

# Package ‘MODISTools’

April 4, 2022

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

**Version** 1.1.2

**Description** Programmatic interface to the Oak Ridge National Laboratories 'MODIS Land Products Subsets' web services (<[https://modis.ornl.gov/data/modis\\_webservice.html](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://docs.ropensci.org/MODISTools/>

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

**Depends** R (>= 3.6)

**Imports** httr, utils, sf, raster, stats, memoise, jsonlite

**License** AGPL-3

**LazyData** true

**ByteCompile** true

**RoxygenNote** 7.1.1

**Suggests** knitr, rmarkdown, covr, testthat, rgdal, ggplot2, dplyr

**VignetteBuilder** knitr

**NeedsCompilation** no

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**Repository** CRAN

**Date/Publication** 2022-04-04 10:20:02 UTC

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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

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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

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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)
```

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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 <a href="#">mt_subset</a>
yllcorner	lower left y coordinate as provided by <a href="#">mt_subset</a>
cellsize	cell size provided by <a href="#">mt_subset</a>

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

*Download all available products*

---

**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

## 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\_raster

*Convert tidy MODISTools data to raster (stack)*

---

**Description**

Convert tidy MODISTools data to a raster (stack)

**Usage**

```
mt_to_raster(df, reproject = FALSE)
```

**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)

**Value**

A raster stack 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_raster(df = LC)
```

---

`sin_to_ll`*Convert sinusoidal coordinates to lat / lon*

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**Description**

A full description of the sinusoidal projection is provided on the lpdaac page: [https://lpdaac.usgs.gov/dataset\\_discovery/modis](https://lpdaac.usgs.gov/dataset_discovery/modis) and wikipedia: [https://en.wikipedia.org/wiki/Sinusoidal\\_projection](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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