day     1    21.012 471447 83004
## <none>          471426 83005
##
## Step: AIC=83004.05
## TEMP ~ O3 + CO + NO2 + SO2 + PM10 + PM2.5 + year + month + hour +
##       PRES + DEWP + WSPM
##
## Call:
## lm(formula = TEMP ~ O3 + CO + NO2 + SO2 + PM10 + PM2.5 + year +
##       month + hour + PRES + DEWP + WSPM, data = airquality)
##
## Coefficients:
## (Intercept)      O3        CO        NO2        SO2        PM10
## 452.200618    0.047366   -0.001238   0.009338   0.009045   0.010623
## PM2.5         year       month      hour       PRES       DEWP
## -0.019211   -0.070533    0.027751   0.088223   -0.298027   0.493416
## WSPM
## 0.866425

anova(mod.red, mod.full)

## Analysis of Variance Table
##
## Model 1: TEMP ~ O3 + CO + NO2 + SO2 + PM10 + PM2.5 + year + month + hour +
##       PRES + DEWP + WSPM
## Model 2: TEMP ~ O3 + CO + NO2 + SO2 + PM10 + PM2.5 + year + month + day +
##       hour + PRES + DEWP + WSPM
## Res.Df   RSS Df Sum of Sq   F Pr(>F)
## 1 30181 471447
## 2 30180 471426  1    21.012 1.3451 0.2461

#regsubsets
mod.reg <- regsubsets(cbind(O3, CO, NO2, SO2, PM10, PM2.5, year, month, day, hour, PRES, DEWP, WSPM), data = airquality)
summary.reg <- summary(mod.reg)
summary.reg$which

## (Intercept)      O3        CO        NO2        SO2        PM10       PM2.5       year       month       day       hour       PRES
## 1      TRUE FALSE TRUE
## 2      TRUE  TRUE FALSE FALSE
## 3      TRUE  TRUE FALSE TRUE
## 4      TRUE  TRUE  TRUE FALSE TRUE
## 5      TRUE  TRUE  TRUE FALSE TRUE
## 6      TRUE  TRUE  TRUE FALSE TRUE TRUE
## 7      TRUE  TRUE  TRUE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE
## 8      TRUE  TRUE  TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE
## DEWP      WSPM
```

```

## 1 FALSE FALSE
## 2 TRUE FALSE
## 3 TRUE FALSE
## 4 TRUE FALSE
## 5 TRUE TRUE
## 6 TRUE TRUE
## 7 TRUE TRUE
## 8 TRUE TRUE

summary.reg$rsq

## [1] 0.6767051 0.8039872 0.8436099 0.8676987 0.8743635 0.8778877 0.8787255
## [8] 0.8803891

summary.reg$adjr2

## [1] 0.6766944 0.8039742 0.8435944 0.8676812 0.8743427 0.8778635 0.8786974
## [8] 0.8803574

summary.reg$cp

## [1] 51758.4523 19497.1274 9455.5966 3351.5894 1664.1995 772.8873 562.5369
## [8] 142.8399

summary.reg$bic

## [1] -34074.14 -49172.45 -55980.74 -61021.03 -62571.42 -63420.17 -63617.72
## [8] -64024.47

#by plots
par(mfrow = c(2,2))
plot(summary.reg$rsq, xlab = "Number of Variables", ylab = "RSq", type = "b")
plot(summary.reg$adjr2, xlab = "Number of Variables", ylab = "Adjusted RSq", type = "b")
best_adj_r2 = which.max(summary.reg$adjr2)
points(best_adj_r2, summary.reg$adjr2[best_adj_r2],
col = "red",cex = 2, pch = 20)
plot(summary.reg$cp, xlab = "Number of Variables", ylab = "Cp", type = 'b')
best_cp = which.min(summary.reg$cp[-c(length(summary.reg$cp))])
points(best_cp, summary.reg$cp[best_cp],
col = "red", cex = 2, pch = 20)
plot(summary.reg$bic, xlab = "Number of Variables", ylab = "BIC", type = 'b')
best_bic = which.min(summary.reg$bic)
points(best_bic, summary.reg$bic[best_bic],
col = "red", cex = 2, pch = 20)

```