Package ‘hydroToolkit’

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**Title** Hydrological Tools for Handling Hydro-Meteorological Data from Argentina and Chile

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**Description** Read, plot, manipulate and process hydro-meteorological data from Argentina and Chile.

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agg_hydroMet

Description

This method provides common functions to aggregate the data inside a slot.

Usage

```r
agg_hydroMet(
  obj,
  slot_name,
  col_name,
  fun,
  period,
  out_name = NULL,
  start_month = NULL,
  end_month = NULL,
  allow_NA = NULL
)
```

## S4 method for signature 'hydroMet_BDHI'

```r
agg_hydroMet(
```
agg_hydroMet

    obj,
    slot_name,
    col_name,
    fun,
    period,
    out_name = NULL,
    start_month = NULL,
    end_month = NULL,
    allow_NA = NULL
  )

## S4 method for signature 'hydroMet_DGI'
agg_hydroMet(  
  obj,
  slot_name,
  col_name,
  fun,
  period,
  out_name = NULL,
  start_month = NULL,
  end_month = NULL,
  allow_NA = NULL
)

## S4 method for signature 'hydroMet_CR2'
agg_hydroMet(  
  obj,
  slot_name,
  col_name,
  fun,
  period,
  out_name = NULL,
  start_month = NULL,
  end_month = NULL,
  allow_NA = NULL
)

## S4 method for signature 'hydroMet_IANIGLA'
agg_hydroMet(  
  obj,
  slot_name,
  col_name,
  fun,
  period,
  out_name = NULL,
  start_month = NULL,
  end_month = NULL,
  allow_NA = NULL
)
Arguments

- **obj**
  an hydroMet_XXX class object. This method is not allowed for hydroMet_compact class. This is because this class was thought as ready to use, so when building this class you should have already aggregated your data.

- **slot_name**
  a single or vector string containing the slot(s) to aggregate.

- **col_name**
  a single or vector string with the name of the column to aggregate in slot_name.

- **fun**
  a single or vector string containing one of the following functions: 'mean', 'min', 'max' or 'sum'.

- **period**
  a single or vector string with the period of aggregation: 'hourly', 'daily', 'monthly', 'annual' or 'climatic'. **NOTE:** the 'climatic' option returns the all series annual statistics ('fun'). **NOTE:** if the object is of class hydroMet_IANIGLA you must provide a single period value.

- **out_name**
  optional. Single or vector string with the output column name of the variable to aggregate.

- **start_month**
  optional. Numeric (or numeric vector) value of the first month. It only makes sense if the 'period' is 'annual'. **NOTE:** as an example, in case you have just two slots (out of five) that you want to aggregate annually you must provide a vector of length two. Default value is January. **NOTE:** if the object is of class hydroMet_IANIGLA you must provide a single start_month value.

- **end_month**
  optional. Numeric (or numeric vector) value of the last month. It only makes sense if the 'period' is 'annual'. **NOTE:** as an example, in case you have just two slots (out of five) that you want to aggregate annually you must provide a vector of length two. Default value is December. **NOTE:** if the object is of class hydroMet_IANIGLA you must provide a single end_month value.

- **allow_NA**
  optional. Numeric (or numeric vector) value with the maximum allowed number of NA_real_values. By default the function will not tolerate any NA_real_ in an aggregation period (and will return NA_real_ instead).

Value

An hydroMet_XXX class object with the required slot(s) aggregated.

Functions

- **agg_hydroMet,hydroMet_BDHI-method**: aggregation method for BDHI data
- **agg_hydroMet,hydroMet_DGI-method**: aggregation method for DGI data
- **agg_hydroMet,hydroMet_CR2-method**: aggregation method for CR2 data
- **agg_hydroMet,hydroMet_IANIGLA-method**: aggregation method for IANIGLA data
Examples

# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = 'BDHI')

# List with meteorological variables (slots in BDHI's object)
cargar <- list('precip', 'Qmd', 'Qmm')

# Assign as names the files
hydro_files <- list.files(system.file('extdata', package = 'hydroToolkit'), pattern = 'Guido')
names(cargar) <- hydro_files

# Build the object with the met records
guido <- build_hydroMet(obj = guido, slot_list = cargar, path = system.file('extdata', package = 'hydroToolkit'))

# Aggregate precipitation serie
guido <- agg_hydroMet(obj = guido, slot_name = 'precip', col_name = 'precip', fun = 'sum', period = 'monthly', out_name = 'P_month', allow_NA = 3)

---

agg_serie  Aggregates a data frame to a larger time period

Description

This is a useful function to easily aggregate your data.

Usage

agg_serie(df, fun, period, out_name, start_month = NULL, end_month = NULL, allow_NA = NULL)

Arguments

df  data frame with class Date or POSIXct in the first column. The function always aggregates the second column.

fun  string containing one of the following functions: 'mean', 'min', 'max' or 'sum'.

period  string with the period of aggregation: 'hourly', 'daily', 'monthly', 'annual' or 'climatic'. **NOTE:** the 'climatic' option returns the all series annual statistics ('fun').
out_name string with the output column name of the variable to aggregate.
start_month optional. Numeric value of the first month. It only makes sense if the 'period' is 'annual'.
end_month optional. Numeric value of the last month. It only makes sense if the 'period' is 'annual'.
allow_NA optional. Numeric value with the maximum allowed number of NA_real_values. By default the function will not tolerate any NA_real_ in an aggregation period (and will return NA_real_ instead).

Value
A data frame with to columns: the date and the aggregated variable.

Examples

```r
# Path to file
dgi_path <- system.file('extdata', package = "hydroToolkit")
toscas <- read_DGI(file = 'Toscas.xlsx', sheet = 'tmean', path = dgi_path)
# Monthly mean temperature
m_toscas <- agg_serie(df = toscas, fun = 'mean', period = 'monthly', out_name = 'T_month')
```

### Description

This method is the recommended one for loading your data-sets (as provided by the agency).

### Usage

```r
build_hydroMet(
  obj,
  slot_list,
  path = NULL,
  col_names = NULL,
  start_date = NULL,
  end_date = NULL
)
```

```r
## S4 method for signature 'hydroMet_BDHI'
build_hydroMet(obj, slot_list, path = NULL)
```

```r
## S4 method for signature 'hydroMet_CR2'
build_hydroMet(obj, slot_list, path = NULL)
```
## S4 method for signature 'hydroMet_DGI'
build_hydroMet(obj, slot_list, path = NULL)

## S4 method for signature 'hydroMet_IANIGLA'
build_hydroMet(obj, slot_list, path = NULL)

## S4 method for signature 'hydroMet_compact'
build_hydroMet(
  obj,
  slot_list,
  col_names = NULL,
  start_date = NULL,
  end_date = NULL
)

### Arguments

**obj**
- an hydroMet_XXX class object (see create_hydroMet).

**slot_list**
- a list containing (in each element) a vector string with the slot names. The name of the list elements are the native file names (e.g.: Qmd_Guido_BDHI.txt).

**NOTE:** when the obj argument is of class hydroMet_compact, slot_list allows to build from multiple objects. So, in this case you have to provide a list of list: the top list contains as names the objects names (as you read them from Global Environment); then every object (top level) contains another list with slot names as names and the column(s) number(s) to extract as numeric value. E.g.: list(bdhi_obj = list(Qmd = 2, Qmm = c(2, 5)), cr2_obj = list(precip = 4)).

**path**
- string with the files directory. If not provided, the method will use the current working directory. **NOTE:** this argument is harmless for an object of class hydroMet_compact.

**col_names**
- it just make sense if 'obj' argument is of hydroMet_compact class. String vector with the names of the column output. Default value (NULL) will return expressive column names.

**start_date**
- it just make sense if 'obj' argument is of hydroMet_compact class. String or POSIXct with the starting date to extract. You can use start_date without end_date. In this case you will subset your data from start_date till the end.

**end_date**
- it just make sense if 'obj' argument is of hydroMet_compact class. String or POSIXct with the last date to extract. You can use end_date without start_date. In this case you will subset your data from the beginning till end_date.

### Value

An S4 object of class hydroMet_XXX with the data loaded in each slot.

### Functions

- **build_hydroMet,hydroMet_BDHI-method**: build up method for BDHI class
• `build_hydroMet,hydroMet_CR2-method`: build up method for CR2 class
• `build_hydroMet,hydroMet_DGI-method`: build up method for DGI class
• `build_hydroMet,hydroMet_IANIGLA-method`: build up method for IANIGLA class
• `build_hydroMet,hydroMet_compact-method`: build up method for compact class

Examples

```r
# Path to file
dgi_path <- system.file('extdata', package = 'hydroToolkit')
file_name <- list.files(path = dgi_path, pattern = 'Toscas')

# Read Toscas
var_nom <- list(slotNames(x = 'hydroMet_DGI')[2:7])
names(var_nom) <- file_name

# Load Toscas meteo station data
toscas_dgi <- create_hydroMet(class_name = 'DGI')
toscas_dgi <- build_hydroMet(obj = toscas_dgi, slot_list = var_nom,
                              path = dgi_path)
```

create_hydroMet  

*Creates an hydroMet class or subclass.*

Description

This function is the constructor of hydroMet class and its subclasses.

Usage

`create_hydroMet(class_name = "hydroMet")`

Arguments

- `class_name` string with the name of the class. Valid arguments are: hydroMet, BDHI, CR2, DGI, IANIGLA or compact.

Value

an S4 object of class hydroMet

Examples

```r
# Create class 'hydroMet'
met_station <- create_hydroMet(class_name = 'hydroMet')

# Subclass 'BDHI'
bdhi_station <- create_hydroMet(class_name = 'BDHI')
```
# Subclass 'DGI'
dgi_station <- create_hydroMet(class_name = 'DGI')

# Subclass 'CR2'
cr2_station <- create_hydroMet(class_name = 'CR2')

# Subclass 'IANIGLA'
ianigla_station <- create_hydroMet(class_name = 'IANIGLA')

---

### fill_serie

#### Description

This function complete non-reported dates and assign `NA_real_` as their value.

#### Usage

```r
fill_serie(df, colName, timeStep)
```

#### Arguments

- **df**: data frame with date and numeric vector as first and second column respectively.
- **colName**: output colname of the numeric variable, e.g.: 'Qmd(m3/s).'</n-  
- **timeStep**: character with a valid time step: 'day', 'month', '4h', 'day/3', 'hour'.

#### Value

A data frame with missing time steps filled with NA's.

#### Examples

```r
# Create a data frame
dates <- seq.Date(from = as.Date('1990-01-01'), to = as.Date('1990-12-01'), by = 'm')
met_var <- runif(n = 12, 0, 10)
met_serie <- data.frame(dates, met_var)

# Fill serie
met_fill <- fill_serie(df = met_serie, colName = 'Temp', timeStep = 'day')
```
fill_value  

Fill a time interval in a data frame with a specific numeric value

Description

Assign specific values to a time interval.

Usage

fill_value(df, col, value, from, to)

Arguments

df  
data frame with the first column being the date and the others numeric variables.
col  
numeric vector with column(s) number(s) to be filled.
value  
numeric or NA_real_. This numeric vector contains the elements to be fill in.
from  
character, Date or POSIXct with the first date to be filled.
to  
character, Date or POSIXct with the last date to be filled.

Value

A data frame filled with the 'value' in the specified time period.

Examples

# Create a data frame
dates <- seq.Date(from = as.Date('1990-01-01'), to = as.Date('1990-12-01'), by = 'm')
met_var <- runif(n = 12, 0, 10)

met_serie <- data.frame(dates, met_var)

# Fill serie
met_fill <- fill_serie(df = met_serie, colName = 'Temp', timeStep = 'day')

# Now fill value
met_fill <- fill_value(df = met_fill, col = 2, value = 10, from = '1990-02-01', to = '1990-02-15')
get_hydroMet  

**Get the slot(s) content(s)**

---

**Description**

Extract the slots that you want from an hydroMet or hydroMet_XXX class.

**Usage**

```r
get_hydroMet(obj, name = NA_character_)
## S4 method for signature 'hydroMet'
get_hydroMet(obj, name = NA_character_)
## S4 method for signature 'hydroMet_BDHI'
get_hydroMet(obj, name = NA_character_)
## S4 method for signature 'hydroMet_DGI'
get_hydroMet(obj, name = NA_character_)
## S4 method for signature 'hydroMet_IANIGLA'
get_hydroMet(obj, name = NA_character_)
## S4 method for signature 'hydroMet_CR2'
get_hydroMet(obj, name = NA_character_)
## S4 method for signature 'hydroMet_compact'
get_hydroMet(obj, name = NA_character_)
```

**Arguments**

- `obj`: an hydroMet or hydroMet_XXX class object.
- `name`: a valid single string or vector string with the required slot name(s).

**Value**

A list with the slot’s data.

**Functions**

- `get_hydroMet`, `hydroMet-method`: get method for generic hydroMet object
- `get_hydroMet`, `hydroMet_BDHI-method`: get method for BDHI class
- `get_hydroMet`, `hydroMet_DGI-method`: get method for DGI class
- `get_hydroMet`, `hydroMet_IANIGLA-method`: get method for IANIGLA class
- `get_hydroMet`, `hydroMet_CR2-method`: get method for CR2 class
- `get_hydroMet`, `hydroMet_compact-method`: get method for compact class
Examples

```r
# Create an IANIGLA object
cuevas <- create_hydroMet(class_name = 'IANIGLA')

# Extract one of its slots
tair <- get_hydroMet(obj = cuevas, name = 'tair')
```

---

**Description**

A suitable object for store basic information about an hydro-meteorological station.

**Value**

A basic hydroMet class object.

**Slots**

- id numeric. This is the ID assigned by the agency.
- agency character. The name of the agency (or institution) that provides the data of the station.
- station character. The name of the (hydro)-meteorological station.
- lat numeric. Latitude of the station.
- long numeric. Longitude of the station.
- alt numeric. Altitude of the station.
- country character. Country where the station is located. Argentina is set as default value.
- province character. Name of the province where the station is located. Mendoza is set as default value.
- river character. Basin river's name.
- active logical. It indicates whether or not the station is currently operated. Default value is TRUE.
hydroMet_BDHI-class

hydroMet subclass for BDHI (Base de Datos Hidrologica Integrada)

data

Description

An suitable object for store hydro-meteorological data from BDHI.

Value

A hydroMet_BDHI class object.

Slots

Qmd  data.frame from read_BDHI containing daily mean river discharge [m3/s].
Qmm  data.frame from read_BDHI containing monthly mean river discharge [m3/s].
precip data.frame from read_BDHI containing daily liquid precipitation [mm].
tdb  data.frame from read_BDHI containing subdaily dry bulb temperature [ºC].
tmax  data.frame from read_BDHI containing daily maximum air temperature [ºC].
tmin  data.frame from read_BDHI containing daily minimum air temperature [ºC].
swe  data.frame from read_BDHI containing daily snow water equivalent [mm].
hr  data.frame from read_BDHI containing subdaily relative humidity [%].
wspd  data.frame from read_BDHI containing subdaily wind speed [km/hr].
wdir  data.frame from read_BDHI containing subdaily wind direction [º].
evap  data.frame from read_BDHI containing daily pan-evaporation [mm].
anem  data.frame from read_BDHI containing daily wind speed above the evap tank [km/hr].
patm  data.frame from read_BDHI containing subdaily atmospheric pressure [mbar].

hydroMet_compact-class

hydroMet subclass for compact data

Description

This subclass is useful for storing in a single data frame ready to use hydro-meteorological series or many variables of the same kind (e.g. lets say precipitacion series).

Value

A hydroMet_compact class object.
hydroMet_DGI-class

Slots

compact  data.frame with Date as first column (class `Date` or `POSIXct`). All other columns are the numeric hydro-meteorological variables (double). This subclass was though to join in a single table ready to use data (e.g. in modelling). You can also use it to put together variables of the same kind (e.g. precipitation records) to make some regional analysis.

hydroMet_CR2-class  hydroMet subclass for CR2 (Explorador Climático) data

Description

A suitable object for store hydro-meteorological data from CR2.

Value

A hydroMet_CR2 class object.

Slots

precip  data.frame from `read_CR2` containing daily precipitation [mm].
tmean  data.frame from `read_CR2` containing daily mean air temperature [ºC].
tmax  data.frame from `read_CR2` containing daily maximum air temperature [ºC].
tmin  data.frame from `read_CR2` containing daily minimum air temperature [ºC].

hydroMet_DGI-class  hydroMet subclass for DGI (Departamento General de Irrigación) data

Description

A suitable object for store hydro-meteorological data from DGI.

Value

A hydroMet_DGI class object.

Slots

hsnow  data.frame from `read_DGI` containing daily snow height [m].
swe  data.frame from `read_DGI` containing daily snow water equivalent [mm].
tmean  data.frame from `read_DGI` containing daily mean air temperature [ºC].
tmax  data.frame from `read_DGI` containing daily max. air temperature [ºC].
tmin  data.frame from `read_DGI` containing daily min. air temperature [ºC].
hr  data.frame from `read_DGI` containing daily mean relative humidity [%].
patm  data.frame from `read_DGI` containing daily mean atmospheric pressure [hPa].
**hydroMet_IANIGLA-class**

hydroMet subclass for IANIGLA (Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales) data

---

**Description**

A suitable object for store hydro-meteorological data provided by IANIGLA.

**Value**

A hydroMet_IANIGLA class object.

**Slots**

date  time serie of dates (class POSIXct or Date).
dair  numeric matrix with air temperature.
dr  numeric matrix with relative humidity.
datm  numeric matrix with atmospheric pressure.
dprecip  numeric matrix with precipitacion.
dwspd  numeric matrix with wind speed.
ddir  numeric matrix with wind direction.
dkin  numeric matrix with incoming short-wave radiation.
dhsnow  numeric matrix with snow height.
dtsoid  numeric matrix with soil temperature.
dhwat  numeric matrix with stream water level.

---

**hydro_year_DGI**  

*Hydrological year classification*

---

**Description**

This function allows you to get the hydrological year. The criteria is consistent with the one of Departamento General de Irrigacion (Mendoza - Argentina).

**Usage**

hydro_year_DGI(df)

**Arguments**

df  a data frame with total annual volumes discharges created with agg_serie function.
### interpolate

#### Interpolation

This function applies interpolation to fill in missing (or non-recorded) values.

#### Usage

```r
interpolate(df, miss_table, threshold, method = "linear")
```

#### Arguments

- `df`: data frame with two columns: `Date` or `POSIXct` class in the first column and a numeric variable in the second one.

---

### Value

A data frame containing the hydrological classification for each year.

### Examples

```r
# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = 'BDHI')

# List with meteorological variables (slots in BDHI's object)
cargar <- list('precip', 'Qmd', 'Qmm')

# Now assign as names the files
hydro_files <- list.files( system.file('extdata', package = "hydroToolkit"), pattern = 'Guido')
names(cargar) <- hydro_files

# Build the object with the met records
guido <- build_hydroMet(obj = guido, slot_list = cargar,  
                         path = system.file('extdata', package = "hydroToolkit"))

# Now get mean monthly discharge
Qmm <- get_hydroMet(obj = guido, name = 'Qmm')[[1]]

# Get the monthly water volume
Qmm_vol <- Qmm_to_Dm(df = Qmm)

# Aggregate data frame to get total annual discharges
AD <- agg_serie(df = Qmm_vol, fun = 'sum', period = 'annual', out_name = 'Ann_vol',  
                 start_month = 7, end_month = 6, allow_NA = 2)

# Get hydrological year classification
AD_class <- hydro_year_DGI(df = AD)
```
modify_hydroMet

miss_table: data frame with three columns: first and last date of interpolation (first and second column respectively). The last and third column, is a numeric with the number of steps to interpolate. See report_miss_data.

threshold: numeric variable with the maximum number of dates in which to apply the interpolation.

method: string with the interpolation method. In this version only ‘linear’ method is allowed.

Value

A data frame with date and the interpolated numeric variable.

Examples

# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = 'BDHI')

# List with meteorological variables (slots in BDHI's object)
cargar <- list('precip', 'Qmd', 'Qmm')

# Now assign as names the files
hydro_files <- list.files(system.file('extdata', package = 'hydroToolkit'), pattern = 'Guido')
names(cargar) <- hydro_files

# Build the object with the met records
guido <- build_hydroMet(obj = guido, slot_list = cargar,
                         path = system.file('extdata', package = 'hydroToolkit'))

# Get mean daily discharge and report miss data
Qmd <- get_hydroMet(obj = guido, name = 'Qmd')[[1]]
miss <- report_miss_data(df = Qmd)

# Now interpolate miss values
Qmd_fill <- interpolate(df = Qmd, miss_table = miss, threshold = 5, method = "linear")

modify_hydroMet Modify data inside a specific slot

Description

Apply a pre-defined (e.g.: movAvg, fill_value or Qmm_to_Dm) or user defined function to an existing series inside a slot.
modify_hydroMet

Usage

modify_hydroMet(
  obj,
  name = NA_character_,
  colName = NA_character_,
  colNum = 2,
  FUN = NULL,
  ...
)

## S4 method for signature 'hydroMet_BDHI'
modify_hydroMet(
  obj,
  name = NA_character_,
  colName = NA_character_,
  colNum = 2,
  FUN = NULL,
  ...
)

## S4 method for signature 'hydroMet_CR2'
modify_hydroMet(
  obj,
  name = NA_character_,
  colName = NA_character_,
  colNum = 2,
  FUN = NULL,
  ...
)

## S4 method for signature 'hydroMet_DGI'
modify_hydroMet(
  obj,
  name = NA_character_,
  colName = NA_character_,
  colNum = 2,
  FUN = NULL,
  ...
)

## S4 method for signature 'hydroMet_IANIGLA'
modify_hydroMet(
  obj,
  name = NA_character_,
  colName = NA_character_,
  colNum = 1,
  FUN = NULL,
  ...
)
modify_hydroMet

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>obj</td>
<td>hydroMet_XXX subclass object. See hydroMet_BDHI, hydroMet_DGI, hydroMet_IANIGLA or hydroMet_CR2.</td>
</tr>
<tr>
<td>name</td>
<td>string with the slot name of the data frame.</td>
</tr>
<tr>
<td>colName</td>
<td>string with the new column name (from FUN).</td>
</tr>
<tr>
<td>colNum</td>
<td>numeric value with the data frame column where to apply FUN. It must be &gt; 1 (except in 'IANIGLA' subclass).</td>
</tr>
<tr>
<td>FUN</td>
<td>the function name.</td>
</tr>
<tr>
<td>...</td>
<td>FUN arguments to pass.</td>
</tr>
</tbody>
</table>

Value

The same hydroMet subclass provided in obj with an extra column.

Functions

- modify_hydroMet,hydroMet_BDHI-method: modify method for BDHI class
- modify_hydroMet,hydroMet_CR2-method: modify method for CR2 class
- modify_hydroMet,hydroMet_DGI-method: modify method for DGI class
- modify_hydroMet,hydroMet_IANIGLA-method: modify method for IANIGLA class

Examples

```r
# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = "BDHI")

# List with meteorological variables (slots in BDHI's object)
cargar <- list('precip', 'Qmd', 'Qmm')

# Now assign as names the files
hydro_files <- list.files(system.file('extdata', package = "hydroToolkit"), pattern = 'Guido')
names(cargar) <- hydro_files

# Build the object with the met records
guido <- build_hydroMet(obj = guido, slot_list = cargar, path = system.file('extdata', package = "hydroToolkit") )
```
**movAvg**

**Moving average windows**

**Description**

Smooth a numeric serie with a moving average windows

**Usage**

`movAvg(df, k, pos)`

**Arguments**

- `df` data frame with the serie that you want to smooth. By default, the function uses column 2.
- `k` numeric value with windows size, e.g.: 5
- `pos` string with the position of the window:
  - 'izq': left aligned. The output value is on the left, so the function weights the (k - 1) values at the right side.
  - 'der': right aligned. The output value is on the right, so the function weights the (k - 1) values at the left side.
  - 'cen': center. The output value is in the middle of the window.

**Value**

data frame with the smooth serie.

**Examples**

```r
# Relative path to raw data
full_path <- system.file("extdata", package = "hydroToolkit")

# Apply function
cuevas <- read_IANIGLA(file = 'Cuevas.csv', path = full_path)

# Get air temperature
cuevas_tair <- cuevas[, 1:2]

# Create a moving average serie of Tair
Tair_mov <- movAvg(df = cuevas_tair, k = 10, pos = 'izq')
```
Description

This method allows you to make plots (using simple and expressive arguments) of the variables contained inside an hydroMet_XXX object. The plot outputs can be static (ggplot2) or interactive (plotly).

Usage

```
plot_hydroMet(
  obj,
  slot_name,
  col_number,
  interactive = FALSE,
  line_type = NULL,
  line_color = "dodgerblue",
  x_lab = "Date",
  y_lab = "y",
  title_lab = NULL,
  legend_lab = NULL,
  double_yaxis = NULL,
  list_extra = NULL,
  from = NULL,
  to = NULL,
  scatter = NULL
)
```

## S4 method for signature 'hydroMet_BDHI'

```
plot_hydroMet(
  obj,
  slot_name,
  col_number,
  interactive = FALSE,
  line_type = NULL,
  line_color = "dodgerblue",
  x_lab = "Date",
  y_lab = "y",
  title_lab = NULL,
  legend_lab = NULL,
  double_yaxis = NULL,
  list_extra = NULL,
  from = NULL,
  to = NULL
)
```
## S4 method for signature 'hydroMet_CR2'
plot_hydroMet(
  obj,
  slot_name,
  col_number,
  interactive = FALSE,
  line_type = NULL,
  line_color = "dodgerblue",
  x_lab = "Date",
  y_lab = "y",
  title_lab = NULL,
  legend_lab = NULL,
  double_yaxis = NULL,
  list_extra = NULL,
  from = NULL,
  to = NULL
)

## S4 method for signature 'hydroMet_DGI'
plot_hydroMet(
  obj,
  slot_name,
  col_number,
  interactive = FALSE,
  line_type = NULL,
  line_color = "dodgerblue",
  x_lab = "Date",
  y_lab = "y",
  title_lab = NULL,
  legend_lab = NULL,
  double_yaxis = NULL,
  list_extra = NULL,
  from = NULL,
  to = NULL
)

## S4 method for signature 'hydroMet_IANIGLA'
plot_hydroMet(
  obj,
  slot_name,
  col_number,
  interactive = FALSE,
  line_type = NULL,
  line_color = "dodgerblue",
  x_lab = "Date",
  y_lab = "y",
  title_lab = NULL,
  legend_lab = NULL,
Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>obj</td>
<td>a valid <code>hydroMet_XXX</code> object.</td>
</tr>
<tr>
<td>slot_name</td>
<td>string(s) with the name of the slot(s) to use in plotting.</td>
</tr>
<tr>
<td>col_number</td>
<td>numeric (vector) with the column’s variable to plot. In case you decide to merge slots you must provide a list in which each element contains the column numbers of the variable to plot.</td>
</tr>
<tr>
<td>interactive</td>
<td>logical. Default value, FALSE, will return a <code>ggplot2</code> class object. Otherwise you will get a <code>plotly</code> one.</td>
</tr>
<tr>
<td>line_type</td>
<td>string with line dash type (<code>ggplot2</code>) or mode in <code>plotly</code> case. <code>ggplot2</code>: 'solid' (default value), 'twodash', 'longdash', 'dotted', 'dotdash', 'dashed' or 'blank'. <code>plotly</code>: 'lines' (default value), 'lines+markers' or 'markers'.</td>
</tr>
<tr>
<td>line_color</td>
<td>string with a valid color. See 'colors()' or <code>Rcolor</code> document.</td>
</tr>
<tr>
<td>x_lab</td>
<td>string with x axis label.</td>
</tr>
<tr>
<td>y_lab</td>
<td>string with y axis label. In case you use <code>double_yaxis</code> argument you must supply both <code>c('ylab', 'y2lab')</code>.</td>
</tr>
<tr>
<td>title_lab</td>
<td>string with the title of the plot. Default is a plot without title.</td>
</tr>
<tr>
<td>legend_lab</td>
<td>string with plot label(s) name(s). <strong>NOTE:</strong> <code>ggplot2</code> <code>double_yaxis</code> does not support <code>legend_label</code> in this package version, so giving values to this argument will be harmfulness.</td>
</tr>
</tbody>
</table>
double_yaxis numeric vector with either 1 (= main axis - left) or 2 (= secondary axis - right) indicating whether the variable should be plotted in either left or right axis. **NOTE:** in this package version `ggplot2` supports just one line plot for each 'y' axis.

list_extra list with the `ggplot2` argument to pass. This argument was design to allow the user to modify `ggplot2` arguments (you can find nice examples in `ggplot2 - Essentials`). **NOTE:** in this package version this argument doesn’t make sense for `plotly` (except for scatter plot in `hydroMet_compact` class).

from string (or POSIXct - valid only in 'BDHI' and 'IANIGLA') with the starting Date. You can use 'from' without 'to'. In this case you will subset your data 'from' till the end.

to string (or POSIXct - valid only in 'BDHI' and 'IANIGLA') with the ending Date. You can use 'to' without 'from'. In this case you will subset your data from the beginning till 'to'.

scatter numeric vector of length two with the column number to plot as scatter. The first variable (column number) will be the 'x' variable and the second one the 'y' variable. This argument will work just for class `hydroMet_compact`.

Value A `ggplot2` or `plotly` objects to analyze your data.

Functions

- `plot_hydroMet,hydroMet_BDHI-method`: plot method for BDHI class
- `plot_hydroMet,hydroMet_CR2-method`: plot method for CR2 class
- `plot_hydroMet,hydroMet_DGI-method`: plot method for DGI class
- `plot_hydroMet,hydroMet_IANIGLA-method`: plot method for IANIGLA class
- `plot_hydroMet,hydroMet_compact-method`: plot method for compact class

Examples

```r
# Path to file
dgi_path <- system.file('extdata', package = "hydroToolkit")
file_name <- list.files(path = dgi_path, pattern = 'Toscas')

# Read Toscas
var_nom <- list(slotNames(x = 'hydroMet_DGI')[2:7])
names(var_nom) <- file_name

# Load Toscas meteo station data
toscas_dgi <- create_hydroMet(class_name = 'DGI')
toscas_dgi <- build_hydroMet(obj = toscas_dgi, slot_list = var_nom, path = dgi_path)

# Plot mean air temperature
plot_hydroMet(obj = toscas_dgi, col_number = 2, slot_name = 'tmean', legend_lab = 'Tmean(°C)')
```
# Now let's plot an interactive graph
plot_hydroMet(obj = tocas_dgi, col_number = 2, slot_name = 'tmean',
interactive = TRUE, y_lab = 'Tmean(°C)')

---

**precip_cumsum**  
*Cumulative sum of precipitation series*

**Description**

Returns a data frame with two columns: the date and the cumulative sum of the chosen `col_number`. This function can deal with `NA_real_`.

**Usage**

`precip_cumsum(df, col_number = 2, out_name = NULL)`

**Arguments**

- `df`  
  data frame with `Date` (or `POSIXct`) in the first column and numeric variables on the others.

- `col_number`  
  numeric. The column number of the series where to apply the cumulative sum.

- `out_name`  
  optional. String value with the column output name. Default is 'cumsum_' plus the original name.

**Value**

A data frame with two columns: date and the cumulative sum of the series.

**Examples**

# Load daily precipitation data-set from BDHI
load( paste0(system.file('extdata', package = "hydroToolkit"), '/bdhi_p.rda') )

# Get compact slot
p_bdhi <- get_hydroMet(obj = bdhi_p, name = 'compact')[[1]]

# Apply cumulative precipitation function
p_cum <- precip_cumsum(df = p_bdhi, col_number = 2, out_name = 'cum_guido')
precip_hydroMet

Make homogeneity test or fill gaps in a series

Description

This method can do both: test homogeneity in precipitation series or fill data gaps using regional analysis.

Usage

precip_hydroMet(
  obj,
  col_target = 2,
  fill = FALSE,
  method = "spearman",
  min_value = 0.2
)

## S4 method for signature 'hydroMet_compact'
precip_hydroMet(
  obj,
  col_target = 2,
  fill = FALSE,
  method = "spearman",
  min_value = 0.2
)

Arguments

- **obj**: an `hydroMet_compact` class object.
- **col_target**: numeric. The column number of the target series (either to test homogeneity or to fill gaps) in `compact` slot.
- **fill**: logical. By default value (FALSE) you will make an homogeneity test to your target series.
- **method**: string (default is `spearman` - possible values are: `spearman`, `pearson` or `kendall`). When creating the regional (or master series) the method uses a weighted mean. The weighted values are the correlations coefficients.
- **min_value**: numeric. Series with a correlation value less than `min_value` are thrown away.

Value

If fill = FALSE the method will return a list with three elements: a data frame with all necessary values to correct your target serie, a plot with p-values and the correlation matrix. When fill = TRUE the list will contain: the data frame with the target series gaps filled and the correlation matrix.
Functions

- `precip_hydroMet.hydroMet_compact-method`: homogeneity test applied to precipitation data stored in compact class.

Examples

```r
# Load daily precipitation data-set from BDHI
load( paste0(system.file('extdata', package = 'hydroToolkit'), '/bdhi_p.rda') )

# Fill gaps in Tupungato station
relleno <- precip_hydroMet(obj = bdhi_p, col_target = 5, fill = TRUE)
```

### Qmm_to_Dm

River discharge \([m^3/s]\) to volume \([hm^3]\)

**Description**

Converts mean monthly river discharge \([m^3/s]\) to total volume discharge \([hm^3]\).

**Usage**

`Qmm_to_Dm(df)`

**Arguments**

- `df`: data frame with class `Date` in the first column. By default the function converts the second column only. If you have daily or hourly data see `agg_serie`.

**Value**

A data frame with two columns: Date and total volume discharge.

**Examples**

```r
# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = 'BDHI')

# List with meteorological variables (slots in BDHI's object)
cargar <- list('precip', 'Qmd', 'Qmm')

# Now assign as names the files
hydro_files <- list.files( system.file('extdata', package = 'hydroToolkit'), pattern = 'Guido')
names(cargar) <- hydro_files

# Build the object with the met records
guido <- build_hydroMet(obj = guido, slot_list = cargar, path = system.file('extdata', package = 'hydroToolkit'))
```
# Now get mean monthly discharge
Qmm <- get_hydroMet(obj = guido, name = 'Qmm')[[1]]

# Get the monthly water volume
Qmm_vol <- Qmm_to_Dm(df = Qmm)

---

**Description**

Reads data from Base de Datos Hidrológica Integrada (BDHI) - Argentina

**Usage**

```r
read_BDHI(file, colName, timeStep, is.Wdir = FALSE)
```

**Arguments**

- `file` string with the name (including extension) of the file.
- `colName` string with variable name. E.g.: Qmd(m3/s)
- `timeStep` string with time step: 'month', 'day', 'day/3', '4h' or 'hour'.
  - 'day': data recorded once a day
  - 'month': data recorded monthly
  - '4h': applies to atmospheric pressure time series only
  - 'day/3': applies to wind related variables, relative humidity, and dry bulb temperature
  - 'hour': in case you have to deal with hourly data.
- `is.Wdir` a logical value indicating if the variable is wind direction. Default value is set to FALSE.

**Value**

A data frame with two columns: date and variable. Gaps between dates are filled with NA_real_ and duplicated rows are eliminated automatically.

**Examples**

```r
# Relative path to raw data
full_path <- system.file('extdata', package = "hydroToolkit")

# Apply function
guido_Qmd <- read_BDHI(file = paste0(full_path, '/Qmd_Mendoza_Guido'),
                       colName = 'Q(m3/s)', timeStep = 'day')
```
**read_CR2**  
*Reads data from Explorador Climático de Chile*

**Description**

Reads data downloaded from Explorador Climático de Chile (CR2) as a data frame.

**Usage**

```r
read_CR2(file, colName, path = NULL)
```

**Arguments**

- `file`: string with the file name (include extension). The only accepted format is `.csv`.
- `colName`: string with the name of the variable.
- `path`: string with the files directory. If not provided, the function will use the current working directory.

**Value**

A two column data frame with date and variable. Gaps between dates are filled with `NA_real_` and duplicated rows are eliminated automatically.

**Examples**

```r
# Relative path to raw data
full_path <- system.file("extdata", package = "hydroToolkit")

# Apply function
yeso_tmed <- read_CR2(file = "Tmed_Yeso_Embalse.csv", colName = "T(°C)", path = full_path)
```

**read_DGI**  
*Reads data from Departamento General de Irrigación (Mendoza - Argentina)*

**Description**

Reads the Departamento General de Irrigacion (Mendoza - Argentina) excel sheet.

**Usage**

```r
read_DGI(file, sheet = NULL, colName = NULL, range = NULL, path = NULL)
```
**Arguments**

- **file**
  string with the file name (‘xlsx’ excel files).

- **sheet**
  sheet to read. Either a string (the name of a sheet), or an integer (the position of the sheet). Default value is sheet one.

- **colName**
  string with the name of the second column (as default first column is Date). If ignored first row excel names are used.

- **range**
  string providing cell range to read. E.g.: 'A1:B75'.

- **path**
  string with the files directory. If not provided, the function will use the current working directory.

**Value**

A data frame with two columns: date and variable. Gaps between dates are filled with `NA_real_` and duplicated rows are eliminated automatically.

**Examples**

```r
# Relative path to raw data
full_path <- system.file('extdata', package = "hydroToolkit")

# Apply function
toscas_hr <- read_DGI(file = 'Toscas.xlsx', sheet = 'hr',
                       colName = 'RH(%)', path = full_path)
```

---

**read_IANIGLA**

*Reads data provided by IANIGLA*

**Description**

Reads the data provided by IANIGLA (Instituto Argentino de Nivologia, Glaciologia y Ciencias Ambientales).

**Usage**

```r
read_IANIGLA(file, all = FALSE, path = NULL)
```

**Arguments**

- **file**
  string with the name of the `.csv` file downloaded from the meteo-stations web page.

- **all**
  logical value indicating whether the returned data frame contain all the original columns or just the date and data.

- **path**
  string with the files directory. If not provided, the function will use the current working directory.
Value

A data frame containing the hourly data measured by the automatic weather stations. Gaps between dates are filled with NA_real_ and duplicated rows are eliminated automatically.

Note

In this package version we only provide functionality for a specific data-set generated in the institute.

Examples

# Relative path to raw data
full_path <- system.file('extdata', package = "hydroToolkit")

# Apply function
cuevas <- read_IANIGLA(file = 'Cuevas.csv', path = full_path)

Description

This method returns a list with two elements: the first one is a data frame with miss data (see also report_miss_data) and the second one is also a data frame with the mean, sd, max and min values.

Usage

```r
report_hydroMet(
  obj,
  slot_name,
  col_name,
  start_date = NULL,
  end_date = NULL,
  Lang = "spanish"
)
```

```r
## S4 method for signature 'hydroMet_BDHI'
report_hydroMet(
  obj,
  slot_name,
  col_name,
  start_date = NULL,
  end_date = NULL,
  Lang = "spanish"
)
```
### S4 method for signature 'hydroMet_CR2'

```r
report_hydroMet(
  obj,
  slot_name,
  col_name,
  start_date = NULL,
  end_date = NULL,
  Lang = "spanish"
)
```

### S4 method for signature 'hydroMet_DGI'

```r
report_hydroMet(
  obj,
  slot_name,
  col_name,
  start_date = NULL,
  end_date = NULL,
  Lang = "spanish"
)
```

### S4 method for signature 'hydroMet_IANIGLA'

```r
report_hydroMet(
  obj,
  slot_name,
  col_name,
  start_date = NULL,
  end_date = NULL,
  Lang = "spanish"
)
```

#### Arguments

- **obj**: an `hydroMet_XXX` object.
- **slot_name**: a single or vector string containing the slot(s) to report.
- **col_name**: a single or vector string with the name of the column to report in slot_name.
- **start_date**: optional (default is the first Date). Single string or `POSIXct` with the starting Date to report.
- **end_date**: optional (default is the last Date). Single string or `POSIXct` with the last Date to report.
- **Lang**: optional (default value is `spanish`). Single string with the language to report results: `spanish` or `english`.

#### Value

A list containing two data frames: the first one with miss data and the second with the mean, sd, max and min values of the series.
Functions

- `report_hydroMet,hydroMet_BDHI-method`: report method for BDHI class
- `report_hydroMet,hydroMet_CR2-method`: report method for CR2 class
- `report_hydroMet,hydroMet_DGI-method`: report method for DGI class
- `report_hydroMet,hydroMet_IANIGLA-method`: report method for IANIGLA class

Examples

```r
# Create IANIGLA class
cuevas <- create_hydroMet(class_name = "IANIGLA")

# List with meteorological variables (slots in BDHI's object)
cargar <- list(slotNames(x = 'hydroMet_IANIGLA')[2:11])

# Assign as names the files
hydro_files <- list.files(system.file('extdata', package = "hydroToolkit"), pattern = 'Cuevas')
names(cargar) <- hydro_files

# Build met-station
cuevas <- build_hydroMet(obj = cuevas, slot_list = cargar, path = system.file('extdata', package = "hydroToolkit") )

# Get report
report_hydroMet(obj = cuevas, slot_name = 'kin', col_name = 'kin_1')
```

---

**report_miss_data**

**Report NA_real_values**

**Description**

Creates a data frame with reported dates and number of times-step of missing or not recorded data.

**Usage**

`report_miss_data(df, Lang = "spanish")`

**Arguments**

- `df` data frame with hydro-meteo data. First column is date and the second numeric vector to be reported.
- `Lang` string with output column name language: 'spanish' (default) or 'english'.

**Value**

A data frame with three columns: start-date, end-date and number of missing time steps.
Examples

# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = 'BDHI')

# List with meteorological variables (slots in BDHI's object)
cargar <- list('precip', 'Qmd', 'Qmm')

# Now assign as names the files
hydro_files <- list.files(system.file('extdata', package = 'hydroToolkit'), pattern = 'Guido')
names(cargar) <- hydro_files

# Build the object with the met records
guido <- build_hydroMet(obj = guido, slot_list = cargar,
                         path = system.file('extdata', package = 'hydroToolkit'))

# Get mean daily discharge and report miss data
Qmd <- get_hydroMet(obj = guido, name = 'Qmd')[[1]]
miss <- report_miss_data(df = Qmd)

---

rm_spikes

Remove spikes

Description

Removes spikes, and sets their value to NA_real_.

Usage

rm_spikes(df, tolerance)

Arguments

df data frame with date and numeric variable in the first and second column respectively (from read_XXX functions).
tolerance numeric with maximum tolerance between a number and its successor.

Value

The same data frame but without peaks.

Examples

# Relative path to raw data
full_path <- system.file('extdata', package = 'hydroToolkit')

# Read IANIGLA file
cuevas <- read_IANIGLA(file = ' Cuevas.csv', path = full_path)
# Remove spikes from air temperature series
tair_rm_spikes <- rm_spikes(df = cuevas, tolerance = 10)

---

**set_hydroMet**

*Set the data of an hydroMet object or its subclasses*

**Description**

With this method you can set (or change) an specific slot value.

**Usage**

```r
set_hydroMet(
  obj = NULL,
  id = NULL,
  agency = NULL,
  station = NULL,
  lat = NULL,
  long = NULL,
  alt = NULL,
  country = NULL,
  province = NULL,
  river = NULL,
  active = NULL,
  ...
)
```

```r
## S4 method for signature 'hydroMet'
set_hydroMet(
  obj = NULL,
  id = NULL,
  agency = NULL,
  station = NULL,
  lat = NULL,
  long = NULL,
  alt = NULL,
  country = NULL,
  province = NULL,
  river = NULL,
  active = NULL
)
```

```r
## S4 method for signature 'hydroMet_BDHI'
set_hydroMet(
  obj = NULL,
  id = NULL,
```
set_hydroMet

agency = NULL,
station = NULL,
lat = NULL,
long = NULL,
alt = NULL,
country = NULL,
province = NULL,
river = NULL,
active = NULL,
Qmd = NULL,
Qmm = NULL,
precip = NULL,
tdb = NULL,
tmax = NULL,
tmin = NULL,
swe = NULL,
h = NULL,
hsnow = NULL
}

## S4 method for signature 'hydroMet_DGI'
set_hydroMet(
  obj = NULL,
id = NULL,
agency = NULL,
station = NULL,
lat = NULL,
long = NULL,
alt = NULL,
country = NULL,
province = NULL,
river = NULL,
active = NULL,
swe = NULL,
tmean = NULL,
tmax = NULL,
tmin = NULL,
h = NULL,
patm = NULL
)

## S4 method for signature 'hydroMet_IANIGLA'
set_hydroMet(
set_hydroMet

obj = NULL,
id = NULL,
agency = NULL,
estation = NULL,
lat = NULL,
long = NULL,
alt = NULL,
country = NULL,
province = NULL,
river = NULL,
active = NULL,
date = NULL,
tair = NULL,
h = NULL,
patm = NULL,
precip = NULL,
wspd = NULL,
wd = NULL,
kin = NULL,
hsnow = NULL,
tsoil = NULL,
hwat = NULL
)

## S4 method for signature 'hydroMet_CR2'
set_hydroMet

set_hydroMet

obj = NULL,
id = NULL,
agency = NULL,
estation = NULL,
lat = NULL,
long = NULL,
alt = NULL,
country = NULL,
province = NULL,
river = NULL,
active = NULL,
precip = NULL,
tmean = NULL,
tmax = NULL,
tmin = NULL
)

## S4 method for signature 'hydroMet_compact'
set_hydroMet

set_hydroMet

obj = NULL,
id = NULL,
agency = NULL,
station = NULL,
lat = NULL,
long = NULL,
alt = NULL,
country = NULL,
province = NULL,
river = NULL,
active = NULL,
compact = NULL
)

Arguments

obj an hydroMet or hydroMet_XXX class object.
id numeric. This is the ID assigned by the agency.
agency character. The name of the agency (or institution) that provides the data of the station.
station character. The name of the (hydro)-meteorological station.
lat numeric. Latitude of the station.
long numeric. Longitude of the station.
alt numeric. Altitude of the station.
country character. Country where the station is located. Argentina is set as default value.
province character. Name of the province where the station is located. Mendoza is set as default value.
river character. Basin river’s name.
active logical. It indicates whether or not the station is currently operated. Default value is TRUE.
...
arguments to be passed to methods. They rely on the slots of the obj subclass.
Qmd daily mean river discharge.
Qmm monthly mean river discharge.
precip precipitation.
tdb dry bulb temperature.
tmax daily maximum air temperature.
tmin daily minimum air temperature.
swe snow water equivalent.
hr relative humidity.
wspd wind speed.
wdir wind direction.
evap evaporation.
anem wind speed above the pan-evaporation.
patm atmospheric pressure.
set_threshold

- **tmean**: daily mean air temperature.
- **hsnow**: snow height.
- **date**: time serie with dates.
- **tair**: air temperature.
- **kin**: incoming shortwave radiation.
- **tsoil**: soil temperature.
- **hwat**: stream water level.
- **compact**: data frame with Date as first column. All other columns are hydro-meteorological variables.

**Value**

The hydroMet object with the slots setted.

**Functions**

- `set_hydroMet`, `hydroMet-method`: set method for generic object
- `set_hydroMet`, `hydroMet_BDHI-method`: set method for BDHI object
- `set_hydroMet`, `hydroMet_DGI-method`: set method for DGI object
- `set_hydroMet`, `hydroMet_IANIGLA-method`: set method for IANIGLA object
- `set_hydroMet`, `hydroMet_CR2-method`: set method for CR2 object
- `set_hydroMet`, `hydroMet_compact-method`: set method for compact object

**Examples**

```r
# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = 'BDHI')

# Assign altitude
guido <- set_hydroMet(obj = guido, alt = 2480)
```

---

**set_threshold**

**Set a threshold**

**Description**

Set tolerable extreme values (maximum or minimum). Records greater or equal than (‘>=’) or lesser or equal than (‘<=’) ‘threshold’ argument are set to *NA_real_*.  

**Usage**

```r
set_threshold(x, threshold, case = ">=")
```
Arguments

- **x**: numeric vector or data frame with a numeric series in the second column.
- **threshold**: numeric value with threshold.
- **case**: string with either ‘>=’ (greater or equal than) or ‘<=’ (lesser or equal than) symbol.

Value

Numeric vector or data frame with values greater (or lesser) or equal than 'threshold' set as NA_real_.

Examples

```r
# Relative path to raw data
full_path <- system.file('extdata', package = "hydroToolkit")

# Read IANIGLA file
cuevas <- read_IANIGLA(file = 'Cuevas.csv', path = full_path)

# Set threshold from air temperature series
tair_thres <- set_threshold(x = cuevas, threshold = 40)
```

Description

This method allows you to easily cut the data stored in an hydroMet_XXX class object by dates.

Usage

```r
subset_hydroMet(obj, slot_name, from = NULL, to = NULL)
```
Arguments

obj        an hydroMet_XXX class object.
slot_name  string vector with the slot(s) name(s) to subset. **NOTE:** in case you want to subset a hydroMet_IANIGLA object is recommended to consider all the slots with data.
from       string (or POSIXct - valid only in 'BDHI' and 'IANIGLA') with the starting Date. You can use from without to. In this case you will subset your data 'from' till the end.
to         string (or POSIXct - valid only in 'BDHI' and 'IANIGLA') with the ending Date. You can use to without from. In this case you will subset your data from the beginning till 'to'.

Value

The same hydroMet_XXX class provided in obj but subsetted.

Functions

- subset_hydroMet,hydroMet_BDHI-method: subset method for BDHI data
- subset_hydroMet,hydroMet_DGI-method: subset method for DGI data
- subset_hydroMet,hydroMet_CR2-method: subset method for CR2 data
- subset_hydroMet,hydroMet_IANIGLA-method: subset method for IANIGLA data
- subset_hydroMet,hydroMet_compact-method: subset method for compact data

Examples

```r
# Create BDHI hydro-met station
guido <- create_hydroMet(class_name = 'BDHI')

# List with meteorological variables (slots in BDHI's object)
cargar <- list('precip', 'Qmd', 'Qmm')

# Assign as names the files
hydro_files <- list.files(system.file('extdata', package = "hydroToolkit"), pattern = 'Guido')
names(cargar) <- hydro_files

# Build the object with the met records
guido <- build_hydroMet(obj = guido, slot_list = cargar, path = system.file('extdata', package = "hydroToolkit") )

# Subset daily mean discharge
guido <- subset_hydroMet(obj = guido, slot_name = 'Qmd', from = '2005-01-01', to = '2010-12-31')
```
swe_to_melt  

Snow water equivalent to melt

Description

Converts a snow water equivalent series (from snow pillow) into a melt series.

Usage

swe_to_melt(df)

Arguments

- df: data frame with 'swe' serie in the second column. See 'read_XXX' functions.

Value

Data frame containing the numeric vector with melted snow.

Examples

# Relative path to raw data
full_path <- system.file('extdata', package = "hydroToolkit")

# Read swe sheet
toscas_swe <- read_DGI(file = 'Toscas.xlsx', sheet = 'swe',
                         colName = 'swe(mm)', path = full_path)

# swe to melt
toscas_melt <- swe_to_melt(df = toscas_swe)

swe_to_precip  

Snow water equivalent to snowfall

Description

Converts a snow water equivalent series (from snow pillow) to a snowfall series.

Usage

swe_to_precip(df)

Arguments

- df: data frame with 'swe' series in the second column. See 'read_XXX' functions.
swe_to_precip

Value

Data frame containing the numeric vector with inferred snowfall.

Examples

# Relative path to raw data
full_path <- system.file('extdata', package = "hydroToolkit")

# Read swe sheet
toscas_swe <- read_DGI(file = 'Toscas.xlsx', sheet = 'swe',
colName = 'swe(mm)', path = full_path)

# swe to snowfall
toscas_snfall <- swe_to_precip(df = toscas_swe)
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