

Package ‘appears’

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Title Interface to 'AppEEARS' NASA Web Services

Version 1.1

Description Programmatic interface to the NASA Application for Extracting and Exploring Analysis Ready Samples services (AppEEARS; <<https://appears.earthdatacloud.nasa.gov/>>). The package provides easy access to analysis ready earth observation data in R.

URL <https://github.com/bluegreen-labs/appears>

BugReports <https://github.com/bluegreen-labs/appears/issues>

Depends R (>= 4.0)

Imports httr, keyring, memoise, getPass, R6, sf, jsonlite, geojsonio, rstudioapi

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ByteCompile true

RoxygenNote 7.2.3

Suggests rmarkdown, covr, testthat, terra, ncd4, knitr, rlang, dplyr, ggplot2, patchwork

VignetteBuilder knitr

NeedsCompilation no

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rs_build_task	<i>Build a task request</i>
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Description

Builds a valid JSON formatted API request from either a tidy data frame with point based sub-tasks, or when a region of interest (roi) is specified coordinates (latitude/longitude) will be ignored and a bounding box for an sf or SpatRaster object will be used instead.

Usage

```
rs_build_task(df, roi, format = "geotiff")
```

Arguments

df	a data frame with task name (task), subtask name (subtask), latitude, longitude, start (start) and end (end) date.
roi	a region of interest defined by a SpatRaster or sf object, the roi will override any point based data provided as latitude-longitude coordinates in the data frame
format	file format of the downloaded data either geotiff (the default) or netcdf4

Value

a valid AppEEARS JSON formatted task

Examples

```
# define a task as a tidy data frame
# multiple subtasks can be provided
df <- data.frame(
  task = "task_name",
  subtask = c("sub_task"),
  latitude = c(36.206228),
  longitude = c(-112.127134),
  start = c("2018-01-01"),
```

```
end = c("2018-01-15"),
product = c("MCD12Q2.006"),
layer = c("Greenup")
)

# build a task
rs_build_task(df)
```

rs_bundle

AppEEARS list of bundled files to download

Description

Returns a data frame of all data ready for download as one bundle

Usage

```
rs_bundle(task_id, user)
```

Arguments

task_id	task id for which to return the file download bundle
user	username used to sign up

Value

returns a nested list of files to download

Author(s)

Koen Hufkens

Examples

```
## Not run:
# get a list of datasets
rs_bundle(
  user = "your_user_name",
  task_id = "a_task_id"
)

## End(Not run)
```

`rs_delete`*Delete AppEEARS task from queue*

Description

Removes a task from the queue and or buffer

Usage

```
rs_delete(task_id, user, purge = FALSE)
```

Arguments

<code>task_id</code>	AppEEARS task id
<code>user</code>	username used to sign up
<code>purge</code>	if TRUE, remove all previously finished tasks from the task list (default = FALSE)

Value

returns the content of the API call

Author(s)

Koen Hufkens

Examples

```
## Not run:  
# delete a single task  
rs_delete(  
  user = "your_user_name",  
  task_id = "a_task_id"  
)  
  
# delete all finished or crashed  
# jobs (if not deleted previously)  
rs_delete(  
  user = "your_user_name",  
  purge = TRUE  
)  
  
## End(Not run)
```

rs_get_key	<i>Retrieve NASA Earth Data password</i>
------------	--

Description

Returns you token set by [rs_set_key](#)

Usage

```
rs_get_key(user)
```

Arguments

user	username used to sign up
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Value

the password set using [rs_set_key](#) saved in the keychain

Author(s)

Koen Hufkens

See Also

[rs_set_key](#)

Examples

```
## Not run:  
# set key  
rs_set_key(user = "test@mail.com", password = "123")  
  
# get key  
rs_get_key(user = "test@mail.com")  
  
## End(Not run)
```

rs_layers	<i>AppEEARS dataset layers</i>
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Description

Returns a data frame of available layers for an AppEEARS product

Usage

```
rs_layers(product)
```

Arguments

product product for which to list the layers

Value

returns a data frame with the AppEEARS datasets

Author(s)

Koen Hufkens

See Also

[rs_products](#)

Examples

```
# is the server reachable
server_check <- appeears::rs_running(
  file.path(appeears::rs_server(), "product")
)

# get a list of datasets
if(server_check){
  layers <- rs_layers("MCD43A4.006")
  print(layers$Layer)
}
```

rs_list_task	<i>AppEEARS list of tasks and status</i>
--------------	--

Description

Returns a data frame of all submitted tasks either in full or when providing the di

Usage

```
rs_list_task(task_id, user)
```

Arguments

task_id	task for which to list the status (if missing all tasks are listed)
user	username used to sign up

Value

returns a data frame with the AppEEARS tasks

Author(s)

Koen Hufkens

Examples

```
## Not run:  
# get a list of datasets  
rs_list_task()  
  
## End(Not run)
```

rs_login	<i>Checks AppEEARS login</i>
----------	------------------------------

Description

Returns a valid token for a session if successful otherwise fails with an error (stop())

Usage

```
rs_login(user)
```

Arguments

user	AppEEARS username
------	-------------------

Value

returns an AppEEARS session (bearer) token

rs_logout	<i>Invalidates an AppEEARS bearer token</i>
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Description

Given a token it will log out / delete this token, invalidating it.

Usage

```
rs_logout(token)
```

Arguments

token a Bearer token as returned by rs_login()

Value

returns if the session has closed TRUE/FALSE

rs_products	<i>AppEEARS dataset list</i>
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Description

Returns a data frame of available data products

Usage

```
rs_products()
```

Value

returns a data frame with the AppEEARS datasets

Author(s)

Koen Hufkens

See Also

[rs_set_key](#) [rs_transfer](#) [rs_request](#)

Examples

```
# is the server reachable
server_check <- appeears::rs_running(
  file.path(appeears::rs_server(),"product")
)

# get a list of datasets
if(server_check){
  products <- rs_products()
}
```

rs_quality

List or translate AppEEARS quality metrics

Description

Returns a data frame of all quality layers, or the translation of a quality layer value into plain language.

Usage

```
rs_quality(product, layer, value)
```

Arguments

product	AppEEARS product name
layer	name of a product quality control layer
value	quality control value to translate

Value

returns a data frame of all AppEEARS quality layers, or those associated with a product. When a value is provided this quality flag will be translated from bitwise representation to plain language.

Author(s)

Koen Hufkens

Examples

```
## Not run:
# get a list of quality layers for all data products
rs_quality()

## End(Not run)
```

rs_request	<i>AppEEARS data request and download</i>
------------	---

Description

Stage a data request, and optionally download the data to disk. Alternatively you can only stage requests, logging the request URLs to submit download queries later on using [rs_transfer](#).

Usage

```
rs_request(
  request,
  user,
  transfer = TRUE,
  path = tempdir(),
  time_out = 3600,
  job_name,
  verbose = TRUE
)

rs_request_batch(
  request_list,
  workers = 2,
  user,
  path = tempdir(),
  time_out = 7200,
  total_timeout = length(request_list) * time_out/workers,
  verbose = TRUE
)
```

Arguments

request	nested list with query parameters following the layout as specified on the AppEEARS APIs page
user	user (email address or ID) provided by the AppEEARS data service, used to retrieve the token set by rs_set_key
transfer	logical, download data TRUE or FALSE (default = TRUE)
path	path were to store the downloaded data
time_out	individual time out for each request
job_name	optional name to use as an RStudio job and as output variable name. It has to be a syntactically valid name.
verbose	show feedback on processing
request_list	a list of requests that will be processed in parallel.
workers	maximum number of simultaneous request that will be submitted to the service. Most services are limited to ~20 concurrent requests (default = 2).

`total_timeout` overall timeout limit for all the requests in seconds. (note that the overall timeout on a session is 48h)

Value

the path of the downloaded (requested file) or the an R6 object with download/transfer information

Author(s)

Koen Hufkens

See Also

[rs_set_key](#) [rs_transfer](#)

Examples

```
## Not run:
# specify a task/request as a
# data frame
df <- data.frame(
  task = "grand canyon",
  subtask = c("test1", "test2"),
  latitude = c(36.206228, 36.206228),
  longitude = c(-112.127134, -112.127134),
  start = c("2018-01-01", "2018-01-01"),
  end = c("2018-01-15", "2018-01-15"),
  product = c("MOD11A2.061", "MCD12Q2.006"),
  layer = c("LST_Day_1km", "Dormancy")
)

# build a proper JSON query
task <- rs_build_task(df = df)

# request the task to be executed
rs_request(
  request = task,
  user = "earth_data_user",
  transfer = TRUE,
  path = "~/some_path",
  verbose = TRUE
)

## End(Not run)
```

`rs_set_key`*Set NASA Earth Data password*

Description

Saves the token to your local keychain under a service called "appears".

Usage

```
rs_set_key(user, password)
```

Arguments

<code>user</code>	user used to sign up for the AppEEARS data service (this is not the email address, but the true user name!)
<code>password</code>	used to sign up for AppEEARS

Details

In systems without keychain management set the option `keyring_backend` to 'file' (i.e. `options(keyring_backend = "file")`) in order to write the keychain entry to an encrypted file. This mostly pertains to headless Linux systems. The keychain files can be found in `~/.config/r-keyring`.

Value

It invisibly returns the user.

Author(s)

Koen Hufkens

See Also

[rs_get_key](#)

Examples

```
## Not run:
# set key
rs_set_key(user = "test", password = "123")

# get key
rs_get_key(user = "test")

# leave user and key empty to open a browser window to the service's website
# and type the key interactively
rs_get_key()
```

```
## End(Not run)
```

rs_transfer	<i>AppEEARS data transfer function</i>
-------------	--

Description

Returns the contents of the requested url as a NetCDF file downloaded to disk or the current status of the requested transfer.

Usage

```
rs_transfer(task_id, user, path = tempdir(), verbose = TRUE)
```

Arguments

task_id	R6 rs_request) query output or task id
user	user (email address) used to sign up for the AppEEARS data service, used to retrieve the token set by rs_set_key .
path	path were to store the downloaded data
verbose	show feedback on data transfers

Value

data on disk as specified by a [rs_request](#)

Author(s)

Koen Hufkens

See Also

[rs_set_key](#) [rs_request](#)

Examples

```
## Not run:  
# set key  
rs_set_key(user = "test", password = "123")  
  
# request data and grab url and try a transfer  
r <- rs_request(request, "test", transfer = FALSE)  
  
# check transfer, will download if available  
rs_transfer(r$get_task_id(), user = "test")  
  
## End(Not run)
```

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