

Package ‘hubeau’

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Type Package

Title Get Data from the French National Database on Water 'Hub'Eau'

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Description Collection of functions to help retrieving data from 'Hub'Eau' the free and public French National APIs on water <<https://hubeau.eaufrance.fr/>>.

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URL <https://inrae.github.io/hubeau/>,
<https://github.com/inrae/hubeau#readme>

BugReports <https://github.com/inrae/hubeau/issues>

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convert_list_to_tibble

Convert list provided by the APIs into a tibble

Description

Convert list provided by the APIs into a tibble

Usage

```
convert_list_to_tibble(l)
```

Arguments

1 a [list](#) provided by the API (See [doApiQuery](#))

Details

This function is used internally by all the retrieving data functions for converting data after the call to [doApiQuery](#).

Value

A [tibble::tibble](#) with one row by record and one column by field.

Examples

```
# To get the available APIs in the package
list_apis()

# To get the available endpoints in an API
list_endpoints("prelevements")

# To get available parameters in endpoint "chroniques" of the API "prelevements"
list_params(api = "prelevements", endpoint = "chroniques")

# To query the endpoint "chroniques" of the API "prelevements"
# on all devices in the commune of Romilly-sur-Seine in 2018
## Not run:
resp <- doApiQuery(api = "prelevements",
                  endpoint = "chroniques",
                  code_commune_insee = "10323",
                  annee = "2018")
convert_list_to_tibble(resp)

## End(Not run)
```

doApiQuery

Main internal functions for querying the Hub'Eau API endpoints

Description

The function `doQueryApi` is called by all the function querying the API endpoints and return the raw data sent by the endpoint.

Usage

```
doApiQuery(api, endpoint, ..., params)
```

Arguments

<code>api</code>	a character name of the API (e.g.: "indicateurs_services", "prelevements"...), see example for available APIs
<code>endpoint</code>	a character name of the endpoint, see example for available endpoints in an API
<code>...</code>	parameters of the queries and their values in the format <code>Param1_Name = "Param1 value"</code> , <code>Param2_Name</code> use the function list_params for a list of the available filter parameters for a given API endpoint and see the API documentation for their description
<code>params</code>	(deprecated) a list the list of parameters of the queries and their values in the format <code>list(ParamName = "Param value", ...)</code> . This parameter is replaced by the parameter <code>...</code>

Details

Pagination of the queries is handled automatically and the returned `list` is the concatenation of all the results sent by the API.

The functions `get_[api]_[endpoint]` call the function `doQueryApi` and parse the response in a `tibble::tibble` format for the user (See `convert_list_to_tibble`).

By default the user agent used for the query is `"https://github.com/inrae/hubeau"`. You can redefined the user agent with the global option `"hubeau.user_agent": options(hubeau.user_agent = "My user agent")`.

Value

A `list` with the concatenated results returned by the API.

Examples

```
# To get the available APIs in the package
list_apis()

# To get the available endpoints in an API
list_endpoints("prelevements")

# To get available parameters in endpoint "chroniques" of the API "prelevements"
list_params(api = "prelevements", endpoint = "chroniques")

# To query the endpoint "chroniques" of the API "prelevements"
# on all devices in the commune of Romilly-sur-Seine in 2018
## Not run:
resp <- doApiQuery(api = "prelevements",
                  endpoint = "chroniques",
                  code_commune_insee = "10323",
                  annee = "2018")
convert_list_to_tibble(resp)

## End(Not run)
```

`get_ecoulement_stations`

Retrieve data from API "Ecoulement des cours d'eau"

Description

The data originate from the "ONDE" river low waters monitoring network. Available endpoints are:

- `get_ecoulement_stations` retrieves site data and locations
- `get_ecoulement_observations` retrieves flow information
- `get_ecoulement_campagnes` retrieves annual surveys

See the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-ecoulement>

Usage

```
get_ecoulement_stations(...)  
  
get_ecoulement_observations(...)  
  
get_ecoulement_campagnes(...)
```

Arguments

... parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:  
# Retrieve 2022 observation campaigns in the Jura French department  
get_ecoulement_campagnes(  
  list(code_departement = "39",  
        date_campagne_min = "2022-01-01",  
        date_campagne_max = "2022-12-31")  
)  
  
# Retrieve river stations  
stations_39 <- get_ecoulement_stations(  
  list(code_departement = "39",  
        fields = "code_station,libelle_cours_eau,libelle_commune")  
)  
stations_39  
  
# Get the query parameters for the requested API/endpoint  
list_params(api = "ecoulement",  
            endpoint = "observations")  
  
# Retrieve the river flow data in the Jura departement in 2022 with  
# a selection of the fields  
onde_39 <- get_ecoulement_observations(  
  list(code_departement = "39",  
        date_observation_min = "2022-01-01",  
        date_observation_max = "2022-12-31",  
        fields = "code_station,libelle_station,date_observation,libelle_ecoulement")  
)  
onde_39  
  
## End(Not run)
```

`get_hydrobio_stations_hydrobio`*Retrieve data from API "Hydrobiologie"*

Description

The data originate from the "NAIADES" database. Available endpoints are:

- `get_hydrobio_stations_hydrobio` retrieves site data and locations
- `get_hydrobio_indices` retrieves bioassessment indices values
- `get_hydrobio_taxons` retrieves taxa data

See the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-hydrobiologie>

Usage

```
get_hydrobio_stations_hydrobio(...)
```

```
get_hydrobio_indices(...)
```

```
get_hydrobio_taxons(...)
```

Arguments

... parameters of the queries and their values in the format `Param1_Name = "Param1 value"`, `Param2_Name` use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:  
# Retrieve the hydrobiology monitoring sites in the Pays-de-Loire region  
list_params(api = "hydrobio",  
            endpoint = "stations_hydrobio")  
  
get_hydrobio_stations_hydrobio(code_region = 52)  
  
# Retrieve the hydrobiological bioassessment indices in the city of Rennes  
list_params(api = "hydrobio",  
            endpoint = "indices")  
  
get_hydrobio_indices(code_commune = 35051)
```

```
# species records in the city of Rennes
list_params(api = "hydrobio",
            endpoint = "taxons")

get_hydrobio_taxons(code_commune = 35051)

## End(Not run)
```

```
get_hydrometrie_obs_elab
```

Retrieve data from API "Hydrométrie"

Description

Available endpoints are:

- get_hydrometrie_obs_elab retrieves hydrometric elaborate observations (daily/monthly mean flow)
- get_hydrometrie_observations_tr retrieves hydrometric "real time" observations ()
- get_hydrometrie_sites retrieves hydrometric sites
- get_hydrometrie_stations retrieves hydrometric stations

See the API documentation of each endpoint for available filter parameters: <https://hubeau.eaufrance.fr/page/api-hydrometrie>

Usage

```
get_hydrometrie_obs_elab(...)

get_hydrometrie_observations_tr(..., entities = "station")

get_hydrometrie_sites(..., unique_site = TRUE)

get_hydrometrie_stations(..., code_sandre_reseau_station = FALSE)
```

Arguments

...	parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function list_params for a list of the available filter parameters for a given API endpoint and see the API documentation for their description
entities	1-length character string filtering the rows of the returned value, possible values are: "station" for filtering on station rows, "site" for filtering on site rows, "both" for keeping all the rows
unique_site	optional logical , if set to FALSE sites with several different locations produce one row by different location otherwise the first location found is used for fields code_commune_site, libelle_commune, code_departement, code_region, libelle_region, libelle_departement

code_sandre_reseau_station

optional [logical](#) indicating if code_sandre_reseau_station field is included in the result; if so, one line is added by item and other fields are repeated

Value

A [tibble::tibble](#) with one row by record and one column by field.

Examples

```
## Not run:
# Retrieve the hydrometric sites in the department of Aube
get_hydrometrie_sites(code_departement = "10")

# The same operation returning 2 rows for the site 'H0203020' which has 2 different locations
get_hydrometrie_sites(code_departement = "10", unique_site = FALSE)

# Retrieve the hydrometric stations in the department of Aube
get_hydrometrie_stations(code_departement = "10")

# Which parameters are available for endpoint "obs_elab" of API "hydrometrie"?
list_params("hydrometrie", "obs_elab")

# Retrieve the hydrometric monthly mean flow at site 'H0203020'
get_hydrometrie_obs_elab(code_entite = "H0203020", grandeur_hydro_elab = "QmM")

# Retrieve the hydrometric daily mean flow at site 'H0203020' of the last 30 days
get_hydrometrie_obs_elab(code_entite = "H0203020",
  date_debut_obs_elab = format(Sys.Date() - 30, "%Y-%m-%d"),
  grandeur_hydro_elab = "QmJ")

## End(Not run)
```

get_indicateurs_services_communes

Retrieve data from API "Indicateurs des services"

Description

Retrieve performance indicators collected in drinking water and sanitation services in France.

See [list_params](#) and the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-indicateurs-services>

Usage

```
get_indicateurs_services_communes(...)
```

```
get_indicateurs_services_indicateurs(...)
```

```
get_indicateurs_services_services(...)
```


Arguments

... parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

get_indicateurs_services_communes returns a `tibble::tibble` with one row by commune, by service and by year and the following columns:

- "code_commune_insee": `character` identifier of the commune
- "nom_commune": `character` name of the commune
- "codes_service": `integer` identifier of the drinking water supply and/or sanitation service
- "annee": `integer` year of the data
- The following columns are the performance indicators flagged by their respective codes. The documentation of these codes can be found at this URL: <https://www.services.eaufrance.fr/indicateurs/indicateurs>.

get_indicateurs_services_indicateurs returns a `tibble::tibble` with one row by service and by year and the following columns:

- "code_service": `character` identifier of the service
- "nom_service": `character` name of the service
- "numero_siren ": `character` SIREN identifier of the service
- "type_collectivite": `character` kind of community
- "mode_gestion": `character` management mechanism of the service
- "annee": `integer` year of the data
- "indicateur": value of the indicator
- "uri_indicateur": the link to the indicator documentation

get_indicateurs_services_services returns a `tibble::tibble` with one row by commune, by service and by year and the following columns:

- "code_service": `character` identifier of the service
- "nom_service": `character` name of the service
- "code_commune_insee": `character` identifier of the commune
- "nom_commune": `character` name of the commune
- "numero_siren ": `character` SIREN identifier of the service
- "type_collectivite": `character` kind of community
- "mode_gestion": `character` management mechanism of the service
- "annee": `integer` year of the data
- The following columns are the performance indicators flagged by their respective codes. The documentation of these codes can be found at this URL: <https://www.services.eaufrance.fr/indicateurs/indicateurs>.

Examples

```
## Not run:  
# Retrieve performance indicator time series in the commune of Romilly-sur-Seine  
get_indicateurs_services_communes(code_commune = "10323")  
  
# Retrieve the drinking water withdrawal indicators of the year 2012 for all services  
get_indicateurs_services_indicateurs(code_indicateur = "D102.0", annee = "2012")  
  
# Retrieve performance indicator time series of Romilly-sur-Seine with service details  
get_indicateurs_services_services(code_commune = "10323")  
  
## End(Not run)
```

get_niveaux_nappes_stations

Retrieve data from API "Piézométrie"

Description

The available endpoints are:

- get_niveaux_nappes_stations retrieves list of piezometric stations
- get_nappes_chroniques retrieves piezometric archived time series
- get_nappes_chroniques_tr retrieves piezometric "real time" data

See the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-piezometrie>

Usage

```
get_niveaux_nappes_stations(...)
```

```
get_niveaux_nappes_chroniques(...)
```

```
get_niveaux_nappes_chroniques_tr(...)
```

Arguments

... parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:
# Retrieve the hydrometric stations in the department of Aube
get_niveaux_nappes_stations(code_departement = "10")

# Retrieve the archived observed piezometric level at station '07548X0009/F' (old BSS identifier)
# for the year 2020
df <- get_niveaux_nappes_chroniques(code_bss = "07548X0009/F",
                                   date_debut_mesure = "2020-01-01",
                                   date_fin_mesure = "2020-12-31")

# Plot the water elevation (NGF)
plot(as.POSIXct(df$date_mesure), df$niveau_nappe_eau, type = "l")

# For retrieving the last real time observed piezometric level
# at station 'BSS001VZGZ' (new BSS identifier)
df <- get_niveaux_nappes_chroniques_tr(bss_id = "BSS001VZGZ")

# Plot the water elevation (NGF)
plot(as.POSIXct(df$date_mesure), df$niveau_eau_ngf, type = "l")

## End(Not run)
```

get_poisson_observations

Retrieve data from API "Poisson"

Description

Available endpoint:

- get_poisson_observations retrieves data of scientific fishery operations

See the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-poisson>

Usage

```
get_poisson_observations(...)
```

Arguments

... parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:
# Get the query parameters for the requested API/endpoint
list_params(api = "poisson",
            endpoint = "observations")

# Retrieve selected fields on a river fish sampled in Brest
library(dplyr)
fields <- paste("code_operation",
               "date_operation",
               "libelle_point_prelevement_aspe",
               "effectif_lot",
               "code_alternatif_taxon",
               sep = ",")

breast_fishes <- get_poisson_observations(
  list(
    libelle_commune = "Brest",
    fields = fields
  )
) %>%
group_by_at(vars(-effectif_lot)) %>%
  summarise(nb_individuals = sum(effectif_lot))

breast_fishes

## End(Not run)
```

get_prelevements_points_prelevement

Retrieve data from API "Prélèvements en eau"

Description

Available endpoints are:

- get_prelevements_points_prelevement retrieves withdrawal points
- get_prelevements_ouvrages retrieves withdrawal devices
- get_prelevements_chroniques retrieves time series of withdrawals

See the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-prelevements-eau>

Usage

```
get_prelevements_points_prelevement(...)
```

```
get_prelevements_ouvrages(...)
```

```
get_prelevements_chroniques(...)
```

Arguments

... parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:
# Retrieve the withdrawal points located in Romilly-sur-Seine
get_prelevements_points_prelevement(code_commune_insee = "10323")

# Retrieve the withdrawal devices located in Romilly-sur-Seine
get_prelevements_ouvrages(code_commune_insee = "10323")

# Retrieve the withdrawal time series of the devices located in Romilly-sur-Seine
get_prelevements_chroniques(code_commune_insee = "10323")

## End(Not run)
```

```
get_qualite_eau_potable_communes_udi
```

Retrieve data from API "Qualité de l'eau potable"

Description

Results of the sanitary control of the distributed water commune by commune: samples and results of the analyses carried out within the framework of the regulatory sanitary control on the distribution units or the installations directly upstream, and links between communes and distribution units. The elements made available in this dataset correspond to a compilation of analysis bulletins published online, commune by commune, on the website of the Ministry of Health: <https://sante.gouv.fr/sante-et-environnement/eaux/eau>

Available endpoints are:

- `get_qualite_eau_potable_communes_udi` retrieves links between "UDI" (Distribution units or networks) and communes
- `get_qualite_eau_potable_resultats_dis` retrieves samples, analysis results and sanitary conclusions from the sanitary control of the distributed water commune by commune

See the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-qualite-eau-potable>

Usage

```
get_qualite_eau_potable_communes_udi(...)

get_qualite_eau_potable_resultats_dis(...)
```

Arguments

... parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:
# List of available filter parameters on 'get_qualite_eau_potable_communes_udi'
list_params("qualite_eau_potable", "communes_udi")

# List of UDIs available in 2022 at Grabels (INSEE code 34116)
get_qualite_eau_potable_communes_udi(annee = 2022, code_commune = 34116)

# List of available filter parameters on 'get_qualite_eau_potable_resultats_dis'
list_params("qualite_eau_potable", "resultats_dis")

# Get results of analysis realised at Grabels in 2022
get_qualite_eau_potable_resultats_dis(code_commune = 34116,
                                     date_min_prelevement = "2000-01-01",
                                     date_max_prelevement = "2022-12-31")

## End(Not run)
```

```
get_qualite_nappes_analyses
```

Retrieve data from API "Qualité des nappes d'eau souterraines"

Description

The data originate from the "ADES" database (<https://ades.eaufrance.fr/>). Available end-points are:

- `get_qualite_nappes_stations` retrieves measuring stations for groundwater quality
- `get_qualite_nappes_analyses` retrieves the result analysis of quality measurement

See the API documentation for available filter parameters: <https://hubeau.eaufrance.fr/page/api-qualite-nappes>

Usage

```
get_qualite_nappes_analyses(...)
```

```
get_qualite_nappes_stations(...)
```

Arguments

```
...           parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name
              use the function list\_params for a list of the available filter parameters for a given
              API endpoint and see the API documentation for their description
```

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:
# List of available filter parameters on 'get_qualite_nappes_stations'
list_params("qualite_nappes", "stations")

# List of stations available in Hérault department
get_qualite_nappes_stations(code_commune = 34116)

# List of available filter parameters on 'get_qualite_nappes_analyses'
list_params("qualite_nappes", "analyses")

# Get results of analysis realised at Grabels in 2019
get_qualite_nappes_analyses(bss_id = "BSS002GNSA",
                           date_debut_prelevement = "2019-11-12")

## End(Not run)
```

```
get_temperature_stations
```

Retrieve data from API "Température des cours d'eau"

Description

Available endpoints are:

- `get_temperature_stations` retrieves temperature stations
- `get_temperature_chronique` retrieves temperature time series

See the API documentation of each endpoint for available filter parameters: <https://hubeau.eaufrance.fr/page/api-temperature-continu>

Usage

```
get_temperature_stations(...)

get_temperature_chronique(...)
```

Arguments

... parameters of the queries and their values in the format Param1_Name = "Param1 value", Param2_Name use the function [list_params](#) for a list of the available filter parameters for a given API endpoint and see the API documentation for their description

Value

A `tibble::tibble` with one row by record and one column by field.

Examples

```
## Not run:
# Retrieve the temperature stations in the department of Loiret
get_temperature_stations(code_departement = "45")

# Retrieve the temperature from 2012-01-01 to 2012-01-05 at site 04051125

get_temperature_chronique(
  code_station = "04051125",
  date_debut_mesure = "2012-01-01",
  date_fin_mesure="2012-01-05",
  fields = paste("code_station,date_mesure_temp,heure_mesure_temp,resultat,symbole_unite")
)

## End(Not run)
```

hubeau

hubeau: A package for retrieving data on the French databases on water 'Hub'Eau'

Description

The 'hubeau' package provides functions for 'Hub'Eau' APIs and their related endpoints. These functions are named as follow: `hubeau::get_[API]_[endpoint]`.

Currently available APIs and related endpoints are listed below.

API "Ecoulement des cours d'eau":

API documentation: <https://hubeau.eaufrance.fr/page/api-ecoulement>

Available functions:

- `get_ecoulement_stations()`: site data and locations

- [get_ecoulement_observations\(\)](#): flow observations collected during campaigns
- [get_ecoulement_campagnes\(\)](#): observation campaign information

API "Hydrométrie":

API documentation: <https://hubeau.eaufrance.fr/page/api-hydrometrie>

Available functions:

- [get_hydrometrie_sites\(\)](#): hydrometry sites (can contain several stations)
- [get_hydrometrie_stations\(\)](#): hydrometry stations
- [get_hydrometrie_observations_tr\(\)](#): hydrometry water level and discharge time series
- [get_hydrometrie_obs_elab\(\)](#): hydrometric elaborate observations (daily/monthly mean flow)

API "Indicateurs des services":

API documentation: <https://hubeau.eaufrance.fr/page/api-indicateurs-services>

Available functions:

- [get_indicateurs_services_communes\(\)](#): performance indicators by commune
- [get_indicateurs_services_indicateurs\(\)](#): performance indicators by indicator
- [get_indicateurs_services_services\(\)](#): performance indicators by commune for each service

API "Piézométrie":

API documentation: <https://hubeau.eaufrance.fr/page/api-piezometrie>

Available functions:

- [get_niveaux_nappes_chroniques\(\)](#): archived time series of piezometric stations
- [get_niveaux_nappes_chroniques_tr\(\)](#): real-time time series of piezometric stations
- [get_niveaux_nappes_stations\(\)](#): piezometric stations

API "Poisson":

API documentation: <https://hubeau.eaufrance.fr/page/api-poisson>

Available function:

- [get_poisson_observations\(\)](#): scientific fishery observations

API "Prélèvements en eau":

API documentation: <https://hubeau.eaufrance.fr/page/api-prelevements-eau>

Available functions:

- [get_prelevements_chroniques\(\)](#): time series of annual withdrawn volumes by device
- [get_prelevements_ouvrages\(\)](#): withdrawal devices (can contain several withdrawal points)
- [get_prelevements_points_prelevement\(\)](#): withdrawal points

API "Qualité de l'eau potable":

API documentation: <https://hubeau.eaufrance.fr/page/api-qualite-eau-potable>

Available functions:

- [get_qualite_eau_potable_communes_udi\(\)](#): links between "UDI" (Distribution units or networks) and communes

- `get_qualite_eau_potable_resultats_dis()`: samples, analysis results and sanitary conclusions from the sanitary control of the distributed water commune by commune

API "Qualité des nappes d'eau souterraines":

API documentation: <https://hubeau.eaufrance.fr/page/api-qualite-nappes>

Available functions:

- `get_qualite_nappes_stations()`: measuring stations for groundwater quality
- `get_qualite_nappes_analyses()`: analysis results of quality measurement

API "Température des cours d'eau":

API Documentation <https://hubeau.eaufrance.fr/page/api-temperature-continu>

Available functions:

- `get_temperature_stations()`: temperature stations in French rivers
- `get_temperature_chronique()`: river temperature time series

list_apis

List available Hub'Eau APIs, endpoints and filter parameters

Description

`list_apis()` returns the list of available APIs in the package.

`list_endpoints()` returns the list of available endpoints for an API.

`list_params()` returns the list of available parameters for an API endpoint.

Usage

`list_apis()`

`list_endpoints(api)`

`list_params(api, endpoint)`

Arguments

`api` a **character** name of the API (e.g.: "indicateurs_services", "prelevements"...), see example for available APIs

`endpoint` a **character** name of the endpoint, see example for available endpoints in an API

Details

The listed APIs correspond to the term [API] used in the name of the functions `get_[API]_[endpoint]` used for querying the APIs.

Value

character vector of APIs, endpoints or filter parameters

Examples

```
# To get the available APIs in the package  
list_apis()
```

```
# To get the available endpoints in an API  
list_endpoints("prelevements")
```

```
# To get available parameters in endpoint "chroniques" of the API "prelevements"  
list_params(api = "prelevements", endpoint = "chroniques")
```

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