

# Package ‘SwissAir’

October 2, 2018

**Version** 1.1.5

**Date** 2018-10-02

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

**Maintainer** Rene Locher <rene.locher@zhaw.ch>

**Author** Rene Locher

**Description** Ozone, NOx (= Sum of nitrogen monoxide and nitrogen dioxide), nitrogen monoxide, ambient temperature, dew point, wind speed and wind direction at 3 sites around lake of Lucerne in Central Switzerland in 30 min time resolution for year 2004.

**LazyData** yes

**Depends** R(>= 2.13.1)

**Suggests** IDPmisc(>= 1.1.17)

**License** GPL (>= 3)

**NeedsCompilation** no

**Repository** CRAN

**Date/Publication** 2018-10-02 18:50:07 UTC

## R topics documented:

AirQual . . . . . 1

**Index** . . . . . 6

---

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")
```

# Index

\*Topic **datasets**

AirQual, [1](#)

AirQual, [1](#)

SwissAir (AirQual), [1](#)