Package 'pRecipe'

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Title Precipitation R Recipes

Version 1.0.0

Description An open-access tool/framework to download, validate, visualize, and analyze multi-source precipitation data across various spatio-temporal scales. Ultimately providing the hydrology science community with the tools for consistent and reproducible analysis regarding precipitation.

Depends R (>= 4.0.0)

Imports grDevices, methods, parallel, stats, utils, data.table, ggplot2, ggpubr, ncdf4, openair, raster, R.utils, scales, sf

License GPL-3

Encoding UTF-8

LazyData true

URL https://github.com/MiRoVaGo/pRecipe

BugReports https://github.com/MiRoVaGo/pRecipe/issues

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

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Suggests rmarkdown, knitr, spelling, testthat (>= 3.0.0)

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R topics documented:

`pRecipe-package` *pRecipe: Precipitation R Recipes*

Description

An open-access tool/framework to download, validate, visualize, and analyze multi-source precipitation data across various spatio-temporal scales. Ultimately providing the hydrology science community with the tools for consistent and reproducible analysis regarding precipitation.

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crop_data *Crop precipitation data sets*

Description

The function crop_data crops the data sets using a shapefile mask and stores it in the same location of the input file.

Usage

```
crop_data(data_file, shp_path)
```

Arguments

data_file	a character string with the path to the data file.
shp_path	a character string with the path to the ".shp" file.

Value

No return value, called to crop and store store the new data file.

Examples

```
## Not run:
crop_data("gpcp_tp_mm_global_197901_202205_025_monthly.nc", "cze.shp")
crop_data("dummie.nc", "cze.shp")

## End(Not run)
```

download_data *Download various precipitation data products*

Description

The function download_data downloads the selected data product.

Usage

```
download_data(data_name = "all", destination = ".")
```

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),
- "20cr" for 20CR v3,
- "chirps" for CHIRPS v2.0,
- "cmap" for CMAP standard version,
- "cmorph" for CMORPH,
- "cpc" for CPC-Global,
- "cru-ts" for CRU_TS v4.06,
- "em-earth" for EM-EARTH,
- "era20c" for ERA-20C,
- "era5" for ERA5,
- "ghcn" for GHCN-M v2,
- "gldas-clsm" for GLDAS CLSM,
- "gldas-noah" for GLDAS NOAH,
- "gldas-vic" for GLDAS VIC,
- "gpcc" for GPCC v2020,
- "gpcp" for GPCP v2.3,
- "gpm_imerg" for GPM IMERGM Final v06,
- "mswep" for MSWEP v2.8,
- "ncep-doe" for NCEP/DOE,
- "ncep-ncar" for NCEP/NCAR,
- "persiann" for PERSIANN-CDR,
- "precl" for PREC/L,
- "terraclimate" for TerraClimate,
- "trmm-3b43" for TRMM 3B43 v7,
- "udel" for UDEL v501.

`destination` a character string with the path where the database will be downloaded.

Value

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

Examples

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

era5_ce_ts *Monthly precipitation data*

Description

A subset of ERA5 monthly precipitation data in mm over 2-28E, 42-58N. More details of the raw data can be found here.

Usage

```
era5_ce_ts
```

Format

A data.table with 480 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

European Centre for Medium-Range Weather Forecasts (ECMWF)

era5_cze_ts *Monthly precipitation data*

Description

A subset of ERA5 monthly precipitation data in mm over Czechia. More details of the raw data can be found here.

Usage

```
era5_cze_ts
```

Format

A data.table with 480 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

European Centre for Medium-Range Weather Forecasts (ECMWF)

era5_global_ts *Monthly precipitation data*

Description

Global ERA5 monthly precipitation data in mm. More details of the raw data can be found here.

Usage

```
era5_global_ts
```

Format

A data.table with 756 obs. of 2 variables:

date IDate format %Y-%m-%d

value monthly average values

Source

European Centre for Medium-Range Weather Forecasts (ECMWF)

make_ts *Generate time series*

Description

The function `make_ts` generates a csv time series and stored in the same location of the input file.

Usage

```
make_ts(data_file)
```

Arguments

`data_file`	a character string with the path to the data file.

Value

No return value, called to generate and store csv time series.

Examples

```
## Not run:
make_ts("gpcp_tp_mm_global_197901_202205_025_monthly.nc")
make_ts("dummie.nc")

## End(Not run)
```

mon_to_year *Rescale a precipitation data product in time*

Description

The function mon_to_year aggregates the requested data set from monthly to yearly time steps and stores it in the same location of the input file.

Usage

```
mon_to_year(data_file, stat = "sum")
```

Arguments

data_file	a character string with the path to the data file.
stat	a character string with the desired aggregation function. Suitable options are: • "max" • "mean" • "median" • "min" • "sum" (default)

Value

No return value, called to aggregate and store store the new data file.

Examples

```
## Not run:
mon_to_year("gpcp_tp_mm_global_197901_202205_025_monthly.nc")
mon_to_year("dummie.nc")

## End(Not run)
```

nc_to_csv *Transform raster into data.table*

Description

Function to transform a raster brick into a data.table

Usage

```
nc_to_csv(data_file)
```

Arguments

data_file	a character string with the path to the data file.

Value

data.table

Examples

```
## Not run:
x <- nc_to_csv("gpcp_tp_mm_global_197901_202205_025_monthly.nc")
y <- nc_to_csv("dummie.nc")

## End(Not run)
```

---

plot_box *Precipitation box plot*

Description

Function for plotting (boxplot) time-series of area averaged precipitation.

Usage

```
plot_box(dummie)
```

Arguments

dummie	a csv generated by make_ts

Value

ggplot object

---

plot_density *Precipitation density*

Description

Function for plotting (density) time-series of area averaged precipitation.

Usage

```
plot_density(dummie)
```

Arguments

dummie	a csv generated by make_ts

Value

ggplot object

---

plot_heatmap *Precipitation heatmap*

Description

Function for plotting (heatmap) time-series of area averaged precipitation.

Usage

```
plot_heatmap(dummie)
```

Arguments

dummie	a csv generated by make_ts

Value

ggplot object

---

plot_line *Precipitation line plot*

Description

Function for plotting (line) time-series of area averaged precipitation.

Usage

```
plot_line(dummie)
```

Arguments

dummie	a csv generated by make_ts

Value

ggplot object

plot_map *Precipitation map plot*

Description

Function for mapping the first layer of a .nc file

Usage

```
plot_map(dummie)
```

Arguments

dummie	a .nc file with precipitation

Value

ggplot object

plot_summary *Precipitation summary plot*

Description

Function for plotting precipitation summary (line, matrix, box, and density)

Usage

```
plot_summary(dummie)
```

Arguments

dummie	a csv generated by make_ts

Value

ggplot object

plot_taylor *Precipitation taylor diagram*

Description

Function for plotting (taylor diagram) time-series of area averaged precipitation

Usage

```
plot_taylor(dummie, ref, groups = "type")
```

Arguments

dummie	a csv generated by make_ts
ref	a csv to be used as reference in the same format as that generated by make_ts. I.e., with columns: "date", "value", "name", and "type".
groups	a string character to define panels. Suitable options are: • "type" (default) • "seasons" (only works properly with monthly data)

Value

plot object

rescale_data *Subset a precipitation data product in space*

Description

The function rescale_data aggregates the requested data sets into desired resolution and stores it in the same location of the input file.

Usage

```
rescale_data(data_file, new_res)
```

Arguments

data_file	a character string with the path to the data file.
new_res	numeric. Target resolution must be a multiple of 0.25 (e.g., 0.5, 1, 2.5).

Value

No return value, called to aggregate and store the data file.

Examples

```
## Not run:
x <- rescale_data("gpcp_tp_mm_global_197901_202205_025_monthly.nc", 1)
z <- rescale_data("dummie.nc", 1)

## End(Not run)
```

`show_info` *Show data content*

Description

The function `show_info` displays the specification of the desired file.

Usage

```
show_info(nc_path)
```

Arguments

`nc_path`	a character with the path to the desired file

Value

character vector with screen print out

`subset_space` *Subset a precipitation data product in space*

Description

The function `subset_space` subsets (space) the requested data set and stores it in the same location of the input file.

Usage

```
subset_space(data_file, bbox)
```

Arguments

`data_file`	a character string with the path to the data file.
`bbox`	numeric vector. Bounding box in the form: (xmin, xmax, ymin, ymax).

Value

No return value, called to subset and store store the new data file.

Examples

```
## Not run:
subset_space("gpcp_tp_mm_global_197901_202205_025_monthly.nc",
c(12.24, 18.85, 48.56, 51.12))
subset_space("dummie.nc", c(12.24, 18.85, 48.56, 51.12))

## End(Not run)
```

`subset_spacetime` *Subset a precipitation data product in time and space*

Description

The function `subset_spacetime` subsets (time and space) the requested data set and stores it in the same location of the input file.

Usage

```
subset_spacetime(data_file, years, bbox)
```

Arguments

`data_file`	a character string with the path to the data file.
`years`	numeric vector. Time range in the form: (start_year, end_year)
`bbox`	numeric vector. Bounding box in the form: (xmin, xmax, ymin, ymax).

Value

No return value, called to subset and store store the new data file.

Examples

```
## Not run:
subset_spacetime("gpcp_tp_mm_global_197901_202205_025_monthly.nc",
c(2000, 2010), c(12.24, 18.85, 48.56, 51.12))
subset_spacetime("dummie.nc", c(2000, 2010),
c(12.24, 18.85, 48.56, 51.12))

## End(Not run)
```

subset_time *Subset a precipitation data product in time*

Description

The function subset_time subsets (time) the requested data set and stores it in the same location of the input file.

Usage

```
subset_time(data_file, years)
```

Arguments

data_file	a character string with the path to the data file.
years	numeric vector. Time range in the form: (start_year, end_year)

Value

No return value, called to subset and store store the new data file.

Examples

```
## Not run:
subset_time("gpcp_tp_mm_global_197901_202205_025_monthly.nc",
c(2000, 2010))
subset_time("dummie.nc", c(2000, 2010))

## End(Not run)
```

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