

# Package: smapr (via r-universe)

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**Type** Package

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

**Version** 0.2.1

**Depends** R (>= 3.2.5)

**Imports** hdf5r, httr (>= 1.1.0), methods, rappdirs (>= 0.3.1), rvest, terra, xml2

**Maintainer** Maxwell Joseph <maxwell.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.

**License** GPL-3

**LazyData** TRUE

**RoxygenNote** 7.2.3

**Suggests** knitr, rmarkdown, roxygen2, testthat, utils, covr

**VignetteBuilder** knitr

**URL** <https://docs.ropensci.org/smapr>, <https://github.com/ropensci/smapr>

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

**Encoding** UTF-8

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

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

**RemoteRef** master

**RemoteSha** 6274022ddcfa4e109679df5b71c32de104ae06e3

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smmap-package	<i>smmap: A package for acquisition and processing of NASA SMAP data.</i>
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## Description

The smmap 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>

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download_smmap	<i>Download SMAP data</i>
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## Description

This function downloads SMAP data in HDF5 format.

## Usage

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

## Arguments

files	A data.frame produced by find_smmap() 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_smmap_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)
```

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extract_smap	<i>Extracts contents of SMAP data</i>
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**Description**

Extracts datasets from SMAP data files.

**Usage**

```
extract_smap(data, name)
```

**Arguments**

data	A data frame produced by download_smap() that specifies input files from which to extract data.
name	The path in the HDF5 file pointing to data to extract.

**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 SpatRaster 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**

<code>id</code>	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.
<code>dates</code>	An object of class <code>Date</code> or a character string formatted as <code>%Y-%m-%d</code> . To search for one specific date, this can be a <code>Date</code> object of length one. To search over a time interval, it can be a multi-element object of class <code>Date</code> such as produced by <code>seq.Date</code> .
<code>version</code>	Which data version would you like to search for? Version information for each data product can be found at <a href="https://nsidc.org/data/smap/data_versions">https://nsidc.org/data/smap/data_versions</a>

**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)
```

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list_smap	<i>Lists the contents of SMAP data files</i>
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**Description**

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

**Usage**

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

**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)
```

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set\_smap\_credentials *Set credentials for NASA's Earthdata portal*

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### 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 .Renviron file (e.g., ~/.Renviron). Previous Earthdata credentials will not be overwritten unless overwrite = TRUE.
overwrite	Logical: whether to overwrite previous Earthdata credentials in your .Renviron file (only applies when save = TRUE)

### 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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