

Package ‘smapr’

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Type Package

Title Acquisition and Processing of NASA Soil Moisture Active-Passive (SMAP) Data

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biocViews

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Maintainer Maxwell Joseph <maxwell1.b.joseph@colorado.edu>

Description Facilitates programmatic access to NASA Soil Moisture Active Passive (SMAP) data with R. It includes functions to search for, acquire, and extract SMAP data.

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LazyData TRUE

RoxygenNote 6.1.1

Suggests knitr, rgdal, rmarkdown, roxygen2, sp, testthat, utils, covr

VignetteBuilder knitr

URL <https://github.com/ropensci/smapr>

BugReports <https://github.com/ropensci/smapr/issues>

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Author Maxwell Joseph [aut, cre],
Matthew Oakley [aut],
Zachary Schira [aut]

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R topics documented:

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|---------------|---|
| smapr-package | <i>smapr: A package for acquisition and processing of NASA SMAP data.</i> |
|---------------|---|

Description

The smapr package provides a means to discover, acquire, and process NASA Soil Moisture Active Passive (SMAP) data.

Author(s)

Max Joseph <maxwell.b.joseph@colorado.edu>

| | |
|---------------|---------------------------|
| download_smap | <i>Download SMAP data</i> |
|---------------|---------------------------|

Description

This function downloads SMAP data in HDF5 format.

Usage

```
download_smap(files, directory = NULL, overwrite = TRUE,
              verbose = TRUE)
```

Arguments

| | |
|-----------|--|
| files | A data.frame produced by find_smap() that specifies data files to download. |
| directory | A local directory path in which to save data, specified as a character string. If left as NULL, data are stored in a user's cache directory. |
| overwrite | TRUE or FALSE: should existing data files be overwritten? |
| verbose | TRUE or FALSE: should messages be printed to indicate that files are being downloaded? |

Details

This function requires a username and password from NASA's Earthdata portal. If you have an Earthdata username and password, pass them in using the `set_smap_credentials()` function.

If you do not yet have a username and password, register for one here: <https://urs.earthdata.nasa.gov/>

Value

Returns a `data.frame` that appends a column called `local_dir` to the input data frame, which consists of a character vector specifying the local directory containing the downloaded files.

Examples

```
## Not run:
files <- find_smap(id = "SPL4SMGP", dates = "2015-03-31", version = 4)
# files[1, ] refers to the first available data file
downloads <- download_smap(files[1, ])

## End(Not run)
```

| | |
|--------------|---------------------------------------|
| extract_smap | <i>Extracts contents of SMAP data</i> |
|--------------|---------------------------------------|

Description

Extracts datasets from SMAP data files.

Usage

```
extract_smap(data, name, in_memory = FALSE)
```

Arguments

| | |
|------------------------|---|
| <code>data</code> | A data frame produced by <code>download_smap()</code> that specifies input files from which to extract data. |
| <code>name</code> | The path in the HDF5 file pointing to data to extract. |
| <code>in_memory</code> | Logical. Should the result be stored in memory? If not, then raster objects are stored on disk in the cache directory. By default the result is stored on disk. |

Details

The arguments `group` and `dataset` must refer specifically the group and name within group for the input file, such as can be obtained with `list_smap()`. This function will extract that particular dataset, returning a Raster object.

Value

Returns a RasterStack object.

Examples

```
## Not run:
files <- find_smap(id = "SPL4SMGP", dates = "2015-03-31", version = 4)
downloads <- download_smap(files[1, ])
sm_raster <- extract_smap(downloads, name = '/Geophysical_Data/sm_surface')

## End(Not run)
```

find_smap

*Find SMAP data***Description**

This function searches for SMAP data on a specific date, returning a data.frame describing available data.

Usage

```
find_smap(id, dates, version)
```

Arguments

| | |
|---------|--|
| id | A character string that refers to a specific SMAP dataset, e.g., "SPL4SMGP" for SMAP L4 Global 3-hourly 9 km Surface and Rootzone Soil Moisture Geophysical Data. See "Details" for a list of supported data types and their associated id codes. |
| dates | An object of class Date or a character string formatted as To search for one specific date, this can be a Date object of length one. To search over a time interval, it can be a multi-element object of class Date such as produced by seq.Date. |
| version | Which data version would you like to search for? Version information for each data product can be found at https://nsidc.org/data/smap/data_versions |

Details

There are many SMAP data products that can be accessed with this function. Currently, smapr supports level 3 and level 4 data products, each of which has an associated Data Set ID which is specified by the id argument, described at <https://nsidc.org/data/smap/smap-data.html> and summarized below:

SPL2SMAP_S SMAP/Sentinel-1 Radiometer/Radar Soil Moisture

SPL3FTA Radar Northern Hemisphere Daily Freeze/Thaw State

SPL3SMA Radar Global Daily Soil Moisture

SPL3SMP Radiometer Global Soil Moisture

SPL3SMAP Radar/Radiometer Global Soil Moisture

SPL4SMAU Surface/Rootzone Soil Moisture Analysis Update
SPL4SMGP Surface/Rootzone Soil Moisture Geophysical Data
SPL4SMLM Surface/Rootzone Soil Moisture Land Model Constants
SPL4CMDL Carbon Net Ecosystem Exchange

This function requires a username and password from NASA's Earthdata portal. If you have an Earthdata username and password, pass them in using the `set_smap_credentials()` function.

If you do not yet have a username and password, register for one here: <https://urs.earthdata.nasa.gov/>

Value

A data.frame with the names of the data files, the remote directory, and the date.

Examples

```
## Not run:
# looking for data on one day:
find_smap(id = "SPL4SMGP", dates = "2015-03-31", version = 4)

# searching across a date range
start_date <- as.Date("2015-03-31")
end_date <- as.Date("2015-04-02")
date_sequence <- seq(start_date, end_date, by = 1)
find_smap(id = "SPL4SMGP", dates = date_sequence, version = 4)

## End(Not run)
```

| | |
|-----------|--|
| list_smap | <i>Lists the contents of SMAP data files</i> |
|-----------|--|

Description

This function returns a list of the contents of SMAP data files.

Usage

```
list_smap(files, all = FALSE)
```

Arguments

`files` A data.frame produced by `download_smap()` that specifies input data files.
`all` If TRUE a longer, more detailed list of information on each entry is provided.

Value

Returns a list of data.frame objects that list the contents of each data file in files.

Examples

```
## Not run:
files <- find_smap(id = "SPL4SMGP", dates = "2015-03-31", version = 4)
files <- download_smap(files[1, ])
list_smap(files)
list_smap(files, all = TRUE)

## End(Not run)
```

set_smap_credentials *Set credentials for NASA's Earthdata portal*

Description

To use smapr, users need to provide NASA Earthdata portal credentials. This function allows users to interactively set these credentials via the user's Earthdata username and password.

Usage

```
set_smap_credentials(username, password, save = TRUE,
  overwrite = FALSE)
```

Arguments

| | |
|-----------|---|
| username | A character string of your Earthdata portal username |
| password | A character string of your Earthdata portal password |
| save | Logical: whether to save your credentials to your .Renvi- ron file (e.g., ~/.Renvi- ron). Previous Earthdata credentials will not be overwritten unless <code>overwrite = TRUE</code> . |
| overwrite | Logical: whether to overwrite previous Earthdata credentials in your .Renvi- ron file (only applies when <code>save = TRUE</code>) |

Details

If you do not yet have a username and password, register for one here: <https://urs.earthdata.nasa.gov/>
A warning: do not commit your username and password to a public repository! This function is meant to be used interactively, and not embedded within a script that you would share.

Value

A data.frame with the names of the data files, the remote directory, and the date.

Examples

```
## Not run:
set_smap_credentials('myusername', 'mypassword')

## End(Not run)
```

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