

Package ‘droughtevents’

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Title Identify and Characterize Drought Events from Drought Index Time Series

Version 0.1.0

Description Detects, describes, and analyzes drought events from time series of drought indices, such as the Standardized Precipitation-Evapotranspiration Index (SPEI). Identifies drought episodes based on threshold values and calculates their duration, intensity, severity, and peak month. Includes utilities for summarizing and visualizing drought dynamics over time. The Standardized Precipitation-Evapotranspiration Index is described in Vicente-Serrano et al. (2010) [<doi:10.1175/2009JCLI2909.1>](https://doi.org/10.1175/2009JCLI2909.1).

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Encoding UTF-8

Suggests spelling, testthat (>= 3.0.0)

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URL <https://github.com/ajpelu/droughtevents>,
<https://ajpelu.github.io/droughtevents/>

BugReports <https://github.com/ajpelu/droughtevents/issues>

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add_drought_events	<i>Add drought period (bands or markers) to a spei time series plot</i>
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Description

Adds shaded polygons, vertical lines, or both to a ggplot object to highlight drought events, based on a drought assessment summary (as returned by `droughts()`). Optionally, labels or points can be added to indicate drought severity.

Usage

```
add_drought_events(
  p,
  drought_assessment,
  which_events = c("all", "top"),
  metric = c("duration", "severity", "intensity", "lowest_index"),
  top_n = 5,
  type = c("line", "polygon", "both"),
  line_col = "black",
  line_type = "dashed",
  pol_fill = "gray70",
  pol_alpha = 0.5,
  show_severity = FALSE
)
```

Arguments

<code>p</code>	A ggplot object created by <code>plot_drought_ts()</code> .
<code>drought_assessment</code>	A data frame with columns <code>minyear</code> , <code>month_peak</code> , <code>d_duration</code> , <code>d_severity</code> , and others, as returned by <code>droughts()</code> .
<code>which_events</code>	Display "all" droughts or only the "top" events.
<code>metric</code>	If <code>which_events = "top"</code> , use this column to rank events. Options: "duration", "severity", "intensity", "lowest_index".
<code>top_n</code>	Number of top events to display when <code>which_events = "top"</code> . Default to 5.
<code>type</code>	Type of marker to display: "polygon" (shaded bands), "line" (vertical lines at peak), or "both".
<code>line_col</code>	Color of vertical line (if used).

<code>line_type</code>	Line type of vertical line (e.g. "dashed", "solid").
<code>pol_fill</code>	Fill color of polygon (if used).
<code>pol_alpha</code>	Transparency of polygon fill.
<code>show_severity</code>	Logical. If TRUE, plots a point and label for severity at top of each event.

Value

A modified ggplot object.

Examples

```
data(spei_granada)

result <- droughts(spei_granada, vname = "spei12", threshold = -1.28)

p <- plot_drought_ts(spei_granada, vname = "spei12")

add_drought_events(
  p,
  drought_assessment = result$drought_assessment,
  which_events = "top",
  metric = "severity",
  top_n = 3,
  type = "both",
  show_severity = TRUE
)
```

droughts	<i>Detect and summarize drought events from SPEI droughts index time series</i>
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Description

Identifies drought events in a time series when a given index (e.g., SPEI) falls below a specified threshold for at least two consecutive months. Returns the processed dataset, the detected drought events, and a summary of their characteristics.

Usage

```
droughts(df, vname, threshold, min_duration = 2)
```

Arguments

`df` A data.frame or tibble containing the time series data. Must include either:

- a date column of class Date or POSIXct, or
- separate year and month columns.

- a numeric column specified by vname that contains the drought index values.
- vname A string indicating the name of the numeric column to be evaluated (e.g., "spei12").
- threshold A numeric threshold below which values are considered part of a drought event.
- min_duration Minimum number of consecutive months below threshold required for an event to be considered a drought. Default is 2.

Value

A named list with three elements:

- data: the original data frame with drought flags and durations.
- drought_events: only the rows that are part of drought events (duration >= min_duration).
- drought_assessment: summary of each event, including duration, intensity, severity, and timing.

Examples

```
data(spei_granada)
# Detect droughts in the SPEI-12 time series with a threshold of -1.28
droughts_result <- droughts(spei_granada, vname = "spei12", threshold = -1.28)
```

plot_drought_ts *Plot Drought Index Time Series with Positive/Negative Bars*

Description

Creates a bar plot of a drought-related time series (e.g., SPEI or SPI), where values above and below zero are colored differently. Optionally, the time series can be aggregated and displayed by year.

Usage

```
plot_drought_ts(
  df,
  vname,
  title = NULL,
  date_col = "date",
  pos_color = "blue",
  neg_color = "red",
  zero_line_color = "black",
  zero_line_linetype = "solid",
  by_year = FALSE,
  y_axis_title = NULL
)
```

Arguments

<code>df</code>	A <code>data.frame</code> or <code>tibble</code> containing the time series data.
<code>vname</code>	A string. Name of the numeric column representing the drought index.
<code>title</code>	An optional character string for the plot title.
<code>date_col</code>	A string. Name of the column containing date information (default is "date").
<code>pos_color</code>	Color used for positive values (default is "blue").
<code>neg_color</code>	Color used for negative values (default is "red").
<code>zero_line_color</code>	Color of the horizontal line at zero (default is "black").
<code>zero_line_linetype</code>	Line type for the horizontal zero line (default is "solid").
<code>by_year</code>	Logical. If TRUE, aggregates the drought index by year and plots annual means (default is FALSE).
<code>y_axis_title</code>	Optional label for the y-axis. If NULL, the name of <code>vname</code> is used.

Details

This plot is useful for visualizing the temporal dynamics of drought indices, highlighting positive (wet) and negative (dry) periods. When `by_year = TRUE`, the function averages the index per year and plots one bar per year.

Value

A `ggplot` object representing the drought index time series as a bar plot.

See Also

[droughts\(\)](#)

Examples

```
data(spei_granada)
plot_drought_ts(spei_granada, vname = "spei12", title = "SPEI-12 Time Series")
plot_drought_ts(spei_granada, vname = "spei12", title = "SPEI-12 Annual Mean", by_year = TRUE)
```

spei_granada

SPEI time series for Granada

Description

Standardised Precipitation-Evapotranspiration Index (SPEI) time series for Granada, Spain (coordinates -3.75, 37.25), at four different time scales (6, 12, 24, and 48 months). SPEI is a multi-scalar drought index that combines precipitation and evapotranspiration data; negative values indicate drier-than-average conditions, positive values indicate wetter-than-average conditions.

Note that the longer time scales (`spei12`, `spei24`, `spei48`) require that many months of prior data to be computed, so they contain NaN values at the start of the series.

Usage

```
spei_granada
```

Format

A data frame (tibble) with 1,483 rows and 5 columns:

date Date of the observation (class Date), monthly from 1901-06-16 to 2024-12-16.

spei6 SPEI at the 6-month time scale.

spei12 SPEI at the 12-month time scale. NaN for the first months of the series.

spei24 SPEI at the 24-month time scale. NaN for the first months of the series.

spei48 SPEI at the 48-month time scale. NaN for the first months of the series.

Value

A tibble with 1,483 rows and 5 columns, as described in @format.

Source

https://spei.csic.es/spei_database/

References

Vicente-Serrano, S.M., Beguería, S., López-Moreno, J.I. (2010). A Multi-scalar Drought Index Sensitive to Global Warming: The Standardized Precipitation Evapotranspiration Index. *Journal of Climate*, 23(7), 1696-1718. doi:10.1175/2009JCLI2909.1

Examples

```
data(spei_granada)
tail(spei_granada)
```

```
# Detect drought events using the 12-month SPEI
droughts(spei_granada, vname = "spei12", threshold = -1.28)
```

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