

Package ‘MODISTools’

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Title Interface to the 'MODIS Land Products Subsets' Web Services

Version 1.1.6

Description Programmatic interface to the Oak Ridge National Laboratories 'MODIS Land Products Subsets' web services (https://modis.ornl.gov/data/modis_webservice.html). Allows for easy downloads of 'MODIS' time series directly to your R workspace or your computer.

URL <https://github.com/bluegreen-labs/MODISTools>,
<https://bluegreen-labs.github.io/MODISTools/>

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

Depends R (>= 3.4)

Imports httr, utils, sf, terra, stats, memoise, jsonlite

License AGPL-3

Encoding UTF-8

LazyData true

ByteCompile true

RoxygenNote 7.3.2

Suggests knitr, markdown, covr, testthat, ggplot2, dplyr

VignetteBuilder knitr

NeedsCompilation no

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arcachon_lai	<i>arcachon_lai</i>
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Description

MODIS leaf area index (LAI) around the French town of Arcachon derived from the MODIS MOD15A2H product (band Lai_500m).

Usage

arcachon_lai

Format

A MODISTools tidy data frame

arcachon_lc	<i>arcachon_lc</i>
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Description

MODIS land cover (IGBP) around the French town of Arcachon derived from the MODIS MCD12Q2 product (band LC_Type1).

Usage

arcachon_lc

Format

A MODISTools tidy data frame

mt_bands	<i>Download all available bands</i>
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Description

Lists all available bands for a MODIS Land Products Subset product.

Usage

mt_bands(product)

Arguments

product a valid MODIS product name

Value

A data frame of all available bands for a MODIS Land Products Subsets products

See Also

[mt_products](#) [mt_sites](#) [mt_dates](#)

Examples

```
# list all available MODIS Land Products Subsets products
bands <- mt_bands(product = "MCD12Q2")
head(bands)
```

mt_batch_subset	<i>Batch download MODIS Land Products subsets</i>
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Description

Lists all available dates for a MODIS Land Products Subset product at a particular location.

Usage

```
mt_batch_subset(
  df,
  product,
  band,
  start = "2000-01-01",
  end = format(Sys.time(), "%Y-%m-%d"),
  km_lr = 0,
  km_ab = 0,
  out_dir = tempdir(),
  internal = TRUE
)
```

Arguments

df	a CSV file or data frame holding locations and their sitenames to batch process with column names site_name, lat, lon holding the respective sitenames, latitude and longitude. When providing a CSV make sure that the data are comma separated.
product	a valid MODIS product name
band	band to download
start	start date
end	end date
km_lr	km left-right to sample
km_ab	km above-below to sample
out_dir	location where to store all data
internal	should the data be returned as an internal data structure TRUE or FALSE (default = TRUE)

Value

A data frame combining meta-data and actual data values, data from different sites is concatenated into one large dataframe. Subsets can be created by searching on sitename.

See Also

[mt_sites](#) [mt_dates](#) [mt_bands](#) [mt_products](#) [mt_subset](#)

Examples

```
## Not run:
# create data frame with a site_name, lat and lon column
# holding the respective names of sites and their location
df <- data.frame("site_name" = paste("test",1:2))
df$lat <- 40
df$lon <- -110
```

```

print(df)

# test batch download
subsets <- mt_batch_subset(df = df,
                           product = "MOD11A2",
                           band = "LST_Day_1km",
                           internal = TRUE,
                           start = "2004-01-01",
                           end = "2004-03-31")

# the same can be done using a CSV file with
# a data structure similar to the dataframe above

write.table(df, file.path(tempdir(), "my_sites.csv"),
            quote = FALSE,
            row.names = FALSE,
            col.names = TRUE,
            sep = ",")

# test batch download form CSV
subsets <- mt_batch_subset(df = file.path(tempdir(), "my_sites.csv"),
                           product = "MOD11A2",
                           band = "LST_Day_1km",
                           internal = TRUE,
                           start = "2004-01-01",
                           end = "2004-03-31"
                           )

head(subsets)

## End(Not run)

```

mt_bbox

*Converts lower-left sinusoidal coordinates to lat-lon sf bounding box***Description**

Converts lower-left sinusoidal coordinates to lat-lon sf bounding box

Usage

```
mt_bbox(xllcorner, yllcorner, cellsize, nrows, ncols, transform = TRUE)
```

Arguments

xllcorner	lower left x coordinate as provided by mt_subset
yllcorner	lower left y coordinate as provided by mt_subset
cellsize	cell size provided by mt_subset
nrows	cell size provided by mt_subset

ncols	cell size provided by mt_subset
transform	transform the bounding box from sin to lat long coordinates, TRUE or FALSE (default = TRUE)

See Also

[sin_to_ll](#), [mt_subset](#)

Examples

```
# Download some test data
subset <- mt_subset(product = "MOD11A2",
                    lat = 40,
                    lon = -110,
                    band = "LST_Day_1km",
                    start = "2004-01-01",
                    end = "2004-03-31",
                    progress = FALSE)

# convert sinusoidal to lat / lon
lat_lon <- sin_to_ll(subset$xllcorner, subset$yllcorner)

# bind with the original dataframe
subset <- cbind(subset, lat_lon)

# convert to bounding box
bb <- apply(subset, 1, function(x){
  mt_bbox(xllcorner = x['xllcorner'],
          yllcorner = x['yllcorner'],
          cellsize = x['cellsize'],
          nrows = x['nrows'],
          ncols = x['ncols'])
})

head(bb)
```

mt_dates

Download all available dates

Description

Lists all available dates for a MODIS Land Products Subset product at a particular location.

Usage

```
mt_dates(product, lat, lon, site_id, network)
```

Arguments

product	a valid MODIS product name
lat	latitude in decimal degrees
lon	longitude in decimal degrees
site_id	site id (overrides lat / lon)
network	the network for which to generate the site list, when not provided the complete list is provided

Value

A data frame of all available dates for a MODIS Land Products Subsets products at the given location.

See Also

[mt_products](#) [mt_sites](#) [mt_bands](#)

Examples

```
# list all available MODIS Land Products Subsets products
bands <- mt_dates(product = "MOD11A2", lat = 40, lon = -110)
head(bands)
```

mt_products	<i>Download all available products</i>
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Description

Lists all available MODIS Land Products Subset products.

Usage

```
mt_products()
```

Value

A data frame of all available MODIS Land Products Subsets products

See Also

[mt_bands](#) [mt_sites](#) [mt_dates](#)

Examples

```
# list all available MODIS Land Products Subsets products
products <- mt_products()
head(products)
```

mt_sites

Download all available fixed sites

Description

Lists all available MODIS Land Products Subset pre-processed sites

Usage

```
mt_sites(network)
```

Arguments

network	the network for which to generate the site list, when not provided the complete list is provided
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Value

A data frame of all available MODIS Land Products Subsets pre-processed sites

See Also

[mt_products](#) [mt_bands](#) [mt_dates](#)

Examples

```
# list all available MODIS Land Products Subsets products
sites <- mt_sites()
print(head(sites))
```


mt_subset

*Download MODIS Land Products subsets***Description**

Download a MODIS Land Products Subset product for a given point location buffered with a given amount of kilometers left-right, top-bottom for a given location (provided as latitude and longitude values).

Usage

```
mt_subset(
  product,
  band,
  lat,
  lon,
  start = "2000-01-01",
  end = format(Sys.time(), "%Y-%m-%d"),
  km_lr = 0,
  km_ab = 0,
  site_id,
  network,
  site_name = "sitename",
  out_dir = tempdir(),
  internal = TRUE,
  progress = TRUE
)
```

Arguments

product	a valid MODIS product name
band	band or bands (as a character vector) to download
lat	latitude in decimal degrees
lon	longitude in decimal degrees
start	start date
end	end date
km_lr	km left-right to sample (rounded to the nearest integer)
km_ab	km above-below to sample (rounded to the nearest integer)
site_id	site id (overrides lat / lon)
network	the network for which to generate the site list, when not provided the complete list is provided
site_name	arbitrary site name used in writing data to file (default = sitename)
out_dir	path where to store the data if writing to disk (default = tempdir())

internal	should the data be returned as an internal data structure TRUE or FALSE (default = TRUE)
progress	show download progress

Value

A data frame combining meta-data and actual data values.

See Also

[mt_sites](#) [mt_dates](#) [mt_bands](#) [mt_products](#) [mt_batch_subset](#)

Examples

```
# list all available MODIS Land Products Subsets products
# download data
subset <- mt_subset(product = "MOD11A2",
                    lat = 40,
                    lon = -110,
                    band = "LST_Day_1km",
                    start = "2004-01-01",
                    end = "2004-03-31",
                    progress = FALSE)

head(subset)
```

mt_to_terra	<i>Convert tidy MODISTools data to terra SpatRaster</i>
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Description

Convert tidy MODISTools data to a terra SpatRaster for easy spatial processing and plotting.

Usage

```
mt_to_terra(df, reproject = FALSE, method = "bilinear")
```

Arguments

df	a valid MODISTools data frame with a single band (filter for a particular band using the dplyr filter() function or base subset())
reproject	reproject output to lat / long (default = FALSE)
method	character. Method used for estimating the new cell values of a SpatRaster. One of: near: nearest neighbor. This method is fast, and it can be the preferred method if the cell values represent classes. It is not a good choice for continuous values. This is used by default if the first layer of x is categorical. bilinear: bilinear interpolation. This is the default if the first layer of x is numeric (not categorical). cubic: cubic interpolation. cubicspline: cubic spline interpolation.

Value

A terra SpatRaster populated with the tidy dataframe values

See Also

[mt_subset](#) [mt_batch_subset](#)

Examples

```
# list all available MODIS Land Products Subsets products
# download data
LC <- mt_subset(product = "MCD12Q1",
  lat = 48.383662,
  lon = 2.610250,
  band = "LC_Type1",
  start = "2005-01-01",
  end = "2005-12-30",
  km_lr = 2,
  km_ab = 2,
  site_name = "testsite",
  internal = TRUE,
  progress = FALSE)

head(LC)

# convert to raster
LC_r <- mt_to_terra(df = LC)
```

sin_to_ll	<i>Convert sinusoidal coordinates to lat / lon</i>
-----------	--

Description

A full description of the sinusoidal projection is provided on the lpdaac page: https://lpdaac.usgs.gov/dataset_discovery/modis and wikipedia: https://en.wikipedia.org/wiki/Sinusoidal_projection

Usage

```
sin_to_ll(x, y)
```

Arguments

- x sinusoidal x coordinate (vector)
- y sinusoidal y coordinate (vector)

See Also[mt_bbox](#)**Examples**

```
# Download some test data
subset <- mt_subset(product = "MOD11A2",
                    lat = 40,
                    lon = -110,
                    band = "LST_Day_1km",
                    start = "2004-01-01",
                    end = "2004-03-31",
                    progress = FALSE)

# convert sinusoidal to lat / lon
lat_lon <- sin_to_ll(subset$xllcorner, subset$yllcorner)

# bind with the original dataframe
subset <- cbind(subset, lat_lon)
head(subset)
```

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