

Package ‘easyclimate’

July 29, 2026

Title Easy Access to High-Resolution Daily Climate Data for Europe

Version 1.0.0

Description Get high-resolution (1 km) daily, monthly and annual climate data (precipitation, and average, minimum and maximum temperatures) for points and polygons within Europe.

License GPL (>= 3)

URL <https://verughub.github.io/easyclimate/>,
<https://github.com/VeruGHub/easyclimate>

BugReports <https://github.com/VeruGHub/easyclimate/issues>

Depends R (>= 3.5.0)

Imports R.utils, RCurl, stats, terra (>= 1.2-13)

Suggests sf, testthat (>= 3.0.0)

Config/testthat/edition 3

Encoding UTF-8

RoxygenNote 7.3.3

NeedsCompilation no

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Repository CRAN

Date/Publication 2026-07-28 22:40:09 UTC

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build_url	<i>Build the URL for a given request</i>
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Description

Build the URL to download climate data from ftp://palantir.boku.ac.at/Public/ClimateData/

Usage

build_url(climatic_var_single, year, version = "last", temp_res = "day")

Arguments

- climatic_var_single
Character. Climatic variable to download. One of "Tmax", "Tmin", "Tavg", or "Prep".
- year
Numeric. Year for which climatic data will be downloaded.
- version
Character. Climate data version. Either "last" (default) or "4" (version 4).
- temp_res
Character. One of "day" , "month" or "year".

Value

Character string with the URL.

Author(s)

Veronica Cruz-Alonso, Francisco Rodríguez-Sánchez, Sophia Ratcliffe, Sofía Miguel

check_server	<i>Check climatic data server</i>
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Description

Checks that the online climatic data server is available and working correctly.

Usage

```
check_server(  
  climatic_var = NULL,  
  year = NULL,  
  version = "last",  
  verbose = TRUE,  
  time_unit = "day"  
)
```

Arguments

- climatic_var Optional. One of "Prcp", "Tmin", or "Tmax".
- year Optional. Year between 1950 and the latest year available on the server. Use get_periods() to obtain the available data versions and years available.
- version Character. Climatic data version. Either "last" (default) or "4" (version 4).
- verbose Logical. If TRUE, prints diagnostic messages; otherwise, returns only TRUE/FALSE.
- time_unit Character. One of "day" , "month" or "year".

Value

TRUE if the server is available; FALSE otherwise.

Examples

```
interactive()  
check_server()
```

get_annual_climate	<i>Get annual data for multiple climatic variables</i>
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Description

Extract annual climate data (temperature and precipitation) for a given set of points or polygons within Europe.

Usage

```
get_annual_climate(
  coords = NULL,
  climatic_var = "Prcp",
  period = NULL,
  output = "df",
  check_connection = FALSE
)
```

Arguments

coords	A matrix , data.frame , tibble::tbl_df-class , sf::sf() , or terra::SpatVector() object containing point or polygon coordinates in decimal degrees (lonlat/geographic format, EPSG 4326). Longitude must fall between -40.5 and 75.5 degrees, and latitude between 25.5 and 75.5 degrees. If coords is a matrix, it must have exactly two columns: the first containing longitude and the second containing latitude. If coords is a data.frame or a tbl_df, it must contain at least two columns called lon and lat with longitude and latitude coordinates, respectively.
climatic_var	Character. Climate variables to download ("Tmax", "Tmin", "Tavg", or "Prcp"). Various elements can be concatenated in the vector.
period	Numbers representing years between 1950 and the latest year available. To specify a sequence of years use the format 'start:end' (e.g. YYYY:YYYY, see examples). Various elements can be concatenated in the vector (e.g. c(2000:2005, 2010:2015, 2020))
output	Character. Either "df", which returns a data.frame with daily climatic values for each point or polygon, or "raster", which returns terra::SpatRaster() objects (within a list when more than one climatic variable is downloaded).
check_connection	Logical. Check the connection to the server before attempting data download?

Value

Either:

- A data.frame (if output = "df")
- A list of [terra::SpatRaster\(\)](#) object (if output = "raster")

For precipitation, the function returns total (accumulated) precipitation per year. For temperature variables ('Tmin', 'Tmax', 'Tavg') the function returns the average (i.e. the annual average of minimum and maximum daily temperatures, or the average annual temperature).

Author(s)

Veronica Cruz-Alonso, Francisco Rodriguez-Sanchez

References

Pucher, Christoph (2026). Description of Downscaled European Climate Data. figshare. Online resource. <https://doi.org/10.6084/m9.figshare.33078053.v1>

Pucher C. 2023. Description and Evaluation of Downscaled Daily Climate Data Version 4. <https://doi.org/10.6084/m9.figshare.33078053.v1>

Adam Moreno, Hubert Hasenauer. 2016. Spatial downscaling of European climate data. International Journal of Climatology 36: 1444–1458.

Examples

```
# Coords as matrix
coords <- matrix(c(-5.36, 37.40), ncol = 2)
ex <- get_annual_climate(coords, period = 2008) # 2008
ex <- get_annual_climate(coords, period = c(2008, 2010)) # 2008 AND 2010
ex <- get_annual_climate(coords, period = 2008:2010) # 2008 TO 2010

ex <- get_annual_climate(coords, period = 2008, climatic_var = "Tmin")

# Coords as data.frame or tbl_df
coords <- as.data.frame(coords) # coords <- tibble::as_tibble(coords)
names(coords) <- c("lon", "lat") # must have these columns
ex <- get_annual_climate(coords, period = 2008) # single month

# Coords as sf
coords <- sf::st_as_sf(coords, coords = c("lon", "lat"))
ex <- get_annual_climate(coords, period = 2008) # single month

# Several points
coords <- matrix(c(-5.36, 37.40, -4.05, 38.10), ncol = 2, byrow = TRUE)
ex <- get_annual_climate(coords, period = 2008, output = "raster") # raster output

# Multiple climatic variables
coords <- matrix(c(-5.36, 37.40), ncol = 2)
ex <- get_annual_climate(coords, climatic_var = c("Tmin", "Tmax"), period = 2008)

## Polygons
coords <- terra::vect("POLYGON ((-5 38, -5 37.5, -4.5 37.5, -4.5 38, -5 38))")

# Return raster
ex <- get_annual_climate(coords, period = 2008, output = "raster")
ex <- get_annual_climate(coords, climatic_var = c("Tmin", "Tmax"),
period = 2008, output = "raster") # Multiple climatic variables

# Return dataframe for polygon
ex <- get_annual_climate(coords, period = 2008)
```

get_daily_climate	<i>Get daily data for multiple climatic variables</i>
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Description

Extracts daily climatic data (temperature and precipitation) for a given set of points or polygons within Europe.

Usage

```
get_daily_climate(
  coords = NULL,
  climatic_var = "Prcp",
  period = NULL,
  output = "df",
  version = "last",
  check_connection = FALSE
)
```

Arguments

coords	A matrix , data.frame , tibble::tbl_df-class , sf::sf() , or terra::SpatVector() object containing point or polygon coordinates in decimal degrees (lonlat/geographic format, EPSG 4326). Longitude must fall between -40.5 and 75.5 degrees, and latitude between 25.5 and 75.5 degrees. If coords is a matrix, it must have exactly two columns: the first containing longitude and the second containing latitude. If coords is a data.frame or a tbl_df, it must contain at least two columns called lon and lat with longitude and latitude coordinates, respectively.
climatic_var	Character. One or more climatic variables to download ("Tmax", "Tmin", "Tavg", or "Prcp"). Various elements can be concatenated in the vector.
period	Either numeric vector of years (between 1950 and the latest available year) or character vector of dates in "YYYY-MM-DD" format (to obtain data for specific days). To specify a sequence of years or dates, use the format 'start:end' (e.g. YYYY:YYYY or "YYYY-MM-DD:YYYY-MM-DD", see examples). Multiple dates or years can be concatenated in the vector (e.g. c(2000:2005, 2010:2015, 2020), c("2000-01-01:2000-01-15", "2000-02-01")). Use get_periods() to obtain the available data versions and years available.
output	Character. Either "df", which returns a data.frame with daily climatic values for each point or polygon, or "raster", which returns terra::SpatRaster() objects (within a list when more than one climatic variable is downloaded).
version	Character. Climate data version. Uses the latest version ("last") by default. Version "4" is also available for reproducibility. See References for details about the climate datasets.
check_connection	Logical. Default is FALSE. If TRUE, checks the connection to the server before attempting to download the data.

Value

Either:

- A `data.frame` (if `output = "df"`)
- A `terra::SpatRaster()` object (if `output = "raster"`)
- A list of `terra::SpatRaster()` objects (if `output = "raster"` and there is more than one `climatic_var`).

Author(s)

Veronica Cruz-Alonso, Francisco Rodriguez-Sanchez

References

For details on the latest version of the climatic data, see: Pucher, Christoph (2026). Description of Downscaled European Climate Data. figshare. Online resource. <https://doi.org/10.6084/m9.figshare.33078053.v1>

For details on version 4, see: Pucher C. 2023. Description and Evaluation of Downscaled Daily Climate Data Version 4. <https://doi.org/10.6084/m9.figshare.22962671.v1>

Adam Moreno, Hubert Hasenauer. 2016. Spatial downscaling of European climate data. International Journal of Climatology 36: 1444–1458.

Examples

```
# Coords as matrix
coords <- matrix(c(-5.36, 37.40), ncol = 2)
ex <- get_daily_climate(coords, period = "2001-01-01") # single day
ex <- get_daily_climate(coords, period = c("2001-01-01", "2001-01-03")) # 1st AND 3rd Jan 2001
ex <- get_daily_climate(coords, period = "2001-01-01:2001-01-03") # 1st TO 3rd Jan 2001
ex <- get_daily_climate(coords, period = 2008) # entire year
ex <- get_daily_climate(coords, period = c(2008, 2010)) # 2008 AND 2010
ex <- get_daily_climate(coords, period = 2008:2010) # 2008 TO 2010

ex <- get_daily_climate(coords, period = "2001-01-01", climatic_var = "Tmin")

# Coords as data.frame or tbl_df
coords <- as.data.frame(coords) # coords <- tibble::as_tibble(coords)
names(coords) <- c("lon", "lat") # must have these columns
ex <- get_daily_climate(coords, period = "2001-01-01") # single day

# Coords as sf
coords <- sf::st_as_sf(coords, coords = c("lon", "lat"))
ex <- get_daily_climate(coords, period = "2001-01-01") # single day

# Several points
coords <- matrix(c(-5.36, 37.40, -4.05, 38.10), ncol = 2, byrow = TRUE)
ex <- get_daily_climate(coords, period = "2001-01-01", output = "raster") # raster output

# Multiple climatic variables
coords <- matrix(c(-5.36, 37.40), ncol = 2)
```

```

ex <- get_daily_climate(coords, climatic_var = c("Tmin", "Tmax"), period = "2001-01-01")

## Polygons
coords <- terra::vect("POLYGON ((-5 38, -5 37.5, -4.5 37.5, -4.5 38, -5 38)))")

# Return raster
ex <- get_daily_climate(coords, period = "2001-01-01", output = "raster")

# Return dataframe for polygon
ex <- get_daily_climate(coords, period = "2001-01-01")

```

get_monthly_climate *Get monthly data for multiple climatic variables*

Description

Extract monthly climate data (temperature and precipitation) for a given set of points or polygons within Europe.

Usage

```

get_monthly_climate(
  coords = NULL,
  climatic_var = "Prcp",
  period = NULL,
  output = "df",
  check_connection = FALSE
)

```

Arguments

coords	A matrix , data.frame , tibble::tbl_df-class , sf::sf() , or terra::SpatVector() object containing point or polygon coordinates in decimal degrees (lonlat/geographic format, EPSG 4326). Longitude must fall between -40.5 and 75.5 degrees, and latitude between 25.5 and 75.5 degrees. If coords is a matrix, it must have exactly two columns: the first containing longitude and the second containing latitude. If coords is a data.frame or a tbl_df, it must contain at least two columns called lon and lat with longitude and latitude coordinates, respectively.
climatic_var	Character. One or more climatic variables to download ("Tmax", "Tmin", "Tavg", or "Prcp"). Various elements can be concatenated in the vector.
period	Either numbers (representing years between 1950 and the latest year available), or dates in "YYYY-MM" format (to obtain data for specific months). To specify a sequence of years or months use the format 'start:end' (e.g. YYYY:YYYY or "YYYY-MM:YYYY-MM", see examples). Various elements can be concatenated in the vector (e.g. c(2000:2005, 2010:2015, 2020), c("2000-01:2000-06", "2001-01")). Use get_periods() to obtain the available data versions and years available.

output Character. Either "df", which returns a data.frame with daily climatic values for each point or polygon, or "raster", which returns `terra::SpatRaster()` objects (within a list when more than one climatic variable is downloaded).

check_connection Logical. Default is FALSE. If TRUE, checks the connection to the server before attempting to download the data.

Value

Either:

- A data.frame (if output = "df")
- A list of `terra::SpatRaster()` object (if output = "raster")

For precipitation, the function returns total (accumulated) precipitation per month. For temperature variables ("Tmin", "Tmax", "Tavg") the function returns the average (i.e. the monthly average of minimum and maximum daily temperatures, or the average monthly temperature).

Author(s)

Veronica Cruz-Alonso, Francisco Rodriguez-Sanchez

References

For details on the latest version of the climatic data, see: Pucher, Christoph (2026). Description of Downscaled European Climate Data. figshare. Online resource. <https://doi.org/10.6084/m9.figshare.33078053.v1>

For details on version 4, see: Pucher C. 2023. Description and Evaluation of Downscaled Daily Climate Data Version 4. <https://doi.org/10.6084/m9.figshare.22962671.v1>

Adam Moreno, Hubert Hasenauer. 2016. Spatial downscaling of European climate data. International Journal of Climatology 36: 1444–1458.

Examples

```
# Coords as matrix
coords <- matrix(c(-5.36, 37.40), ncol = 2)
ex <- get_monthly_climate(coords, period = "2001-01") # single month
ex <- get_monthly_climate(coords, period = c("2001-01", "2001-03")) # January AND March 2001
ex <- get_monthly_climate(coords, period = "2001-01:2001-03") # January TO March 2001
ex <- get_monthly_climate(coords, period = 2008) # entire year
ex <- get_monthly_climate(coords, period = c(2008, 2010)) # 2008 AND 2010
ex <- get_monthly_climate(coords, period = 2008:2010) # 2008 TO 2010

ex <- get_monthly_climate(coords, period = "2001-01", climatic_var = "Tmin")

# Coords as data.frame or tbl_df
coords <- as.data.frame(coords) # coords <- tibble::as_tibble(coords)
names(coords) <- c("lon", "lat") # must have these columns
ex <- get_monthly_climate(coords, period = "2001-01") # single month
```

```

# Coords as sf
coords <- sf::st_as_sf(coords, coords = c("lon", "lat"))
ex <- get_monthly_climate(coords, period = "2001-01") # single month

# Several points
coords <- matrix(c(-5.36, 37.40, -4.05, 38.10), ncol = 2, byrow = TRUE)
ex <- get_monthly_climate(coords, period = "2001-01", output = "raster") # raster output

# Multiple climatic variables
coords <- matrix(c(-5.36, 37.40), ncol = 2)
ex <- get_monthly_climate(coords, climatic_var = c("Tmin", "Tmax"), period = "2001-01")

## Polygons
coords <- terra::vect("POLYGON ((-5 38, -5 37.5, -4.5 37.5, -4.5 38, -5 38))")

# Return raster
ex <- get_monthly_climate(coords, period = "2001-01", output = "raster")
ex <- get_monthly_climate(coords, climatic_var = c("Tmin", "Tmax"), period = "2001-01",
output = "raster") # Multiple climatic variables

# Return dataframe for polygon
ex <- get_monthly_climate(coords, period = "2001-01")

```

get_periods

Get available climatic data versions and years available.

Description

Returns a data.frame describing the available climatic data versions and their temporal coverage (initial and latest available years).

Usage

```
get_periods()
```

Value

A data.frame containing the available climate data versions and their corresponding initial and latest available years.

Author(s)

Sofia Miguel

References

For details on the latest version of the climatic data, see: Pucher, Christoph (2026). Description of Downscaled European Climate Data. figshare. Online resource. <https://doi.org/10.6084/m9.figshare.33078053.v1>

For details on version 4, see: Pucher C. 2023. Description and Evaluation of Downscaled Daily Climate Data Version 4. <https://doi.org/10.6084/m9.figshare.22962671.v1>

Adam Moreno, Hubert Hasenauer. 2016. Spatial downscaling of European climate data. *International Journal of Climatology* 36: 1444–1458.

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