

rdwd - an R package to select, download and read climate data from the German Weather Service

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github.com/brry/rdwd#rdwd

The German Weather Service (DWD) provides over 25'000 climate datasets

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Screenshot of FTP server:

Index von ftp://ftp-cdc.dwd.de/pub/CDC/observations_germany/climate/daily/more_precip/recent/

 In den übergeordneten Ordner wechseln

| Name | Größe | Zuletzt verändert | |
|---|---------|-------------------|----------|
|  BESCHREIBUNG_obsgermany_climate_daily_more_precip_recent_de.pdf | 67 KB | 25.04.2016 | 00:00:00 |
|  DESCRIPTION_obsgermany_climate_daily_more_precip_recent_en.pdf | 66 KB | 25.04.2016 | 00:00:00 |
|  RR_Tageswerte_Beschreibung_Stationen.txt | 1094 KB | 27.01.2017 | 09:45:00 |
|  tageswerte_RR_00015_akt.zip | 5 KB | 27.01.2017 | 05:12:00 |
|  tageswerte_RR_00019_akt.zip | 6 KB | 26.01.2017 | 00:13:00 |
|  tageswerte_RR_00020_akt.zip | 6 KB | 26.01.2017 | 00:13:00 |
|  tageswerte_RR_00021_akt.zip | 6 KB | 26.01.2017 | 00:13:00 |
|  tageswerte_RR_00022_akt.zip | 6 KB | 26.01.2017 | 00:13:00 |
|  tageswerte_RR_00023_akt.zip | 6 KB | 26.01.2017 | 13:17:00 |
|  tageswerte_RR_00041_akt.zip | 6 KB | 26.01.2017 | 13:17:00 |
|  tageswerte_RR_00044_akt.zip | 6 KB | 26.01.2017 | 13:17:00 |
|  taoeswerte_RR_00053_akt.zip | 6 KB | 27.01.2017 | 06:33:00 |

R saves the day

R package `rdwd` —> easy usage of the datasets

Overview

- ▶ Motivation
- ▶ Usage
- ▶ Applications
- ▶ Community

Usage

- get URL
- download
 - read
 - plot
 - map

U1/5: Get dataset URL with `selectDWD`

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```
library("rdwd")
```

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```
link <- selectDWD("Potsdam", res="daily",  
                  var="kl", per="recent")
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```
## ftp://ftp-cdc.dwd.de/pub/CDC/observations_germany/  
## /climate/daily/kl/recent/tageswerte_KL_03987_akt.zip
```

U2/5: Download dataset with dataDWD

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```
file <- dataDWD(link, read=FALSE)
```

```
## rdwd::dirDWD: creating directory 'C:/Users/boessenkool/Dropbox/Public/rdwd/presentation/DWDdata'  
## rdwd::fileDWD: Creating 1 file: 'daily_kl_recent_tageswerte_KL_03987_akt.zip'
```

U2/5: Download dataset with dataDWD

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file <- dataDWD(link, read=FALSE)
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## rdwd::dirDWD: creating directory 'C:/Users/boessenkool/Dropbox/Public/rdwd/presentation/DWDdata'  
## rdwd::fileDWD: Creating 1 file: 'daily_kl_recent_tageswerte_KL_03987_akt.zip'
```

```
file
```

```
## [1] "daily_kl_recent_tageswerte_KL_03987_akt.zip"
```

U3/5: Unzip file and read + convert data with readDWD

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clim <- readDWD(file)
```


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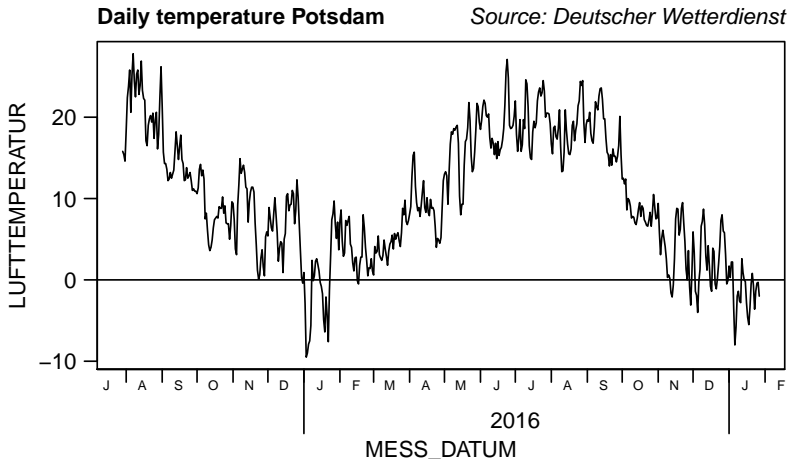
```
str(clim)
```

```
## 'data.frame': 549 obs. of 18 variables:
## $ STATIONS_ID : int 3987 3987 3987 3987 3987 3987 3987 3987 3987 3987 ...
## $ MESS_DATUM : POSIXct, format: "2015-07-29" "2015-07-30" ...
## $ QUALITAETS_NIVEAU : int 3 3 3 3 3 3 3 3 3 3 ...
## $ LUFTTEMPERATUR : num 15.8 15.4 14.6 18.4 22.4 23.8 25.8 20.6 25.2 27.8 ...
## $ DAMPFDRUCK : num 11.1 11.3 10.5 10.5 11.7 13.3 15.7 15.4 15.8 17.4 ...
## $ BEDECKUNGSGRAD : num 4.4 5.3 4.2 4.3 4.5 2 2.9 4.9 3.6 3.4 ...
## $ LUFTDRUCK_STATIONSHOEHE : num 994 999 1006 1006 1007 ...
## $ REL_FEUCHTE : num 62.9 66.2 64.7 53.2 46.8 ...
## $ WINDGESCHWINDIGKEIT : num 5.8 7 4.3 3.3 3 3 5 3.4 3.4 4 ...
## $ LUFTTEMPERATUR_MAXIMUM : num 21.4 19.8 19.6 26.8 30 32.3 35.3 26.3 34.6 37.6 ...
## $ LUFTTEMPERATUR_MINIMUM : num 12.4 11.8 10.7 10 15.1 14 18.4 16.4 16.1 21.2 ...
## $ LUFTTEMP_AM_ERDB_MINIMUM : num 10 9.3 7.7 7 11.6 11.7 16.1 14.9 13.5 18.1 ...
## $ WINDSPITZE_MAXIMUM : num 17.3 17 10.7 7.8 8.1 9.2 17.3 9.1 9.6 9.1 ...
## $ NIEDERSCHLAGSHOEHE : num 0.1 0.4 0 0 0 0 4.1 0 0 0 ...
## $ NIEDERSCHLAGSHOEHE_IND : int 6 6 0 0 0 0 6 0 0 0 ...
## $ SONNENSCHEINDAUER : num 8.95 4.85 6.97 12.07 13.45 ...
## $ SCHNEEHOEHE : int 0 0 0 0 0 0 0 0 0 0 ...
## $ eor : Factor w/ 1 level "eor": 1 1 1 1 1 1 1 1 1 1 ...
```

U4/5: Data can be plotted with regular R code

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```
plot(clim[,c(2,4)], type="l", xaxt="n", las=1)  
berryFunctions::monthAxis(ym=TRUE) ; abline(h=0)
```

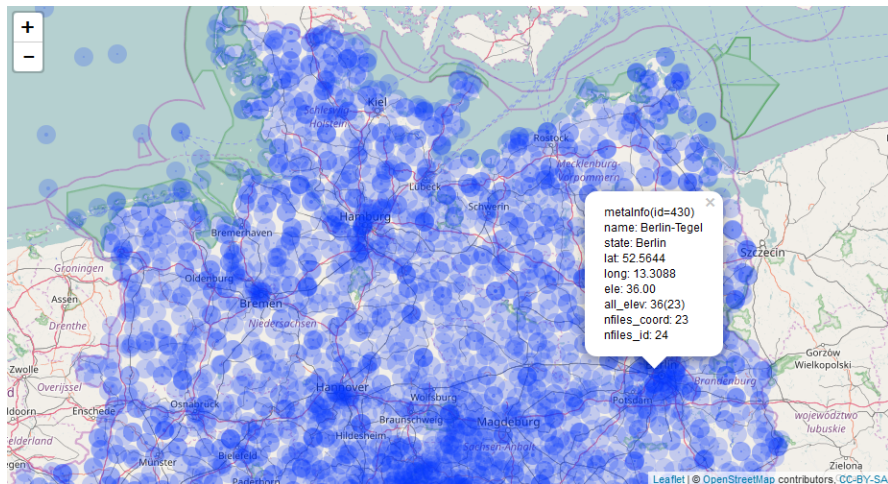


U5/5: Interactive map (mapDWD.html)

```
data(mapDWD) ; library(leaflet) ; mapDWD
```



U5/5: Interactive map (mapDWD.html)



Applications

- climate graph
- event analysis
- rainfall extremes

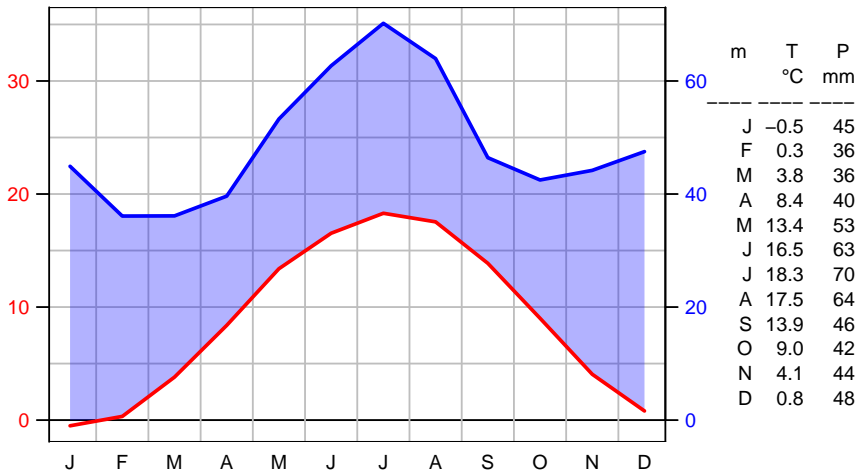
A1/3: Long term climate graph (Potsdam 1893:2015)

```
clim <- dataDWD(selectDWD("Potsdam", res="monthly",  
                           var="kl", per="h"))  
clim$month <- substr(clim$MESS_DATUM_BEGINN,5,6)  
temp <- tapply(clim$LUFTTEMPERATUR, clim$month, mean)  
prec <- tapply(clim$NIEDERSCHLAGSHOEHE, clim$month, mean)  
berryFunctions::climateGraph(temp, prec, main="")
```

A1/3: Long term climate graph (Potsdam 1893:2015)

Ø 8.8 °C

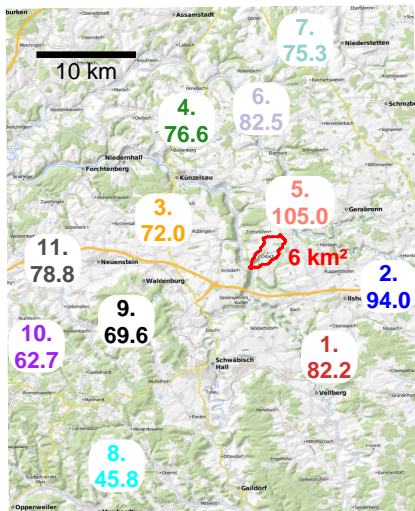
Σ 587.5 mm



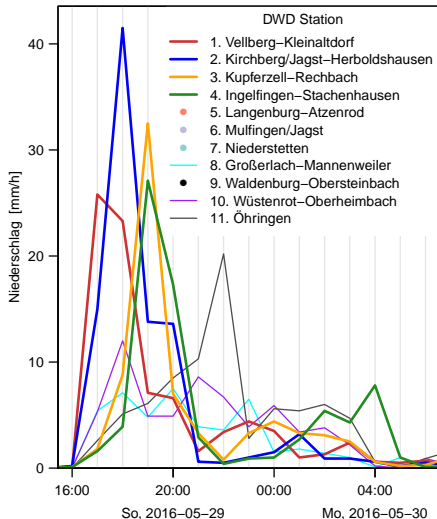
A2/3: Flashflood event rainfall analysis (Taskforce report)

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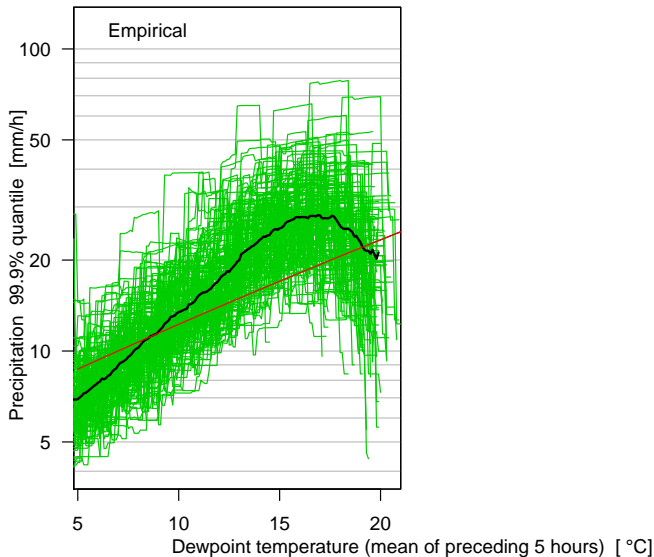
DWD–Stationen bei Braunsbach



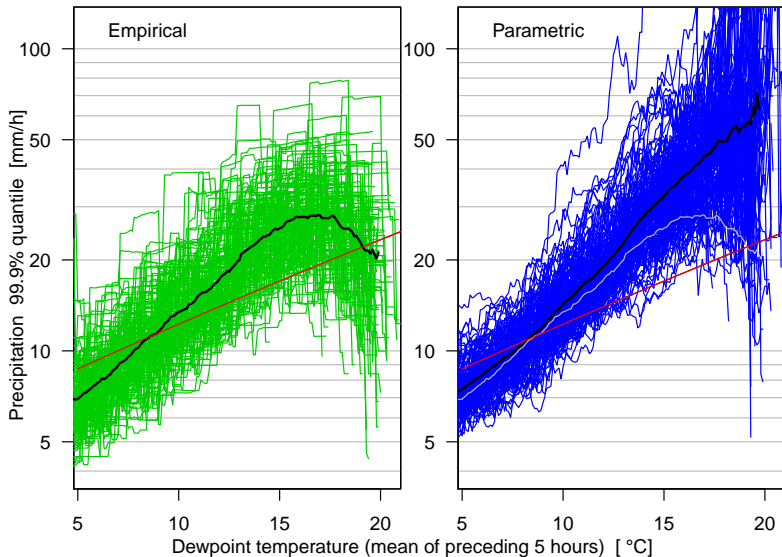
Niederschlagsverlauf



A3/3: Extreme rainfall over temperature (github.com/brry/prectemp)



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The FOSS community role

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- ▶ ...

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