Package 'evapoRe'

November 29, 2023

Title Evapotranspiration R Recipes

Version 1.0.0

Description

An R-based application for exploratory data analysis of global EvapoTranspiration (ET) datasets.
'evapoRe' enables users to download, validate, visualize, and analyze multi-
source ET data across various spatio-temporal scales.
Also, the package offers calculation methods for estimating potential ET (PET), including temper-
ature-based approaches described in : Oudin et al., (2005) <doi:10.1016/j.jhydrol.2004.08.026>.
'evapoRe' supports hydrological modeling, climate studies, agricultural research, and other data-
driven fields by facilitating access to ET data and offering powerful analysis capabilities.
Users can seamlessly integrate the package into their research applications and explore di-
verse ET data at different resolutions.

Depends R (>= 4.0.0), pRecipe

Imports methods, parallel, utils, data.table, doParallel, foreach,
lubridate, raster

License GPL-3

Encoding UTF-8

LazyData true

URL https://github.com/AkbarR1184/evapoRe

SystemRequirements PROJ (>= 6, https://proj.org/download.html), GDAL
(>= 3, https://gdal.org/download.html), NetCDF(>= 4,
https://www.unidata.ucar.edu/software/netcdf/).

RoxygenNote 7.2.3

Suggests rmarkdown, ggpubr, knitr, spelling, kableExtra, tibble,
testthat (>= 3.0.0)

Language en-US

VignetteBuilder knitr

Config/testthat/edition 3

NeedsCompilation no

Author Akbar Rahmati Ziveh [aut, cre]
      (<https://orcid.org/0000-0003-4854-451X>),
    Mijael Rodrigo Vargas Godoy [aut]
     (<https://orcid.org/0000-0002-1828-9266>),
    Vishal Thakur [ctb] (<https://orcid.org/0000-0003-2864-9517>),
    Yannis Markonis [aut, ths] (<https://orcid.org/0000-0003-0144-8969>)

Maintainer Akbar Rahmati Ziveh <rahmati_ziveh@fzp.czu.cz>

Repository CRAN

Date/Publication 2023-11-29 19:10:02 UTC

R topics documented:

---

download_data   *Download various evapotranspiration data products*

Description

The function download_data downloads the selected data product.

Usage

```
download_data(
  data_name = "all",
  path = "",
  domain = "raw",
  time_res = "monthly"
)
```

Arguments

data_name	a character string with the name(s) of the desired data set. Suitable options are:

- "all" for all of the below listed data sets (default),
- "bess" for BESS,
- "camele" for CAMELE,
- "era5" for ERA5,
- "era5-land" for ERA5-Land,
- "fldas" for FLDAS,
- "gldas-clsm" for GLDAS CLSM,
- "gldas-noah" for GLDAS NOAH,
- "gldas-vic" for GLDAS VIC,
- "gleam" for GLEAM V3,
- "jra-55" for JRA-55,
- "merra-2" for MERRA-2,
- "terraclimate" for TerraClimate,
- "zheng" for Zheng,

path	a character string with the path where the database will be downloaded.
domain	a character string with the desired domain data set. Suitable options are:

- "raw" for default available spatial coverage,
- "global" for data sets with global (land and ocean) coverage,
- "land" for data sets with land only coverage,
- "ocean", for data sets with ocean only coverage.

time_res	a character string with the desired time resolution. Suitable options are:

- "monthly",
- "yearly".

Value

No return value, called to download the required data sets.

Examples

```
download_data("gldas-vic", tempdir())
```

---

download_t_data   *Temperature Data Downloader*

Description

Downloading Temperature data from different datasets

Usage

```
download_t_data(
  data_name,
  path = "",
  domain = "raw",
  time_res = "monthly",
  variable = "all"
)
```

Arguments

data_name   a character string indicating the dataset to download. Suitable options are:

- "terraclimate" for TerraClimate dataset,
- "cru" for CRU dataset,
- "mswx" for MSWX dataset.

path   a character string with the path where the data will be downloaded.

domain   a character string with the desired domain data set. Suitable options are:

- "raw" for default available spatial coverage,
- "global" for data sets with global (land and ocean) coverage,
- "land" for data sets with land only coverage,
- "ocean" for data sets with ocean only coverage.

time_res   a character string with the desired time resolution. Suitable options are:

- "monthly",
- "yearly".

variable   a character string indicating the variable to download. Suitable options are: For TerraClimate dataset:

- "t2m" for average temperature,
- "tmin" for minimum temperature,
- "tmax" for maximum temperature.

Use "all" to download all available variables for the dataset.

Value

No return value, called to download the required data sets.

Examples

```
download_t_data("cru", tempdir())
```

| gldas_clsm_esp_ts | *Monthly Evapotranspiration data* |

Description

A subset of GLDAS CLSM monthly Evapotranspiration data in mm over Spain. More detail about raw data can be found here.

Usage

```
gldas_clsm_esp_ts
```

Format

A data.table with 120 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

National Aeronautics and Space Administration (NASA)

| gldas_clsm_global_ts | *Monthly Evapotranspiration data* |

Description

Global GLDAS monthly Evapotranspiration data in mm. More details of the raw data can be found here.

Usage

```
gldas_clsm_global_ts
```

Format

A data.table with 120 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

National Aeronautics and Space Administration (NASA)

---

gldas_clsm_subset_ts   *Monthly Evapotranspiration data*

Description

A subset of GLDAS monthly Evapotranspiration data in mm over -10-40E, 30-45N. More details of the raw data can be found here.

Usage

```
gldas_clsm_subset_ts
```

Format

A data.table with 120 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

National Aeronautics and Space Administration (NASA)

---

muldpm   *Multiply by days per month*

Description

The function muldpm multiplies the value by days per month.

Usage

```
muldpm(x)
```

Arguments

x   a RasterBrick object with monthly data in [units/day]

Value

a RasterBrick object

Examples

```
tavg_brick <- raster::brick('terraclimate_tavg.nc')
pet_od <- pet(method = "od", tavg = tavg_brick)
pet_od <- muldpm(pet_od)
```

---

pet   *Potential Evapotranspiration*

Description

The function pet estimates PET by different methods

Usage

```
pet(x, method = "od")
```

Arguments

x	a RasterBrick object with average temperature data.
method	a character string indicating the method to be used. Available options are:

- "bc" for Blaney and Criddle (1950),
- "ha" for Hamon (1961),
- "jh" for Jensen and Haise (1963),
- "mb" for McGuinness and Bordne (1972),
- "od" for Oudin (2005). Default,
- "th" for Thornthwaite (1948).

Value

a RasterBrick object with potential evapotranspiration in [mm/day].

Examples

```
#Calculate PET by Oudin
tavg <- raster::brick("terraclimate_tavg_land_19580101_20221231_025_monthly.nc")
pet_oudin <- pet(tavg, method = "od")
pet_oudin <- muldpm(pet_oudin)
```

---

pet_oudin_esp_ts   *Monthly Potential Evapotranspiration data*

Description

A subset of calculated monthly Potential Evapotranspiration data in mm over Spain. More details of
the used method can be found '`https://www.sciencedirect.com/science/article/pii/S0022169404004056`'.

Usage

```
pet_oudin_esp_ts
```

Format

A data.table with 120 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

Data was calculated using the Oudin method based on raw temperature data. More details of the raw
data can be found '`https://journals.ametsoc.org/view/journals/bams/103/3/BAMS-D-21-0145.1.xml`'.

---

pet_oudin_global_ts   *Monthly Potential Evapotranspiration data*

Description

Monthly Potential Evapotranspiration data in mm calculated by Oudin method. More details of the
used method can be found '`https://www.sciencedirect.com/science/article/pii/S0022169404004056`'.

Usage

```
pet_oudin_global_ts
```

Format

A data.table with 120 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

Data was calculated using the Oudin method based on raw temperature data. More details of the raw
data can be found '`https://journals.ametsoc.org/view/journals/bams/103/3/BAMS-D-21-0145.1.xml`'.

---

pet_oudin_subset_ts *Monthly Potential Evapotranspiration data*

Description

A subset of Monthly Potential Evapotranspiration data in mm calculated by Oudin method over -10-
40E, 30-45N. More details of the used method can be found 'https://www.sciencedirect.com/science/article/pii/S(

Usage

```
pet_oudin_subset_ts
```

Format

A data.table with 120 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

Data was calculated using the Oudin method based on raw temperature data. More details of the raw
data can be found 'https://journals.ametsoc.org/view/journals/bams/103/3/BAMS-D-21-0145.1.xml'.

Index