Package 'icecdr'

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Type Package

Title Download Sea Ice Concentration Data from the NSIDC Climate Data Record

Version 1.2.0

Description Programmatic access to NSIDC's sea ice concentration CDR <https://nsidc.org/data/g02202> via ERDAPP server and Sea Ice index <https://nsidc.org/data/g02135>. Supports caching results and optional fixes for some inconsistencies of the raw files.

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Encoding UTF-8

Depends R (>= 4.3.0)

Suggests here, ncdf4, rcdo, testthat (>= 3.0.0), vcr

Imports cli, digest, glue, httr2, rlang

URL https://github.com/eliocamp/icecdr, https://eliocamp.github.io/icecdr/

BugReports https://github.com/eliocamp/icecdr/issues

Config/testthat/edition 3

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NeedsCompilation no

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Contents

`cdr` *Download sea ice concentration from NSIDC Climate Data Record*

Description

This is a low-level function to download data from PolarWatch's ERDDAP server.

Usage

```
cdr(
  date_range = c(NA, NA),
  variables = "aice",
  hemisphere = c("south", "north"),
  resolution = c("monthly", "daily"),
  date_stride = 1,
  xgrid_range = c(NA, NA),
  xgrid_stride = 1,
  ygrid_range = c(NA, NA),
  ygrid_stride = 1,
  version = 6,
  format = "nc",
  file = NULL,
  dir = tempdir(),
  use_cache = TRUE
)
```

Arguments

`date_range` Vector of size two with the start and end dates. Supported formats are:

- A Date or POSIXct/POSIXlt object.
- A character vector with ISO format dates: `c("2020-01-01", "2020-12-31")`
- A character vector with year-month: `c("2020-01", "2020-06")` (expands to first/last day of month).
- A character vector with year only: `c("2020", "2021")` (expands to full year).

`variables` Character vector with the variables to fetch. Valid values are

`aice` CDR Sea ice concentration.

`qa` Quality control flag.

`stdev` Sea ice standard deviation.

`interpolation_spatial` Flag for spatial interpolation.

`interpolation_temporal` Flag for temporal interpolation.

`aice_bt` Sea ice concentration of the Bootstrap method.

`aice_nt` Sea ice concentration of the Nasa Team method.

	Although not all variables are available in all versions and all resolutions. The `*_nt` and `*_bt` variables are only available in version 4 and the interpolation flags are only available for daily values.
`hemisphere`	Character with the hemisphere to download. Can be either "south" or "north".
`resolution`	Character with the temporal resolution. Can be either "monthly" or "daily".
`date_stride`	Numeric with the temporal stride. A number greater than 1 means to take only the nth date in the series.
`xgrid_range`	Numeric vector of size 2 with the range of the x dimension.
`xgrid_stride`	Numeric with the stride of the x dimension.
`ygrid_range`	Numeric vector of size 2 with the range of the y dimension.
`ygrid_stride`	Numeric with the stride of the y dimension.
`version`	Version of the dataset. Can be 4 or 5.
`format`	Character with the format.
`file`	Character with the file name to use for download. If `NULL`, the file name will be constructed by hashing the request URL. Requests consisting in more than one file will append a number.
`dir`	Directory where to download the file.
`use_cache`	Logical indicating whether to not perform the download if the file already exist.

Value

Path or vector of paths to the downloaded files.

Examples

```
## Not run:
cdr(date_range = c("2022-01", "2022-01"),
    # Data every 7 days
    date_stride = 7,
    resolution = "daily",
    # Thin the grid by taking every other gridpoint
    xgrid_stride = 2,
    ygrid_stride = 2,
    hemisphere = "north"
    )

## End(Not run)
```

cdr_antarctic_monthly *Convenience functions*

Description

These are convenience functions to download, daily or monthly sea ice concentration data from the whole Antarctic or Arctic. For a more complete low level function, see `cdr()`.

Usage

```
cdr_antarctic_monthly(
  date_range,
  variables = "aice",
  version = 6,
  file = NULL,
  dir = tempdir(),
  use_cache = TRUE
)

cdr_antarctic_daily(
  date_range,
  variables = "aice",
  version = 6,
  file = NULL,
  dir = tempdir(),
  use_cache = TRUE
)

cdr_arctic_monthly(
  date_range,
  variables = "aice",
  version = 6,
  file = NULL,
  dir = tempdir(),
  use_cache = TRUE
)

cdr_arctic_daily(
  date_range,
  variables = "aice",
  version = 6,
  file = NULL,
  dir = tempdir(),
  use_cache = TRUE
)
```

Arguments

`date_range`	Vector of size two with the start and end dates. Supported formats are: • A Date or POSIXct/POSIXlt object. • A character vector with ISO format dates: `c("2020-01-01", "2020-12-31")` • A character vector with year-month: `c("2020-01", "2020-06")` (expands to first/last day of month). • A character vector with year only: `c("2020", "2021")` (expands to full year).
`variables`	Character vector with the variables to fetch. Valid values are `aice` CDR Sea ice concentration. `qa` Quality control flag. `stdev` Sea ice standard deviation. `interpolation_spatial` Flag for spatial interpolation. `interpolation_temporal` Flag for temporal interpolation. `aice_bt` Sea ice concentration of the Bootstrap method. `aice_nt` Sea ice concentration of the Nasa Team method. Although not all variables are available in all versions and all resolutions. The `*_nt` and `*_bt` variables are only available in version 4 and the interpolation flags are only available for daily values.
`version`	Version of the dataset. Can be 4 or 5.
`file`	Character with the file name to use for download. If `NULL`, the file name will be constructed by hashing the request URL. Requests consisting in more than one file will append a number.
`dir`	Directory where to download the file.
`use_cache`	Logical indicating whether to not perform the download if the file already exist.

Value

A string vector with the location of the downloaded files

Examples

```
## Not run:
cdr_antarctic_monthly(c("2022-01", "2022-01"))

## End(Not run)
```

cdr_fix *Minor fixes to CDR files.*

Description

cdr_fix() "fixes" some inconsistencies in the raw data. It standardised variable names between versions and temporal resolutions and adds projection information to the grid definition so CDO can compute the area of each gridpoint to compute weighted means or area integrals. Both require the rcdo package and CDO installed.

Usage

```
cdr_fix(files, fix = c("names", "grid"))

cdr_fix_names(files)

cdr_fix_grid(files)
```

Arguments

files	Path to the files.
fix	Character vector with the fixes to implement.

Details

cdr_fix_names() and cdr_fix_grid() are aliases for cdr_fix(fix = "names") and cdr_fix(fix = "grid"), respectively. Using cdr_fix() to fix both at the same time is more efficient as it recreates each file only once.

Value

The path to the modified files.

Examples

```
## Not run:
cdr_antarctic_monthly(c("2022-01", "2022-01")) |>
  cdr_fix()

## End(Not run)
```

sea_ice_index *Download sea ice index data.*

Description

The NSIDC sea ice index product provides computed sea ice extent for each hemisphere on daily and monthly resolution.

Usage

```
sea_ice_index(
  hemisphere = c("south", "north"),
  resolution = c("monthly", "daily"),
  file = NULL,
  dir = tempdir(),
  use_cache = TRUE
)
```

Arguments

hemisphere	Character with the hemisphere to download. Can be either "south" or "north".
resolution	Character with the temporal resolution. Can be either "monthly" or "daily".
file	Character with the file name to use for download. If NULL, the file name will be constructed by hashing the request URL. Requests consisting in more than one file will append a number.
dir	Directory where to download the file.
use_cache	Logical indicating whether to not perform the download if the file already exist.

Details

The returned files are not the raw files, but contain minor format modifications for ease of use. Instead of year and month columns, there is a single time column. Instead of a region column with "S" or "N" values, there is a hemisphere column with values "south" and "north" (for consistency with the function arguments). Column names are all in lower case and are the same for the daily and monthly products, except for an area column that is only available in the monthly product. Area and extent values are expressed in km^2.

Value

The route to the file name.

Examples

```
## Not run:
sea_ice_index("south", "monthly")

## End(Not run)
```

Index