

Package ‘scPDSIr’

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Type Package

Title Calculation of the Self-Calibrating Palmer Drought Severity Index
from gridded data

Version 0.1.0

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Description Calculating the monthly conventional and self-calibrating Palmer Drought Severity Index (scPDSI) using gridded precipitation and potential evapotranspiration data.
This is a modified version of scPDSI CRAN package adapted to better suit gridded data supplied by the package gridclimind.
The function to calculate PDSI is based on the C++ source codes developed by Nathan Wells, Steve Goddard and Michael J. Hayes, University of Nebraska-Lincoln.
Reference: Palmer W. (1965). Meteorological drought.
U.s.department of Commerce Weather Bureau Research Paper,
<<https://www.ncdc.noaa.gov/temp-and-precip/drought/docs/palmer.pdf>>;
Wells N., Goddard S., Hayes M. J. (2004). A Self-Calibrating Palmer Drought Severity Index.
Journal of Climate, 17(12):2335-2351, <DOI:10.1175/1520-0442(2004)017%3C2335:ASPDSI%3E2.0.CO;2>.

License GPL-3

Encoding UTF-8

LazyData true

Depends R (>= 3.0)

Imports stats, Rcpp (>= 0.12.0)

URL <https://github.com/>

BugReports <https://github.com/>

RoxygenNote 7.0.2

LinkingTo Rcpp

NeedsCompilation yes

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Repository GitHub

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pdsi	<i>Calculate the (sc)PDSI</i>
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Description

Calculating the monthly Self-calibrating PDSI (scPDSI) using the precipitation and potential evapotranspiration.

Usage

```
pdsi(
  indat,
  AWC = NULL,
  start = NULL,
  end = NULL,
  cal_start = NULL,
  cal_end = NULL,
  sc = TRUE
)
```

Details

The Palmer Drought Severity Index (PDSI), proposed by Palmer (1965), is a widely used drought indicator to quantify the long-term drought conditions, for an area at a certain time. The PDSI is a semi-physical based drought index calculated using the precipitation and potential evapotranspiration data, based on a simple two-layer bucket water balance model. Conventionally, the constants to calculate the PDSI were firstly empirically derived by using the meteorological records in Kansas and Iowa in middle US with a semi-arid climate conditions, therefore the conventional PDSI usually could not satisfactorily represent the drought conditions for other areas around the world, which also makes spatial comparisons of PDSI values difficult.

For this, Wells et al. (2004) proposed a self-calibrating Palmer Drought Severity Index (scPDSI). The scPDSI could automatically adjust the empirical constants in the PDSI computation with dynamically calculated values. Several works have proved that the scPDSI performs better in spatially comparison than the conventional PDSI. For more details please see the works of Wells et al. (2004).

Value

This function return a vector of scpdsi.

References

Palmer W., 1965. Meteorological drought. U.s.department of Commerce Weather Bureau Research Paper.

Wells, N., Goddard, S., Hayes, M. J., 2004. A Self-Calibrating Palmer Drought Severity Index. Journal of Climate, 17(12):2335-2351.

Examples

```
library(scPDSIr)
scpdsi(indat, start, end, cal_start, cal_end)
Where the dataframe "indat" contains the following variables:
```

P = Monthly precipitation series without NA [mm]. Can be a time series.

PE = Monthly potential evapotranspiration corresponding to the precipitation series. Can be calculated by the Penman-Monteith or the Thonthwate equation [mm].

lat = Latitude (degrees)

lon = Longitude (degrees)

The following are provided as separate arguments:

AWC Available Water Capacity of the soil layer [mm]. This will be retrieved automatically from a 0.1 degree European grid and does not need to be supplied. However if using a single site this can be specified if required.

start Integer. Start year of the PDSI to be calculated default 1.

end Integer. End year of the PDSI to be calculated.

cal_start Integer. Start year of the calibrate period. Default is start year.

cal_end Integer. End year of the calibrate period. Default is end year.

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