Package 'cmsafvis'

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Title Tools to Visualize CM SAF NetCDF Data

Version 1.1.12

Description The Satellite Application Facility on Climate Monitoring (CM SAF) is a ground segment of the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) and one of EUMETSATs Satellite Application Facilities. The CM SAF contributes to the sustainable monitoring of the climate system by providing essential climate variables related to the energy and water cycle of the atmosphere (<https://www.cmsaf.eu>). It is a joint cooperation of eight National Meteorological and Hydrological Services.
The 'cmsafvis' R-package provides a collection of R-operators for the analysis and visualization of CM SAF NetCDF data.
CM SAF climate data records are provided for free via (<https://wui.cmsaf.eu/safira>). Detailed information and test data are provided on the CM SAF webpage (<http://www.cmsaf.eu/R_toolbox>).

License GPL (>= 3)

BugReports https://github.com/cmsaf/cmsaf-r-tools/issues

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absolute_map *A 'cmsaf' extension for creating absolute valued plots.*

Description

This plotting routine generates graphical output for the given variable within the given time range and area. Dependent on the output format a PNG or MP4 is created.

Usage

```
absolute_map(
  config = NULL,
  variable = NULL,
  accumulate = FALSE,
  mean_value = FALSE,
  infile = NULL,
  temp_dir = tempdir(),
  out_dir = getwd(),
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "animation",
  animation_pace = 0.07,
  freeze_animation = FALSE,
  min_value = NULL,
  max_value = NULL,
  nbreaks = NULL,
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
  dwd_logo = FALSE,
  verbose = TRUE,
  nc = NULL
)
```

Arguments

config	Path to YAML config file (character). The config file does not have to specify all arguments. Each addressed argument has to be formatted according to the example config file: (#TODO: LINK EXAMPLE CONFIG FILE!).

variable	Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.
accumulate	Whether the input file should be accumulated (logical).
mean_value	Whether the input file should be averaged (logical).
infile	Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.
temp_dir	Path to temporary working directory (character).
out_dir	Path to output directory (character).
start_date	Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.
end_date	End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.
country_code	Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.
lon_min	Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.
lon_max	Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.
lat_min	Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.
lat_max	Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.
outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.
output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
animation_pace	Pace of the animation in seconds (positive numeric). This only has an effect if `output_format == 'animation'`.
freeze_animation	If TRUE then the animation will freeze at the last frame (logical).
min_value	Lower values than this are ignored (NULL or numeric). If NULL, no values are ignored.
max_value	Larger values than this are ignored (NULL or numeric). If NULL, no values are ignored.
nbreaks	Number of color breaks (NULL or positive integer). A value will be computed if NULL is passed.
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).

keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
dwd_logo	Whether to add the DWD logo (logical).
verbose	Whether to display progress messages (logical).
nc	Alternatively to `infile` you can specify the input as an object of class `ncdf4` (as returned from `ncdf4::nc_open`).

Details

You can pass a YAML config file and/or specify the arguments directly. Argument prioritization is done in the following way: Direct argument > config argument > default argument. Thus, if you pass a existing config file but also want to modify a specific argument you can do that easily.

`anomaly_map` *A 'cmsaf' extension for creating an anomaly map.*

Description

This plotting routine generates a graph showing the anomaly of a given variable within the given time range and area. The intended application is for daily accumulated data, such as sunshine duration. Dependent on the output format a PNG or MP4 is created.

Usage

```
anomaly_map(
  config = NULL,
  variable = NULL,
  accumulate = FALSE,
  mean_value = FALSE,
  infile = NULL,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start = 1983,
  climate_year_end = 2018,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
```

```
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "animation",
  animation_pace = 0.07,
  freeze_animation = FALSE,
  min_value = NULL,
  max_value = NULL,
  color_pal = 1,
  relative = FALSE,
  nbreaks = NULL,
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
  dwd_logo = FALSE,
  verbose = TRUE,
  nc = NULL
)
```

Arguments

config	Path to YAML config file (character). The config file does not have to specify all arguments. Each addressed argument has to be formatted according to the example config file: (#TODO: LINK EXAMPLE CONFIG FILE!).
variable	Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.
accumulate	Whether the input file should be accumulated (logical).
mean_value	Whether the input file should be averaged (logical).
infile	Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.
temp_dir	Path to temporary working directory (character).
out_dir	Path to output directory (character).
climate_dir	Path to directory in which climatology is computed or contained (NULL or character). If NULL then the temp_dir directory is taken.
climate_year_start	Start year of climatology (integer).
climate_year_end	End year of climatology (integer).
start_date	Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.
end_date	End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.

country_code	Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.
lon_min	Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.
lon_max	Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.
lat_min	Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.
lat_max	Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.
outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.
output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
animation_pace	Pace of the animation in seconds (positive numeric). This only has an effect if output_format == 'animation'.
freeze_animation	If TRUE then the animation will freeze at the last frame (logical).
min_value	Lower values than this are ignored (NULL or numeric). If NULL, no values are ignored.
max_value	Larger values than this are ignored (NULL or numeric). If NULL, no values are ignored.
color_pal	Color option for stripe and anomaly plots
relative	Use relative values for anomaly plots
nbreaks	Number of color breaks (NULL or positive integer). A value will be computed if NULL is passed.
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).
keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
dwd_logo	Whether to add the DWD logo (logical).
verbose	Whether to display progress messages (logical).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Details

You can pass a YAML config file and / or specify the arguments directly. Argument prioritization is done in the following way: Direct argument > config argument > default argument. Thus, if you pass a existing config file but also want to modify a specific argument you can do that easily.

`climatology_map` *A 'cmsaf' extension for creating a climatology map.*

Description

This plotting routine generates the climatological mean for the given variable within the given time range and area. The intended application is for daily accumulated data, such as sunshine duration. Dependent on the output format a PNG or MP4 is created.

Usage

```
climatology_map(
  config = NULL,
  variable = NULL,
  accumulate = FALSE,
  mean_value = FALSE,
  infile = NULL,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start = 1983,
  climate_year_end = 2018,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "animation",
  animation_pace = 0.07,
  freeze_animation = FALSE,
  min_value = NULL,
  max_value = NULL,
  nbreaks = NULL,
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
```

```
  dwd_logo = FALSE,
  verbose = TRUE,
  nc = NULL
)
```

Arguments

config	Path to YAML config file (character). The config file does not have to specify all arguments. Each addressed argument has to be formatted according to the example config file: (#TODO: LINK EXAMPLE CONFIG FILE!).
variable	Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.
accumulate	Whether the input file should be accumulated (logical).
mean_value	Whether the input file should be averaged (logical).
infile	Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.
temp_dir	Path to temporary working directory (character).
out_dir	Path to output directory (character).
climate_dir	Path to directory in which climatology is computed or contained (NULL or character). If NULL then the temp_dir directory is taken.
climate_year_start	Start year of climatology (integer).
climate_year_end	End year of climatology (integer).
start_date	Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.
end_date	End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.
country_code	Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.
lon_min	Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.
lon_max	Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.
lat_min	Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.
lat_max	Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.
outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.

output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
animation_pace	Pace of the animation in seconds (positive numeric). This only has an effect if output_format == 'animation'.
freeze_animation	If TRUE then the animation will freeze at the last frame (logical).
min_value	Lower values than this are ignored (NULL or numeric). If NULL, no values are ignored.
max_value	Larger values than this are ignored (NULL or numeric). If NULL, no values are ignored.
nbreaks	Number of color breaks (NULL or positive integer). A value will be computed if NULL is passed.
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).
keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
dwd_logo	Whether to add the DWD logo (logical).
verbose	Whether to display progress messages (logical).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Details

You can pass a YAML config file and/or specify the arguments directly. Argument prioritization is done in the following way: Direct argument > config argument > default argument. Thus, if you pass a existing config file but also want to modify a specific argument you can do that easily.

---

cmsaf.diff *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a difference plot (absolute or relative) of two variables.

Usage

```
cmsaf.diff(
  var1,
  infile1,
  var2,
  infile2,
  outfile,
  plot.out = FALSE,
  relative = FALSE,
  nc34 = 4,
  overwrite = FALSE,
  verbose = FALSE,
  toolbox = FALSE,
  nc1 = NULL,
  nc2 = NULL
)
```

Arguments

var1	Name of the first NetCDF variable (character).
infile1	Filename of the first input NetCDF file. This may include the directory (character).
var2	Name of the second NetCDF variable (character).
infile2	Filename of the second input NetCDF file. This may include the directory (character).
outfile	Filename of output NetCDF file. This may include the directory (character).
plot.out	logical; if TRUE, the plot will be stored in the same folder as outfile. If FALSE, the plot will not be saved.
relative	logical; if TRUE, plot a relative difference plot
nc34	NetCDF version of output file. If nc34 = 3 the output file will be in NetCDFv3 format (numeric). Default output is NetCDFv4.
overwrite	logical; should existing output file be overwritten?
verbose	logical; if TRUE, progress messages are shown
toolbox	logical; if TRUE, toolbox mode enabled. The two files are adjusted in space and time so that they can be plotted.
nc1	Alternatively to infile1 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).
nc2	Alternatively to infile2 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Value

A NetCDF file is written.

See Also

Other 2d visualization: `cmsaf.side.by.side()`

`cmsaf.hist` *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a histogram plot of two variables.

Usage

```
cmsaf.hist(
  var1,
  infile1,
  var2,
  infile2,
  outfile1,
  outfile2,
  plot.out = FALSE,
  nc34 = 4,
  overwrite = FALSE,
  verbose = FALSE,
  toolbox = FALSE,
  nc1 = NULL,
  nc2 = NULL
)
```

Arguments

`var1`	Name of the first NetCDF variable (character).
`infile1`	Filename of the first input NetCDF file. This may include the directory (character).
`var2`	Name of the second NetCDF variable (character).
`infile2`	Filename of the second input NetCDF file. This may include the directory (character).
`outfile1`	Filename of the first output NetCDF file. This may include the directory (character).
`outfile2`	Filename of the second output NetCDF file. This may include the directory (character).
`plot.out`	logical; if TRUE, the plot will be stored in the same folder as outfile1. If FALSE, the plot will not be saved.
`nc34`	NetCDF version of output file. If `nc34 = 3` the output file will be in NetCDFv3 format (numeric). Default output is NetCDFv4.

overwrite	logical; should existing output file be overwritten?
verbose	logical; if TRUE, progress messages are shown
toolbox	logical; if TRUE, toolbox mode enabled. The two files are adjusted in space and time so that they can be plotted.
nc1	Alternatively to infile1 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).
nc2	Alternatively to infile2 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Value

Two NetCDF files are written.

See Also

Other 1d visualization: cmsaf.hovmoller(), cmsaf.scatter(), cmsaf.time.series()

---

cmsaf.hovmoller *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a hovmoller plot of two variables.

Usage

```
cmsaf.hovmoller(
  var1,
  infile1,
  var2,
  infile2,
  outfile1,
  outfile2,
  plot.out = FALSE,
  nc34 = 4,
  overwrite = FALSE,
  verbose = FALSE,
  toolbox = FALSE,
  nc1 = NULL,
  nc2 = NULL
)
```

Arguments

var1	Name of the first NetCDF variable (character).
infile1	Filename of the first input NetCDF file. This may include the directory (character).
var2	Name of the second NetCDF variable (character).
infile2	Filename of the second input NetCDF file. This may include the directory (character).
outfile1	Filename of the first output NetCDF file. This may include the directory (character).
outfile2	Filename of the second output NetCDF file. This may include the directory (character).
plot.out	logical; if TRUE, the plot will be stored in the same folder as outfile1. If FALSE, the plot will not be saved.
nc34	NetCDF version of output file. If nc34 = 3 the output file will be in NetCDFv3 format (numeric). Default output is NetCDFv4.
overwrite	logical; should existing output file be overwritten?
verbose	logical; if TRUE, progress messages are shown
toolbox	logical; if TRUE, toolbox mode enabled. The two files are adjusted in space and time so that they can be plotted.
nc1	Alternatively to infile1 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).
nc2	Alternatively to infile2 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Value

Two NetCDF files are written.

See Also

Other 1d visualization: cmsaf.hist(), cmsaf.scatter(), cmsaf.time.series()

---

cmsaf.scatter *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a scatter plot of two variables.

Usage

```
cmsaf.scatter(
  var1,
  infile1,
  var2,
  infile2,
  outfile1,
  outfile2,
  plot.out = FALSE,
  nc34 = 4,
  overwrite = FALSE,
  verbose = FALSE,
  toolbox = FALSE,
  nc1 = NULL,
  nc2 = NULL
)
```

Arguments

var1	Name of the first NetCDF variable (character).
infile1	Filename of the first input NetCDF file. This may include the directory (character).
var2	Name of the second NetCDF variable (character).
infile2	Filename of the second input NetCDF file. This may include the directory (character).
outfile1	Filename of the first output NetCDF file. This may include the directory (character).
outfile2	Filename of the second output NetCDF file. This may include the directory (character).
plot.out	logical; if TRUE, the plot will be stored in the same folder as outfile1. If FALSE, the plot will not be saved.
nc34	NetCDF version of output file. If nc34 = 3 the output file will be in NetCDFv3 format (numeric). Default output is NetCDFv4.
overwrite	logical; should existing output file be overwritten?
verbose	logical; if TRUE, progress messages are shown
toolbox	logical; if TRUE, toolbox mode enabled. The two files are adjusted in space and time so that they can be plotted.
nc1	Alternatively to infile1 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).
nc2	Alternatively to infile2 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Value

Two NetCDF files are written.

See Also

Other 1d visualization: cmsaf.hist(), cmsaf.hovmoller(), cmsaf.time.series()

---

cmsaf.side.by.side *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a side by side plot of two variables.

Usage

```
cmsaf.side.by.side(
  var1,
  infile1,
  var2,
  infile2,
  outfile1,
  outfile2,
  plot.out = FALSE,
  nc34 = 4,
  overwrite = FALSE,
  verbose = FALSE,
  toolbox = FALSE,
  nc1 = NULL,
  nc2 = NULL
)
```

Arguments

var1	Name of the first NetCDF variable (character).
infile1	Filename of the first input NetCDF file. This may include the directory (character).
var2	Name of the second NetCDF variable (character).
infile2	Filename of the second input NetCDF file. This may include the directory (character).
outfile1	Filename of the first output NetCDF file. This may include the directory (character).
outfile2	Filename of the second output NetCDF file. This may include the directory (character).
plot.out	logical; if TRUE, the plot will be stored in the same folder as outfile1. If FALSE, the plot will not be saved.
nc34	NetCDF version of output file. If nc34 = 3 the output file will be in NetCDFv3 format (numeric). Default output is NetCDFv4.

overwrite	logical; should existing output file be overwritten?
verbose	logical; if TRUE, progress messages are shown
toolbox	logical; if TRUE, toolbox mode enabled. The two files are adjusted in space and time so that they can be plotted.
nc1	Alternatively to infile1 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).
nc2	Alternatively to infile2 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Value

Two NetCDF files are written.

See Also

Other 2d visualization: cmsaf.diff()

---

cmsaf.time.series *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a time series plot of two variables.

Usage

```
cmsaf.time.series(
  var1,
  infile1,
  var2,
  infile2,
  outfile1,
  outfile2,
  plot.out = FALSE,
  nc34 = 4,
  overwrite = FALSE,
  verbose = FALSE,
  toolbox = FALSE,
  nc1 = NULL,
  nc2 = NULL
)
```

Arguments

var1	Name of the first NetCDF variable (character).
infile1	Filename of the first input NetCDF file. This may include the directory (character).
var2	Name of the second NetCDF variable (character).
infile2	Filename of the second input NetCDF file. This may include the directory (character).
outfile1	Filename of the first output NetCDF file. This may include the directory (character).
outfile2	Filename of the second output NetCDF file. This may include the directory (character).
plot.out	logical; if TRUE, the plot will be stored in the same folder as outfile1. If FALSE, the plot will not be saved.
nc34	NetCDF version of output file. If nc34 = 3 the output file will be in NetCDFv3 format (numeric). Default output is NetCDFv4.
overwrite	logical; should existing output file be overwritten?
verbose	logical; if TRUE, progress messages are shown
toolbox	logical; if TRUE, toolbox mode enabled. The two files are adjusted in space and time so that they can be plotted.
nc1	Alternatively to infile1 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).
nc2	Alternatively to infile2 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Value

Two NetCDF files are written.

See Also

Other 1d visualization: cmsaf.hist(), cmsaf.hovmoller(), cmsaf.scatter()

---

cmsafvis *cmsafvis: A 'cmsaf' package extension for visualization of CM SAF NetCDF data.*

Description

The 'cmsafvis' plotting routines are designed to analyze climate files by generating graphics or videos. The functions (Fieldmean, Fieldmean and anomaly plots) were designed and tested for daily valued CM SAF NetCDF data. The functions (Absolute Map, Anomaly Map, Climatology, Warming Stripes Plot, Time Series Plot, Trend Plot) were designed and tested for daily or monthly valued CM SAF NetCDF data. As interface to NetCDF data the ncdf4 package is used.

Absolute

absolute_map

Anomaly

anomaly_map

Climatology

climatology_map

Fieldmean

fieldmean_plot

Fieldmean and anomaly plots

fieldmean_and_anomaly_map

Warming Stripes Plot

warming_stripes_plot

Time Series Plot

time_series_plot

Trend Plot

trend_plot

Author(s)

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Contact: CM SAF Team <contact.cmsaf@dwd.de>

References

http://www.cmsaf.eu/R_toolbox

Kothe, S.; Hollmann, R.; Pfeifroth, U.; Träger-Chatterjee, C.; Trentmann, J. The CM SAF R Toolbox—A Tool for the Easy Usage of Satellite-Based Climate Data in NetCDF Format. ISPRS Int. J. Geo-Inf. 2019, 8, 109. doi:10.3390/ijgi8030109

`fieldmean_and_anomaly_map` *A 'cmsaf' extension for creating both, a spatial mean and an anomaly map.*

Description

This plotting routine generates a graph showing the evolution of the spatial mean of a given variable and the corresponding anomaly map within the given time range and area. The intended application is for daily accumulated data, such as sunshine duration. Dependent on the output format a PNG or MP4 is created.

Usage

```
fieldmean_and_anomaly_map(
  config = NULL,
  variable = NULL,
  accumulate = FALSE,
  infile = NULL,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start,
  climate_year_end,
  show_extreme_climate_years = NULL,
  climatology_until_eoy = FALSE,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "animation",
  animation_pace = 0.07,
  freeze_animation = FALSE,
  min_value = NULL,
  max_value = NULL,
  nbreaks = NULL,
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
  dwd_logo = FALSE,
  verbose = TRUE,
```

```
  nc = NULL
)
```

Arguments

config	Path to YAML config file (character). The config file does not have to specify all arguments. Each addressed argument has to be formatted according to the example config file: (#TODO: LINK EXAMPLE CONFIG FILE!).
variable	Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.
accumulate	Whether the input file should be accumulated (logical).
infile	Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.
temp_dir	Path to temporary working directory (character).
out_dir	Path to output directory (character).
climate_dir	Path to directory in which climatology is computed or contained (NULL or character). If NULL then the temp_dir directory is taken.
climate_year_start	Start year of climatology (integer).
climate_year_end	End year of climatology (integer).
show_extreme_climate_years	Whether the minimum and maximum of the climate years should be titled in the fieldmean plot (NULL or logical). This is usually only of interest when plotting accumulated data. If the default NULL is chosen, then it will be set to the value of accumulate.
climatology_until_eoy	Plot the climatology and fieldmeans until the end of year (logical). Only affects fieldmean plots analyzed from January 1st.
start_date	Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.
end_date	End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.
country_code	Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.
lon_min	Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.
lon_max	Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.
lat_min	Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.

lat_max	Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.
outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.
output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
animation_pace	Pace of the animation in seconds (positive numeric). This only has an effect if output_format == 'animation'.
freeze_animation	If TRUE then the animation will freeze at the last frame (logical).
min_value	Lower values than this are ignored (NULL or numeric). If NULL, no values are ignored.
max_value	Larger values than this are ignored (NULL or numeric). If NULL, no values are ignored.
nbreaks	Number of color breaks (NULL or positive integer). A value will be computed if NULL is passed.
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).
keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
dwd_logo	Whether to add the DWD logo (logical).
verbose	Whether to display progress messages (logical).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Details

You can pass a YAML config file and/or specify the arguments directly. Argument prioritization is done in the following way: Direct argument > config argument > default argument. Thus, if you pass a existing config file but also want to modify a specific argument you can do that easily.

`fieldmean_plot` *A 'cmsaf' extension for creating spatial mean plots.*

Description

This plotting routine generates a graph showing the evolution of the spatial mean of a given variable within the given time range and area. The intended application is for daily accumulated data, such as sunshine duration. Dependent on the output format a PNG or MP4 is created.

Usage

```
fieldmean_plot(
  config = NULL,
  variable = NULL,
  accumulate = FALSE,
  infile = NULL,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start = 1983,
  climate_year_end = 2018,
  show_extreme_climate_years = NULL,
  climatology_until_eoy = FALSE,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "animation",
  animation_pace = 0.07,
  freeze_animation = FALSE,
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
  dwd_logo = FALSE,
  verbose = TRUE,
  nc = NULL
)
```

Arguments

`config`	Path to YAML config file (character). The config file does not have to specify all arguments. Each addressed argument has to be formatted according to the

example config file: (#TODO: LINK EXAMPLE CONFIG FILE!).

`variable` Name of variable in infile (`NULL` or character). If `NULL` then the first variable from the infile is taken.

`accumulate` Whether the input file should be accumulated (logical).

`infile` Path to NetCDF file (`NULL` or character). If `NULL` then it needs to be specified in the config file.

`temp_dir` Path to temporary working directory (character).

`out_dir` Path to output directory (character).

`climate_dir` Path to directory in which climatology is computed or contained (`NULL` or character). If `NULL` then the temp_dir directory is taken.

`climate_year_start`
Start year of climatology (integer).

`climate_year_end`
End year of climatology (integer).

`show_extreme_climate_years`
Whether the minimum and maximum of the climate years should be titled in the fieldmean plot (`NULL` or logical). This is usually only of interest when plotting accumulated data. If the default `NULL` is chosen, then it will be set to the value of `accumulate`.

`climatology_until_eoy`
Plot the climatology and fieldmeans until the end of year (logical). Only affects fieldmean plots analyzed from January 1st.

`start_date` Start date in format of 'YYYY-MM-DD' (`NULL` or character). If `NULL` then the first date of the infile is used.

`end_date` End date in format of 'YYYY-MM-DD' (`NULL` or character). If `NULL` then the last date of the infile is used.

`country_code` Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.

`lon_min` Longitude of lower left corner (`NULL` or numeric). If `NULL` then the smallest longitude of the infile is used.

`lon_max` Longitude of upper right left corner (`NULL` or numeric). If `NULL` then the largest longitude of the infile is used.

`lat_min` Latitude of lower left corner (`NULL` or numeric). If `NULL` then the smallest latitude of the infile is used.

`lat_max` Latitude of upper right corner (`NULL` or numeric). If `NULL` then the largest latitude of the infile is used.

`outfile_name` Filename of the PNG or MP4 outfile (`NULL` or character). If `NULL` then a name is computed from the current configuration. Please match the file ending according to the output_format.

`output_format` Specification of output format (either 'graphic' for PNG or 'animation' for MP4).

animation_pace	Pace of the animation in seconds (positive numeric). This only has an effect if output_format == 'animation'.
freeze_animation	If TRUE then the animation will freeze at the last frame (logical).
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).
keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
dwd_logo	Whether to add the DWD logo (logical).
verbose	Whether to display progress messages (logical).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Details

You can pass a YAML config file and/or specify the arguments directly. Argument prioritization is done in the following way: Direct argument > config argument > default argument. Thus, if you pass a existing config file but also want to modify a specific argument you can do that easily.

---

get_basename_vis *Determine the basename of a NetCDF file*

Description

This function determines the basename of either a file/URL path or an 'nc' object (using nc$filename).

Usage

```
get_basename_vis(infile, nc = NULL)
```

Arguments

infile	Filename of input NetCDF file. This may include the directory (character).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Details

When the origin of the file path is a local .nc file then `get_basename_vis()` is equivalent to `base::basename()`.

`get_basename_vis()` also handles the case of `infile`/`nc` originating from a URL.

The value of `get_basename_vis()` always ends in ".nc".

If both `infile` and `nc` are specified, `infile` is ignored.

Value

A character string giving the basename.

`helper_time_series_compare` *Designed for the CM SAF R Toolbox.*

Description

This function is a helper function for render_plot_time_series_compare.

Usage

```
helper_time_series_compare(visualizeVariables)
```

Arguments

`visualizeVariables`
: A data frame containing all meta data for the plotting process (data.frame).

`monitor_climate` *A 'cmsaf' extension for creating various climate plots.*

Description

This plotting routine generates graphical output of the evolution of the given variable within the given time range and area. The intended application is for daily accumulated data, such as sunshine duration. Dependent on the output format a PNG or MP4 is created.

Usage

```
monitor_climate(
  plot_type = "absolute_map",
  config = NULL,
  variable = NULL,
  accumulate = FALSE,
  mean_value = FALSE,
  infile = NULL,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start = 1983,
  climate_year_end = 2018,
  show_extreme_climate_years = NULL,
  climatology_until_eoy = FALSE,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "animation",
  animation_pace = 0.07,
  freeze_animation = FALSE,
  min_value = NULL,
  max_value = NULL,
  nbreaks = NULL,
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
  analyze_method = TRUE,
  selected_number = 1,
  color_pal = 1,
  relative = FALSE,
  circ_plot = FALSE,
  dwd_logo = FALSE,
  verbose = TRUE,
  nc = NULL
)
```

Arguments

plot_type	Specifies the type of the plot ('absolute_map', 'anomaly_map', 'climatology_map', 'fieldmean_plot', 'fieldmean_and_anomaly_map').

config Path to YAML config file (character). The config file does not have to specify all arguments. Each addressed argument has to be formatted according to the example config file: (#TODO: LINK EXAMPLE CONFIG FILE!).

variable Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.

accumulate Whether the input file should be accumulated (logical).

mean_value Whether the input file should be averaged (logical).

infile Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.

temp_dir Path to temporary working directory (character).

out_dir Path to output directory (character).

climate_dir Path to directory in which climatology is computed or contained (NULL or character). If NULL then the temp_dir directory is taken.

climate_year_start
Start year of climatology (integer).

climate_year_end
End year of climatology (integer).

show_extreme_climate_years
Whether the minimum and maximum of the climate years should be titled in the fieldmean plot (NULL or logical). This is usually only of interest when plotting accumulated data. If the default NULL is chosen, then it will be set to the value of accumulate.

climatology_until_eoy
Plot the climatology and fieldmeans until the end of year (logical). Only affects fieldmean plots analyzed from January 1st.

start_date Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.

end_date End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.

country_code Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.

lon_min Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.

lon_max Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.

lat_min Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.

lat_max Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.

outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.
output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
animation_pace	Pace of the animation in seconds (positive numeric). This only has an effect if output_format == 'animation'.
freeze_animation	If TRUE then the animation will freeze at the last frame (logical).
min_value	Lower values than this are ignored (NULL or numeric). If NULL, no values are ignored.
max_value	Larger values than this are ignored (NULL or numeric). If NULL, no values are ignored.
nbreaks	Number of color breaks (NULL or positive integer). A value will be computed if NULL is passed.
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).
keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
analyze_method	Two analyze methods: mean == FALSE; accumulate == TRUE (logical) (Warming Stripes Plots, Time Series Plots, Trend Plots)
selected_number	Timesteps of the same selected time range (Warming Stripes Plots, Time Series Plots, Trend Plots)
color_pal	Color option for stripe and anomaly plots
relative	Use relative values for anomaly plots
circ_plot	Circular stripe plots (logical)
dwd_logo	Whether to add the DWD logo (logical).
verbose	Whether to display progress messages (logical).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Details

Circular stripe plots are inspired by Emanuele Bevacqua (see emanuele.bevacqua.eu)

You can pass a YAML config file and/or specify the arguments directly. Argument prioritization is done in the following way: Direct argument > config argument > default argument. Thus, if you pass a existing config file but also want to modify a specific argument you can do that easily.

`quicklook` *Create a quicklook of NetCDF data*

Description

The function creates a plot of the variables in NetCDF file(s) specified in the config file. Only NetCDF files that conform to the CM SAF naming convention are supported.

Usage

```
quicklook(
  config,
  filelist,
  outpath = getwd(),
  jpeg_quality = 100,
  dpi = 150,
  iwidth = 1242,
  logo = TRUE,
  copyright = TRUE,
  bluemarble = FALSE,
  verbose = TRUE
)
```

Arguments

`config`	filename of configuration file. This may include the directory (character).
`filelist`	list of NetCDF file to create plots from (character).
`outpath`	directory in which to save the output files. (character).
`jpeg_quality`	jpeg quality for the image in percent, see grDevices::jpeg()
`dpi`	resolution of the image in dots per inch, see grDevices::jpeg()
`iwidth`	width of the resulting image in pixels, see grDevices::jpeg()
`logo`	logical; should the cmsaf logo be added to the plot?
`copyright`	logical; should the copyright text be added to the plot?
`bluemarble`	logical; should the data be plotted onto a NASA bluemarble (only available for MSG/Seviri based data)? Due to data size this option is not available for the cmsafvis package on CRAN. Please have a look at our website https://www.cmsaf.eu/R_toolbox
`verbose`	logical; if TRUE, progress messages are shown

Details

This operator can be applied using a configuration file (quicklook_config.yml). An example config file can be found in the extdata folder of this package. The following parameters can be defined:

- logo: color / black

- slot: numeric (e.g., 13)
- invert_col: TRUE / FALSE
- Dataset: character (e.g., ICDR Seviri Radiation)
- limits: min: numeric; max: numeric
- legend: TRUE / FALSE
- colorscale: character (e.g., Viridis)
- unit: character (e.g., Percent / '%')

Value

A jpeg file with the same name as the original NetCDF file.

`recalculateImageDimensions`
Get rectangular image dimensions

Description

Given regional bounds image width and height are computed in order to display a region without distortion.

Usage

```
recalculateImageDimensions(
  visualizeVariables,
  lon_bounds,
  lat_bounds,
  image_def,
  ihsf
)
```

Arguments

`visualizeVariables`	A dataframe containing $lon and $lat values which will be bounded by lon/lat_bounds (data.frame).
`lon_bounds`	Array containing two values for longitude min and max (numeric).
`lat_bounds`	Array containing two values for latitude min and max (numeric).
`image_def`	Minimal image default size for width and height (numeric).
`ihsf`	Image height rescaling factor (numeric).

render_hist_plot *Creating a simple histogram.*

Description

This routine was implemented for creating histograms in the CM SAF R Toolbox.

Usage

```
render_hist_plot(
  dastat,
  shortDescription,
  grid_col,
  bordercolor,
  linesize,
  xlab
)
```

Arguments

dastat	Statistics given to hist plot (numeric).
shortDescription	A title will be generated using "Histogram of" + description (character).
grid_col	Color used for the grid.
bordercolor	Color used for borders.
linesize	Line width to be used (positive numeric).
xlab	Label for x axis (character).

render_instat_plot *Creating a simple instat plot.*

Description

This function creates a simple r-instat plot.

Usage

```
render_instat_plot(
  co.data,
  shortDescription,
  grid_col,
  bordercolor,
  linesize,
  ylab
)
```

Arguments

co.data	Statistics given to hist plot (data.frame).
shortDescription	A title will be generated using "Comparison of" + description (character).
grid_col	Color used for the grid.
bordercolor	Color used for borders.
linesize	Line width to be used (positive numeric).
ylab	Label for y axis (character).

---

render_plot *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a 2D image usually called by the CM SAF R Toolbox.

Usage

```
render_plot(
  plot_rinstat,
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  visualizeDataTimestep,
  nc_path_visualize,
  visualizeDataMax,
  lon_bounds,
  lat_bounds,
  lon_loc_vec,
  lat_loc_vec,
  name_loc_vec,
  timestep,
  num_tick,
  num_rmin,
  num_rmax,
  num_brk,
  co.data,
  co.data.compare.diff,
  proj,
  xort,
  yort,
  rort,
  slider1,
  slider2,
  imagewidth,
```

```
  imageheight,
  location,
  int,
  text1,
  text2,
  text3,
  textsize,
  bordercolor,
  linesize,
  na.color,
  PAL,
  palettes,
  reverse,
  plot_grid,
  grid_col
)
```

Arguments

plot_rinstat	Whether to create an R-Instat plot (logical).
outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).
visualizeDataTimestep	The data to be plotted.
nc_path_visualize	The nc file path of which the plot is generated for.
visualizeDataMax	Maximal data for computing breaks.
lon_bounds	Array containing two values for longitude min and max (numeric).
lat_bounds	Array containing two values for latitude min and max (numeric).
lon_loc_vec	All longitude entries for points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).
lat_loc_vec	All latitude entries for points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).
name_loc_vec	Names for the points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).
timestep	The current timestep chosen.
num_tick	Number of ticks (numeric).
num_rmin	Color scale range minimum (numeric).
num_rmax	Color scale range maximium (numeric).

num_brk	Number of breaks (numeric).
co.data	Data to be plotted in R-Instat mode (data.frame).
co.data.compare.diff	Data to be plotted in compare data mode (data.frame).
proj	The chosen projection (either 'rect' for rectangular or 'ortho' for orthographic).
xort	Centering the globe at longitude xort (numeric). Only in orthographic mode.
yort	Centering the globe at latitude yort (numeric). Only in orthographic mode.
rort	Rotation of the globe (numeric). Only in orthographic mode.
slider1	Controlling the horizontal plot position as vector of two values min and max (numeric).
slider2	Controlling the vertical plot position as vector of two values min and max (numeric).
imagewidth	Width of the image (numeric).
imageheight	Height of the image (numeric).
location	Whether points specified by (lat_loc_vec, lon_loc_vec, name_loc_vec) should be added to the map (logical).
int	Whether interior country borders should be added (logical).
text1	Title text (character).
text2	Text to be passed to graphics::mtext (character).
text3	Text to be added to the legend (character).
textsize	Textsize to be used (cex).
bordercolor	Color used for borders.
linesize	Line width to be used (positive numeric).
na.color	The color to be used for NA values.
PAL	Color palette.
palettes	Color palettes to be used.
reverse	Whether to revert the color palette (logical).
plot_grid	Whether to plot a grid using color grid_col (logical).
grid_col	Color used for the grid.

`render_plot_1d` *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a 1D plot of data at one single lon / lat point.

Usage

```
render_plot_1d(
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  ticknumber,
  dateformat,
  analyze_timeseries,
  addTrend,
  sliderx,
  slidery,
  checkGroup_type,
  imagewidth,
  imageheight,
  text1_1d,
  text2_1d,
  text3_1d,
  text4_1d,
  textsize,
  linesize,
  col
)
```

Arguments

outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).
ticknumber	Number of ticks (numeric).
dateformat	Date format for constructing a date label.
analyze_timeseries	Whether or not to analyze the timeseries of the given point (logical).
addTrend	Whether to add a trend line (logical).
sliderx	Limiting the time series with a two valued vector for min and max (numeric).
slidery	Limiting the y axis with a two valued vector for min and max (numeric).
checkGroup_type	An integer between 1 and 5 indicating group type (numeric). 1 for Line, 2 for Points, 3 for Line and Points, 4 for steps, 5 for histogram.
imagewidth	Width of the image (numeric).
imageheight	Height of the image (numeric).
text1_1d	Title text (character).
text2_1d	Text to be passed to graphics::mtext (character).

text3_1d	X-label (character).
text4_1d	Y-label (character).
textsize	Textsize to be used (cex).
linesize	Line width to be used (positive numeric).
col	A color chosen via colourpicker::colourInput.

`render_plot_1d_advanced` *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a 1D plot of data at one single lon or one single lat point.

Usage

```
render_plot_1d_advanced(
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  ticknumber,
  addTrend,
  sliderx,
  slidery,
  checkGroup_type,
  imagewidth,
  imageheight,
  text1_1d,
  text2_1d,
  textsize,
  linesize,
  col,
  timestep_1d_visualize
)
```

Arguments

outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).
ticknumber	Number of ticks (numeric).
addTrend	Whether to add a trend line (logical).

sliderx	Limiting the time series with a two valued vector for min and max (numeric).
slidery	Limiting the y axis with a two valued vector for min and max (numeric).
checkGroup_type	An integer between 1 and 5 indicating group type (numeric). 1 for Line, 2 for Points, 3 for Line and Points, 4 for steps, 5 for histogram.
imagewidth	Width of the image (numeric).
imageheight	Height of the image (numeric).
text1_1d	Title text (character).
text2_1d	Text to be passed to graphics::mtext (character).
textsize	Textsize to be used (cex).
linesize	Line width to be used (positive numeric).
col	A color chosen via colourpicker::colourInput.
timestep_1d_visualize	The time step to be visualized.

`render_plot_hist_compare` *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a histogram of two variables.

Usage

```
render_plot_hist_compare(
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  imagewidth,
  imageheight,
  text1_1d,
  text2_1d,
  textsize,
  legend_label1,
  legend_label2,
  timestep_1d_visualize
)
```

Arguments

outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).
imagewidth	Width of the image (numeric).
imageheight	Height of the image (numeric).
text1_1d	Title text (character).
text2_1d	Text to be passed to graphics::mtext (character).
textsize	Textsize to be used (cex).
legend_label1	Legend label of the first data set
legend_label2	Legend label of the second data set
timestep_1d_visualize	Selected timestemp

---

render_plot_hovmoller *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a hovmoller plot of two variables.

Usage

```
render_plot_hovmoller(
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  imagewidth,
  imageheight,
  textsize,
  linesize,
  title_data1,
  title_data2,
  nc = NULL,
  nc2 = NULL
)
```

Arguments

outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).
imagewidth	Width of the image (numeric).
imageheight	Height of the image (numeric).
textsize	Textsize to be used (cex).
linesize	Line width to be used (positive numeric).
title_data1	Title of the first data set
title_data2	Title of the second data set
nc	Alternatively to infile1 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).
nc2	Alternatively to infile2 you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

---

render_plot_scatter *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function renders a scatter plot of two variables.

Usage

```
render_plot_scatter(
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  dateformat,
  ticknumber,
  imagewidth,
  imageheight,
  text1_1d,
  text2_1d,
  textsize,
  linesize,
  x_axis_label_1d,
  y_axis_label_1d,
  timestep_1d_visualize
)
```

Arguments

outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).
dateformat	Date format for constructing a date label.
ticknumber	Number of ticks (numeric).
imagewidth	Width of the image (numeric).
imageheight	Height of the image (numeric).
text1_1d	Title text (character).
text2_1d	Text to be passed to graphics::mtext (character).
textsize	Textsize to be used (cex).
linesize	Line width to be used (positive numeric).
x_axis_label_1d	x-label (first data set)
y_axis_label_1d	y-label (second data set)
timestep_1d_visualize	Selected timestemp

---

render_plot_side_by_side

Plotting routine designed for the CM SAF R Toolbox.

Description

This function renders a 2D image of two files usually called by the CM SAF R Toolbox.

Usage

```
render_plot_side_by_side(
  plot_rinstat,
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  visualizeDataTimestep,
  nc_path_visualize,
  visualizeDataMax,
  timestep_2d,
  lon_bounds,
  lat_bounds,
```

```
  lon_loc_vec,
  lat_loc_vec,
  name_loc_vec,
  timestep,
  num_tick,
  num_rmin,
  num_rmax,
  num_brk,
  co.data,
  proj,
  xort,
  yort,
  rort,
  slider1,
  slider2,
  imagewidth,
  imageheight,
  location,
  int,
  text1,
  text2,
  text3,
  textsize,
  bordercolor,
  linesize,
  na.color,
  PAL,
  palettes,
  reverse,
  plot_grid,
  grid_col,
  text1_2,
  text2_2
)
```

Arguments

plot_rinstat	Whether to create an R-Instat plot (logical).
outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).
visualizeDataTimestep	The data to be plotted.
nc_path_visualize	The nc file path of which the plot is generated for.

visualizeDataMax
: Maximal data for computing breaks.

timestep_2d
: The time step to be visualized.

lon_bounds
: Array containing two values for longitude min and max (numeric).

lat_bounds
: Array containing two values for latitude min and max (numeric).

lon_loc_vec
: All longitude entries for points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).

lat_loc_vec
: All latitude entries for points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).

name_loc_vec
: Names for the points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).

timestep
: The current timestep chosen.

num_tick
: Number of ticks (numeric).

num_rmin
: Color scale range minimum (numeric).

num_rmax
: Color scale range maximium (numeric).

num_brk
: Number of breaks (numeric).

co.data
: Data to be plotted in R-Instat mode (data.frame).

proj
: The chosen projection (either 'rect' for rectangular or 'ortho' for orthographic).

xort
: Centering the globe at longitude xort (numeric). Only in orthographic mode.

yort
: Centering the globe at latitude yort (numeric). Only in orthographic mode.

rort
: Rotation of the globe (numeric). Only in orthographic mode.

slider1
: Controlling the horizontal plot position as vector of two values min and max (numeric).

slider2
: Controlling the vertical plot position as vector of two values min and max (numeric).

imagewidth
: Width of the image (numeric).

imageheight
: Height of the image (numeric).

location
: Whether points specified by (lat_loc_vec, lon_loc_vec, name_loc_vec) should be added to the map (logical).

int
: Whether interior country borders should be added (logical).

text1
: Title text data set 1 (character).

text2
: Text to be passed to graphics::mtext for data set 1 (character).

text3
: Text to be added to the legend (character).

textsize
: Textsize to be used (cex).

bordercolor
: Color used for borders.

linesize
: Line width to be used (positive numeric).

na.color
: The color to be used for NA values.

PAL
: Color palette.

palettes
: Color palettes to be used.

reverse	Whether to revert the color palette (logical).
plot_grid	Whether to plot a grid using color grid_col (logical).
grid_col	Color used for the grid.
text1_2	Title text data set 2 (character).
text2_2	Text to be passed to graphics::mtext for data set 2 (character).

`render_plot_time_series_compare` *Plotting routine designed for the CM SAF R Toolbox.*

Description

This function provides a time series comparison of two data sets.

Usage

```
render_plot_time_series_compare(
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  ticknumber,
  dateformat,
  sliderx,
  slidery,
  checkGroup_type,
  imagewidth,
  imageheight,
  text1_1d,
  text2_1d,
  textsize,
  linesize,
  col,
  legend_label1,
  legend_label2,
  station_number
)
```

Arguments

outfile	Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.
fileExtension	The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.
visualizeVariables	A data frame containing all meta data for the plotting process (data.frame).

ticknumber	Number of ticks (numeric).
dateformat	Date format for constructing a date label.
sliderx	Limiting the time series with a two valued vector for min and max (numeric).
slidery	Limiting the y axis with a two valued vector for min and max (numeric).
checkGroup_type	An integer between 1 and 5 indicating group type (numeric). 1 for Line, 2 for Points, 3 for Line and Points, 4 for steps, 5 for histogram.
imagewidth	Width of the image (numeric).
imageheight	Height of the image (numeric).
text1_1d	Title text (character).
text2_1d	Text to be passed to graphics::mtext (character).
textsize	Textsize to be used (cex).
linesize	Line width to be used (positive numeric).
col	A color chosen via colourpicker::colourInput.
legend_label1	Legend label of the first data set
legend_label2	Legend label of the second data set
station_number	For station data compare; which station is selected

---

`render_preview_plot` *Creates a preview plot of a selected area*

Description

This function creates a simple preview plot via maps::map of a given region.

Usage

```
render_preview_plot(spatial_lon_range, spatial_lat_range, lonRange, latRange)
```

Arguments

spatial_lon_range	Array containing two values for longitude min and max (numeric).
spatial_lat_range	Array containing two values for latitude min and max (numeric).
lonRange	Array containing two values for longitude min and max (numeric).
latRange	Array containing two values for latitude min and max (numeric).

render_region_plot *Function to create a plot of a selected country.*

Description

This function generates a plot of within a certain region (e.g. a country).

Usage

```
render_region_plot(
  infile,
  outfile = NULL,
  fileExtension = ".png",
  visualizeVariables,
  visualizeDataMax,
  lon_bounds,
  lat_bounds,
  lon_loc_vec,
  lat_loc_vec,
  name_loc_vec,
  division,
  selectedRegion,
  region_data,
  timestep,
  num_tick,
  num_rmin,
  num_rmax,
  location,
  text1,
  text2,
  text3,
  PAL,
  palettes,
  num_brk,
  reverse,
  textsize,
  bordercolor,
  plot_grid,
  grid_col,
  image_def,
  ihsf,
  nc = NULL
)
```

Arguments

infile	The nc file to be visualized.

`outfile` Name of the outfile (NULL or character). Should match the fileExtension. If NULL is passed a file is created in the R session temporary directory.

`fileExtension` The file extension of the image (character). Has to be one of the following: 'png', 'jpg', 'tif', 'kml', 'pdf'.

`visualizeVariables` A data frame containing all meta data for the plotting process (data.frame).

`visualizeDataMax` Maximal data for computing breaks.

`lon_bounds` Array containing two values for longitude min and max (numeric).

`lat_bounds` Array containing two values for latitude min and max (numeric).

`lon_loc_vec` All longitude entries for points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).

`lat_loc_vec` All latitude entries for points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).

`name_loc_vec` Names for the points at (lat_loc_vec, lon_loc_vec) to be specified on the map (numeric).

`division` Division to contain region (either 'COUNTRY' or something coherent to region_data).

`selectedRegion` The region to be cropped according to division. If `division == "COUNTRY"`, the country's 3-character ISO code should be used. Otherwise it has to fit to the passed region data.

`region_data` If Division is not 'COUNTRY' then region_data has to contain spatial data of the given division.

`timestep` Timestep to visualize at (character).

`num_tick` Number of ticks (numeric).

`num_rmin` Color scale range minimum (numeric).

`num_rmax` Color scale range maximium (numeric).

`location` Whether points specified by (lat_loc_vec, lon_loc_vec, name_loc_vec) should be added to the map (logical).

`text1` Title text (character).

`text2` Text to be passed to graphics::mtext (character).

`text3` Text to be added to the legend (character).

`PAL` Color palette.

`palettes` Color palettes to be used.

`num_brk` Number of breaks (numeric).

`reverse` Whether to revert the color palette (logical).

`textsize` Textsize to be used (cex).

`bordercolor` Color used for borders.

`plot_grid` Whether to plot a grid using color grid_col (logical).

`grid_col` Color used for the grid.

image_def	Default size (positive numeric).
ihsf	Image height scaling factor (positive numeric).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

---

time_series_plot *A 'cmsaf' extension for creating time series plots.*

Description

This plotting routine generates graphical output for the given variable within the given time range and area. Dependent on the output format a PNG is created.

Usage

```
time_series_plot(
  variable = NULL,
  infile = NULL,
  selected_number = 1,
  analyze_method = TRUE,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start = 1983,
  climate_year_end = 2018,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "graphic",
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
  title = "",
  verbose = TRUE,
  nc = NULL
)
```

Arguments

variable	Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.
infile	Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.
selected_number	Timesteps of the same selected time range (Warming Stripes Plots, Time Series Plots, Trend Plots)
analyze_method	Two analyze methods: mean == FALSE; accumulate == TRUE (logical) (Warming Stripes Plots, Time Series Plots, Trend Plots)
temp_dir	Path to temporary working directory (character).
out_dir	Path to output directory (character).
climate_dir	Path to directory in which climatology is computed or contained (NULL or character). If NULL then the temp_dir directory is taken.
climate_year_start	Start year of climatology (integer).
climate_year_end	End year of climatology (integer).
start_date	Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.
end_date	End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.
country_code	Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.
lon_min	Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.
lon_max	Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.
lat_min	Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.
lat_max	Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.
outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.
output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).

keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
title	Set title (character).
verbose	Whether to display progress messages (logical).
nc	Alternatively to `infile` you can specify the input as an object of class `ncdf4` (as returned from `ncdf4::nc_open`).

`trend_plot` *A 'cmsaf' extension for creating trend plots.*

Description

This plotting routine generates graphical output for the given variable within the given time range and area. Dependent on the output format a PNG is created.

Usage

```
trend_plot(
  variable = NULL,
  infile = NULL,
  selected_number = 1,
  analyze_method = TRUE,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start = 1983,
  climate_year_end = 2018,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "graphic",
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
```

```
  attach = FALSE,
  infile_attach = "auto",
  verbose = TRUE,
  nc = NULL
)
```

Arguments

variable	Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.
infile	Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.
selected_number	Timesteps of the same selected time range (Warming Stripes Plots, Time Series Plots, Trend Plots)
analyze_method	Two analyze methods: mean == FALSE; accumulate == TRUE (logical) (Warming Stripes Plots, Time Series Plots, Trend Plots)
temp_dir	Path to temporary working directory (character).
out_dir	Path to output directory (character).
climate_dir	Path to directory in which climatology is computed or contained (NULL or character). If NULL then the temp_dir directory is taken.
climate_year_start	Start year of climatology (integer).
climate_year_end	End year of climatology (integer).
start_date	Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.
end_date	End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.
country_code	Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.
lon_min	Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.
lon_max	Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.
lat_min	Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.
lat_max	Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.
outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.

output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).
keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
verbose	Whether to display progress messages (logical).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

---

warming_stripes_plot *A 'cmsaf' extension for creating warming stripes plots.*

Description

This plotting routine generates graphical output for the given variable within the given time range and area. Dependent on the output format a PNG is created.

Usage

```
warming_stripes_plot(
  variable = NULL,
  infile = NULL,
  selected_number = 1,
  color_pal = 1,
  analyze_method = TRUE,
  temp_dir = tempdir(),
  out_dir = getwd(),
  climate_dir = NULL,
  climate_year_start = 1983,
  climate_year_end = 2018,
  start_date = NULL,
  end_date = NULL,
  country_code = "S_A",
  lon_min = NULL,
  lon_max = NULL,
  lat_min = NULL,
  lat_max = NULL,
  outfile_name = NULL,
  output_format = "graphic",
```

```
  language = "eng",
  keep_files = TRUE,
  states = FALSE,
  attach = FALSE,
  infile_attach = "auto",
  pointsTF = FALSE,
  lineTF = FALSE,
  circ_plot = FALSE,
  title = "",
  verbose = TRUE,
  nc = NULL
)
```

Arguments

variable	Name of variable in infile (NULL or character). If NULL then the first variable from the infile is taken.
infile	Path to NetCDF file (NULL or character). If NULL then it needs to be specified in the config file.
selected_number	Timesteps of the same selected time range (Warming Stripes Plots, Time Series Plots, Trend Plots)
color_pal	Color option for stripe and anomaly plots
analyze_method	Two analyze methods: mean == FALSE; accumulate == TRUE (logical) (Warming Stripes Plots, Time Series Plots, Trend Plots)
temp_dir	Path to temporary working directory (character).
out_dir	Path to output directory (character).
climate_dir	Path to directory in which climatology is computed or contained (NULL or character). If NULL then the temp_dir directory is taken.
climate_year_start	Start year of climatology (integer).
climate_year_end	End year of climatology (integer).
start_date	Start date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the first date of the infile is used.
end_date	End date in format of 'YYYY-MM-DD' (NULL or character). If NULL then the last date of the infile is used.
country_code	Either a country code in iso3c format or from the following: 'AFR' for Africa, 'EUR' for Europe, 'TOT' for the total disc, or 'S_A' for an arbitrary region selection (character). If a country is passed the data from within this country is extracted, else a rectangular box is visualized. Directly provided latitude and longitude ranges will be ignored in case of 'AFR', 'EUR' or 'TOT'.
lon_min	Longitude of lower left corner (NULL or numeric). If NULL then the smallest longitude of the infile is used.

lon_max	Longitude of upper right left corner (NULL or numeric). If NULL then the largest longitude of the infile is used.
lat_min	Latitude of lower left corner (NULL or numeric). If NULL then the smallest latitude of the infile is used.
lat_max	Latitude of upper right corner (NULL or numeric). If NULL then the largest latitude of the infile is used.
outfile_name	Filename of the PNG or MP4 outfile (NULL or character). If NULL then a name is computed from the current configuration. Please match the file ending according to the output_format.
output_format	Specification of output format (either 'graphic' for PNG or 'animation' for MP4).
language	Language used for title, legend, etc. in plots (either 'eng' for English or 'deu' for German).
keep_files	A flag indicating whether all files created in the process of obtaining the output file should be kept (logical). If false, all intermediate results are deleted, otherwise all are kept. Keeping these files could improve performance in further function calls.
states	Whether to crop/plot administration level of states (logical).
attach	Whether to temporaly merge the infile to an already existing one. (logical).
infile_attach	File to attach the infile to. When 'auto', a suitable file will be searched in out_dir. If attach is false, this will be ignored(character).
pointsTF	Show data points (logical).
lineTF	Show trend line (logical).
circ_plot	Circular stripe plots (logical)
title	Set title (character).
verbose	Whether to display progress messages (logical).
nc	Alternatively to infile you can specify the input as an object of class ncdf4 (as returned from ncdf4::nc_open).

Details

Circular stripe plots are inspired by Emanuele Bevacqua (see emanuele.bevacqua.eu)

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