Package: agriclimr (via r-universe)

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Type Package

Title Agricultural Climate Data Processing and Agrometeorological Tools

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Description Tools for downloading and processing climate data of agricultural interest.

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URL https://github.com/joaobtj/agriclimr, https://joaobtj.github.io/agriclimr/

BugReports https://github.com/joaobtj/agriclimr/issues

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Contents

`daily_to_hourly_lwd` *Disaggregate Daily Weather Data to Hourly Leaf Wetness Duration*

Description

Takes a daily data frame containing temperature extrema and average relative humidity, reconstructs the hourly parameters internally, and computes the hourly leaf wetness presence along with its daily operational hour sum.

Usage

```
daily_to_hourly_lwd(
  data,
  date_col,
  t_min_col,
  t_max_col,
  rh_daily_col,
  lat_col,
  rh_threshold = 85
)
```

Arguments

`data`	A data frame containing the daily weather records.
`date_col`	Unquoted name of the column containing the Date object.
`t_min_col`	Unquoted name of the column containing the current day's minimum temperature (°C).
`t_max_col`	Unquoted name of the column containing the current day's maximum temperature (°C).
`rh_daily_col`	Unquoted name of the column containing the daily average relative humidity (%).
`lat_col`	Unquoted name of the column containing the latitude (decimal degrees).
`rh_threshold`	A single numeric value indicating the RH percentage above which leaf wetness is assumed to occur. Default is 85% based on optimized regional validations.

Value

A tibble (data frame) expanded to hourly resolution (24 rows per original daily row) with four columns: `datetime` (POSIXct), `temperature_hourly` (°C), `rh_hourly` (\ `leaf_wetness_hourly` (binary 0/1), and `lwd_daily_sum` (total wet hours in that day).

Examples

```
# Sample daily dataset matching your exact input structure with 5 continuous days
daily_series <- tibble::tibble(
  date = as.Date("2026-06-01") + 0:4,
  lat = rep(-27.3, 5),
  tmin = c(12.0, 13.5, 11.0, 10.5, 14.0),
  tmax = c(22.0, 24.5, 21.0, 19.5, 23.0),
  rh_mean = c(80, 75, 85, 90, 70)
)

daily_to_hourly_lwd(daily_series, date, tmin, tmax, rh_mean, lat, rh_threshold = 85)
```

`daily_to_hourly_rh` *Disaggregate Daily Weather Data to Hourly Relative Humidity*

Description

Takes a daily data frame containing temperature extrema and average relative humidity, reconstructs the hourly temperature internally, and uses it to generate a 24-hour profile of relative humidity for each day. Returns a clean time-series data frame with combined datetime.

Usage

```
daily_to_hourly_rh(data, date_col, t_min_col, t_max_col, rh_daily_col, lat_col)
```

Arguments

`data`	A data frame containing the daily weather records.
`date_col`	Unquoted name of the column containing the Date object.
`t_min_col`	Unquoted name of the column containing the current day's minimum temperature (°C).
`t_max_col`	Unquoted name of the column containing the current day's maximum temperature (°C).
`rh_daily_col`	Unquoted name of the column containing the daily average relative humidity (%).
`lat_col`	Unquoted name of the column containing the latitude (decimal degrees).

Value

A tibble (data frame) expanded to hourly resolution (24 rows per original daily row) with three columns: `datetime` (POSIXct), `temperature_hourly` (°C), and `rh_hourly` (%).

Examples

```
# Sample daily dataset matching your exact input structure with 5 continuous days
daily_series <- tibble::tibble(
  date = as.Date("2026-06-01") + 0:4,
  lat = rep(-27.3, 5),
  tmin = c(12.0, 13.5, 11.0, 10.5, 14.0),
  tmax = c(22.0, 24.5, 21.0, 19.5, 23.0),
  rh_mean = c(80, 75, 85, 90, 70)
)

daily_to_hourly_rh(daily_series, date, tmin, tmax, rh_mean, lat)
```

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daily_to_hourly_temp *Expand Daily Temperature Data Frame to Hourly Scale*

Description

Takes a data frame containing daily records (minimum and maximum temperatures) and expands it into an hourly data frame (24 rows per day) using a sine-exponential reconstruction model. Returns a clean time-series data frame with combined datetime.

Usage

```
daily_to_hourly_temp(data, date_col, t_min_col, t_max_col, lat_col)
```

Arguments

`data`	A data frame containing the daily weather records.
`date_col`	Unquoted name of the column containing the Date object.
`t_min_col`	Unquoted name of the column containing the current day's minimum temperature (°C).
`t_max_col`	Unquoted name of the column containing the current day's maximum temperature (°C).
`lat_col`	Unquoted name of the column containing the latitude (decimal degrees).

Value

A tibble (data frame) expanded to hourly resolution (24 rows per original daily row) with two columns: `datetime` (POSIXct) and `temperature_hourly` (°C).

Examples

```
# Sample daily dataset representing 5 continuous days
daily_series <- tibble::tibble(
  date = as.Date("2026-06-01") + 0:4,
  lat = rep(-27.3, 5),
  tmin = c(12.0, 13.5, 11.0, 10.5, 14.0),
```

```
  tmax = c(22.0, 24.5, 21.0, 19.5, 23.0)
)

daily_to_hourly_temp(daily_series, date, tmin, tmax, lat)
```

`estimate_hourly_rh` *Estimate Hourly Relative Humidity from Daily Metrics*

Description

Reconstructs a 24-hour profile of hourly relative humidity values based on daily average relative humidity, daily average temperature, and a vector of hourly temperatures. It assumes that the actual vapor pressure remains constant throughout the day.

Usage

```
estimate_hourly_rh(rh_daily, t_daily, t_hourly)
```

Arguments

`rh_daily`	A single numeric value representing the daily average relative humidity (%).
`t_daily`	A single numeric value representing the daily average temperature (°C).
`t_hourly`	A numeric vector of length 24 containing the hourly temperatures (°C).

Value

A numeric vector of length 24 containing estimated hourly relative humidity values (%).

Examples

```
daily_rh <- 80
daily_t <- 20
hourly_t <- c(16, 15, 14, 14, 15, 17, 19, 21, 23, 24, 25, 25,
              24, 23, 22, 21, 20, 19, 18, 17, 17, 16, 16, 16)

estimate_hourly_rh(rh_daily = daily_rh, t_daily = daily_t, t_hourly = hourly_t)
```

`estimate_hourly_temp` *Reconstruct Hourly Temperatures from Daily Extrema*

Description

Reconstructs a 24-hour hourly temperature profile from daily minimum, maximum, and the next day's minimum temperatures using a sine-exponential model.

Usage

```
estimate_hourly_temp(
  t_min,
  t_max,
  t_min_next,
  lat,
  doy,
  alpha = 2.75,
  beta = 1.4,
  gamma = 2.75
)
```

Arguments

`t_min`	Single numeric value of the current day's minimum temperature (°C).
`t_max`	Single numeric value of the current day's maximum temperature (°C).
`t_min_next`	Single numeric value of the next day's minimum temperature (°C).
`lat`	Latitude of the location in decimal degrees.
`doy`	Day of the year (Julian day, 1 to 365/366).
`alpha`	Parameters for the time lag between solar noon and maximum temperature (hours). Default is 2.75.
`beta`	Parameters for the time lag between minimum temperature and sunrise (hours). Default is 1.40.
`gamma`	Parameter representing the temperature characteristics decay rate at night. Default is 2.75.

Value

A numeric vector of length 24 containing the reconstructed hourly temperatures (°C) from 00:00 to 23:00.

Examples

```
estimate_hourly_temp(t_min = 12, t_max = 25, t_min_next = 13, lat = -27.28, doy = 150)
```

`estimate_lwd_rh` *Estimate Leaf Wetness Duration (LWD)*

Description

Estimates the number of hours of leaf wetness based on a Relative Humidity (RH) threshold. This is a standard empirical approach used in agricultural meteorology to predict plant disease risks.

Usage

```
estimate_lwd_rh(rh, threshold = 90)
```

Arguments

`rh`	A numeric vector containing hourly Relative Humidity values (0 to 100).
`threshold`	A numeric value indicating the RH percentage above which leaf wetness is assumed to occur. Default is 90%.

Value

A numeric vector of the same length as `rh` containing binary values: 1 (wet) or 0 (dry).

Examples

```
hourly_rh <- c(85, 88, 91, 95, 92, 87, 80)
estimate_lwd_rh(hourly_rh, threshold = 90)
```

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