

Package ‘pRecipe’

September 21, 2022

Title Precipitation R Recipe

Version 0.3.0

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 data.table, ggplot2, grDevices, gridExtra, methods, ncd4,
raster, sf, stats, utils

License GPL-3

Encoding UTF-8

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/>) and CDO (>= 2, <https://code.mpimet.mpg.de/projects/cdo>).

RoxygenNote 7.2.1

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

Config/testthat/edition 3

Language en-US

VignetteBuilder knitr

NeedsCompilation no

Author Mijael Rodrigo Vargas Godoy [aut, cre],
Yannis Markonis [aut, ths]

Maintainer Mijael Rodrigo Vargas Godoy <mirovago@gmail.com>

Repository CRAN

Date/Publication 2022-09-21 07:10:02 UTC

R topics documented:

pRecipe-package	2
crop_data	2
download_data	3
make_ts	4
mon_to_year	6
plot_box	7
plot_density	7
plot_heatmap	8
plot_line	8
plot_map	9
plot_summary	9
rescale_data	10
show_info	11
subset_space	11
subset_spacetime	13
subset_time	14
Index	16

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.

Author(s)

Mijael Rodrigo Vargas Godoy <vargas_godoy@fzp.czu.cz> and Yannis Markonis <markonis@fzp.czu.cz>

crop_data *Crop precipitation data sets*

Description

The function `crop_data` crops the data sets using a shapefile mask.

Usage

```
crop_data(nc_path, shp_path, save_nc = FALSE)
```

Arguments

nc_path	a character string with the path to the ".nc" file or a raster object
shp_path	a character string with the path to the ".shp" file.
save_nc	logical. If TRUE will write a ".nc" file with the cropped data and there will be no return value.

Value

a raster brick with cropped data

Examples

```
## Not run:
x <- crop_data("gpm_imer.nc", "cze.shp")
crop_data("gpm_imer.nc", "cze.shp", TRUE)
w <- raster::brick("dummie.nc")
z <- crop_data(w, "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(name = "all", project_folder = ".")
```

Arguments

name	a character string with the name(s) of the desired data set. Suitable options are: <ul style="list-style-type: none"> • "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 IMERG 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.

`project_folder` a character string with the path where pRecipe will be hosted. Inside it the required subfolders will be created.

Value

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

Examples

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

make_ts	<i>Generate time series</i>
---------	-----------------------------

Description

The function `make_ts` generates a csv time series. If the input data set is a Raster object the output will be stored in the same location of the input file.

Usage

```
make_ts(name, csv_out = NULL, database_path = "./data/database")
```

Arguments

`name` a Raster object or a character string with the name(s) of the desired data set. Suitable options are:

- "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 IMERG 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.

csv_out (optional) a character string with the path where the csv file will be stored.

database_path a character string with the path where the "database" folder is located.

Value

No return value, called to subset via cdo

Examples

```
## Not run:
x <- make_ts("gpcp", tempdir())
w <- raster::brick("dummie.nc")
z <- make_ts(w, tempdir())

## 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 `<project_folder>/data/processed`. If the input data set is a Raster object the output will be stored in the same location of the input file.

Usage

```
mon_to_year(name, database_path = "./data/database")
```

Arguments

name	<p>a Raster object or a character string with the name(s) of the desired data set. Suitable options are:</p> <ul style="list-style-type: none"> • "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_imer" for GPM IMERG 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.
database_path	a character string with the path where the "database" folder is located.

Value

No return value, called to subset via cdo

Examples

```
## Not run:
x <- mon_to_year("gpcp", tempdir())
w <- raster::brick("dummie.nc")
z <- mon_to_year(w, tempdir())

## End(Not run)
```

plot_box	<i>Precipitation box plot</i>
----------	-------------------------------

Description

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

Usage

```
plot_box(dummie)
```

Arguments

dummie a csv generated by [make_ts](#)

Value

ggplot object

plot_density	<i>Precipitation density</i>
--------------	------------------------------

Description

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

Usage

```
plot_density(dummie)
```

Arguments

dummie a csv generated by [make_ts](#)

Value

ggplot object

plot_heatmap	<i>Precipitation heatmap</i>
--------------	------------------------------

Description

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

Usage

```
plot_heatmap(dummie)
```

Arguments

dummie a csv generated by [make_ts](#)

Value

ggplot object

plot_line	<i>Precipitation line plot</i>
-----------	--------------------------------

Description

Function for plotting (line) monthly 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

rescale_data	<i>Subset a precipitation data product in space</i>
--------------	---

Description

The function `rescale_data` aggregates the requested data sets into desired resolution and stores it in `<project_folder>/data/processed`. If the input data set is a Raster object the output will be stored in the same location of the input file.

Usage

```
rescale_data(name, new_res, database_path = "./data/database")
```

Arguments

name	a character string with the name(s) of the desired data set. Suitable options are: <ul style="list-style-type: none"> • "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_imer" for GPM IMERG 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.
new_res	numeric. Target resolution must be a multiple of 0.25 (e.g., 0.5, 1, 2.5).
database_path	a character string with the path where the "database" folder is located.

Value

No return value, called to subset via cdo

Examples

```
## Not run:
x <- rescale_data("gpcp", 1, tempdir())
w <- raster::brick("dummie.nc")
z <- rescale_data(w, 1, tempdir())

## End(Not run)
```

show_info	<i>Show data content</i>
-----------	--------------------------

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	<i>Subset a precipitation data product in space</i>
--------------	---

Description

The function subset_space subsets (space) the requested data set and stores it in <project_folder>/data/processed. If the input data set is a Raster object the output will be stored in the same location of the input file.

Usage

```
subset_space(name, bbox, database_path = "./data/database")
```

Arguments

name	a Raster object or a character string with the name(s) of the desired data set. Suitable options are: <ul style="list-style-type: none"> • "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_imer" for GPM IMERG 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.
bbox	numeric vector. Bounding box in the form: (xmin, xmax, ymin, ymax).
database_path	a character string with the path where the "database" folder is located.

Value

No return value, called to subset via cdo

Examples

```
## Not run:
x <- subset_space("gpcp", c(12.24, 18.85, 48.56, 51.12), tempdir())
w <- raster::brick("dummie.nc")
z <- subset_space(w, c(12.24, 18.85, 48.56, 51.12), tempdir())

## End(Not run)
```

subset_spacetime	<i>Subset a precipitation data product in time and space</i>
------------------	--

Description

The function `subset_spacetime` subsets (time and space) the requested data set and stores it in `<project_folder>/data/processed`. If the input data set is a Raster object the output will be stored in the same location of the input file.

Usage

```
subset_spacetime(  
  name,  
  start_year,  
  end_year,  
  bbox,  
  database_path = "./data/database"  
)
```

Arguments

name	a Raster object or a character string with the name(s) of the desired data set. Suitable options are: <ul style="list-style-type: none">• "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_imergm" 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.

start_year numeric.

end_year numeric.

bbox numeric vector. Bounding box in the form: (xmin, xmax, ymin, ymax).

database_path a character string with the path where the "database" folder is located.

Value

No return value, called to subset via cdo

Examples

```
## Not run:
x <- subset_spacetime("gpcp", 2000, 2010, c(12.24, 18.85, 48.56, 51.12),
tempdir())
w <- raster::brick("dummie.nc")
z <- subset_spacetime(w, 2000, 2010, c(12.24, 18.85, 48.56, 51.12),
tempdir())

## End(Not run)
```

subset_time	<i>Subset a precipitation data product in time</i>
-------------	--

Description

The function `subset_time` subsets (time) the requested data set and stores it in `<project_folder>/data/processed`. If the input data set is a Raster object the output will be stored in the same location of the input file.

Usage

```
subset_time(name, start_year, end_year, database_path = "./data/database")
```

Arguments

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

- "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 IMERG 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.

start_year numeric.

end_year numeric.

database_path a character string with the path where the "database" folder is located.

Value

No return value, called to subset via cdo

Examples

```
## Not run:
x <- subset_time("gpcp", 2000, 2010, tempdir())
w <- raster::brick("dummie.nc")
z <- subset_time(w, 2000, 2010, tempdir())

## End(Not run)
```

Index

[crop_data](#), [2](#)

[download_data](#), [3](#)

[make_ts](#), [4](#), [7-9](#)

[mon_to_year](#), [6](#)

[plot_box](#), [7](#)

[plot_density](#), [7](#)

[plot_heatmap](#), [8](#)

[plot_line](#), [8](#)

[plot_map](#), [9](#)

[plot_summary](#), [9](#)

[pRecipe-package](#), [2](#)

[rescale_data](#), [10](#)

[show_info](#), [11](#)

[subset_space](#), [11](#)

[subset_spacetime](#), [13](#)

[subset_time](#), [14](#)