

# Package: qualR (via r-universe)

July 12, 2024

**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.

**License** MIT + file LICENSE

**Encoding** UTF-8

**LazyData** true

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.2.1

**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

**Depends** R (>= 3.5.0)

**Config/testthat/edition** 3

**VignetteBuilder** knitr

**Repository** <https://ropensci.r-universe.dev>

**RemoteUrl** <https://github.com/ropensci/qualR>

**RemoteRef** master

**RemoteSha** ae624d9f84c4d046fe4871541ca7b8a24ca985a8

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cetesb_aqs	<i>CETESB AQS station latitude and longitude</i>
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## 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 70 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	<i>CETESB Parameters</i>
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### 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
```

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cetesb_retrieve_met	<i>Download meteorological parameters from CETESB QUALAR</i>
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---

### 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	<i>Monitor Ar AQS stations.</i>
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---

**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	<i>Monitor Ar Parameters</i>
------------------	------------------------------

---

### 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	<i>Download meteorological parameters from Monitor Ar program</i>
-------------------------	---

---

### 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	<i>qualR: An R package to download Sao Paulo and Rio de Janeiro air pollution data</i>
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**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/>

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