Package 'MODISTools'

March 1, 2019

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

Version 1.1.0

Description Programmatic interface to the '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/khufkens/MODISTools

BugReports https://github.com/khufkens/MODISTools/issues

Depends R (>= 3.4)

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

License AGPL-3

LazyData true

ByteCompile true

RoxygenNote 6.1.1

Suggests knitr, rmarkdown, covr, testthat

VignetteBuilder knitr

NeedsCompilation no

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`mt_bands` *Download all available bands*

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 = "MOD11A2")
head(bands)
```

`mt_batch_subset` *Batch download MODIS Land Products subsets*

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, ncores = "auto")
```

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`)
`ncores`	number of cores to use while downloading in parallel (auto will select the all cpu cores - 1)

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

```
# 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")

head(subsets)
```

---

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)
```

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

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)
```

Arguments

product	a valid MODIS product name
lat	latitude in decimal degrees
lon	longitude in decimal degrees
site_id	site id (overides lat / lon)

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()
```

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

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

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, site_name = "sitename", out_dir = tempdir(),
  internal = TRUE, progress = TRUE)
```

Arguments

product	a valid MODIS product name
band	band 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
km_ab	km above-below to sample
site_id	site id (overides lat / lon)
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)
```

sin_to_ll *Convert sinusoidal coordinates to lat / lon*

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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