airGRdatasets: Hydro-Meteorological Catchments Datasets for the 'airGR' Packages (v. 0.1.4)

Olivier Delaigue, P. Brigode, Guillaume Thirel

Package 'airGRdatasets'

December 12, 2022

Type Package

Title Hydro-Meteorological Catchments Datasets for the 'airGR' Packages

Version 0.1.4

Date 2022-12-12

Description Sample of hydro-meteorological datasets extracted from the 'CAMELS-FR' French database <https://hal.inrae.fr/hal-03687235>. It provides metadata and catchment-scale aggregated hydro-meteorological time series on a pool of French catchments for use by the 'airGR' packages.

License CC BY-NC-SA 4.0

Encoding UTF-8

Depends R (>= 3.5.0)

URL https://gitlab.irstea.fr/HYCAR-Hydro/airgrgalaxy/airgrdatasets

BugReports https://gitlab.irstea.fr/HYCAR-Hydro/airgrgalaxy/airgrdatasets/-/issues

NeedsCompilation no

LazyData true

Author Olivier Delaigue [aut, cre] (<https://orcid.org/0000-0002-7668-8468>),
Pierre Brigode [aut] (<https://orcid.org/0000-0001-8257-0741>),
Guillaume Thirel [aut] (<https://orcid.org/0000-0002-1444-1830>),
Benoît Génot [ctb],
Guilherme Mendoza Guimarães [ctb]

Maintainer Olivier Delaigue <airGR@inrae.fr>

Repository CRAN

Date/Publication 2022-12-12 12:40:12 UTC

R topics documented:

airGRdatasets-package *Hydro-Meteorological Catchments Datasets for the 'airGR' Packages*

Description

Sample of hydro-meteorological datasets extracted from the 'CAMELS-FR' French database <https://hal.inrae.fr/hal-03687235>. It provides metadata and catchment-scale aggregated hydro-meteorological time series on a pool of French catchments for use by the 'airGR' packages. More especially, it can be used by teachers and students for hydrological modeling exercises adapted to the 'airGRteaching' package as described in Delaigue et al. (submitted) and in the 'airGRteaching' vignettes.

The package contains the following types of datasets:

- `lumped_daily`: a set of lumped catchment daily hydrometeorological time series, and associated metadata.

Source

Delaigue, O., Brigode, P., Andréassian, V., Perrin, C., Etchevers, P., Soubeyroux, J.-M., Janet, B. and Addor, N. (2022). CAMELS-FR: A large sample hydroclimatic dataset for France to explore hydrological diversity and support model benchmarking. 11th edition of the IAHS Scientific Assembly. International Association of Hydrological Sciences, Montpellier, 29 May - 3 Jun. 2022. hal-03687235

References

Delaigue, O., Brigode, P., Thirel, G. and Coron, L. (submitted). airGRteaching: an open-source tool for teaching hydrological modelling. Hydrology and Earth System Sciences.

lumped_daily *Metadata and daily time series of catchment-scale hydro-meteorological observations*

Description

The meteorological forcing is derived from the SAFRAN reanalysis (8 km resolution grid) produced by Météo-France (Vidal et al., 2010).

The meteorological forcing is aggregated at the catchment scale and merged to streamflow data in the CAMELS-FR database from INRAE (Delaigue et al., 2022). To do that, boundaries, area and elevation are calculated using the SRTM DEM (Werner, 2001); the stations were snaped on a theorical river network by INRAE (100 m resolution grid).

The streamflows, codes and name of hydrometric station are provided by the SCHAPI (the French Central Hydrometeorological and Flood Forecasting Support Service) on the Hydroportail website (SCHAPI, 2022). Streamflows are converted into mm/d using the DEM-based area.

Usage

```
A341020001
A605102001
B222001001
E540031001
E645651001
H010002001
H120101001
F439000101
H622101001
J171171001
J421191001
K134181001
K265401001
K731261001
V121401001
X031001001
X045401001
Y643401001
Y862000101
```

Format

list of 3 elements:

`Meta` [list] metadata

- `Code` [list] of 2 [character] codes of the hydrometric station (`H3`: code since 2022, `H2`: former code)
- `Name` [character] name of the hydrometric station (H3)
- `Coor` [list] of 2 [numeric] coordinates (`X` and `Y`) of the catchment outlet [decimal degrees; epsg: 4326]
- `Area` [numeric] area of the catchment [km²]

`TS` [data.frame] catchment daily time series from 1999-01-01 to 2018-12-31

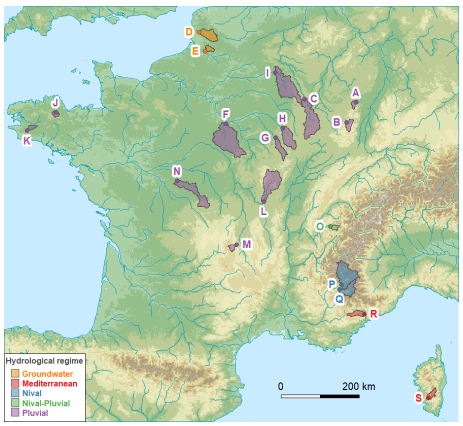
- `Date` [POSIXct] dates (timezone = "UTC")
- `Ptot` [numeric] total precipitation (liquid + solid) [mm/d]
- `Temp` [numeric] mean air temperature [°C]
- `Evap` [numeric] total potential evapotranspiration computed with Oudin's Formula (Oudin, 2005)
- `Qls` [numeric] outlet streamflow [l/s]
- `Qmmd` [numeric] outlet streamflow [mm/d]

`Hypso` [numeric] hypsometric values (101 quantiles from 0 to 100 % of the elevation range of the catchment) [m]

Note

List of available catchments:

station_code	id_map	station_name
A341020001	A	the Zorn at Saverne [Schinderthal]
A605102001	B	the Meurthe at Saint-Dié-des-Vosges
B222001001	C	the Meuse at Saint-Mihiel
E540031001	D	the Canche at Brimeux
E645651001	E	the Nièvre at the Étoile
H010002001	F	the Seine at Plaines-Saint-Lange
H120101001	G	the Aube at Bar-sur-Aube
F439000101	H	the Loing at Épisy
H622101001	I	the Aisne at Givry
J171171001	J	the Trieux at Saint-Péver - Pont Locminé
J421191001	K	the Odet at Ergué-Gabéric - Treodet
K134181001	L	the Arroux at Rigny-sur-Arroux
K265401001	M	the Couze Pavin at Saint-Floret
K731261001	N	the Indre at Saint-Cyran-du-Jambot
V121401001	O	the Fier at Dingy-Saint-Clair
X031001001	P	the Durance at Embrun [La Clapière] - DREAL PACA
X045401001	Q	the Ubaye at Lauzet-Ubaye [Roche-Rousse] - DREAL PACA
Y643401001	R	the Esteron at Broc [La Clave]
Y862000101	S	the Taravo at Zigliara [Pont d'Abra]



Source

Delaigue, O., Brigode, P., Andréassian, V., Perrin, C., Etchevers, P., Soubeyroux, J.M., Janet, B. and Addor, N. (2022). CAMELS-FR: A large sample hydroclimatic dataset for france to explore hydrological diversity and support model benchmarking. 11th edition of the IAHS Scientific Assembly. International Association of Hydrological Sciences, Montpellier, 29 May - 3 Jun. 2022. hal-03687235

References

Oudin, L., Hervieu, F., Michel, C., Perrin, C., Andréassian, V., Anctil, F. and Loumagne, C. (2005). Which potential evapotranspiration input for a lumped rainfall-runoff model? Part 2 - Towards a simple and efficient potential evapotranspiration model for rainfall-runoff modelling. Journal of Hydrology, 303(1-4), 290-306, doi:10.1016/j.jhydrol.2004.08.026.

SCHAPI (2022). Hydroportail website. Retrieve hydrometric data from the French National Surface Water Quantity Database. https://www.hydro.eaufrance.fr/.

Vidal, J.-P., Martin, E., Franchistéguy, L., Baillon, M. and Soubeyroux, J. (2010). A 50-year high-resolution atmospheric reanalysis over France with the Safran system. International Journal of Climatology, 30, 1627–1644, doi:10.1002/joc.2003.

Werner, M. (2001). Shuttle Radar Topography Mission (SRTM), mission overview. Journal of Telecommunication (Frequenz), 55, 75-79.

Examples

```
library(airGRdatasets)

# list the datasets in the 'airGRdatasets' package
list_ds <- try(data(package = "airGRdatasets"), silent = TRUE)
list_ds$results[, "Item"]

# load the 'A341020001' catchment data
data(A341020001)

# display the structure of the data
str(A341020001)
```

Index