Package 'SwissAir'

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Title Air Quality Data of Switzerland for One Year in 30 Min
Resolution

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Description Ozone, NOx (= Sum of nitrogen monoxide and nitrogen dioxide), nitrogen monox-
ide, ambient temperature, dew point, wind speed and wind direc-
tion at 3 sites around lake of Lucerne in Central Switzerland in 30 min time resolu-
tion for year 2004.

LazyData yes

Depends R(>= 2.13.1)

Suggests IDPmisc(>= 1.1.17)

License GPL (>= 3)

NeedsCompilation no

Repository CRAN

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R topics documented:

AirQual   *Air Quality Data of Switzerland*

Description

Dataset contains Ozone (= O3), Sum of nitrogen monoxide and nitrogen dioxide (= NOx), nitrogen
monoxid (= NO), ambient temperature (T), dew point (Td), wind speed (WS) and wind direction
(WD) at 3 sites around lake of Lucerne in Central Switzerland in 30 min time resolution for the year
2004.

Usage

    data(AirQual)

Format

A data frame with 17568 observations on the following 22 variables.

`start` start time of observation (GMT+1h, no day saving time)

`ad.O3` Mean concentration [ppb] of O3 in ad

`ad.NOx` Mean concentration [ppb] of NOx in ad

`ad.NO` Mean concentration [ppb] of NO in ad

`ad.WS` Wind speed [m/s] in ad

`ad.WD` Wind direction in ad

`ad.T` Mean ambient temperature [deg C] in ad

`ad.Td` Mean dew point [deg C] in ad

`lu.O3` Mean concentration [ppb] of O3 in sz

`lu.NOx` Mean concentration [ppb] of NOx in sz

`lu.NO` Mean concentration [ppb] of NO in sz

`lu.WS` Wind speed [m/s] in sz

`lu.WD` Wind direction in sz

`lu.T` Mean ambient temperature [deg C] in sz

`lu.Td` Mean dew point [deg C] in sz

`sz.O3` Mean concentration [ppb] of O3 in sz

`sz.NOx` Mean concentration [ppb] of NOx in sz

`sz.NO` Mean concentration [ppb] of NO in sz

`sz.WS` Wind speed [m/s] in sz

`sz.WD` Wind direction in sz

`sz.T` Mean ambient temperature [deg C] in sz

`sz.Td` Mean dew point [deg C] in sz

Details

The 3 sites are

ad Site in Altdorf is located 100 m east of motorway A2 from Bale to Chiasso, on an open field at the beginning of a more than 2000 m deep valley, at 438 m altitude.

lu Site is located in Sedel next to town of Lucerne 35m above and 250m south of motorway A14 on a small hill with free 360 degree panorama at 484 m altitude.

sz Site is located in Schwyz in an aerea of medium density of buildings next to a shopping center.

NO and O3 react in the atmosphere within seconds to NO2. The production and destruction of the sum of O3 and NO2 (= Ox) takes place on a much lower time scale, so that the spatial (cf. ipairs output) and temporal (cf. ilagplot) correlation of Ox is much more pronounced than the correlation of O3 or NO.

Note

Type of variable start has changed in Version 1.08 from factor to character to save memory.

Source

The data are collected by inNet corporation <http://www.innetag.ch/> on behalf of in-Luft, an association for air quality controle, of the Swiss Cantons Aargau, Luzern, Nidwalden, Obwalden, Schwyz, Uri und Zug <http://www.in-luft.ch/>.

References

Rene Locher, Andreas Ruckstuhl; Plausibilisierung von Ozon, Stickoxiden und PM10: Statistische Methoden zur Effizienz- und Qualitaetssteigerung der Messdatenplausibilisierung; inLuft 2003

See Also

For viewing large datasets see library(IDPmisc)

Examples

```
str(AirQual)
sapply(AirQual, function(x) sum(is.na(x)))
cbind(min = sapply(AirQual[,-1], min, na.rm = TRUE),
      median = sapply(AirQual[,-1], median, na.rm = TRUE),
      max = sapply(AirQual[,-1], max, na.rm = TRUE))

if (require(IDPmisc) && require(grid)) {

  ## low correlation, density on logarithmic scale
  ipairs(AirQual[,c("ad.O3","lu.O3","sz.O3")],
         ztrans = function(x){x[x<1] <- 1; log2(x)*10})

  ## Not run:
  ipairs(AirQual[,c("ad.NOx","lu.NOx","sz.NOx")],
         ztrans = function(x){x[x<1] <- 1; log2(x)*10})

## End(Not run)

  lags <- c(1, 2, 4, 8)
  ilagplot(AirQual[,c("ad.O3")], set.lags = lags,
         ztrans = function(x){x[x<1] <- 1; log2(x)*10})

  Ox <- AirQual[,c("lu.O3","sz.O3")]+
        AirQual[,c("lu.NOx","sz.NOx")]-
        AirQual[,c("lu.NO","sz.NO")]
  names(Ox) <- c("lu","sz")

  ## high correlation, density on logarithmic scale
  ipairs(Ox,
         ztrans = function(x){x[x<1] <- 1; log2(x)*10})
  ilagplot(Ox$lu, set.lags = lags,
```

```
            ztrans = function(x){x[x<1] <- 1; log2(x)*10})

dat <-
    data.frame(month =as.numeric(substr(AirQual$start,4,5)),
               hour = as.numeric(substr(AirQual$start,12,13)),
               WD = AirQual$ad.WD,
               NOx = AirQual$ad.NOx,
               O3  = AirQual$ad.O3,
               Ox  = AirQual$ad.O3+AirQual$ad.NOx-AirQual$ad.NO)

med.dayrose <- rose(dat[,c("NOx","O3","Ox")],
                    subset = dat$month > 4 & dat$month < 10,
                    cyclVar =dat$hour, n.cyclVar = 24, circle = 24,
                    FUN = median, na.rm = TRUE)

## NOx (= NO+NO2) and ozone (O3) have a distinct diurnal variation of
## concentration, whereas Ox (= NO2+O3) varies only very slightly
grid.newpage()
plot(med.dayrose,
     general = general.control(lwd=2),
     grid =
     grid.control(ray.n = 12,
                  circ.n = 2,
                  circ.sub.n = 2,
                  cyclVar.lab = seq(0,by = 2,to = 22)),
     title =
         title.control(text = "Day Rose of Medians\nduring summer time"))
grid.newpage()
plot(med.dayrose,
     general = general.control(lwd = 3),
     grid =
         grid.control(ray.n = 12,
                      circ.n = 2,
                      circ.sub.n = 2,
                      cyclVar.lab = seq(0, by = 2, to = 22)),
     title =
         title.control(text = "Day Rose of Medians\nduring summer time"))

## exploration of upslope (North) downslope (South) wind system
## during summer time in the valley north of Gotthard
ncol <- 3

grid.newpage()
pushViewport(viewport(layout = grid.layout(nrow = 3, ncol = ncol),
                      width = 0.98, height = 0.98))

for (hour in seq(0, 21, 3)) {
  windrose <-
    rose(dat$WD, cyclVar = dat$WD, circle = 360, n.cyclVar = 32,
         subset = dat$hour >= hour & dat$hour < hour+2 &
                  dat$month > 4 & dat$month < 10,
         FUN = function(x) sum(!is.na(x)),
         warn = FALSE)
```

```
        pushViewport(viewport(layout.pos.col = (hour/3)%%ncol+1,
                              layout.pos.row = (hour/3)%/%ncol+1))
        pushViewport(viewport(width = 0.9, height = 0.9))
        plot(windrose,
             general =
                 general.control(lwd = 3),
             grid =
                 grid.control(circ.r = seq(0, 150, 50),
                              circ.sub.r = seq(25, 150, 25),
                              circ.between = -0.2,
                              circ.cex = 0.5,
                              cyclVar.cex = 0.8,
                              ray.lim = c(0, 150)),
             title = title.control(
                 text = paste(hour, "-", hour+3),
                 between = 0.3, cex = 1.2))
        popViewport(n = 2)
    } ## end for
} else print("Package IDPmisc is not available")
```

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