Package ‘hydroscoper’

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Type Package

Title Interface to the Greek National Data Bank for
Hydrometeorological Information

Version 1.4

Maintainer Konstantinos Vantas <kon.vantas@gmail.com>

Description R interface to the Greek National Data Bank for Hydrological and
Meteorological Information. It covers
Hydroscope's data sources and provides functions to transliterate,
translate and download them into tidy dataframes.

URL https://github.com/ropensci/hydroscoper,
https://docs.ropensci.org/hydroscoper/

BugReports https://github.com/ropensci/hydroscoper/issues

Depends R (>= 3.4)

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Author Konstantinos Vantas [aut, cre]
(<https://orcid.org/0000-0001-6387-8791>),
Sharla Gelfand [ctb, rev] (Sharla Gelfand reviewed the package for
rOpenSci, see https://github.com/ropensci/onboarding/issues/185),
Tim Trice [rev] (Tim Trice reviewed the package for rOpenSci, see
https://github.com/ropensci/onboarding/issues/185)

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R topics documented:

find_stations *Find nearest stations using a point's coordinates*

Description

find_stations returns a tibble with the nearest stations' distances using a given point's longitude and latitude values. This function uses the Haversine formula for distance calculation in km.

Usage

```
find_stations(longitude = 24, latitude = 38)
```

Arguments

longitude	a numeric value in degrees
latitude	a numeric value in degrees

Value

If the given longitude is in [24, 38] and the latitude is in [34, 42] (i.e. are valid values for Greece) returns an ordered tibble with the station_id, name, subdomain and distance values in km. The station's data that are used come from the 'stations' dataset. Otherwise returns an error message.

Examples

```
# find the five nearest stations to a point near Thessaloniki,
# (lon, lat) = (22.97, 40.60)
head(find_stations(22.97, 40.60), 5)
```

get_data *Get time series values in a tibble*

Description

`get_data` returns a tibble from a Hydroscope's time-series text file.

Usage

```
get_data(subdomain = c("kyy", "ypaat", "emy", "deh"), time_id)
```

Arguments

`subdomain`	One of the subdomains of hydroscope.gr
`time_id`	A time series ID

Value

If `subdomain` is one of:

- `kyy`, Ministry of Environment and Energy
- `ypaat`, Ministry of Rural Development and Food
- `deh`, Greek Public Power Corporation
- `emy`, National Meteorological Service

and `time_id` exists in that `subdomain`, returns a tibble with the time series values. Otherwise returns an error message.

The dataframe columns are:

date The time series Dates (POSIXct)

value The time series values (numeric)

comment Comments about the values (character)

Note

Data are not available freely in the sub-domains: `"deh"` (Greek Public Power Corporation) and `"emy"` (National Meteorological Service).

Author(s)

Konstantinos Vantas, `<kon.vantas@gmail.com>`

References

Stations' data are retrieved from the Hydroscope's databases:

- Ministry of Environment, Energy and Climate Change.
- Ministry of Rural Development and Food.

Examples

```
## Not run:
# get time series 912 from the Greek Ministry of Environment and Energy
time_series <- get_data("kyy", 912)

## End(Not run)
```

---

get_tables *Get tibbles from Hydroscope*

Description

A family of functions that return a tibble from a specific database from Hydroscope using the Enhydris API. get_database returns a named list of tibbles using all the family's functions.

Usage

```
get_stations(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)

get_timeseries(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)

get_instruments(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)

get_water_basins(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)

get_water_divisions(
  subdomain = c("kyy", "ypaat", "emy", "deh"),
  translit = TRUE
)

get_political_divisions(
  subdomain = c("kyy", "ypaat", "emy", "deh"),
  translit = TRUE
)

get_variables(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)

get_units_of_measurement(
  subdomain = c("kyy", "ypaat", "emy", "deh"),
  translit = TRUE
)

get_time_steps(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)

get_owners(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)
```

```
get_instruments_type(
  subdomain = c("kyy", "ypaat", "emy", "deh"),
  translit = TRUE
)

get_station_type(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)

get_database(subdomain = c("kyy", "ypaat", "emy", "deh"), translit = TRUE)
```

Arguments

subdomain	One of the subdomains of Hydroscope in the vector c("kyy","ypaat","emy","deh").
translit	Automatically transliterate Greek to Latin.

Value

If subdomain is one of:

- kyy, Ministry of Environment and Energy.
- ypaat, Ministry of Rural Development and Food.
- deh, Greek Public Power Corporation.
- emy, National Meteorological Service.

returns a tibble or a named list with tibbles from the corresponding database. Otherwise returns an error message.

Note

Objects' IDs are not unique among the different Hydroscope databases. For example, time series' IDs from http://kyy.hydroscope.gr have same values with time series' from http://ypaat.hydroscope.gr.

The coordinates of the stations are based on the European Terrestrial Reference System 1989 (ETRS89).

Author(s)

Konstantinos Vantas, <kon.vantas@gmail.com>

References

The data are retrieved from the Hydroscope's site databases:

- Ministry of Environment, Energy and Climate Change.
- Ministry of Rural Development and Food.
- National Meteorological Service.
- Greek Public Power Corporation.

Examples

```
## Not run:

# data will be downloaded from Ministry of Environment and Energy (kyy):
subdomain <- "kyy"

# stations
kyy_stations <- get_stations(subdomain)

# time series
kyy_ts <- get_timeseries(subdomain)

# instruments
kyy_inst <- get_instruments(subdomain)

# water basins
kyy_wbas <- get_water_basins(subdomain)

# water divisions
kyy_wdiv <- get_water_divisions(subdomain)

# political divisions
kyy_pol <- get_political_divisions(subdomain)

# variables
kyy_vars <- get_variables(subdomain)

# units of measurement
kyy_units <- get_units_of_measurement(subdomain)

# time steps
kyy_time_steps <- get_time_steps(subdomain)

# owners
kyy_owners <- get_owners(subdomain)

# instruments type
kyy_instr_type <- get_instruments_type(subdomain)

# stations' type
kyy_st_type <- get_station_type(subdomain)

# use all the get_ functions above to create a named list with tibbles
kyy_db <- get_database(subdomain)

## End(Not run)
```

greece_borders *Greek borders*

Description

The borders of Greece are taken from Geoadata.gov.gr. The variables are created using the function tidy from the broom package. This data frame was created for use with the geom_polygon from ggplot2 package.

Usage

```
greece_borders
```

Format

A tibble with 18,474 rows and 8 variables:

long Longitude in decimal degrees, ETRS89

lat Latitude in decimal degrees, ETRS89

order order, integer

hole hole, boolean

piece piece, integer

group group, numeric

Source

Konstantinos Vantas

---

hydroscoper *hydroscoper: Interface to Hydroscope*

Description

hydroscoper provides an R interface to the Greek National Data Bank for Hydrological and Meteorological Information http://www.hydroscope.gr.

hydroscoper covers Hydroscope's data sources using the Enhydris API and provides functions to:

1. Transform the available tables and data sets into tibbles.
2. Transliterate the Greek Unicode names to Latin.
3. Translate various Greek terms to English.

Enhydris API

The Enhydris database is implemented in PostgreSQL. Details can be found here

Data Sources

The data are retrieved from the Hydroscope's databases:

- Ministry of Environment, Energy and Climate Change.
- Ministry of Rural Development and Food.
- National Meteorological Service.
- Greek Public Power Corporation.

Author(s)

Maintainer: Konstantinos Vantas `<kon.vantas@gmail.com>` (ORCID)

Other contributors:

- Sharla Gelfand (Sharla Gelfand reviewed the package for rOpenSci, see https://github.com/ropensci/onboarding/issues/1 [contributor, reviewer]
- Tim Trice (Tim Trice reviewed the package for rOpenSci, see https://github.com/ropensci/onboarding/issues/185) [reviewer]

See Also

Useful links:

- `https://github.com/ropensci/hydroscoper`
- `https://docs.ropensci.org/hydroscoper/`
- Report bugs at `https://github.com/ropensci/hydroscoper/issues`

`hydroscoper_defunct` *Defunct functions in hydroscoper*

Description

These functions are no longer available in **hydroscoper**.

Usage

```
get_coords(...)
```

Arguments

`...`	Defunct function's parameters

Details

Defunct functions:

- `get_coords`: This function is defunct. Please use `hydro_coords` to convert Hydroscope's points raw format to a tidy data frame.

hydro_coords *Convert coordinates from Hydroscope's points to a tibble*

Description

hydro_coords returns a tibble with the stations' longitude and latitude using as input the variable point from get_stations function.

Usage

```
hydro_coords(x)
```

Arguments

x	a string vector with the points retrieved from Hydroscope

Value

a tibble with the longitude and latitude values.

Author(s)

Konstantinos Vantas, <kon.vantas@gmail.com>

Examples

```
## Not run:
# get stations from the Greek Ministry of Environment and Energy
kyy_stations <- get_stations("kyy")

# create a tibble with stations' coords
coords <- hydro_coords(kyy_stations$point)

## End(Not run)
```

hydro_translate *Translate Greek names and terms to English*

Description

hydro_translate translates various Hydroscope's names and terms to English.

Usage

```
hydro_translate(x, value = c("owner", "variable", "timestep", "division"))
```

Arguments

`x`	a string vector
`value`	One of the predefined values in `c("owner","variable","timestep","division")`

Value

If `value` is one of:

- `owner`, organizations' names.
- `variable`, hydrometeorological term.
- `timestep`, timestep term.
- `division`, Water Division.

returns a character vector with translations of various hydrometeorological terms or organizations' names from Greek (with latin characters) to English.

The organizations' names in `owner` are:

Code	**Name**
min_envir_energy	Ministry of Environment and Energy
min_agricult	Ministry of Rural Development and Food
natio_meteo_service	National Meteorological Service
natio_observ_athens	National Observatory of Athens
public_power_corp	Public Power Corporation
natio_argic_resear	National Agricultural Research Foundation
greek_perfectures	Greek Prefectures
crete_eng_faculty	Technical University of Crete
crete_natural_museum	Natural History Museum of Crete

The Greek Water Divisions codes in `division` are:

Code	**Name**
GR01	Dytike Peloponnesos
GR02	Boreia Peloponnesos
GR03	Anatolike Peloponnesos
GR04	Dytike Sterea Ellada
GR05	Epeiros
GR06	Attike
GR07	Anatolike Sterea Ellada
GR08	Thessalia
GR09	Dytike Makedonia
GR10	Kentrike Makedonia
GR11	Anatolike Makedonia
GR12	Thrake
GR13	Krete
GR14	Nesoi Aigaiou

Note

The dictionary used for the Greek to English translation is:

Transliterated term	English term
agnosto	unknown
anemos	wind
dieuthynse	direction
parelthon	past
tachyteta	speed
mese	average
brochoptose	precipitation
diarkeia	duration
exatmise	evaporation
exatmisodiapnoe	evapotranspiration
thermokrasia	temperature
edaphous	ground
bathos	depth
elachiste	min
megiste	max
piese	pressure
semeiake	point
chioni	snow
ypsometro	elevation
stathme	level
plemmyra	flood
paroche	flow
broche	precipitation
katastase	condition
ektimemene	estimation
athroistiko	cumulative
stereo	sediment
ygrasia	humidity
ygro	wet
apolyte	absolute
schetike	relative
asbestio	calcium
wetu	precipitation
chionobrochometro	snow_rain_gauge
xero	dry
ydrometrese	flow_gauge
thalasses	sea
semeio_drosou	dew_point
oratoteta	visibility
steria	land
thalassa	sea
barometro	barometer
tase_ydratmon	vapour_pressure
psychrometro	psychrometer

isodynamo_ypsos	water_equivalent
agogimoteta	conductance
aktinobolia	radiation
anthraka	carbon
dioxeidio	dioxide
ypoloipo	residual
argilio	aluminum
argilos	clay
arseniko	arsenic
pyritiou	silicon
aera	air
nephokalypse	cloud_cover
nephose	clouds
axiosemeiota	remarkably
nephe	clouds
kairos	weather
diafora	difference
atmosfairiki	atmospheric
stathera	constant
parousa	present
parelthousa	past
kalymeno	cover
el.	min
meg.	max
skleroteta	hardness
eliophaneia	sunshine
eisroe_se_tamieuteres	inflow_reservoir

Examples

```
## Not run:

# get data from the Ministry of Environment and Energy
kyy_owners <- get_owners("kyy")
kyy_vars <- get_variables("kyy")
owners_names <- hydro_translate(kyy_owners$name, "owner")
vars <- hydro_translate(kyy_vars$descr, "variable")

## End(Not run)
```

stations *stations*

Description

Stations' data from the Greek National Data Bank for Hydrological and Meteorological Information. This dataset is a comprehensive look-up table with geographical and ownership information of the available stations in all Hydroscope's databases.

Usage

```
stations
```

Format

A tibble with 2,322 rows and 9 variables:

station_id The station's ID from the domain's database

name The station's name

water_basin The station's Water Basin

water_division The station's Water Division

owner The station's owner

longitude The station's longitude in decimal degrees, ETRS89

latitude The station's latitude in decimal degrees, ETRS89

altitude The station's altitude, meters above sea level

subdomain The corresponding Hydroscope's database

`timeseries` *timeseries*

Description

Time series' data from the Greek National Data Bank for Hydrological and Meteorological Information. This dataset is a comprehensive look-up table of all of the available measurements for a given station in a given Hydroscope's database, with units of measurement and times of those measurements.

Usage

```
timeseries
```

Format

A tibble with 10,804 rows and 9 variables:

time_id The time series ID

station_id The corresponding station's ID

variable The time series variable type

timestep The timestep of time series

units The units of the time series

start_date The starting date of time series values

end_date The ending date of time series values

subdomain The corresponding Hydroscope's database

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