Untitled

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27-04-2017

Introduction

This series of documents covers different ways of downloading and managing satellite data:

- MODIS16A ET (collection 5) using the package MODISTools
- MODIS1 NDVI (collection 6) (or any other NDVI product) and conversion to ET using METRIC
- Need to talk to Ignacio about Google earth engine

Downloading MODIS ET data using MODISTools

The first component is a demonstration of using the package MODISTools in R to download the data. In this case the example will be based on extracting data for the midpoints of the subbasins of a SWAT model for the Cotter catchment

how to extract the midpoints

This is fairly easy in ARCSWAT, the model actually generates the midpoints as part of the watershed delineation and you can access this through the table of data of the shape file.

Downloading the data

Below is the actual download of the MODIS data, this requires an input file with the coordinates of the midpoints. Also, at this point in time, there is no MODIS16A in collection 6, so we have to rely on the older collection 5.

```
# Example catchment  Cotter
if(!require(MODISTools)) install.packages("MODISTools")
```

```
## Loading required package: MODISTools
```

```
## Warning: package 'MODISTools' was built under R version 3.3.2
```

```
library(MODISTools)

# read in file with xy locations (or create a data.frame)
xy.loc <- read.csv("Inputdata/subbasins.csv")
# Following the MODIS tools manual
coords <- data.frame(lat=xy.loc$Lat,
                     long=xy.loc$Lon,
                     start.date=rep(2000,nrow(xy.loc)),
                     end.date=rep(2014,nrow(xy.loc)),
                     ID=1:nrow(xy.loc))

# We need to figure out the name of the product, you can use GetProducts()
GetProducts()
```

```
##       getproductsResponse
##  [1,] Character,0
##  [2,] "MCD12Q1"
##  [3,] "MCD12Q2"
##  [4,] "MCD43A1"
##  [5,] "MCD43A2"
##  [6,] "MCD43A4"
##  [7,] "MOD09A1"
##  [8,] "MOD11A2"
##  [9,] "MOD13Q1"
## [10,] "MOD15A2"
## [11,] "MOD15A2GFS"
## [12,] "MOD16A2"
## [13,] "MOD17A2_51"
## [14,] "MOD17A3"
## [15,] "MYD09A1"
## [16,] "MYD11A2"
## [17,] "MYD13Q1"
## [18,] "MYD15A2"
```

```
# and check out the data bands that are in the product
GetBands(Product="MOD16A2")
```

```
## [1] "ET_1km"    "LE_1km"    "PET_1km"   "PLE_1km"   "ET_QC_1km"
```

```
#Create directory in which to save data
if (!dir.exists("MODIS")) {
  dir.create("MODIS")
}

# check if directory is empty

# # Now download data using MODISSubsets (This can take very long)
MODISSubsets(LoadDat=coords, Product = "MOD16A2",
             Bands=c("ET_1km","ET_QC_1km"), StartDate=T, Size=c(0,0),
             SaveDir="MODIS")
```

```
## Files downloaded will be written to MODIS.
## Found 25 unique time-series to download.
## Getting subset for location 1 of 25...
## Getting subset for location 2 of 25...
## Getting subset for location 3 of 25...
## Getting subset for location 4 of 25...
## Getting subset for location 5 of 25...
## Getting subset for location 6 of 25...
## Getting subset for location 7 of 25...
## Getting subset for location 8 of 25...
## Getting subset for location 9 of 25...
## Getting subset for location 10 of 25...
## Getting subset for location 11 of 25...
## Getting subset for location 12 of 25...
## Getting subset for location 13 of 25...
## Getting subset for location 14 of 25...
## Getting subset for location 15 of 25...
## Getting subset for location 16 of 25...
## Getting subset for location 17 of 25...
```

```
## Getting subset for location 18 of 25...
## Getting subset for location 19 of 25...
## Getting subset for location 20 of 25...
## Getting subset for location 21 of 25...
## Getting subset for location 22 of 25...
## Getting subset for location 23 of 25...
## Getting subset for location 24 of 25...
## Getting subset for location 25 of 25...
## Full subset download complete. Writing the subset download file...
## Done! Check the subset download file for correct subset information and download messages.
```