Package 'camelsCL'

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Type Package

Title Easy Handling of the CAMELS-CL Dataset

Version 0.1-10

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Description Download and handle spatial and temporal data from the CAMELS-CL dataset (Catchment Attributes and Meteorology for Large Sample Studies, Chile) <https://camels.cr2.cl/>, developed by Alvarez-Garreton et al. (2018) <doi:10.5194/hess-22-5817-2018>. The package does not generate new data, it only facilitates direct access to the original dataset for hydrological analyses.

License GPL (>= 2)

Depends R (>= 4.0.0)

Imports httr, zoo (>= 1.7-2), hydroTSM (>= 0.5-0), terra (>= 1.7.78)

Suggests rmarkdown

URL https://gitlab.com/hgarcesf/camelsCL

MailingList https://stat.ethz.ch/mailman/listinfo/r-sig-ecology

BugReports https://gitlab.com/hgarcesf/camelsCL/-/issues

LazyLoad yes

NeedsCompilation no

Repository CRAN

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Contents

getData *getData*

Description

Download data for a specific catchment from the CAMELS-CL dataset.

Usage

```
getData(x, tscale, from, to, na.rm, na.rm.max, include.shp, include.attr,
        include.extra.P, verbose)

## Default S3 method:
getData(x, tscale=c("daily", "monthly", "annual"),
           from="auto", to="auto", na.rm=TRUE, na.rm.max=0, include.shp=FALSE,
           include.attr=FALSE, include.extra.P=FALSE, verbose=TRUE)
```

Arguments

x	Numeric, indicating the ID of the catchment for which all the data will be downloaded
tscale	Character, indicating the temporal scale to be used for the output time series. Valid values of tscale are: 1) "daily": All the output time series have a daily temporal frequency, directly read from the CAMELS-CL dataset. 2) "monthly": All the output time series have a monthly temporal frequency, aggregated from the original daily time series in the CAMELS-CL dataset. 3) "annual": All the output time series have an annual temporal frequency, aggregated from the original daily time series in the CAMELS-CL dataset.
from	Date, indicating the starting date of the time series to be returned. Its default value is "auto", which automatically selects the first date with at least one non-missing value among all variables.
to	Date, indicating the ending date of the time series to be returned. Its default value is "auto", which automatically selects the last date with at least one non-missing value among all variables.
na.rm	Logical. Should missing values be removed? -) TRUE : the monthly/annual values are computed only for months/years with a percentage of missing values less than na.rm.max -) FALSE: if there is AT LEAST one NA within a month/year, the corresponding monthly/annual values in the output object will be NA.
na.rm.max	Numeric in [0, 1]. It is used to define the maximum percentage of missing values allowed in each month/year to keep the temporally aggregated value (i.e., monthly/annual) in the output object of this function. In other words, if the percentage of missing values in a given month/year is larger or equal than na.rm.max the corresponding monthly or annual value will be NA.

include.shp Optional. Logical, indicating whether to include a shapefile of the catchment in the function's output. Its default value is FALSE.

include.attr Optional. Logical, indicating whether to include all the attributes of the catchment in the function's output. Its default value is FALSE.

include.extra.P Optional. Logical, indicating whether to include all the additional precipitation datasets available in the CAMELS-CL database (i.e., MSWEP, CHIRPSv2, and TMPA). Its default value is FALSE.

verbose Logical; if TRUE, progress messages are printed.

Details

Currently it works with CAMELS-CL version '2022 enero'.

Value

The daily time series output contains a single zoo object with the following columns:

1) P_mm: precipitation obtained fromt the CR2MET dataset, [mm/day].

2) Tmin_degC: minimum air temperature obtained from CR2METv2 dataset, [mm/day].

3) Tavg_degC: average air temperature obtained from CR2METv2 dataset, [mm/day].

4) Tmax_degC: maximum air temperature obtained from CR2METv2 dataset, [mm/day].

5) PET_mm: potential evapotranspiration computed with the Hargreaves-Samani equation, [mm/day].

6) Qobs_mm: streamflow obtained from 'Direccion General de Aguas (DGA)', [mm/day].

7) Qobs_m3s: streamflow obtained from 'Direccion General de Aguas (DGA)', [m3/s].

If include.extra.P = TRUE, the following columns will also be included:

8) P_CHIRPSv2_mm: precipitation obtained from Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) version 2 dataset, [mm/day].

9) P_MSWEP_mm: precipitation obtained from Multi-Source Weighted-Ensemble Precipitation (MSWEP) v1.1 dataset, [mm/day].

10) P_TMPA_mm: precipitation obtained from TMPA 3B42v7 dataset, [mm/day].

Author(s)

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References

https://camels.cr2.cl

Alvarez-Garreton, C.; Mendoza, P. A.; Boisier, J. P.; Addor, N.; Galleguillos, M.; Zambrano-Bigiarini, M.; Lara, A.; Puelma, C.; Cortes, G.; Garreaud, R.; McPhee, J.; and Ayala, A. (2018). The CAMELS-CL dataset: catchment attributes and meteorology for large sample studies - Chile dataset, Hydrology and Earth System Sciences 22, 5817-5846. doi:10.5194/hess-22-5817-2018.

Examples

```
##################

# Example 1: Getting only daily time series data for the 'Rio Trancura Antes Rio Llafenco'
# catchment
x1 <- getData(9414001)
head(x1)

# Example 2: Getting only daily time series of P [mm/day], Tmin [degC], Tavg [degC],
# Tmax [degC], PET [mm/day] and Q [mm/day] data for the 'Rio Trancura Antes Rio Llafenco'
# catchment
var.names <- c("P_mm_day", "Tmin_degC_day", "Tavg_degC_day",
               "Tmax_degC_day", "PET_mm_day", "Qobs_mm_day")
x2 <- getData(9414001)
x2 <- x2[, var.names]
names(x2) <- c("P", "Tmin", "Tavg", "Tmax", "PET", "Q")

# Example 3: Getting only daily time series and catchment borders data for the
# 'Rio Trancura Antes Rio Llafenco' catchment
x3 <- getData(9414001, include.shp=TRUE)
plot(x3[["CatchmentBorders"]])

# Example 4: Getting only daily time series and catchment attributes data for the
# 'Rio Trancura Antes Rio Llafenco' catchment
x4 <- getData(9414001, include.attr=TRUE)
head(x4[["CatchmentAttributes"]])

# Example 5: Getting daily time series, catchment borders and catchment attributes data for the
# 'Rio Trancura Antes Rio Llafenco' catchment
x5 <- getData(9414001, include.shp=TRUE, include.attr=TRUE)
head(x5[["CatchmentTS"]])
plot(x5[["CatchmentBorders"]])
head(x5[["CatchmentAttributes"]])

# Example 6: Getting daily time series, catchment borders, catchment attributes and additional
# precipitation datasets for the 'Rio Trancura Antes Rio Llafenco' catchment
x6 <- getData(9414001, include.shp=TRUE, include.attr=TRUE,
              include.extra.P=TRUE)
head(x6[["CatchmentTS"]])
plot(x6[["CatchmentBorders"]])
head(x6[["CatchmentAttributes"]])

# Example 7: Getting only monthly time series data for the 'Rio Trancura Antes Rio Llafenco'
# catchment
x7 <- getData(9414001, tscale="monthly")
head(x7)

# Example 8: Getting only annual time series data for the 'Rio Trancura Antes Rio Llafenco'
# catchment
x8 <- getData(9414001, tscale="annual")
head(x8)
```

```
# Example 9: Getting only annual time series data between 2008 and 2015 for the
# 'Rio Trancura Antes Rio Llafenco' catchment
x9 <- getData(9414001, tscale="annual", from = as.Date("2008-01-01"),
              to = as.Date("2015-12-31"))
head(x9)

# Example 10: Getting only monthly time series data for the 'Rio Mapocho en Los Almendros'
# and 'Rio Trancura Antes Rio Llafenco' catchments

target.ids <- c(5722002, 9414001)
nelements  <- length(target.ids)
x10 <- vector(mode = "list", length = nelements)

for (i in seq_len(nelements)) {
  x10[[i]] <- getData(target.ids[[i]], tscale="monthly")
}
str(x10)
```

Index