Download TRMM Precipitation Data in NetCDF (Network Common Data Form) (*.nc4) using Wget and a software

(Ajay Yadav)

Table of Content

List of Figures

1. Introduction

To download: Daily data (Follow same process for Monthly data)

Website: https://disc.gsfc.nasa.gov/

(Change the following data as per requirement)

Start Date: 2007-01-01

End Date: 2007-12-31

Latitude Limit: [20, 35] ^{0}N

Longitude Limit: [75, 84] ^{0}E

Data version: TRMM_3B42_Daily_7

      3 ➜ Level

      B ➜ Sensor Side (A or B)

      42 ➜ 40 – Series (42 for daily data and 43 for Monthly data)

2. Steps to choose data and create link
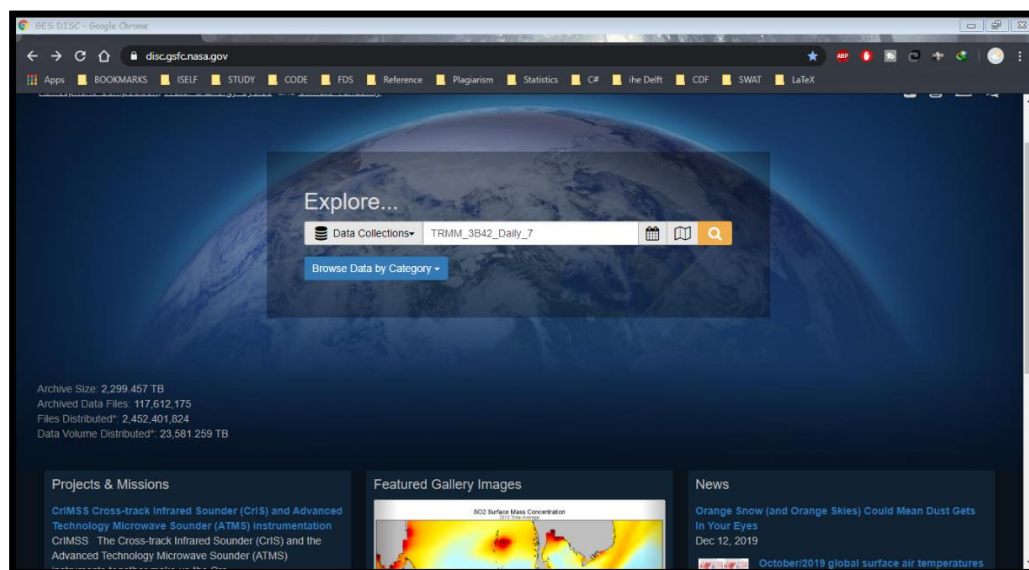
2.1. Go to Data website

Go to Website: https://disc.gsfc.nasa.gov/

Figure 1: Website to download TRMM Data

2.2. Select Date Range

Select date range as follows-

Start Date: 2007-01-01
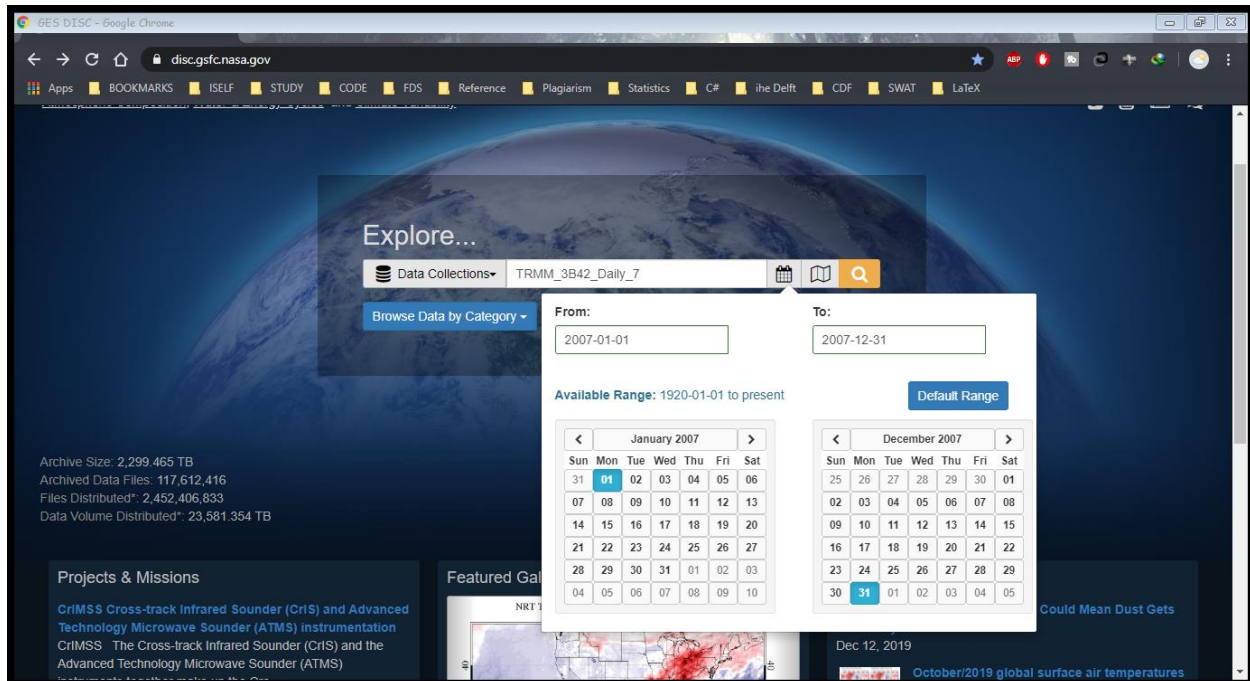
End Date: 2007-12-31

Figure 2: Select Date Range

2.3. Enter Spatial Range (Lat Long)

Select Latitude and Longitude of rectangle of area of interest as below-

Latitude Limit: [20, 35] 0N

Longitude Limit: [75, 84] ^{0}E

Lat and Long should be entered in format: 75,20,84,35
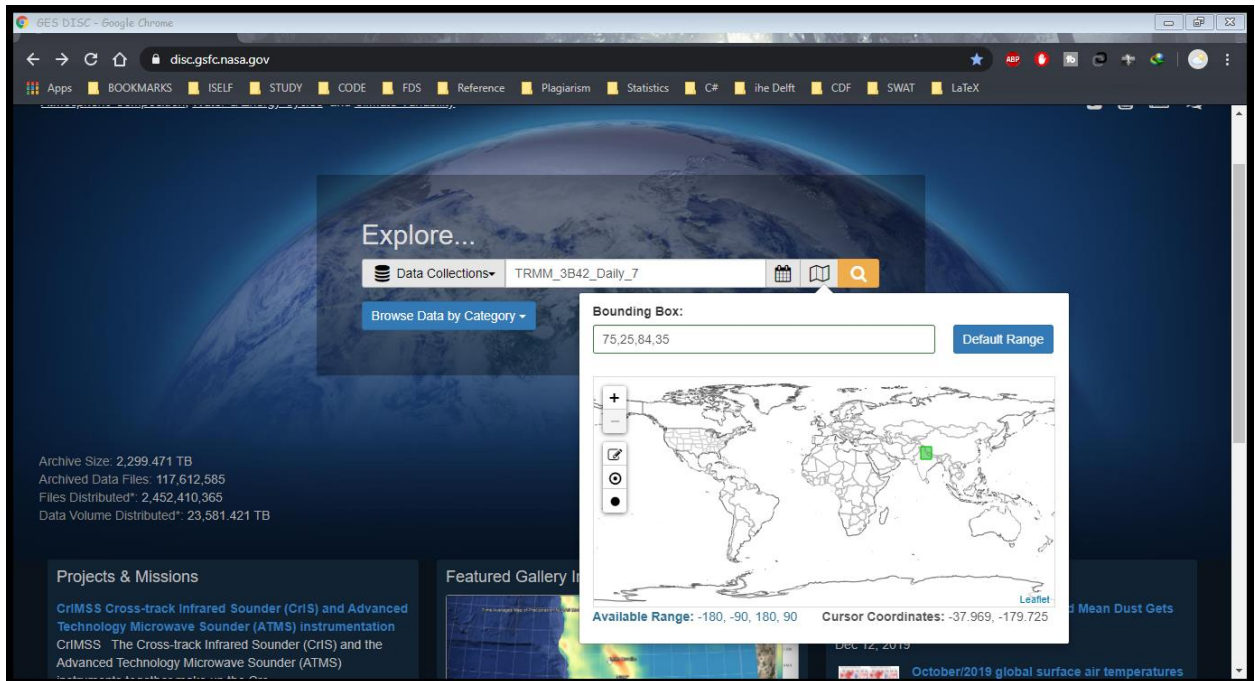
Figure 3: Enter Latitude and Longitude (Spatial Range)

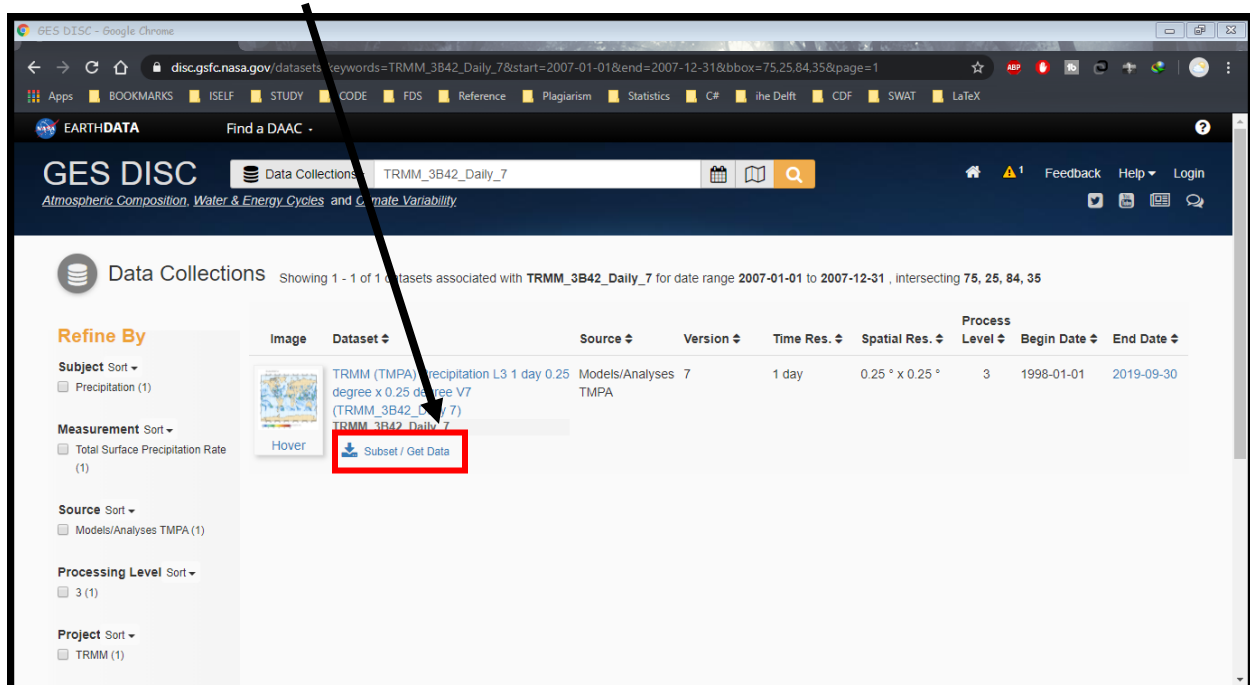## 2.4. Click on Search

Click on Subset/Get Data

Figure 4: Search Result

2.5. Subset/Get Data

After clicking Subset/Get Data, expand Variables and check on "Precipitation". You can also choose "IRPrecipitation" or "HQPrecipitation". If no option is chosen, all variables will be downloaded.
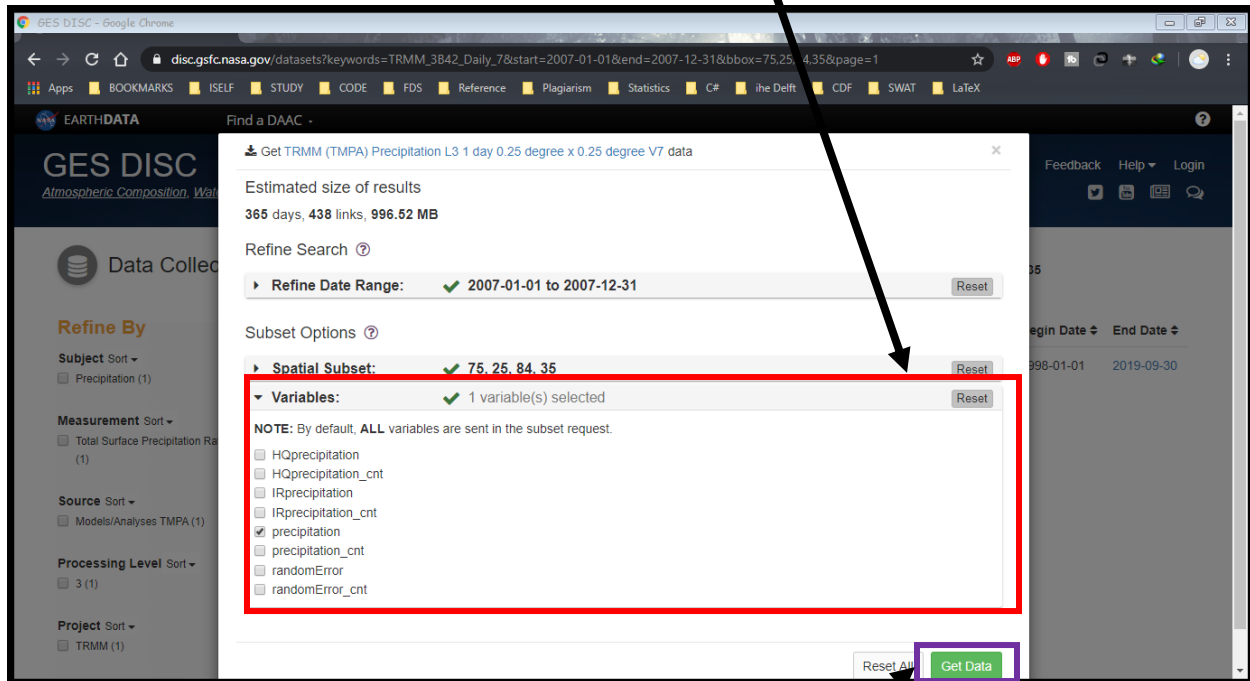

Figure 5: Subset/ Get Data and choose variable

After choosing variables, click on Get Data.

If necessary, you can modify date range or latitude longitude limits.

2.6. Get Data and Download Link List in text file Format

Click on the **Download Link List.** You can get **instruction for downloading.**
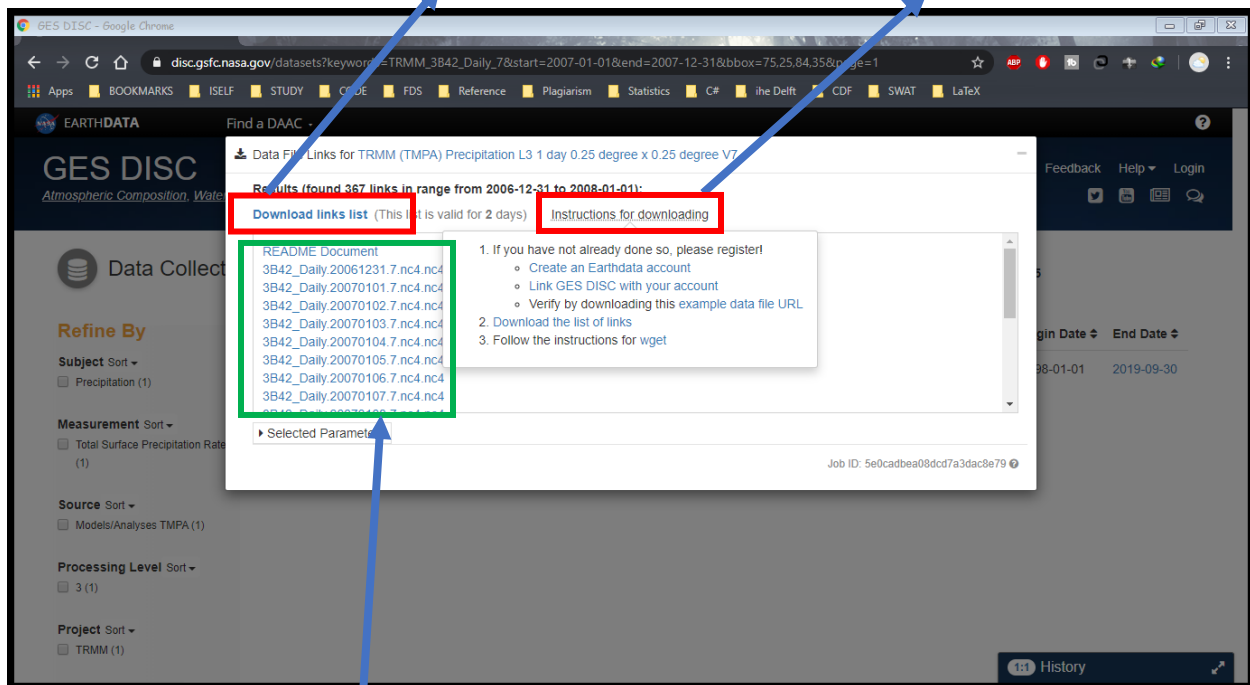

Figure 6: Get data and download link list

You can **download individual file** by clicking on each file (which is tedious and time consuming).

We will see how to automate the download process in next section. For now, only download link list.

2.7. Download link list File

You will get text file with name:

subset_TRMM_3B42_Daily_7_20200101_144425.txt

Rename the file to ***myfile.txt***

Save the file in known location

e.g. **F:\AY\SWAT\Manual\TRMM\Link_Lists**

This text file looks like in the Figure 7.

Figure 7: Text file containing list of all link of *.nc4 file and readme file in .pdf

3. Create Earthdata account

Go to link: https://urs.earthdata.nasa.gov/users/new

Figure 8: Register in EarthData

Enter username, password, your name, Country, etc.

e.g.   usename = ajay

password = trmmData123

country = Nepal, etc.

Then click on "Register for EarthData Login"

You will be asked to verify through email address.

After email verification, verify your Login by going to link:
https://urs.earthdata.nasa.gov/home

4. Download Wget

Wget is a free software using which you can download files from any website.

Download Wget from link: https://eternallybored.org/misc/wget/

Download the .exe file 32-bit or 64-bit as per your requirement.

Figure 9: Download Wget

After downloading Wget.ext, copy the file and paste into location-

C:\Windows\System32

Pasting into this location will allow you to run Wget from any Drive. To check whether Wget is working or not follow the process-

- ✓ Press **Windows Key + R**
- ✓ Type "**cmd**" and press enter
- ✓ Type **Wget -h**

You will get as in Figure 10.

Figure 10: Test Run for Wget

Now you have got everything required to automate the download process.

5. Creating Cookies

Open **cmd.exe** and go to the folder (Directory) you want to create the cookies in.

To change drive type **drive name** followed by **colon**

e.g. **C:\> F:** results in **F:\>**

To go to required folder use command **cd** (change directory)

e.g. **F:\>cd AY** results in **F:\AY>**

To list directories and files, use command **dir** and it will list all directory.

After navigating to the required directory, enter **NUL > .urs_cookies**

e.g. **F:\AY\SWAT\Manual\TRMM\TRMM_COOKIES>NUL > .urs_cookies**

This will create. **urs_cookies** file in the folder **TRMM_COOKIES.**

You may get "Access Denied" error. Ignore this error but ensure that the cookie is created in the chosen folder.

6. Download TRMM Data in NetCDF using Wget

Open **cmd.exe** and go to the folder (Directory) you want to download the TRMM Data in NetCDF (*.nc4) file.

e.g. **F:\AY\SWAT\Manual\TRMM\TRMM_2007>**

Now, we will use the following code:

```
wget --load-cookies C:\.urs_cookies --save-cookies C:\.urs_cookies --auth-no-challenge=on --keep-session-cookies --user=<your username> --ask-password --content-disposition -i <url.txt>
```

You need to change only the colored portion of the above code.

C: will be changed to the folder where you created the cookies, which is

F:\AY\SWAT\Manual\TRMM\TRMM_COOKIES

<your username> will be changed to your username created in section **3 Create Earthdata account**, which is

ajay

--ask-password will be changed to your password created in section **3 Create Earthdata account**, which is

--password=trmmData123

<url.txt> will be changed to the full file path of the text file downloaded, renamed and saved in section **2.7 Download link list File**, which is

F:\AY\SWAT\Manual\TRMM\Link_Lists

The final code will be:

```
wget --load-cookies F:\AY\SWAT\Manual\TRMM\TRMM_COOKIES\.urs_cookies
--save-cookies F:\AY\SWAT\Manual\TRMM\TRMM_COOKIES\.urs_cookies --
auth-no-challenge=on --keep-session-cookies --user=ajay --
password=trmmData123 --content-disposition -i
F:\AY\SWAT\Manual\TRMM\Link_Lists\myfile.txt
```

Now, paste the above code in **cmd.exe** after navigating to the folder where you want to download the files as given below-

```
F:\AY\SWAT\Manual\TRMM\TRMM_2007> wget --load-cookies
F:\AY\SWAT\Manual\TRMM\TRMM_COOKIES\.urs_cookies --save-cookies
F:\AY\SWAT\Manual\TRMM\TRMM_COOKIES\.urs_cookies --auth-no-
challenge=on --keep-session-cookies --user=ajay --password=trmmData123 --
content-disposition -i F:\AY\SWAT\Manual\TRMM\Link_Lists\myfile.txt
```

Note:

- ✓ *There shouldn't be any white space in the full path of any file path used here.*
- ✓ *There should be proper spacing before "--" in the above code*

7. Software to Download TRMM Data

7.1. Introduction to Software

Instead of downloading and writing codes in wget, you can download the software and give following input, **CSAY TRMM DATA DOWNLOADER** (https://github.com/ajayyadavav/CSAYTRMMDATADOWNLOADER),

- ✓ Username of EarthData account
- ✓ Password of EarthData account
- ✓ download link list file (*.txt or *.dat format) and
- ✓ project name (optional i.e. you may leave it blank)

When you click **Download TRMM Data**, a folder name entered in project name text box is created in the root directory in which this software is.

Figure 11: CSAY TRMM DATA DOWNLOADER

7.2. Functions of Button

- ✓ **Register:** Clicking this software will open login page of EarthData.
- ✓ **Show:** This will show the password and turns into "**Hide**". When you click "**Hide**", it will again hide the password by character '*'.
- ✓ **Browse:** By clicking the button, you can navigate to the file containing list of download link as in Figure 7.
- ✓ **Open:** By default, it will open the folder containing this software. When project name is entered and TRMM Data has been downloaded, clicking it will open the folder containing the downloaded data. When project name is not entered, the software generates folder name in format-
  TRMMData_yyMMddTHHSS
- ✓ **Download TRMM Data:** This will download TRMM Data according to the download link in the *.txt or *.dat file.
- ✓ **Go To Data Website:** This will open web page from where, TRMM Data can be generated and link list file can be downloaded.
- ✓ **About:** This will open a window containing information about the software and its creator.
- ✓ **Exit:** This will close the program.