Package 'climaemet'

June 23, 2024

Title Climate AEMET Tools

Version 1.3.0

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

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URL https://ropenspain.github.io/climaemet/, https://github.com/rOpenSpain/climaemet

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

Depends R (>= 3.6.0)

Imports cli (>= 3.0.0), dplyr (>= 1.0.0), ggplot2 (>= 3.3.2), httr2 (>= 1.0.0), jsonlite (>= 1.7.0), rappdirs (>= 0.3.3), readr (>= 1.4.0), rlang (>= 0.4.6), tibble (>= 3.0.3), tidyr (>= 1.1.0)

Suggests climatol (>= 3.1.2), gganimate (>= 1.0.5), jpeg (>= 0.1.8), knitr, lifecycle, lubridate, mapSpain, rmarkdown, scales, sf (>= 0.9.0), testthat (>= 3.0.0)

VignetteBuilder knitr

Config/Needs/website cpp11, crosstalk, devtools, geofacet, geoR, gifski, gstat, leaflet, reactable, scales, sf, terra, tidyterra, tidyverse, usethis

Config/testthat/edition 3

Config/testthat/parallel true

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Encoding UTF-8

LazyData true

RoxygenNote 7.3.1

X-schema.org-applicationCategory Meteorology

X-schema.org-isPartOf https://ropenspain.es/

NeedsCompilation no

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Repository CRAN

Date/Publication 2024-06-23 21:00:02 UTC

Contents

`aemet_api_key` *Install an AEMET API Key*

Description

This function will store your AEMET API key on your local machine so it can be called securely without being stored in your code.

Alternatively, you can install the API Key manually:

- Run `Sys.setenv(AEMET_API_KEY = "Your_Key")`. You would need to run this command on each session (Similar to `install = FALSE`).
- Write this line on your .Renviron file: `AEMET_API_KEY = "Your_Key"` (same behavior than `install = TRUE`). This would store your API key permanently.

Usage

```
aemet_api_key(apikey, overwrite = FALSE, install = FALSE)
```

Arguments

`apikey`	The API key provided to you from the AEMET formatted in quotes. A key can be acquired at https://opendata.aemet.es/centrodedescargas/inicio. You can install several API Keys as a vector of characters, see **Details**.
`overwrite`	If this is set to `TRUE`, it will overwrite an existing `AEMET_API_KEY` that you already have in local machine.
`install`	if `TRUE`, will install the key in your local machine for use in future sessions. Defaults to `FALSE`.

Details

You can pass several `apikey` values as a vector `c(api1, api2)`, in this case several `AEMET_API_KEY` values would be generated. In each subsequent api call **climaemet** would randomly choose one of the provided API keys.

This is useful when performing batch queries to avoid API throttling.

Value

None

Note

To locate your API Key on your local machine, run `rappdirs::user_cache_dir("climaemet", "R")`.

See Also

Other aemet_auth: `aemet_detect_api_key()`

Examples

```
# Don't run these examples!

if (FALSE) {
  aemet_api_key("111111abc", install = TRUE)

  # You can check it with:
  Sys.getenv("AEMET_API_KEY")
}

if (FALSE) {
  # If you need to overwrite an existing key:
  aemet_api_key("222222abc", overwrite = TRUE, install = TRUE)

  # You can check it with:
  Sys.getenv("AEMET_API_KEY")
}
```

`aemet_beaches` *AEMET beaches*

Description

Get AEMET beaches.

Usage

```
aemet_beaches(verbose = FALSE, return_sf = FALSE)
```

Arguments

`verbose`	Logical `TRUE/FALSE`. Provides information about the flow of information between the client and server.
`return_sf`	Logical `TRUE` or `FALSE`. Should the function return an `sf` spatial object? If `FALSE` (the default value) it returns a `tibble`. Note that you need to have the **sf** package installed.

Details

The first result of the API call on each session is (temporarily) cached in the assigned `tempdir()` for avoiding unneeded API calls.

Value

A `tibble` or a **sf** object.

API Key

You need to set your API Key globally using `aemet_api_key()`.

See Also

aemet_forecast_beaches()

Other aemet_api_data: aemet_daily_clim(), aemet_extremes_clim(), aemet_forecast_beaches(), aemet_forecast_daily(), aemet_last_obs(), aemet_monthly, aemet_normal, aemet_stations()

Examples

```
library(tibble)
beaches <- aemet_beaches()
beaches

# Cached during this R session
beaches2 <- aemet_beaches(verbose = TRUE)

identical(beaches, beaches2)

# Select an map beaches
library(dplyr)
library(ggplot2)
library(mapSpain)

# Alicante / Alacant
beaches_sf <- aemet_beaches(return_sf = TRUE) %>%
  filter(ID_PROVINCIA == "03")

prov <- mapSpain::esp_get_prov("Alicante")

ggplot(prov) +
  geom_sf() +
  geom_sf(
    data = beaches_sf, shape = 4, size = 2.5,
    color = "blue"
  )
```

---

aemet_daily_clim *Daily/annual climatology values*

Description

Get climatology values for a station or for all the available stations. Note that aemet_daily_period() and aemet_daily_period_all() are shortcuts of aemet_daily_clim().

Usage

```
aemet_daily_clim(
  station = "all",
  start = Sys.Date() - 7,
```

```
  end = Sys.Date(),
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)

aemet_daily_period(
  station,
  start = as.integer(format(Sys.Date(), "%Y")),
  end = start,
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)

aemet_daily_period_all(
  start = as.integer(format(Sys.Date(), "%Y")),
  end = start,
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)
```

Arguments

station	Character string with station identifier code(s) (see aemet_stations()) or "all" for all the stations.
start, end	Character string with start and end date. See **Details**.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.
return_sf	Logical TRUE or FALSE. Should the function return an sf spatial object? If FALSE (the default value) it returns a tibble. Note that you need to have the **sf** package installed.
extract_metadata	Logical TRUE/FALSE. On TRUE the output is a tibble with the description of the fields. See also get_metadata_aemet().
progress	Logical, display a cli::cli_progress_bar() object. If verbose = TRUE won't be displayed.

Details

start and end parameters should be:

- For aemet_daily_clim(): A Date object or a string with format: YYYY-MM-DD ("2020-12-31") coercible with as.Date().

- For `aemet_daily_period()` and `aemet_daily_period_all()`: A string representing the year(s) to be extracted: `"2020"`, `"2018"`.

Value

A `tibble` or a **sf** object.

API Key

You need to set your API Key globally using `aemet_api_key()`.

See Also

`aemet_api_key()`, `as.Date()`

Other aemet_api_data: `aemet_beaches()`, `aemet_extremes_clim()`, `aemet_forecast_beaches()`, `aemet_forecast_daily()`, `aemet_last_obs()`, `aemet_monthly`, `aemet_normal`, `aemet_stations()`

Examples

```
library(tibble)
obs <- aemet_daily_clim(c("9434", "3195"))
glimpse(obs)

# Metadata
meta <- aemet_daily_clim(c("9434", "3195"), extract_metadata = TRUE)

glimpse(meta$campos)
```

---

aemet_detect_api_key *Check if an AEMET API Key is present for the current session*

Description

The function would detect if an API Key is available on this session:

- If an API Key is already set as an environment variable it would be preserved
- If no environment variable has been set and you have stored permanently an API Key using `aemet_api_key()`, the latter would be loaded.

Usage

```
aemet_detect_api_key(...)

aemet_show_api_key(...)
```

Arguments

...	Ignored

Value

TRUE or FALSE. aemet_show_api_key() would display your stored API keys.

See Also

Other aemet_auth: aemet_api_key()

Examples

```
aemet_detect_api_key()

# CAUTION: This may reveal API Keys
if (FALSE) {
  aemet_show_api_key()
}
```

---

aemet_extremes_clim *Extreme values for a station*

Description

Get recorded extreme values for a station.

Usage

```
aemet_extremes_clim(
  station = NULL,
  parameter = "T",
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)
```

Arguments

station	Character string with station identifier code(s) (see aemet_stations()).
parameter	Character string as temperature ("T"), precipitation ("P") or wind ("V") parameter.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.

`return_sf` Logical TRUE or FALSE. Should the function return an sf spatial object? If FALSE (the default value) it returns a tibble. Note that you need to have the **sf** package installed.

`extract_metadata` Logical TRUE/FALSE. On TRUE the output is a tibble with the description of the fields. See also `get_metadata_aemet()`.

`progress` Logical, display a `cli::cli_progress_bar()` object. If `verbose = TRUE` won't be displayed.

Value

A tibble or a **sf** object. If the function finds an error when parsing it would return the result as a `list()` object.

API Key

You need to set your API Key globally using `aemet_api_key()`.

See Also

`aemet_api_key()`

Other aemet_api_data: `aemet_beaches()`, `aemet_daily_clim()`, `aemet_forecast_beaches()`, `aemet_forecast_daily()`, `aemet_last_obs()`, `aemet_monthly`, `aemet_normal`, `aemet_stations()`

Examples

```
library(tibble)
obs <- aemet_extremes_clim(c("9434", "3195"))
glimpse(obs)
```

---

aemet_forecast_beaches

Forecast database for beaches

Description

Get a database of daily weather forecasts for a beach. Beach database can be accessed with `aemet_beaches()`.

Usage

```
aemet_forecast_beaches(
  x,
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)
```

Arguments

x	A vector of beaches codes to extract. See aemet_beaches().
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.
return_sf	Logical TRUE or FALSE. Should the function return an sf spatial object? If FALSE (the default value) it returns a tibble. Note that you need to have the sf package installed.
extract_metadata	Logical TRUE/FALSE. On TRUE the output is a tibble with the description of the fields. See also get_metadata_aemet().
progress	Logical, display a cli::cli_progress_bar() object. If verbose = TRUE won't be displayed.

Value

A tibble or a sf object.

API Key

You need to set your API Key globally using aemet_api_key().

See Also

aemet_beaches() for beaches codes.

Other aemet_api_data: aemet_beaches(), aemet_daily_clim(), aemet_extremes_clim(), aemet_forecast_daily(), aemet_last_obs(), aemet_monthly, aemet_normal, aemet_stations()

Other forecasts: aemet_forecast_daily(), aemet_forecast_tidy()

Examples

```
# Forecast for beaches in Palma, Mallorca
library(dplyr)
library(ggplot2)

palma_b <- aemet_beaches() %>%
  filter(ID_MUNICIPIO == "07040")

forecast_b <- aemet_forecast_beaches(palma_b$ID_PLAYA)
glimpse(forecast_b)

ggplot(forecast_b) +
  geom_line(aes(fecha, tagua_valor1, color = nombre)) +
  facet_wrap(~nombre, ncol = 1) +
  labs(
    title = "Water temperature in beaches of Palma (ES)",
    subtitle = "Forecast 3-days",
    x = "Date",
    y = "Temperature (Celsius)",
    color = "Beach"
```

```
)
```

`aemet_forecast_daily` *Forecast database by municipality*

Description

Get a database of daily or hourly weather forecasts for a given municipality.

Usage

```
aemet_forecast_daily(
  x,
  verbose = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)

aemet_forecast_hourly(
  x,
  verbose = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)
```

Arguments

`x`	A vector of municipality codes to extract. For convenience, **climaemet** provides this data on the dataset aemet_munic (see `municipio` field) as of January 2024.
`verbose`	Logical `TRUE/FALSE`. Provides information about the flow of information between the client and server.
`extract_metadata`	Logical `TRUE/FALSE`. On `TRUE` the output is a `tibble` with the description of the fields. See also `get_metadata_aemet()`.
`progress`	Logical, display a `cli::cli_progress_bar()` object. If `verbose = TRUE` won't be displayed.

Details

Forecasts format provided by the AEMET API have a complex structure. Although **climaemet** returns a `tibble`, each forecasted value is provided as a nested `tibble`. `aemet_forecast_tidy()` helper function can unnest these values an provide a single unnested `tibble` for the requested variable.

If `extract_metadata = TRUE` a simple `tibble` describing the value of each field of the forecast is returned.

Value

A nested tibble. Forecasted values can be extracted with aemet_forecast_tidy(). See also **Details**.

API Key

You need to set your API Key globally using aemet_api_key().

See Also

aemet_munic for municipality codes and **mapSpain** package for working with sf objects of municipalities (see mapSpain::esp_get_munic() and **Examples**).

Other aemet_api_data: aemet_beaches(), aemet_daily_clim(), aemet_extremes_clim(), aemet_forecast_beaches() aemet_last_obs(), aemet_monthly, aemet_normal, aemet_stations()

Other forecasts: aemet_forecast_beaches(), aemet_forecast_tidy()

Examples

```
# Select a city
data("aemet_munic")
library(dplyr)
munis <- aemet_munic %>%
  filter(municipio_nombre %in% c("Santiago de Compostela", "Lugo")) %>%
  pull(municipio)

daily <- aemet_forecast_daily(munis)

# Metadata
meta <- aemet_forecast_daily(munis, extract_metadata = TRUE)
glimpse(meta$campos)

# Vars available
aemet_forecast_vars_available(daily)


# This is nested
daily %>%
  select(municipio, fecha, nombre, temperatura)

# Select and unnest
daily_temp <- aemet_forecast_tidy(daily, "temperatura")

# This is not
daily_temp

# Wrangle and plot
daily_temp_end <- daily_temp %>%
  select(
    elaborado, fecha, municipio, nombre, temperatura_minima,
    temperatura_maxima
```

```
  ) %>%
  tidyr::pivot_longer(cols = contains("temperatura"))

# Plot
library(ggplot2)
ggplot(daily_temp_end) +
  geom_line(aes(fecha, value, color = name)) +
  facet_wrap(~nombre, ncol = 1) +
  scale_color_manual(
    values = c("red", "blue"),
    labels = c("max", "min")
  ) +
  scale_x_date(
    labels = scales::label_date_short(),
    breaks = "day"
  ) +
  scale_y_continuous(
    labels = scales::label_comma(suffix = "º")
  ) +
  theme_minimal() +
  labs(
    x = "", y = "",
    color = "",
    title = "Forecast: 7-day temperature",
    subtitle = paste(
      "Forecast produced on",
      format(daily_temp_end$elaborado[1], usetz = TRUE)
    )
  )

# Spatial with mapSpain
library(mapSpain)
library(sf)

lugo_sf <- esp_get_munic(munic = "Lugo") %>%
  select(LAU_CODE)

daily_temp_end_lugo_sf <- daily_temp_end %>%
  filter(nombre == "Lugo" & name == "temperatura_maxima") %>%
  # Join by LAU_CODE
  left_join(lugo_sf, by = c("municipio" = "LAU_CODE")) %>%
  st_as_sf()

ggplot(daily_temp_end_lugo_sf) +
  geom_sf(aes(fill = value)) +
  facet_wrap(~fecha) +
  scale_fill_gradientn(
    colors = c("blue", "red"),
    guide = guide_legend()
  ) +
  labs(
    main = "Forecast: 7-day max temperature",
    subtitle = "Lugo, ES"
```

```
)
```

`aemet_forecast_tidy` *Helper functions for extracting forecasts*

Description

[Experimental] Helpers for `aemet_forecast_daily()` and `aemet_forecast_hourly()`:

- `aemet_forecast_vars_available()` extracts the values available on the dataset.
- `aemet_forecast_tidy()` produces a `tibble` with the forecast for `var`.

Usage

```
aemet_forecast_tidy(x, var)

aemet_forecast_vars_available(x)
```

Arguments

`x`	A database extracted with `aemet_forecast_daily()` or `aemet_forecast_hourly()`.
`var`	Name of the desired var to extract

Value

A vector of characters (`aemet_forecast_vars_available()`) or a `tibble` (`aemet_forecast_tidy()`).

See Also

Other forecasts: `aemet_forecast_beaches()`, `aemet_forecast_daily()`

Examples

```
# Hourly values
hourly <- aemet_forecast_hourly(c("15030", "28080"))

# Vars available
aemet_forecast_vars_available(hourly)

# Get temperature
temp <- aemet_forecast_tidy(hourly, "temperatura")

library(dplyr)
# Make hour - Need lubridate to adjust timezones
temp_end <- temp %>%
  mutate(
    forecast_time = lubridate::force_tz(
      as.POSIXct(fecha) + hora,
```

```
      tz = "Europe/Madrid"
    )
  )

# Add also sunset and sunrise
suns <- temp_end %>%
  select(nombre, fecha, orto, ocaso) %>%
  distinct_all() %>%
  group_by(nombre) %>%
  mutate(
    ocaso_end = lubridate::force_tz(
      as.POSIXct(fecha) + ocaso,
      tz = "Europe/Madrid"
    ),
    orto_end = lubridate::force_tz(
      as.POSIXct(fecha) + orto,
      tz = "Europe/Madrid"
    ),
    orto_lead = lead(orto_end)
  ) %>%
  tidyr::drop_na()



# Plot

library(ggplot2)

ggplot(temp_end) +
  geom_rect(data = suns, aes(
    xmin = ocaso_end, xmax = orto_lead,
    ymin = min(temp_end$temperatura),
    ymax = max(temp_end$temperatura)
  ), alpha = .4) +
  geom_line(aes(forecast_time, temperatura), color = "blue4") +
  facet_wrap(~nombre, nrow = 2) +
  scale_x_datetime(labels = scales::label_date_short()) +
  scale_y_continuous(labels = scales::label_number(suffix = "º")) +
  labs(
    x = "", y = "",
    title = "Forecast: Temperature",
    subtitle = paste("Forecast produced on", format(temp_end$elaborado[1],
      usetz = TRUE
    ))
  )
```

---

aemet_last_obs *Last observation values for a station*

Description

Get last observation values for a station.

Usage

```
aemet_last_obs(
  station = "all",
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)
```

Arguments

station	Character string with station identifier code(s) (see aemet_stations()) or "all" for all the stations.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.
return_sf	Logical TRUE or FALSE. Should the function return an sf spatial object? If FALSE (the default value) it returns a tibble. Note that you need to have the sf package installed.
extract_metadata	Logical TRUE/FALSE. On TRUE the output is a tibble with the description of the fields. See also get_metadata_aemet().
progress	Logical, display a cli::cli_progress_bar() object. If verbose = TRUE won't be displayed.

Value

A tibble or a sf object

API Key

You need to set your API Key globally using aemet_api_key().

See Also

Other aemet_api_data: aemet_beaches(), aemet_daily_clim(), aemet_extremes_clim(), aemet_forecast_beaches() aemet_forecast_daily(), aemet_monthly, aemet_normal, aemet_stations()

Examples

```
library(tibble)
obs <- aemet_last_obs(c("9434", "3195"))
glimpse(obs)
```

aemet_monthly *Monthly/annual climatology*

Description

Get monthly/annual climatology values for a station or all the stations. `aemet_monthly_period()` and `aemet_monthly_period_all()` allows requests that span several years.

Usage

```
aemet_monthly_clim(
  station = NULL,
  year = as.integer(format(Sys.Date(), "%Y")),
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)

aemet_monthly_period(
  station = NULL,
  start = as.integer(format(Sys.Date(), "%Y")),
  end = start,
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)

aemet_monthly_period_all(
  start = as.integer(format(Sys.Date(), "%Y")),
  end = start,
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)
```

Arguments

station	Character string with station identifier code(s) (see `aemet_stations()`).
year	Numeric value as date (format: `YYYY`).
verbose	Logical `TRUE/FALSE`. Provides information about the flow of information between the client and server.
return_sf	Logical `TRUE` or `FALSE`. Should the function return an `sf` spatial object? If `FALSE` (the default value) it returns a `tibble`. Note that you need to have the **sf** package installed.

extract_metadata
: Logical TRUE/FALSE. On TRUE the output is a tibble with the description of the fields. See also get_metadata_aemet().

progress
: Logical, display a cli::cli_progress_bar() object. If verbose = TRUE won't be displayed.

start
: Numeric value as start year (format: YYYY).

end
: Numeric value as end year (format: YYYY).

Value

A tibble or a **sf** object.

API Key

You need to set your API Key globally using aemet_api_key().

See Also

Other aemet_api_data: aemet_beaches(), aemet_daily_clim(), aemet_extremes_clim(), aemet_forecast_beaches() aemet_forecast_daily(), aemet_last_obs(), aemet_normal, aemet_stations()

Examples

```
library(tibble)
obs <- aemet_monthly_clim(station = c("9434", "3195"), year = 2000)
glimpse(obs)
```

---

aemet_munic *Data set with all the municipalities of Spain*

Description

A tibble with all the municipalities of Spain as defined by the INE (Instituto Nacional de Estadística) as of January 2024.

Format

A tibble with 8,132 rows and fields:

municipio INE code of the municipality.

municipio_nombre INE name of the municipality.

cpro INE code of the province.

cpro_nombre INE name of the province.

codauto INE code of the autonomous community.

codauto_nombre INE code of the autonomous community.

Source

INE, Municipality codes by province

See Also

aemet_forecast_daily(), aemet_forecast_hourly()

Other dataset: climaemet_9434_climatogram, climaemet_9434_temp, climaemet_9434_wind

Examples

```
data(aemet_munic)

aemet_munic
```

---

aemet_normal *Normal climatology values*

Description

Get normal climatology values for a station (or all the stations with aemet_normal_clim_all(). Standard climatology from 1981 to 2010.

Usage

```
aemet_normal_clim(
  station = NULL,
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)

aemet_normal_clim_all(
  verbose = FALSE,
  return_sf = FALSE,
  extract_metadata = FALSE,
  progress = TRUE
)
```

Arguments

station	Character string with station identifier code(s) (see aemet_stations()) or "all" for all the stations.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.

return_sf Logical TRUE or FALSE. Should the function return an sf spatial object? If FALSE (the default value) it returns a tibble. Note that you need to have the **sf** package installed.

extract_metadata Logical TRUE/FALSE. On TRUE the output is a tibble with the description of the fields. See also get_metadata_aemet().

progress Logical, display a cli::cli_progress_bar() object. If verbose = TRUE won't be displayed.

Value

A tibble or a **sf** object.

API Key

You need to set your API Key globally using aemet_api_key().

Note

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

See Also

Other aemet_api_data: aemet_beaches(), aemet_daily_clim(), aemet_extremes_clim(), aemet_forecast_beaches() aemet_forecast_daily(), aemet_last_obs(), aemet_monthly, aemet_stations()

Examples

```
library(tibble)
obs <- aemet_normal_clim(c("9434", "3195"))
glimpse(obs)
```

---

aemet_stations *AEMET stations*

Description

Get AEMET stations.

Usage

```
aemet_stations(verbose = FALSE, return_sf = FALSE)
```

Arguments

verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.
return_sf	Logical TRUE or FALSE. Should the function return an sf spatial object? If FALSE (the default value) it returns a tibble. Note that you need to have the **sf** package installed.

Details

The first result of the API call on each session is (temporarily) cached in the assigned tempdir() for avoiding unneeded API calls.

Value

A tibble or a **sf** object.

API Key

You need to set your API Key globally using aemet_api_key().

Note

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

See Also

Other aemet_api_data: aemet_beaches(), aemet_daily_clim(), aemet_extremes_clim(), aemet_forecast_beaches() aemet_forecast_daily(), aemet_last_obs(), aemet_monthly, aemet_normal

Examples

```
library(tibble)
stations <- aemet_stations()
stations

# Cached during this R session
stations2 <- aemet_stations(verbose = TRUE)

identical(stations, stations2)
```

climaemet_9434_climatogram

Climatogram data for Zaragoza Airport ("9434") period 1981-2010

Description

Normal data for Zaragoza Airport (1981-2010). This is an example dataset used to plot climatograms.

Format

A data.frame with columns 1 to 12 (months) and rows:

p_mes_md Precipitation (mm).

tm_max_md Maximum temperature (Celsius).

tm_min_md Minimum temperature (Celsius).

ta_min_md Absolute monthly minimum temperature (Celsius).

Source

AEMET.

See Also

`ggclimat_walter_lieth()`, `climatogram_period()`, `climatogram_normal()`

Other dataset: `aemet_munic`, `climaemet_9434_temp`, `climaemet_9434_wind`

Other climatogram: `climatogram_normal()`, `climatogram_period()`, `ggclimat_walter_lieth()`

Examples

```
data(climaemet_9434_climatogram)
```

climaemet_9434_temp

Average annual temperatures for Zaragoza Airport ("9434") period 1950-2020

Description

Yearly observations of average temperature for Zaragoza Airport (1950-2020). This is an example dataset.

Format

A `tibble` with columns:

year Year of reference.

indicativo Identifier of the station.

temp Average temperature (Celsius).

Source

AEMET.

See Also

Other dataset: aemet_munic, climaemet_9434_climatogram, climaemet_9434_wind

Other stripes: climatestripes_station(), ggstripes()

Examples

```
data(climaemet_9434_temp)
```

---

climaemet_9434_wind *Wind conditions for Zaragoza Airport ("9434") period 2000-2020*

Description

Daily observations of wind speed and directions for Zaragoza Airport (2000-2020). This is an example dataset.

Format

A tibble with columns:

fecha Date of observation.

dir Wind directions (0-360).

velmedia Average wind speed (km/h)

Source

AEMET.

See Also

Other dataset: aemet_munic, climaemet_9434_climatogram, climaemet_9434_temp

Other wind: ggwindrose(), windrose_days(), windrose_period()

Examples

```
data(climaemet_9434_wind)
```

climaemet_news *climaemet_news*

Description

Show the NEWS file of the **climaemet** package.

Usage

```
climaemet_news()
```

Details

(See description)

Value

Open NEWS from `climaemet`.

See Also

Other helpers: `dms2decdegrees()`, `first_day_of_year()`

Examples

```
## Not run:
climaemet_news()

## End(Not run)
```

climatestripes_station *Station climate stripes graph*

Description

Plot climate stripes graph for a station.

Usage

```
climatestripes_station(
  station,
  start = 1950,
  end = 2020,
  with_labels = "yes",
  verbose = FALSE,
  ...
)
```

Arguments

station	Character string with station identifier code(s) (see aemet_stations()).
start	Numeric value as start year (format: YYYY).
end	Numeric value as end year (format: YYYY).
with_labels	Character string as yes/no. Indicates whether to use labels for the graph or not.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.
...	Arguments passed on to ggstripes n_temp Numeric value as the number of colors of the palette. (default 11). col_pal Character string indicating the name of the hcl.pals() color palette to be used for plotting.

Value

A **ggplot2** object

API Key

You need to set your API Key globally using aemet_api_key().

See Also

ggstripes()

Other aemet_plots: climatogram_normal(), climatogram_period(), ggclimat_walter_lieth(), ggstripes(), ggwindrose(), windrose_days(), windrose_period()

Other stripes: climaemet_9434_temp, ggstripes()

Examples

```
climatestripes_station(
  "9434",
  start = 2010,
  end = 2020,
  with_labels = "yes",
  col_pal = "Inferno"
)
```

`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,
  labels = "en",
  verbose = FALSE,
  ggplot2 = TRUE,
  ...
)
```

Arguments

`station`	Character string with station identifier code(s) (see `aemet_stations()`).
`labels`	Character string as month labels for the X axis: `"en"` (english), `"es"` (spanish), `"fr"` (french), etc.
`verbose`	Logical `TRUE/FALSE`. Provides information about the flow of information between the client and server.
`ggplot2`	`TRUE/FALSE`. On `TRUE` the function uses `ggclimat_walter_lieth()`, if `FALSE` uses `climatol::diagwl()`.
`...`	Further arguments to `climatol::diagwl()` or `ggclimat_walter_lieth()`, depending on the value of **ggplot2**.

Value

A plot.

API Key

You need to set your API Key globally using `aemet_api_key()`.

Note

The code is based on code from the CRAN package **climatol**.

References

- Walter, H. K., Harnickell, E., Lieth, F. H. H., & Rehder, H. (1967). *Klimadiagramm-weltatlas*. Jena: Fischer, 1967.
- Guijarro J. A. (2023). *climatol: Climate Tools (Series Homogenization and Derived Products)*. R package version 4.0.0, https://climatol.eu.

See Also

Other aemet_plots: `climatestripes_station()`, `climatogram_period()`, `ggclimat_walter_lieth()`, `ggstripes()`, `ggwindrose()`, `windrose_days()`, `windrose_period()`

Other climatogram: `climaemet_9434_climatogram`, `climatogram_period()`, `ggclimat_walter_lieth()`

Examples

```
climatogram_normal("9434")
```

`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 = NULL,
  start = 1990,
  end = 2020,
  labels = "en",
  verbose = FALSE,
  ggplot2 = TRUE,
  ...
)
```

Arguments

`station`	Character string with station identifier code(s) (see `aemet_stations()`).
`start`	Numeric value as start year (format: `YYYY`).
`end`	Numeric value as end year (format: `YYYY`).
`labels`	Character string as month labels for the X axis: `"en"` (english), `"es"` (spanish), `"fr"` (french), etc.

verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.
ggplot2	TRUE/FALSE. On TRUE the function uses ggclimat_walter_lieth(), if FALSE uses climatol::diagwl().
...	Further arguments to climatol::diagwl() or ggclimat_walter_lieth(), depending on the value of **ggplot2**.

Value

A plot.

API Key

You need to set your API Key globally using aemet_api_key().

Note

The code is based on code from the CRAN package **climatol**.

References

- Walter, H. K., Harnickell, E., Lieth, F. H. H., & Rehder, H. (1967). *Klimadiagramm-weltatlas*. Jena: Fischer, 1967.
- Guijarro J. A. (2023). *climatol: Climate Tools (Series Homogenization and Derived Products)*. R package version 4.0.0, https://climatol.eu.

See Also

Other aemet_plots: climatestripes_station(), climatogram_normal(), ggclimat_walter_lieth(), ggstripes(), ggwindrose(), windrose_days(), windrose_period()

Other climatogram: climaemet_9434_climatogram, climatogram_normal(), ggclimat_walter_lieth()

Examples

```
climatogram_period("9434", start = 2015, end = 2020, labels = "en")
```

dms2decdegrees *Converts dms to decimal degrees*

Description

Converts degrees, minutes and seconds to decimal degrees.

Usage

```
dms2decdegrees(input = NULL)

dms2decdegrees_2(input = NULL)
```

Arguments

input	Character string as DMS coordinates.

Value

A numeric value.

Note

Code for `dms2decdegrees()` modified from project https://github.com/SevillaR/aemet.

See Also

Other helpers: `climaemet_news()`, `first_day_of_year()`

Examples

```
dms2decdegrees("055245W")
dms2decdegrees_2("-3º 40' 37\"")
```

first_day_of_year *First and last day of year*

Description

Get first and last day of year.

Usage

```
first_day_of_year(year = NULL)

last_day_of_year(year = NULL)
```

Arguments

year	Numeric value as year (format: YYYY).

Value

Character string as date (format: YYYY-MM-DD).

See Also

Other helpers: climaemet_news(), dms2decdegrees()

Examples

```
first_day_of_year(2000)
last_day_of_year(2020)
```

---

get_data_aemet *Client tool for AEMET API*

Description

Client tool to get data and metadata from AEMET and convert json to tibble.

Usage

```
get_data_aemet(apidest, verbose = FALSE)

get_metadata_aemet(apidest, verbose = FALSE)
```

Arguments

apidest	Character string as destination URL. See https://opendata.aemet.es/dist/index.html.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.

Value

A tibble (if possible) or the results of the query as provided by httr2::resp_body_raw() or httr2::resp_body_string().

Source

https://opendata.aemet.es/dist/index.html.

See Also

Some examples on how to use these functions on vignette("extending-climaemet").

Examples

```
# Run this example only if AEMET_API_KEY is detected

url <- "/api/valores/climatologicos/inventarioestaciones/todasestaciones"

get_data_aemet(url)


# Metadata

get_metadata_aemet(url)

# We can get data from any API endpoint

# Plain text

plain <- get_data_aemet("/api/prediccion/nacional/hoy")

cat(plain)

# An image

image <- get_data_aemet("/api/mapasygraficos/analisis")

# Write and read
tmp <- tempfile(fileext = ".gif")

writeBin(image, tmp)

gganimate::gif_file(tmp)
```

---

ggclimat_walter_lieth *Walter and Lieth climatic diagram on* R*hrefhttps://CRAN.R-project.org/package=ggplot2***ggplot2**

Description

Plot of a Walter and Lieth climatic diagram of a station. This function is an updated version of `climatol::diagwl()`, by Jose A. Guijarro.

Usage

```
ggclimat_walter_lieth(
  dat,
  est = "",
  alt = NA,
  per = NA,
  mlab = "es",
```

```
  pcol = "#002F70",
  tcol = "#ff0000",
  pfcol = "#9BAEE2",
  sfcol = "#3C6FC4",
  shem = FALSE,
  p3line = FALSE,
  ...
)
```

Arguments

dat	Monthly climatic data for which the diagram will be plotted.
est	Name of the climatological station.
alt	Altitude of the climatological station.
per	Period on which the averages have been computed.
mlab	Month labels for the X axis. Use 2-digit language code ("en", "es", etc.). See readr::locale() for info.
pcol	Color for precipitation.
tcol	Color for temperature.
pfcol	Fill color for probable frosts.
sfcol	Fill color for sure frosts.
shem	Set to TRUE for southern hemisphere stations.
p3line	Set to TRUE to draw a supplementary precipitation line referenced to three times the temperature (as suggested by Bogdan Rosca).
...	Other graphic parameters

Details

See Details on climatol::diagwl().

Climatic data must be passed as a 4x12 matrix or data.frame of monthly (January to December) data, in the following order:

- Row 1: Mean precipitation.
- Row 2: Mean maximum daily temperature.
- Row 3: Mean minimum daily temperature.
- Row 4: Absolute monthly minimum temperature.

See climaemet_9434_climatogram for a sample dataset.

Value

A **ggplot2** object. See help("ggplot2").

API Key

You need to set your API Key globally using aemet_api_key().

References

- Walter, H. K., Harnickell, E., Lieth, F. H. H., & Rehder, H. (1967). *Klimadiagramm-weltatlas*. Jena: Fischer, 1967.

See Also

`climatol::diagwl()`, `readr::locale()`

Other aemet_plots: `climatestripes_station()`, `climatogram_normal()`, `climatogram_period()`, `ggstripes()`, `ggwindrose()`, `windrose_days()`, `windrose_period()`

Other climatogram: `climaemet_9434_climatogram`, `climatogram_normal()`, `climatogram_period()`

Examples

```
library(ggplot2)

wl <- ggclimat_walter_lieth(
  climaemet::climaemet_9434_climatogram,
  alt = "249",
  per = "1981-2010",
  est = "Zaragoza Airport"
)

wl

# As it is a ggplot object we can modify it

wl + theme(
  plot.background = element_rect(fill = "grey80"),
  panel.background = element_rect(fill = "grey70"),
  axis.text.y.left = element_text(
    colour = "black",
    face = "italic"
  ),
  axis.text.y.right = element_text(
    colour = "black",
    face = "bold"
  )
)
```

`ggstripes` *Warming stripes graph*

Description

Plot different "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 = "stripes",
  plot_title = "",
  n_temp = 11,
  col_pal = "RdBu",
  ...
)
```

Arguments

`data`	a data.frame with date(`year`) and temperature(`temp`) variables.
`plot_type`	plot type (with labels, background, stripes with line trend and animation). Accepted values are `"background"`, `"stripes"`, `"trend"` or `"animation"`.
`plot_title`	character string to be used for the graph title.
`n_temp`	Numeric value as the number of colors of the palette. (default 11).
`col_pal`	Character string indicating the name of the `hcl.pals()` color palette to be used for plotting.
`...`	further arguments passed to `ggplot2::theme()`.

Value

A **ggplot2** object

API Key

You need to set your API Key globally using `aemet_api_key()`.

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.

See Also

`climatestripes_station()`, `ggplot2::theme()` for more possible arguments to pass to `ggstripes`.

Other aemet_plots: `climatestripes_station()`, `climatogram_normal()`, `climatogram_period()`, `ggclimat_walter_lieth()`, `ggwindrose()`, `windrose_days()`, `windrose_period()`

Other stripes: `climaemet_9434_temp`, `climatestripes_station()`

Examples

```
library(ggplot2)

data <- climaemet::climaemet_9434_temp

ggstripes(data, plot_title = "Zaragoza Airport") +
  labs(subtitle = "(1950-2020)")

ggstripes(data, plot_title = "Zaragoza Airport", plot_type = "trend") +
  labs(subtitle = "(1950-2020)")
```

---

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 = NULL,
  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 hcl.pals() color palette to be used for plotting.
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 (ignored).

Value

A **ggplot2** object.

API Key

You need to set your API Key globally using aemet_api_key().

See Also

ggplot2::theme() for more possible arguments to pass to ggwindrose.

Other aemet_plots: climatestripes_station(), climatogram_normal(), climatogram_period(), ggclimat_walter_lieth(), ggstripes(), windrose_days(), windrose_period()

Other wind: climaemet_9434_wind, windrose_days(), windrose_period()

Examples

```
library(ggplot2)

speed <- climaemet::climaemet_9434_wind$velmedia
direction <- climaemet::climaemet_9434_wind$dir

rose <- ggwindrose(
  speed = speed,
  direction = direction,
  speed_cuts = seq(0, 16, 4),
  legend_title = "Wind speed (m/s)",
  calm_wind = 0,
  n_col = 1,
  plot_title = "Zaragoza Airport"
)
rose + labs(
  subtitle = "2000-2020",
  caption = "Source: AEMET"
)
```

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,
  start = "2000-12-01",
  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)",
  verbose = FALSE
)
```

Arguments

station	Character string with station identifier code(s) (see aemet_stations()) or "all" for all the stations.
start	Character string as start date (format: "YYYY-MM-DD").
end	Character string as end date (format: "YYYY-MM-DD").
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 hcl.pals() color 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.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.

Value

A **ggplot2** object.

API Key

You need to set your API Key globally using aemet_api_key().

See Also

aemet_daily_clim()

Other aemet_plots: climatestripes_station(), climatogram_normal(), climatogram_period(), ggclimat_walter_lieth(), ggstripes(), ggwindrose(), windrose_period()

Other wind: climaemet_9434_wind, ggwindrose(), windrose_period()

Examples

```
windrose_days("9434",
  start = "2000-12-01",
  end = "2000-12-31",
  speed_cuts = 4
)
```

---

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,
  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)",
  verbose = FALSE
)
```

Arguments

station	Character string with station identifier code(s) (see aemet_stations()) or "all" for all the stations.
start	Numeric value as start year (format: YYYY).

end	Numeric value as end year (format: YYYY).
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 hcl.pals() color 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.
verbose	Logical TRUE/FALSE. Provides information about the flow of information between the client and server.

Value

A **ggplot2** object

API Key

You need to set your API Key globally using aemet_api_key().

See Also

aemet_daily_period()

Other aemet_plots: climatestripes_station(), climatogram_normal(), climatogram_period(), ggclimat_walter_lieth(), ggstripes(), ggwindrose(), windrose_days()

Other wind: climaemet_9434_wind, ggwindrose(), windrose_days()

Examples

```
windrose_period("9434",
  start = 2000, end = 2010,
  speed_cuts = 4
)
```

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