Package: getCRUCLdata (via r-universe)

July 12, 2024

Type Package

Title 'CRU' 'CL' v. 2.0 Climatology Client

Version 0.3.3

Description Provides functions that automate downloading and importing University of East Anglia Climate Research Unit ('CRU') 'CL' v. 2.0 climatology data, facilitates the calculation of minimum temperature and maximum temperature and formats the data into a data frame or a list of 'terra' 'rast' objects for use. 'CRU' 'CL' v. 2.0 data are a gridded climatology of 1961-1990 monthly means released in 2002 and cover all land areas (excluding Antarctica) at 10 arc minutes (0.1666667 degree) resolution. For more information see the description of the data provided by the University of East Anglia Climate Research Unit, <https://crudata.uea.ac.uk/cru/data/hrg/tmc/readme.txt>.

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Depends R (>= 3.2.0)

Imports curl, data.table, hoardr, terra, utils

RoxygenNote 7.3.1

ByteCompile TRUE

Suggests ggplot2, knitr, rmarkdown, rappdirs, roxygen2, spelling, testthat, viridis

Encoding UTF-8

URL https://docs.ropensci.org/getCRUCLdata/

BugReports https://github.com/ropensci/getCRUCLdata/issues

VignetteBuilder knitr

X-schema.org-applicationCategory Tools

X-schema.org-keywords anglia-cru, climate-data, cru-cl2, temperature, rainfall, elevation, data-access, wind, relative-humidity, solar-radiation, diurnal-temperature, frost

X-schema.org-isPartOf https://ropensci.org

Language en-US

Repository https://ropensci.r-universe.dev

RemoteUrl https://github.com/ropensci/getCRUCLdata

RemoteRef main

RemoteSha bd5c03d4d44a7ffd4ac774ce877f33f39b686536

Contents

`create_CRU_df` *Create a data of climatology variables from local disk files*

Description

Automates importing CRU CL v.2.0 climatology data and creates a tidy data frame of the data. If requested, minimum and maximum temperature may also be automatically calculated as described in the data readme.txt file. This function can be useful if you have network connection issues that mean automated downloading of the files using R does not work properly.

Nomenclature and units from readme.txt:

pre precipitation (millimetres/month)

cv cv of precipitation (percent)

rd0 wet-days (number days with >0.1mm rain per month)

tmp mean temperature (degrees Celsius)

dtr mean diurnal temperature range (degrees Celsius)

reh relative humidity (percent)

sunp sunshine (percent of maximum possible (percent of day length))

frs ground-frost (number of days with ground-frost per month)

wnd 10 metre windspeed (metres/second)

elv elevation (automatically converted to metres)

For more information see the description of the data provided by CRU, `https://crudata.uea.ac.uk/cru/data/hrg/tmc/readme.txt`

Usage

```
create_CRU_df(
  pre = FALSE,
  pre_cv = FALSE,
  rd0 = FALSE,
  tmp = FALSE,
  dtr = FALSE,
  reh = FALSE,
  tmn = FALSE,
  tmx = FALSE,
  sunp = FALSE,
  frs = FALSE,
  wnd = FALSE,
  elv = FALSE,
  dsn = ""
)
```

Arguments

`pre` Logical. Fetch precipitation (millimetres/month) from server and return in the data frame? Defaults to `FALSE`.

`pre_cv` Logical. Fetch cv of precipitation (percent) from server and return in the data frame? Defaults to `FALSE`. NOTE. Setting this to `TRUE` will always results in **pre** being set to `TRUE` and returned as well.

`rd0` Logical. Fetch wet-days (number days with >0.1millimetres rain per month) and return in the data frame? Defaults to `FALSE`.

`tmp` Logical. Fetch temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`dtr` Logical. Fetch mean diurnal temperature range (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`reh` Logical. Fetch relative humidity and return it in the data frame? Defaults to `FALSE`.

`tmn` Logical. Calculate minimum temperature values (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`tmx` Logical. Calculate maximum temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`sunp` Logical. Fetch sunshine, percent of maximum possible (percent of day length) and return it in data frame? Defaults to `FALSE`.

`frs` Logical. Fetch ground-frost records (number of days with ground- frost per month) and return it in data frame? Defaults to `FALSE`.

`wnd` Logical. Fetch 10m wind speed (metres/second) and return it in the data frame? Defaults to `FALSE`.

`elv` Logical. Fetch elevation (converted to metres) and return it in the data frame? Defaults to `FALSE`.

`dsn` Local file path where CRU CL v.2.0 .dat.gz files are located.

Value

A tidy data frame of CRU CL v. 2.0 climatology elements as a `data.frame` object

Note

This package automatically converts elevation values from kilometres to metres.

Author(s)

Adam H Sparks, <adamhsparks@gmail.com>

See Also

`get_CRU_df`

Examples

```
# Create a data frame of temperature from locally available files in the
# tempdir() directory.

download.file(
  url = "https://crudata.uea.ac.uk/cru/data/hrg/tmc/grid_10min_tmp.dat.gz",
  destfile = file.path(tempdir(), "grid_10min_tmp.dat.gz")
)

CRU_tmp <- create_CRU_df(tmp = TRUE, dsn = tempdir())

CRU_tmp
```

`create_CRU_stack` *Create a list of terra rast objects from local disk files*

Description

Automates importing CRU CL v.2.0 climatology data and creates a `terra rast` of the data. If requested, minimum and maximum temperature may also be automatically calculated as described in the data readme.txt file. This function can be useful if you have network connection issues that mean automated downloading of the files using R does not work properly.

Nomenclature and units from readme.txt:

pre precipitation (millimetres/month)

  cv cv of precipitation (percent)

rd0 wet-days (number days with >0.1mm rain per month)

tmp mean temperature (degrees Celsius)

dtr mean diurnal temperature range (degrees Celsius)

reh relative humidity (percent)

sunp sunshine (percent of maximum possible (percent of day length))

frs ground-frost (number of days with ground-frost per month)

wnd 10 metre windspeed (metres/second)

elv elevation (automatically converted to metres)

For more information see the description of the data provided by CRU, https://crudata.uea.ac.uk/cru/data/hrg/tmc/readme.txt

Usage

```
create_CRU_stack(
  pre = FALSE,
  pre_cv = FALSE,
  rd0 = FALSE,
  tmp = FALSE,
  dtr = FALSE,
  reh = FALSE,
  tmn = FALSE,
  tmx = FALSE,
  sunp = FALSE,
  frs = FALSE,
  wnd = FALSE,
  elv = FALSE,
  dsn = ""
)
```

Arguments

`pre` Logical. Fetch precipitation (millimetres/month) from server and return in the data frame? Defaults to `FALSE`.

`pre_cv` Logical. Fetch cv of precipitation (percent) from server and return in the data frame? Defaults to `FALSE`. NOTE. Setting this to `TRUE` will always results in **pre** being set to `TRUE` and returned as well.

`rd0` Logical. Fetch wet-days (number days with >0.1millimetres rain per month) and return in the data frame? Defaults to `FALSE`.

`tmp` Logical. Fetch temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`dtr` Logical. Fetch mean diurnal temperature range (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`reh` Logical. Fetch relative humidity and return it in the data frame? Defaults to `FALSE`.

`tmn` Logical. Calculate minimum temperature values (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`tmx` Logical. Calculate maximum temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`sunp` Logical. Fetch sunshine, percent of maximum possible (percent of day length) and return it in data frame? Defaults to `FALSE`.

`frs` Logical. Fetch ground-frost records (number of days with ground- frost per month) and return it in data frame? Defaults to `FALSE`.

`wnd` Logical. Fetch 10m wind speed (metres/second) and return it in the data frame? Defaults to `FALSE`.

`elv` Logical. Fetch elevation (converted to metres) and return it in the data frame? Defaults to `FALSE`.

`dsn` Local file path where CRU CL v.2.0 .dat.gz files are located.

Value

A `list` of `terra` `rast` objects of CRU CL v. 2.0 climatology elements

Note

This package automatically converts elevation values from kilometres to metres.

This package crops all spatial outputs to an extent of ymin = -60, ymax = 85, xmin = -180, xmax = 180. Note that the original wind data include land area for parts of Antarctica, these data are excluded in the terra rast objects generated by this function.

Author(s)

Adam H. Sparks, <`adamhsparks@gmail.com`>

See Also

`get_CRU_stack`

Examples

```
# Create a terra rast object of temperature from tmp files in the tempdir()
# directory.

download.file(
  url = "https://crudata.uea.ac.uk/cru/data/hrg/tmc/grid_10min_tmp.dat.gz",
  destfile = file.path(tempdir(), "grid_10min_tmp.dat.gz")
)

CRU_tmp <- create_CRU_stack(tmp = TRUE, dsn = tempdir())

CRU_tmp
```

get_CRU_df *Download and create a data frame of climatology parameters*

Description

This function automates downloading and importing CRU CL v. 2.0 climatology data and creates a data frame of the data. If requested, minimum and maximum temperature may also be automatically calculated as described in the data readme.txt file. Data may be cached for later use by this function, saving time downloading files in future use of the function.

Nomenclature and units from readme.txt:

pre precipitation (millimetres/month)

  cv cv of precipitation (percent)

rd0 wet-days (number days with >0.1mm rain per month)

tmp mean temperature (degrees Celsius)

dtr mean diurnal temperature range (degrees Celsius)

reh relative humidity (percent)

sunp sunshine (percent of maximum possible (percent of day length))

frs ground-frost (number of days with ground-frost per month)

wnd 10 metre windspeed (metres/second)

elv elevation (automatically converted to metres)

For more information see the description of the data provided by CRU, https://crudata.uea.ac.uk/cru/data/hrg/tmc/readme.txt

Usage

```
get_CRU_df(
  pre = FALSE,
  pre_cv = FALSE,
  rd0 = FALSE,
  tmp = FALSE,
  dtr = FALSE,
  reh = FALSE,
  tmn = FALSE,
  tmx = FALSE,
  sunp = FALSE,
  frs = FALSE,
  wnd = FALSE,
  elv = FALSE,
  cache = FALSE
)
```

Arguments

`pre` Logical. Fetch precipitation (millimetres/month) from server and return in the data frame? Defaults to `FALSE`.

`pre_cv` Logical. Fetch cv of precipitation (percent) from server and return in the data frame? Defaults to `FALSE`. NOTE. Setting this to `TRUE` will always results in **pre** being set to `TRUE` and returned as well.

`rd0` Logical. Fetch wet-days (number days with >0.1 millimetres rain per month) and return in the data frame? Defaults to `FALSE`.

`tmp` Logical. Fetch temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`dtr` Logical. Fetch mean diurnal temperature range (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`reh` Logical. Fetch relative humidity and return it in the data frame? Defaults to FALSE.

`tmn` Logical. Calculate minimum temperature values (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`tmx` Logical. Calculate maximum temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`sunp` Logical. Fetch sunshine, percent of maximum possible (percent of day length) and return it in data frame? Defaults to `FALSE`.

`frs` Logical. Fetch ground-frost records (number of days with ground- frost per month) and return it in data frame? Defaults to `FALSE`.

`wnd` Logical. Fetch 10m wind speed (metres/second) and return it in the data frame? Defaults to `FALSE`.

`elv` Logical. Fetch elevation (converted to metres) and return it in the data frame? Defaults to `FALSE`.

`cache` Logical. Store CRU CL v. 2.0 data files locally for later use? If `FALSE`, the downloaded files are removed when R session is closed. To take advantage of cached files in future sessions, use `cache = TRUE` after the initial download and caching. Defaults to `FALSE`.

Value

A tidy data frame of CRU CL v. 2.0 climatology elements as a `tibble` object

Note

This package automatically converts elevation values from kilometres to metres.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

See Also

`create_CRU_stack` `manage_cache`

Examples

```
# Download data and create a data frame of precipitation and temperature
# without caching the data files
CRU_pre_tmp <- get_CRU_df(pre = TRUE, tmp = TRUE)

head(CRU_pre_tmp)
CRU_pre_tmp
```

---

get_CRU_stack *Download and create a list of terra rast objects of climatology parameters*

Description

This function automates downloading and importing CRU CL v. 2.0 climatology data into R and creates a list of `terra rast` of the data. If requested, minimum and maximum temperature may also be automatically calculated as described in the data readme.txt file. Data may be cached for later use by this function, saving time downloading files in future use of the function.

Nomenclature and units from readme.txt:

pre precipitation (millimetres/month)

cv cv of precipitation (percent)

rd0 wet-days (number days with >0.1mm rain per month)

tmp mean temperature (degrees Celsius)

dtr mean diurnal temperature range (degrees Celsius)

reh relative humidity (percent)

sunp sunshine (percent of maximum possible (percent of day length))

frs ground-frost (number of days with ground-frost per month)

wnd 10 metre windspeed (metres/second)

elv elevation (automatically converted to metres)

For more information see the description of the data provided by CRU, `https://crudata.uea.ac.uk/cru/data/hrg/tmc/readme.txt`

Usage

```
get_CRU_stack(
  pre = FALSE,
  pre_cv = FALSE,
  rd0 = FALSE,
  tmp = FALSE,
  dtr = FALSE,
  reh = FALSE,
  tmn = FALSE,
  tmx = FALSE,
  sunp = FALSE,
  frs = FALSE,
  wnd = FALSE,
  elv = FALSE,
  cache = FALSE
)
```

Arguments

`pre` Logical. Fetch precipitation (millimetres/month) from server and return in the data frame? Defaults to `FALSE`.

`pre_cv` Logical. Fetch cv of precipitation (percent) from server and return in the data frame? Defaults to `FALSE`. NOTE. Setting this to `TRUE` will always results in **pre** being set to `TRUE` and returned as well.

`rd0` Logical. Fetch wet-days (number days with >0.1millimetres rain per month) and return in the data frame? Defaults to `FALSE`.

`tmp` Logical. Fetch temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`dtr` Logical. Fetch mean diurnal temperature range (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`reh` Logical. Fetch relative humidity and return it in the data frame? Defaults to FALSE.

`tmn` Logical. Calculate minimum temperature values (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`tmx` Logical. Calculate maximum temperature (degrees Celsius) and return it in the data frame? Defaults to `FALSE`.

`sunp` Logical. Fetch sunshine, percent of maximum possible (percent of day length) and return it in data frame? Defaults to `FALSE`.

`frs` Logical. Fetch ground-frost records (number of days with ground- frost per month) and return it in data frame? Defaults to `FALSE`.

`wnd` Logical. Fetch 10m wind speed (metres/second) and return it in the data frame? Defaults to `FALSE`.

`elv` Logical. Fetch elevation (converted to metres) and return it in the data frame? Defaults to `FALSE`.

`cache` Logical. Store CRU CL v. 2.0 data files locally for later use? If `FALSE`, the downloaded files are removed when R session is closed. To take advantage of cached files in future sessions, use `cache = TRUE` after the initial download and caching. Defaults to `FALSE`.

Value

A `list` of `terra` `rast` objects of CRU CL v. 2.0 climatology elements

Note

This package automatically converts elevation values from kilometres to metres.

This package crops all spatial outputs to an extent of ymin = -60, ymax = 85, xmin = -180, xmax = 180. Note that the original wind data include land area for parts of Antarctica, these data are excluded in the terra rast objects generated by this function.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

See Also

create_CRU_stack manage_cache

Examples

```
# Download data and create a \code{\link{terra}} \code{\link[terra]{rast}}
# object of precipitation and temperature without caching the data files
CRU_pre_tmp <- get_CRU_stack(pre = TRUE, tmp = TRUE)

CRU_pre_tmp
```

---

manage_cache *Manage locally cached CRU CL v. 2.0 files*

Description

Manage cached **getCRUCLdata** files with **hoardr**

Details

The default cache directory is `file.path(rappdirs::user_cache_dir(), "R/getCRUCLdata")`, but you can set your own path using `manage_cache$cache_path_set()`

`manage_cache$cache_delete` only accepts one file name, while `manage_cache$cache_delete_all` does not accept any names, but deletes all files. For deleting many specific files, use `manage_cache$cache_delete` in an `lapply()` type call.

Useful user functions

- `manage_cache$cache_path_get()` - get cache path
- `manage_cache$cache_path_set()` - set cache path
- `manage_cache$list()` - returns a character vector of full path file names
- `manage_cache$files()` - returns file objects with metadata
- `manage_cache$details()` - returns files with details
- `manage_cache$delete()` - delete specific files
- `manage_cache$delete_all()` - delete all files, returns nothing

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

Examples

```
## Not run:

# list files in cache
manage_cache$list()

# delete certain database files
manage_cache$delete("file path")
manage_cache$list()

# delete all files in cache
manage_cache$delete_all()
manage_cache$list()

# set a different cache path from the default
manage_cache$cache_path_set("~/tmp")

## End(Not run)
```

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