Package 'rsoi'

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Type Package

Title Import Various Northern and Southern Hemisphere Climate Indices

Version 0.5.8

Description Downloads Southern Oscillation Index, Oceanic Nino Index, North Pacific Gyre Oscillation data, North Atlantic Oscillation and Arctic Oscillation. Data sources are described in the help files for each function.

License GPL (>= 3)

URL https://boshek.github.io/rsoi/, https://github.com/boshek/rsoi

Depends R (>= 3.3.0)

Imports curl, memoise, stats, utils

Suggests testthat (>= 2.1.0), tibble

Encoding UTF-8

RoxygenNote 7.3.3

BugReports https://github.com/boshek/rsoi/issues

NeedsCompilation no

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Repository CRAN

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Contents

`download_aao` *Download Antarctic Oscillation data*

Description

Projection of the monthly 700 hPa anomaly height field south of 20°S on the first EOF obtained from the monthly 700 hPa height anomaly.

Usage

```
download_aao(use_cache = FALSE, file = NULL)
```

Arguments

`use_cache`	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
`file`	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Month: Month of record
- Year: Year of record
- AAO: Antarctic Oscillation

References

https://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/aao/aao.shtml

Examples

```
## Not run:
aao <- download_aao()

## End(Not run)
```

download_ao *Download Arctic Oscillation data*

Description

Projection of the daily 1000 hPa anomaly height field north of 20°N on the first EOF obtained from the monthly 1000 hPa height anomaly.

Usage

```
download_ao(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Month: Month of record
- Year: Year of record
- AO: Arctic Oscillation

References

https://www.ncei.noaa.gov/access/monitoring/ao/

Examples

```
## Not run:
ao <- download_ao()

## End(Not run)
```

`download_asymsam_monthly` *Download Asymmetric and Symmetric SAM indices*

Description

Deprecated. The upstream API for the Asymmetric and Symmetric SAM indices is no longer available. These functions now return `NULL` with a warning.

Usage

```
download_asymsam_monthly(use_cache = FALSE, file = NULL)

download_asymsam_daily(use_cache = FALSE, file = NULL)
```

Arguments

`use_cache`	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
`file`	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

`NULL` (invisibly). A warning is issued.

References

Campitelli, E., Diaz, L. B., & Vera, C. (2022). Assessment of zonally symmetric and asymmetric components of the Southern Annular Mode using a novel approach. Climate Dynamics, 58(1), 161-178. doi:10.1007/s00382021058965

Examples

```
## Not run:
asymsam <- download_asymsam_monthly()

## End(Not run)
```

download_dmi *Download Dipole Mode Index (DMI)*

Description

Intensity of the IOD is represented by anomalous SST gradient between the western equatorial Indian Ocean (50E-70E and 10S-10N) and the south eastern equatorial Indian Ocean (90E-110E and 10S-0N). This gradient is named as Dipole Mode Index (DMI). When the DMI is positive then, the phenomenon is refereed as the positive IOD and when it is negative, it is refereed as negative IOD.

Usage

```
download_dmi(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Year: Year of record
- Month: Month of record
- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- DMI: Dipole Mode Index

References

https://psl.noaa.gov/gcos_wgsp/Timeseries/DMI/

Examples

```
## Not run:
dmi <- download_dmi()

## End(Not run)
```

download_enso *Download Southern Oscillation Index and Oceanic Nino Index data*

Description

The Southern Oscillation Index is defined as the standardized difference between barometric readings at Darwin, Australia and Tahiti. The Oceanic Nino Index is average sea surface temperature in the Nino 3.4 region (120W to 170W) averaged over three months. Phases are categorized by Oceanic Nino Index:

- Warm phase of El Nino/ Southern Oscillation when 3-month average sea-surface temperature departure of positive 0.5 degC
- Cool phase of La Nina/ Southern Oscillation when 3-month average sea-surface temperature departure of negative 0.5 degC
- Neutral phase is defined as when the three month temperature average is between +0.5 and -0.5 degC

Usage

```
download_enso(climate_idx = c("all", "soi", "oni", "npgo"), create_csv = FALSE)
```

Arguments

climate_idx	Choose which ENSO related climate index to output. Current arguments supported are soi (the Southern Oscillation Index), oni (the Oceanic Nino Index), npgo (the North Pacific Gyre Oscillation) and all. all outputs each supported index variable as a slimmer dataset than each individual climate index call.
create_csv	Logical option to create a local copy of the data. Defaults to FALSE.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Month: Month of record
- Year: Year of record
- ONI: Oceanic Oscillation Index
- phase: ENSO phase
- SOI: Southern Oscillation Index
- NPGO: North Pacific Gyre Oscillation

Examples

```
## Not run:
enso <- download_enso()

## End(Not run)
```

download_mei *Download Multivariate ENSO Index Version 2 (MEI.v2)*

Description

MEI.v2 is based on EOF analysis of level pressure, sea surface temperature, surface zonal winds, surface meridional winds, and Outgoing Longwave Radiation. The analysis is conducted for 12 partially overlapping 2-month "seasons".

Warm phase is defined as MEI index greater or equal to 0.5. Cold phase is defined as MEI index lesser or equal to -0.5.

Usage

```
download_mei(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Month: Bi-moonthly season of record
- Year: Year of record
- MEI: Multivariate ENSO Index Version 2
- Phase: ENSO phase

References

https://psl.noaa.gov/enso/mei/

Examples

```
## Not run:
mei <- download_mei()

## End(Not run)
```

download_nao *Download North Atlantic Oscillation data*

Description

surface sea-level pressure difference between the Subtropical (Azores) High and the Subpolar Low.

Usage

```
download_nao(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Month: Month of record
- Year: Year of record
- NAO: North Atlantic Oscillation

References

https://www.ncei.noaa.gov/access/monitoring/nao/

Examples

```
## Not run:
nao <- download_nao()

## End(Not run)
```

download_npgo *Download North Pacific Gyre Oscillation data*

Description

North Pacific Gyre Oscillation data also known as the Victoria mode

Usage

```
download_npgo(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Year: Year of Record
- Month: Month of record
- NPGO: North Pacific Gyre Oscillation

References

https://www.oces.us/npgo/

Examples

```
## Not run:
npgo <- download_npgo()

## End(Not run)
```

download_oni *Download Oceanic Nino Index data*

Description

The Oceanic Nino Index is average sea surface temperature in the Nino 3.4 region (120W to 170W) averaged over three months. Phases are categorized by Oceanic Nino Index:

- Warm phase of El Nino/ Southern Oscillation when 3-month average sea-surface temperature departure of positive 0.5 degC
- Cool phase of La Nina/ Southern Oscillation when 3-month average sea-surface temperature departure of negative 0.5 degC
- Neutral phase is defined as when the three month temperature average is between +0.5 and -0.5 degC

Usage

```
download_oni(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Month: Month of record
- Year: Year of record
- ONI: Oneanic Oscillation Index
- ONI_month_window: 3 month period over which the Oneanic Oscillation Index is calculated
- phase: ENSO phase

References

https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml

Examples

```
## Not run:
oni <- download_oni()

## End(Not run)
```

download_pdo *Download Pacific Decadal Oscillation Data*

Description

The PDO index is derived as the leading principal of monthly SST anomalies in the North Pacific Ocean, poleward of 20N. The monthly mean global average SST anomalies are removed to separate this pattern of variability from any "global warming" signal that may be present in the data.

The NCEI PDO index is based on NOAA's extended reconstruction of SSTs (ERSST Version 4). It is constructed by regressing the ERSST anomalies against the Mantua PDO index for their overlap period, to compute a PDO regression map for the North Pacific ERSST anomalies. The ERSST anomalies are then projected onto that map to compute the NCEI index. The NCEI PDO index closely follows the Mantua PDO index.

Usage

```
download_pdo(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Month: Month of record
- Year: Year of record
- PDO: Pacific Decadal Oscillation index

References

Original PDO: https://www.ncei.noaa.gov/access/monitoring/pdo/

Examples

```
## Not run:
pdo <- download_pdo()

## End(Not run)
```

download_roni *Download Relative Oceanic Nino Index data*

Description

El Niño–Southern Oscillation (ENSO) is often characterized through the use of sea surface temperature (SST) departures from their climatological values, as in the Niño-3.4 index. However, this approach is problematic in a changing climate when the climatology itself is varying. To address this issue, van Oldenborgh et al. proposed a relative Niño-3.4 SST index, which subtracts the tropical mean SST anomaly from the Niño-3.4 index and multiplies by a scaling factor.

- The cold phase was defined as periods in which the RONI values within a sliding five-season window were all below -0.5 degC
- The warm phase was defined as periods in which the RONI values within a sliding five-season window were all above 0.5 degC
- The neutral phase was defined as the situation outside the definitions of warm phase and cold phase

Usage

```
download_roni(use_cache = FALSE, file = NULL)
```

Arguments

use_cache	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
file	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Year: Year of record
- Season: Season of record
- roni: Relative Oceanic Niño Index, using the 1991–2020 base period "3 month running mean of ERSST.v5 SST anomalies in the Niño 3.4 region (5°N–5°S, 120°–170°W) with average tropical mean (20°N–20°S) SST anomalies subtracted. The difference is then adjusted so the variance equals the original Niño 3.4 index".
- Start_Month: Start month of record
- End_Month: End month of record
- phase: ENSO phase

References

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso/roni/#latest-data
doi:10.1175/JCLID230406.1

Examples

```
## Not run:
roni <- download_roni()

## End(Not run)
```

`download_soi` *Download Southern Oscillation Index data*

Description

The Southern Oscillation Index is defined as the standardized difference between barometric readings at Darwin, Australia and Tahiti.

Usage

```
download_soi(use_cache = FALSE, file = NULL)
```

Arguments

`use_cache`	logical option to save and load from cache. If 'TRUE', results will be cached in memory if 'file' is 'NULL' or on disk if 'file' is not 'NULL'.
`file`	optional character with the full path of a file to save the data. If 'cache' is 'FALSE' but 'file' is not 'NULL', the results will be downloaded from the internet and saved on disk.

Value

- Date: Date object that uses the first of the month as a placeholder. Date formatted as date on the first of the month because R only supports one partial of date time
- Month: Month of record
- Year: Year of record
- SOI: Southern Oscillation Index
- SOI_3MON_AVG: 3 Month Average Southern Oscillation Index

References

https://www.cpc.ncep.noaa.gov/data/indices/soi

Examples

```
## Not run:
soi <- download_soi()

## End(Not run)
```

Index