Package: qualR (via r-universe)

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Title An R package to download São Paulo and Rio de Janeiro air pollution data

Version 0.9.7

Description A package to download information from CETESB QUALAR <https://cetesb.sp.gov.br/ar/qualar/> and MonitorAr <http://jeap.rio.rj.gov.br/je-metinfosmac/institucional/index.html> systems. It contains function to download different parameters, a set of criteria pollutants and the most frequent meteorological parameters used in air quality data analysis and air quality model evaluation.

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Encoding UTF-8

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Roxygen list(markdown = TRUE)

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Imports XML, httr, jsonlite

URL https://docs.ropensci.org/qualR (website)
https://github.com/ropensci/qualR

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

Suggests knitr, covr, testthat (>= 3.0.0), rmarkdown, openair, ggplot2, purrr, magrittr

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Repository https://ropensci.r-universe.dev

RemoteUrl https://github.com/ropensci/qualR

RemoteRef master

RemoteSha 95141311e88ad890dd06ad34069f637ae26b834e

Contents

`cetesb_aqs` *CETESB AQS station latitude and longitude*

Description

List of CETESB QUALAR air quality stations (AQS) latitudes and longitudes. Use this to check the AQS `aqs_code` argument in CetesbRetrieveParam() function. AQS names are without diacritics.

Usage

```
cetesb_aqs
```

Format

A data frame with 74 observations and 5 variables:

name CETESB AQS name.

code CETESB AQS code in QUALAR System.

lat CETESB AQS latitude.

lon CETESB AQS longitude.

loc CETESB AQS location.

Examples

```
cetesb_aqs
```

cetesb_param *CETESB Parameters*

Description

List of CETESB QUALAR available parameters and units. Use this to check the `parameters` argument. Parameter names are without diacritics.

Usage

```
cetesb_param
```

Format

A data frame with 20 observations and 3 variables:

name CETESB QUALAR parameter abbreviation and name.

units Parameter units.

code Parameter CETESB QUALAR code.

Examples

```
cetesb_param
```

cetesb_retrieve_met *Download meteorological parameters from CETESB QUALAR*

Description

This function download the main meteorological parameters for model evaluation from one air quality station (AQS) of CETESB AQS network. It will pad out the date with missing data with NA. This function requires to have an account in CETESB QUALAR.

Usage

```
cetesb_retrieve_met(
  username,
  password,
  aqs_code,
  start_date,
  end_date,
  verbose = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

username	User name of CETESB QUALAR
password	User name's password of CETESB QUALAR
aqs_code	Code of AQS
start_date	Date to start downloading in dd/mm/yyyy
end_date	Date to end downloading in dd/mm/yyyy
verbose	Print query summary
to_csv	Creates a csv file. FALSE by default
csv_path	Path to save the csv file.

Value

data.frame with Temperature (C), Relative Humidity (%), Wind Speed (m/s) and Direction (degrees), and Pressure information.

Examples

```
## Not run:
# Downloading meteorological data from Pinheiros AQS
# from January first to 7th of 2020
my_user_name <- "John Doe"
my_pass_word <- "drowssap"
pin_code <- 99 # Check with cetesb_aqs
start_date <- "01/01/2020"
end_date <- "07/01/2020"

pin_pol <- cetesb_retrieve_met(my_user_name, my_pass_word, pin_code,
                               start_date, end_date)

## End(Not run)
```

---

cetesb_retrieve_met_pol

Download meteorological and pollutant data from CETESB QUALAR

Description

This function download the main meteorological parameters for model evaluation, together with criteria pollutants for one air quality station (AQS). It will pad out the date with missing data with NA. This function required to have an account in CETESB QUALAR.

Usage

```
cetesb_retrieve_met_pol(
  username,
  password,
  aqs_code,
  start_date,
  end_date,
  verbose = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

username	User name of CETESB QUALAR
password	User name's password of CETESB QUALAR
aqs_code	Code of AQS
start_date	Date to start downloading in dd/mm/yyyy
end_date	Date to end downloading in dd/mm/yyyy
verbose	Print query summary
to_csv	Creates a csv file. FALSE by default
csv_path	Path to save the csv file.

Value

data.frame with Temperature (C), Relative Humidity (%), Wind Speed (m/s) and Direction (degrees), Pressure information (hPa), O3, NO, NO2, NOx, PM2.5, PM10 and CO information.

Examples

```
## Not run:
# Downloading main meteorological parameters and criteria pollutants
# from Pinheiros AQS from January first to 7th of 2020
my_user_name <- "John Doe"
my_pass_word <- "drowssap"
pin_code <- 99 # Check with cetesb_aqs
start_date <- "01/01/2020"
end_date <- "07/01/2020"

pin_all <- cetesb_retrieve_met_pol(my_user_name, my_pass_word, pin_code,
                                   start_date, end_date)


## End(Not run)
```

`cetesb_retrieve_param` *Download list of observation from CETESB QUALAR*

Description

This function downloads the parameters in a vector. These parameters can be both pollutants or meteorological observations for one air quality station (AQS). It will pad out the date with missing data with NA. This function requires to have an account in CETESB QUALAR.

Usage

```
cetesb_retrieve_param(
  username,
  password,
  parameters,
  aqs_code,
  start_date,
  end_date,
  verbose = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

`username`	User name of CETESB QUALAR
`password`	User name's password of CETESB QUALAR
`parameters`	a character vector with the parameters abbreviations to download
`aqs_code`	Code of AQS
`start_date`	Date to start downloading in dd/mm/yyyy
`end_date`	Date to end downloading in dd/mm/yyyy
`verbose`	Print query summary
`to_csv`	Creates a csv file. FALSE by default
`csv_path`	Path to save the csv file

Value

data.frame with parameters described in `params` vector

Examples

```
## Not run:
# Download ozone, nitrogen dioxide, and wind speed
# from Pinheiros AQS, from January first to 7th of 2020
```

```
my_user_name <- "John Doe"
my_pass_word <- "drowssap"
pin_code <- 99 # Check with cetesb_aqs
start_date <- "01/01/2020"
end_date <- "07/01/2020"
params <- c("o3","NOX", "VV")

pin_param <- cetesb_retrieve_param(my_user_name, my_pass_word,
                                   params, pin_code,
                                   start_date, end_date)

## End(Not run)
```

`cetesb_retrieve_pol` *Download criteria pollutants from CETESB QUALAR*

Description

This function download the criteria pollutants from one air quality station (AQS) of CETESB AQS network. It will pad out the date with missing data with NA. This function required to have an account in CETESB QUALAR.

Usage

```
cetesb_retrieve_pol(
  username,
  password,
  aqs_code,
  start_date,
  end_date,
  verbose = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

`username`	User name of CETESB QUALAR
`password`	User name's password of CETESB QUALAR
`aqs_code`	Code of AQS
`start_date`	Date to start downloading in dd/mm/yyyy
`end_date`	Date to end downloading in dd/mm/yyyy
`verbose`	Print query summary
`to_csv`	Creates a csv file. FALSE by default
`csv_path`	Path to save the csv file

Value

data.frame with O3, NO, NO2, PM2.5, PM10 and CO information. Units are ug/m3 except for CO which is in ppm, and NOx which is in ppb.

Examples

```
## Not run:
# Downloading criteria pollutants from Pinheiros AQS
# from January first to 7th of 2020
my_user_name <- "John Doe"
my_pass_word <- "drowssap"
pin_code <- 99 # Check with cetesb_aqs
start_date <- "01/01/2020"
end_date <- "07/01/2020"

pin_pol <- cetesb_retrieve_pol(my_user_name, my_pass_word, pin_code,
                               start_date, end_date)


## End(Not run)
```

---

monitor_ar_aqs *Monitor Ar AQS stations.*

Description

List of Monitor Ar Rio air quality stations (AQS) with their codes and locations. Use this to check the parameters argument in MonitorArRetrieveParam() function.

Usage

```
monitor_ar_aqs
```

Format

A data frame with 8 observation and 6 variables:

name MonitorAr Program AQS name.

code MonitorAr Program AQS abbreviation.

lon MonitorAr Program AQS longitude.

lat MonitorAr Program AQS latitude.

x_utm_sirgas2000 MonitorAr Program AQS longitude in SIRGAS 2000 (EPSG:31983).

y_utm_sirgas2000 MonitorAr Program AQS latitude in SIRGAS 2000 (EPSG:31983).

Examples

```
monitor_ar_aqs
```

monitor_ar_param *Monitor Ar Parameters*

Description

List of Monitor Ar Rio available parameters. Use this to check the parameters argument in MonitorArRetrieveParam() function. Parameter names are without diacritics.

Usage

```
monitor_ar_param
```

Format

A data frame with 18 observations and 3 variables:

code MonitorAr parameter abbreviation or code.

name MonitorAr parameter name

units Parameter units.

Examples

```
monitor_ar_param
```

monitor_ar_retrieve_met *Download meteorological parameters from Monitor Ar program*

Description

This function download the main meteorological parameters from one air quality station (AQS) of Monitor Ar network. It will pad out the date with missing data with NA.

Usage

```
monitor_ar_retrieve_met(
  start_date,
  end_date,
  aqs_code,
  verbose = TRUE,
  to_local = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

start_date	Date to start downloading in dd/mm/yyyy.
end_date	Date to end downloading in dd/mm/yyyy.
aqs_code	Code of AQS. See monitor_ar_aqs.
verbose	Print query summary.
to_local	Date information in local time. TRUE by default.
to_csv	Create a csv file. FALSE by default.
csv_path	Path to save the csv file.

Value

data.frame with Temperature (c), Relative Humidity (%), Wind speed (m/s) and direction (degrees) and Pressure information.

Examples

```
## Not run:
# Downloading meteorological data from CENTRO AQS
# from January first to 7th of 2020
start_date <- "01/01/2020"
end_date <- "07/01/2020"
ca_met <- monitor_ar_retrieve_met(start_date, end_date, "CA")

## End(Not run)
```

---

monitor_ar_retrieve_met_pol

Download meteorological and pollutant data from Monitor Ar Program

---

Description

This function download the main meteorological parameters for model evaluation, together with criteria pollutants for in air quality station (AQS) of Monitor Ar program. It will pad out the date with missing data with NA

Usage

```
monitor_ar_retrieve_met_pol(
  start_date,
  end_date,
  aqs_code,
  verbose = TRUE,
  to_local = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

start_date	Date to start downloading dd/mm/yyyy
end_date	Date to end downloading dd/mm/yyyy
aqs_code	Code of AQS
verbose	Print query summary
to_local	Date information in local time. TRUE by default.
to_csv	Creates a csv file. FALSE by default.
csv_path	Path to save the csv file.

Value

data.frame with Temperature (C), Relative Humidity (%), Wind Speed (m/s) and Direction (degrees), Pressure information (hPa), O3, NO, NO2, NOx, PM2.5, PM10 and CO information.

Examples

```
## Not run:
# Downloading main meteorological parameters and criteria pollutant
# from CENTRO AQS from January first to 7th of 2020
start_date <- "01/01/2020"
end_date <- "07/01/2020"
ca_all <- monitor_ar_retrieve_met_pol(start_date, end_date, "CA")

## End(Not run)
```

---

monitor_ar_retrieve_param

Download air quality and meteorology information from MonitorAr-Rio

---

Description

This function download air quality and meteorology measurements from MonitorAr-Rio program from Rio de Janeiro city.

Usage

```
monitor_ar_retrieve_param(
  start_date,
  end_date,
  aqs_code,
  parameters,
  to_local = TRUE,
  verbose = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

start_date	Date to start downloading in dd/mm/yyyy
end_date	Date to end downloading in dd/mm/yyyy
aqs_code	AQS code
parameters	Parameters to download. It can be a vector with many parameters.
to_local	Date information in local time. TRUE by default.
verbose	Print query summary.
to_csv	Creates a csv file. FALSE by default
csv_path	Path to save the csv file.

Value

data.frame with the selected parameter information

Examples

```
## Not run:
# Downloading Ozone information from Centro AQS
# from February of 2019
date_start <- "01/02/2019"
date_end <- "01/03/2019"
aqs_code <- "CA"
param <- "O3"
ca_o3 <- monitor_ar_retrieve_param(date_start, date_end, aqs_code, param)


## End(Not run)
```

---

monitor_ar_retrieve_pol

Download criteria pollutants from Monitor Ar program

Description

This function download the criteria pollutants from one air quality station (AQS) of Monitor Ar Program. It will pad out the date with missing data with NA.

Usage

```
monitor_ar_retrieve_pol(
  start_date,
  end_date,
  aqs_code,
  verbose = TRUE,
  to_local = TRUE,
  to_csv = FALSE,
  csv_path = ""
)
```

Arguments

start_date	Date to start downloading in dd/mm/yyyy.
end_date	Date to end downloading in dd/mm/yyyy.
aqs_code	Code of AQS.
verbose	Print query summary.
to_local	Date information in local time. TRUE by default.
to_csv	Creates a csv file. FALSE by default.
csv_path	Path to save the csv file.

Value

data.frame with O3, NO, NO2, NOx, PM2.5, PM10 and CO information.

Examples

```
## Not run:
# Downloading criteria pollutants from CENTRO AQS
# from January first to 7th of 2020
start_date <- "01/01/2020"
end_date <- "07/01/2020"
ca_pol <- monitor_ar_retrieve_pol(start_date, end_date, "CA")

## End(Not run)
```

---

qualR — *qualR: An R package to download Sao Paulo and Rio de Janeiro air pollution data*

Description

A package to download information from CETESB QUALAR https://cetesb.sp.gov.br/ar/qualar/ and MonitorAr http://jeap.rio.rj.gov.br/je-metinfosmac/institucional/index.html systems. It contains function to download different parameters, a set of criteria pollutants and the most frequent meteorological parameters used in air quality data analysis and air quality model evaluation.

Author(s)

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See Also

Useful links:

- Development repository: https://github.com/ropensci/qualR
- Report bugs: https://github.com/ropensci/qualR/issues
- qualR site: https://docs.ropensci.org/qualR/

Index