Package 'climaemet'

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Title Climate AEMET Tools

Version 0.2.0

Author Manuel Pizarro [aut, cre]

Maintainer Manuel Pizarro <m.pizarro@csic.es>

Description Tools to download the climatic data of the Spanish Meteorological Agency (AEMET) directly from R using their API <https://opendata.aemet.es/> and create scientific graphs (climate charts, trend analysis of climate time series, temperature and precipitation anomalies maps, warming stripes graphics, climatograms, etc.).

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Depends R (>= 3.6.0)

Imports dplyr (>= 1.0.0), tidyr (>= 1.1.0), tibble (>= 3.0.3), lubridate (>= 1.7.9), stringr (>= 1.4.0), scales (>= 1.1.1), ggplot2 (>= 3.3.2), ggpubr (>= 0.4.0), ggthemes (>= 4.2.0), gtable (>= 0.3.0), gganimate (>= 1.0.5), RColorBrewer (>= 1.1.2), jpeg (>= 0.1.8.1), httr (>= 1.4.1), jsonlite (>= 1.7.0), climatol (>= 3.1.2), rlang (>= 0.4.6), magrittr (>= 1.5), methods

Collate 'aemet_tools.R' 'climaemet-package.R' 'plot_tools.R' 'climaemet_main.R' 'utils-pipe.R'

Suggests knitr, rmarkdown, learnr

NeedsCompilation no

Repository CRAN

URL https://mpizarrotig.github.io/climaemet, https://github.com/mpizarrotig/climaemet

BugReports https://github.com/mpizarrotig/climaemet/issues

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R **topics documented:**

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aemet_daily_clim *Daily/annual climatology values for a station*

Description

Get daily climatology values for a station for a maximum period of one year.

Usage

```
aemet_daily_clim(station, apikey, start, end)
```

Arguments

station   Character string as station identifier code (see [aemet_stations](#)).

apikey   Character string as personal API key (see [https://opendata.aemet.es/centrodedescargas/](https://opendata.aemet.es/centrodedescargas/obtencionAPIKey) [obtencionAPIKey](https://opendata.aemet.es/centrodedescargas/obtencionAPIKey)).

start   Character string as start date (format: %Y%m%d).

end   Character string as end date (format: %Y%m%d).

Value

a data.frame.

Examples

```
## Not run:
aemet_daily_clim("9434", apikey, "2000-01-01", "2000-12-31")

## End(Not run)
```

---

aemet_daily_period *Daily climatology values of a station for a time period*

Description

Get daily climatology values for a period of years for a station.

Usage

```
aemet_daily_period(station, apikey, start, end)
```

Arguments

station	Character string as station identifier code (see aemet_stations).
apikey	Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).
start	Numeric value as start year (format: %Y).
end	Numeric value as end year (format: %Y).

Value

a data.frame.

Examples

```
## Not run:
aemet_daily_period("9434", apikey, 2000, 2010)

## End(Not run)
```

---

aemet_daily_period_all

Daily climatology values of all stations for a time period

Description

Get daily climatology values for a period of years for all stations.

Usage

```
aemet_daily_period_all(apikey, start, end)
```

Arguments

apikey	Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).
start	Numeric value as start year (format: %Y).
end	Numeric value as end year (format: %Y).

Value

a data.frame.

Examples

```
## Not run:
aemet_daily_period_all(apikey, 2000, 2010)

## End(Not run)
```

---

aemet_extremes_clim   *Extreme values for a station*

Description

Get recorded extreme values for a station.

Usage

```
aemet_extremes_clim(station, apikey, parameter = c("T", "P", "V"))
```

Arguments

station	Character string as station identifier code (see `aemet_stations`).
apikey	Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).
parameter	Character string as temperature (T), precipitatation (P) or wind (W) parameter.

Value

a data.frame.

Examples

```
## Not run:
aemet_extremes_clim("9434", apikey, "T")

## End(Not run)
```

---

aemet_last_obs   *Last observation values for a station*

Description

Get last observation values for a station.

Usage

```
aemet_last_obs(station, apikey)
```

Arguments

station	Character string as station identifier code (see `aemet_stations`).
apikey	Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).

Value

a data.frame.

Examples

```
## Not run:
aemet_last_obs("9434", apikey)

## End(Not run)
```

---

aemet_monthly_clim   *Monthly/annual climatology values for a station*

Description

Get monthly/annual climatology values for a station.

Usage

```
aemet_monthly_clim(station, apikey, year)
```

Arguments

station	Character string as station identifier code (see [aemet_stations](#)).
apikey	Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).
year	Numeric value as date (format: %Y).

Value

a data.frame.

Examples

```
## Not run:
aemet_monthly_clim("9434", apikey, 2000)

## End(Not run)
```

---

aemet_monthly_period   *Monthly climatology values of a station for a time period*

Description

Get monthly climatology values for a period of years for a station.

Usage

```
aemet_monthly_period(station, apikey, start, end)
```

Arguments

station	Character string as station identifier code (see `aemet_stations`).
apikey	Character string as personal API key (see `https://opendata.aemet.es/centrodedescargas/obtencionAPIKey`).
start	Numeric value as start year (format: %Y).
end	a Numeric value as end year (format: %Y).

Value

a data.frame.

Examples

```
## Not run:
aemet_monthly_period("9434", apikey, 2000, 2010)

## End(Not run)
```

---

aemet_monthly_period_all

Monthly climatology of all stations for a period of time

Description

Get monthly climatology values for a period of years for all stations.

Usage

```
aemet_monthly_period_all(apikey, start, end)
```

Arguments

apikey	Character string as personal API key (see `https://opendata.aemet.es/centrodedescargas/obtencionAPIKey`).
start	Numeric value as start year (format: %Y).
end	Numeric value as end year (format: %Y).

Value

a data.frame.

Examples

```
## Not run:
aemet_monthly_period_all(apikey, 2000, 2010)

## End(Not run)
```

---

aemet_normal_clim   *Normal climatology values for a station*

Description

Get normal climatology values for a station. Standard climatology from 1981 to 2010.

Usage

```
aemet_normal_clim(station, apikey)
```

Arguments

station   Character string as station identifier code (see `aemet_stations`).

apikey   Character string as personal API key (see `https://opendata.aemet.es/centrodedescargas/obtencionAPIKey`).

Value

a data.frame.

Note

Code modified from project https://github.com/SevillaR/aemet

Examples

```
## Not run:
aemet_normal_clim("9434", apikey)

## End(Not run)
```

---

aemet_normal_clim_all   *Normal climatology values for all stations*

Description

Get normal climatology values for all stations.

Usage

```
aemet_normal_clim_all(apikey)
```

Arguments

apikey   Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).

Value

a data.frame.

Examples

```
## Not run:
aemet_normal_clim_all(apikey)

## End(Not run)
```

---

aemet_stations   *AEMET stations*

Description

Get AEMET stations.

Usage

```
aemet_stations(apikey)
```

Arguments

apikey   Character string as API key (https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).

Value

a data.frame.

Note

Code modified from project https://github.com/SevillaR/aemet

Examples

```
## Not run:
stations <- aemet_stations(apikey)

## End(Not run)
```

---

climatestripes_station

Station climate stripes graph

Description

Plot climate stripes graph for a station

Usage

```
climatestripes_station(
  station,
  apikey,
  start = 1950,
  end = 2020,
  with_labels = c("yes, no")
)
```

Arguments

station   Character string as station identifier code (see `aemet_stations`).

apikey   Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/
              obtencionAPIKey).

start   Numeric value as start year (format: %Y).

end   Numeric value as end year (format: %Y).

with_labels   Character string as yes/no. Indicates whether to use labels for the graph or not.

Value

a plot.

Examples

```
## Not run:
climatestripes_station(station, apikey, with_labels = "yes")

## End(Not run)
```

climatogram_normal *Walter & Lieth climatic diagram from normal climatology values*

Description

Plot of a Walter & Lieth climatic diagram from normal climatology data for a station. This climatogram are great for showing a summary of climate conditions for a place over a time period ((1981-2010).

Usage

```
climatogram_normal(station, apikey, labels = c("en", "es", ""))
```

Arguments

station   Character string as station identifier code (see `aemet_stations`).

apikey   Character string as personal API key (see `https://opendata.aemet.es/centrodedescargas/obtencionAPIKey`).

labels   Character string as month labels for the X axis: "en" (english), "es" (spanish) or blank (numeric labels: 1-12).

Value

a plot.

Note

The code is based on code from the CRAN package "climatol" by Jose A. Guijarro jguijarrop@aemet.es.

References

Walter, H. & Lieth, H (1960): Klimadiagramm Weltatlas. G. Fischer, Jena.

See Also

See more details in the "diagwl" function `diagwl`.

Examples

```
## Not run:
climatogram_normal(station, apikey, labels = "en")

## End(Not run)
```

---

climatogram_period   *Walter & Lieth climatic diagram for a time period*

Description

Plot of a Walter & Lieth climatic diagram from monthly climatology data for a station. This climatogram are great for showing a summary of climate conditions for a place over a specific time period.

Usage

```
climatogram_period(
  station,
  apikey,
  start = 1990,
  end = 2020,
  labels = c("en", "es", "")
)
```

Arguments

station   Character string as station identifier code (see `aemet_stations`).

apikey   Character string as personal API key (see `https://opendata.aemet.es/centrodedescargas/obtencionAPIKey`).

start   Numeric value as start year (format: %Y).

end   Numeric value as end year (format: %Y).

labels   Character string as month labels for the X axis: "en" (english), "es" (spanish) or blank (numeric labels, 1-12).

Value

a plot.

Note

The code is based on code from the CRAN package "climatol" by Jose A. Guijarro jguijarrop@aemet.es.

References

Walter, H. & Lieth, H (1960): Klimadiagramm Weltatlas. G. Fischer, Jena.

See Also

See more details in the "diagwl" function `diagwl`.

Examples

```
## Not run:
climatogram_period(station, apikey, start = 1990, end = 2020, labels = "en")

## End(Not run)
```

---

dms2decdegrees	*Converts dms to decimal degrees*

Description

Converts degrees, minutes and seconds to decimal degrees.

Usage

```
dms2decdegrees(input)
```

Arguments

input   Character string as DMS coordinates.

Value

a numeric value.

Note

Code modified from project https://github.com/SevillaR/aemet

Examples

```
dms2decdegrees("055245W")
```

---

first_day_of_year *First day of year*

Description

Get first day of year.

Usage

```
first_day_of_year(year)
```

Arguments

year   Numeric value as year (format: %Y).

Value

Character string as date (format: %Y%m%d).

Examples

```
first_day_of_year(2000)
```

---

get_data_aemet *Client tool for AEMET API*

Description

Client tool to get data from AEMET and convert json to data.frame.

Usage

```
get_data_aemet(apidest, apikey, verbose = FALSE)
```

Arguments

apidest   Character string as destination URL. See https://opendata.aemet.es/dist/index.html.

apikey   Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).

verbose   True/False. Provides information about the flow of information between the client and server

Value

a data.frame.

Note

Code modified from project https://github.com/vegmod/meteoland

---

ggstripes   *Warming stripes graph*

Description

Plot diferent "climate stripes" or "warming stripes" using **ggplot2**. This graphics are visual representations of the change in temperature as measured in each location over the past 70-100+ years. Each stripe represents the temperature in that station averaged over a year.

Usage

```
ggstripes(
  data,
  plot_type = c("background", "stripes", "trend", "animation"),
  plot_title = "",
  ...
)
```

Arguments

data	a data.frame with date(year) and temperature(temp) variables.
plot_type	plot type (whith labels, background, stripes with line trend and animation)
plot_title	character string to be used for the graph title.
...	further arguments passed to theme.

Value

a ggplot object

Note

"Warming stripes" charts are a conceptual idea of Professor Ed Hawkins (University of Reading) and are specifically designed to be as simple as possible and alert about risks of climate change. For more details see #ShowYourStripes: https://showyourstripes.info/.

See Also

theme for more possible arguments to pass to ggstripes.

Examples

```
ggstripes(data, plot_type = "background")
```

---

ggwindrose   *Windrose (speed/direction) diagram*

Description

Plot a windrose showing the wind speed and direction using **ggplot2**.

Usage

```
ggwindrose(
  speed,
  direction,
  n_directions = 8,
  n_speeds = 5,
  speed_cuts = NA,
  col_pal = "GnBu",
  legend_title = "Wind speed (m/s)",
  calm_wind = 0,
  n_col = 1,
  facet,
  plot_title = "",
  ...
)
```

Arguments

speed	Numeric vector of wind speeds.
direction	Numeric vector of wind directions.
n_directions	Numeric value as the number of direction bins to plot (petals on the rose). The number of directions defaults to 8.
n_speeds	Numeric value as the number of equally spaced wind speed bins to plot. This is used if speed_cuts is NA (default 5).
speed_cuts	Numeric vector containing the cut points for the wind speed intervals, or NA (default).
col_pal	Character string indicating the name of the brewer.pal.info colour palette to be used for plotting, see 'Palette selection' below.
legend_title	Character string to be used for the legend title.
calm_wind	Numeric value as the upper limit for wind speed that is considered calm (default 0).

n_col	The number of columns of plots (default 1).
facet	Character or factor vector of the facets used to plot the various windroses.
plot_title	Character string to be used for the plot title.
...	further arguments passed to [theme](#).

Value

a ggplot object.

Palette selection

Any of the sequential [brewer.pal.info](#) colour palettes are recommended for colour plots.

See Also

[theme](#) for more possible arguments to pass to ggwindrose.

Examples

```
## Not run:
ggwindrose(speed, direction, n_directions = 16,
n_speeds = 7, col_pal = "GnBu", legend_title = "Wind speed (m/s)",
calm_wind = 0, n_col = 1)

## End(Not run)
```

---

last_day_of_year   *Last day of year*

Description

Get last day of year.

Usage

```
last_day_of_year(year)
```

Arguments

year	Numeric value as year (format: %Y).

Value

Character string as date (format: %Y%m%d).

Examples

```
last_day_of_year(2000)
```

---

windrose_days   *Windrose (speed/direction) diagram of a station over a days period*

Description

Plot a windrose showing the wind speed and direction for a station over a days period.

Usage

```
windrose_days(
  station,
  apikey,
  start = "2000-12-31",
  end = "2000-12-31",
  n_directions = 8,
  n_speeds = 5,
  speed_cuts = NA,
  col_pal = "GnBu",
  calm_wind = 0,
  legend_title = "Wind Speed (m/s)"
)
```

Arguments

station	Character string as station identifier code (see `aemet_stations`).
apikey	Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).
start	Character string as start date (format: %Y%m%d).
end	Character string as end date (format: %Y%m%d).
n_directions	Numeric value as number of direction bins to plot (default = 8).
n_speeds	Numeric value as number of equally spaced wind speed bins to plot (default = 5).
speed_cuts	Numeric vector containing the cut points for the wind speed intervals, or NA (default).
col_pal	Character string indicating the name of the `brewer.pal.info` colour palette to be used for plotting.
calm_wind	Numeric value as the upper limit for wind speed that is considered calm (default = 0).
legend_title	Character string to be used for the legend title.

Value

a plot.

See Also

See more details in the "ggwindrose" function [ggwindrose](#).

Examples

```
## Not run:
windrose_days(station, apikey, start = "2000-01-01", end = "2000-12-31")

## End(Not run)
```

---

windrose_period   *Windrose (speed/direction) diagram of a station over a time period*

Description

Plot a windrose showing the wind speed and direction for a station over a time period.

Usage

```
windrose_period(
  station,
  apikey,
  start = 2000,
  end = 2010,
  n_directions = 8,
  n_speeds = 5,
  speed_cuts = NA,
  col_pal = "GnBu",
  calm_wind = 0,
  legend_title = "Wind Speed (m/s)"
)
```

Arguments

station	Character string as station identifier code (see [aemet_stations](#)).
apikey	Character string as personal API key (see https://opendata.aemet.es/centrodedescargas/obtencionAPIKey).
start	Numeric value as start year (format: %Y).
end	Numeric value as end year (format: %Y).
n_directions	Numeric value as number of direction bins to plot (default = 8).

n_speeds   Numeric value as number of equally spaced wind speed bins to plot (default =
                5).

speed_cuts   Numeric vector containing the cut points for the wind speed intervals, or NA
                (default).

col_pal   Character string indicating the name of the `brewer.pal.info` colour palette to
                be used for plotting.

calm_wind   Numeric value as the upper limit for wind speed that is considered calm (default
                = 0).

legend_title   Character string to be used for the legend title.

Value

a plot.

See Also

See more details in the "ggwindrose" function `ggwindrose`.

Examples

```
## Not run:
windrose_period(station, apikey, start = 2000, end = 2010)

## End(Not run)
```

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