

## **Exercise 1b: Downloading MODIS NDVI**

### **Introduction**

NDVI can be used to characterize the health of vegetation for a particular month. For drought monitoring, NDVI anomalies are used to evaluate a particular month relative to what is considered normal based on long-term averages. For this example, we will examine drought in California in July 2015. In this week's exercise, we will download all the data necessary for the calculations in week 2. First, we will download MODIS Vegetation Indices 16-day L3 Global 500m (MOD13Q1) for NDVI for each July 2001-2010. Next, we will download MODIS Vegetation Indices 16-day L3 Global 500m (MOD13A1) for NDVI for July 2015. In the week 2 exercise, we will calculate the long-term average from 2001-2010, and generate an anomaly map for July 2015. We would expect to see significant NDVI anomalies in the July 2015 image.

### **Objectives**

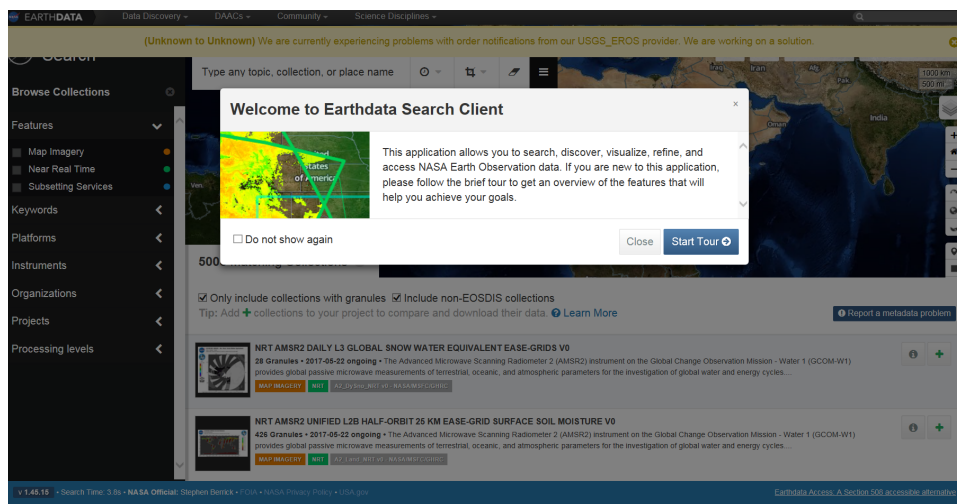
- Locate and Download MODIS NDVI imagery
- Open MODIS NDVI imagery in QGIS

### **Outline**

- Part 1: Download MODIS NDVI Images
- Part 2: Open MODIS NDVI Imagery in QGIS

## Part 1: Download MODIS NDVI Images

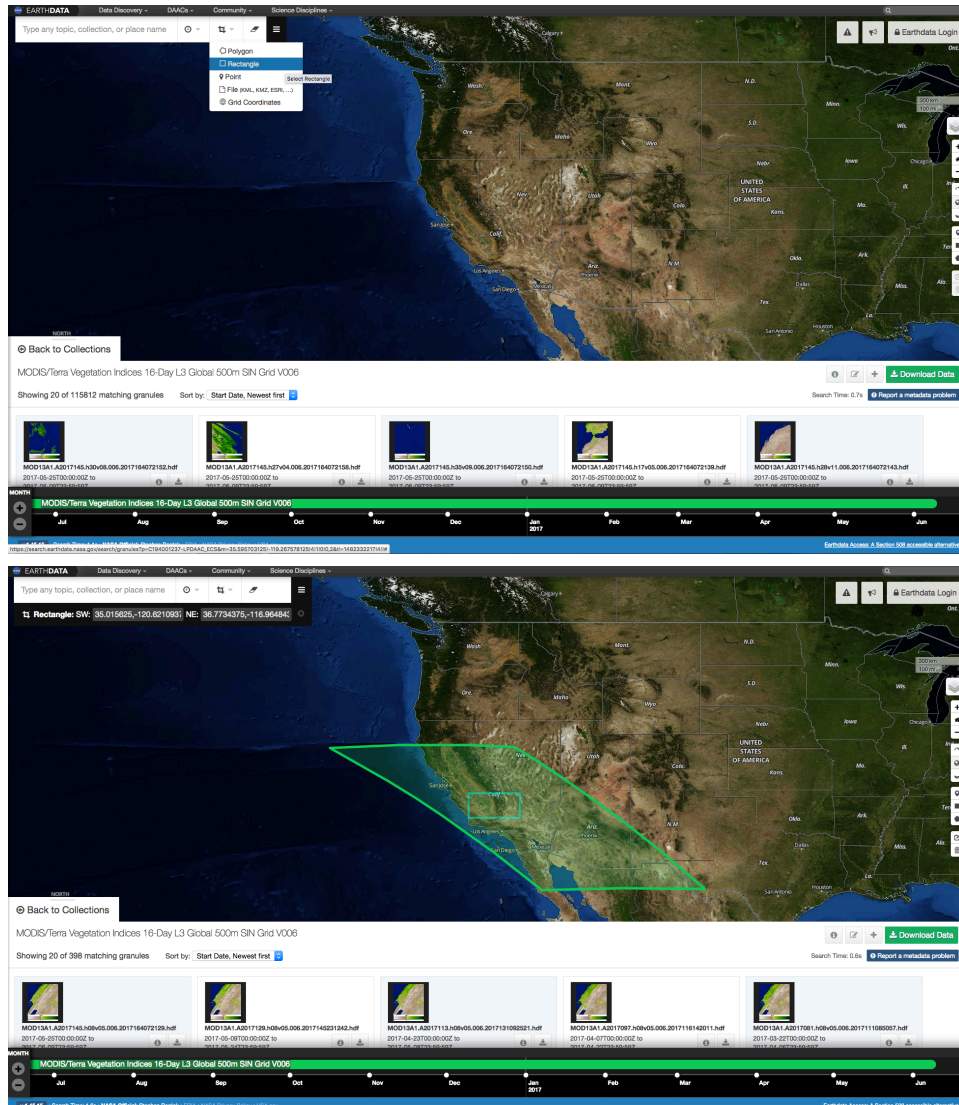
1. Go to NASA Earthdata Search: <https://earthdata.nasa.gov/>
2. Go to the top menu and under **Data Discovery** and click on **Earthdata Search**
3. First, you will be asked to take an introductory tour, which we recommend. You can do this by clicking on **Start Tour**.
4. If you are not logged in, you will see an **Earthdata Login** button at the top right. If you click on it, you will be directed to login or create an account. Accounts are free and anyone can sign up. You will need to be signed in to download data.



We will search for the MODIS Vegetation Indices 16-day L3 Global 500m (MOD13A1) product for California.

5. Use your mouse to scroll over to the United States and zoom into California
6. In the **Search** bar at the top, type in MOD13A1
7. Click on the **MODIS Vegetation Indices 16-day L3 Global 500m (MOD13A1)** product in the **Matching Collections** region at the bottom of the page. It may take a few moments to load, and this should be the first option.

8. Click on the **Spatial Subset** icon, select **Rectangle**, and create a box in the small region in central California. Once you do this, you should see the green outline of the MODIS swath.



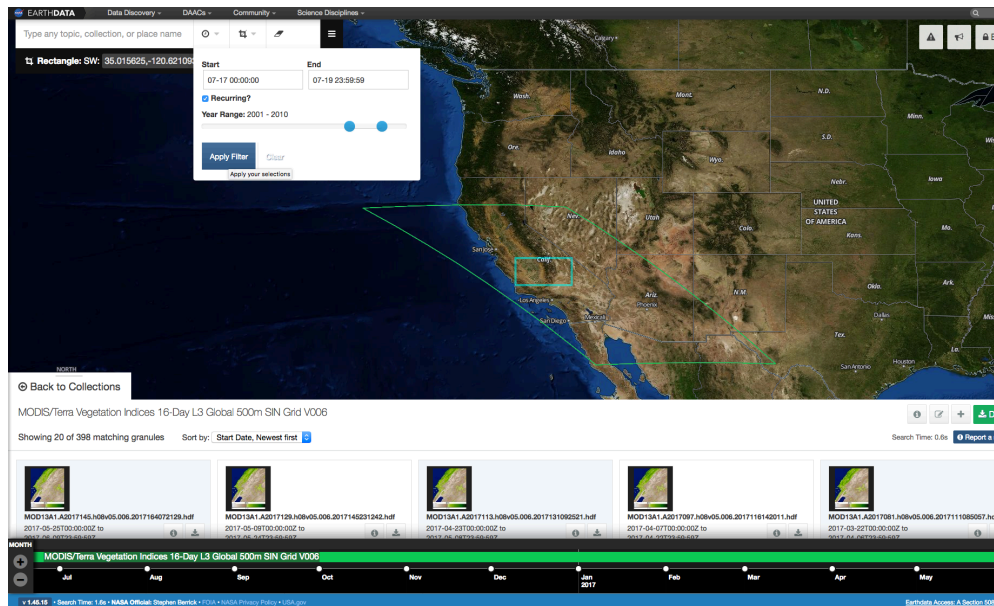
For our date range of interest, we will use July 17-19 for each year from 2001 to 2010.

9. Click on the **Temporal** subset box
10. Check the **Recurring** box. This will provide a Vegetation Indices file for each July throughout your date range and will exclude all other months.
11. Move the blue circle in the year range so that 2001-2010 is shown in the **Year Range**
12. Put your cursor in the **Start** box, then select July, then July 17
13. Put your cursor in the **End** box, then select July, then July 19

14. Click on **Apply Filter**

15. In the bottom panel, click on the **MODIS/Terra Vegetation Indices 16-day L3 Global 500m SIN Grid V006** option (this should be the first collection in the list)

- If your spatial and temporal subset looks like the image below, you should have 10 granules selected.

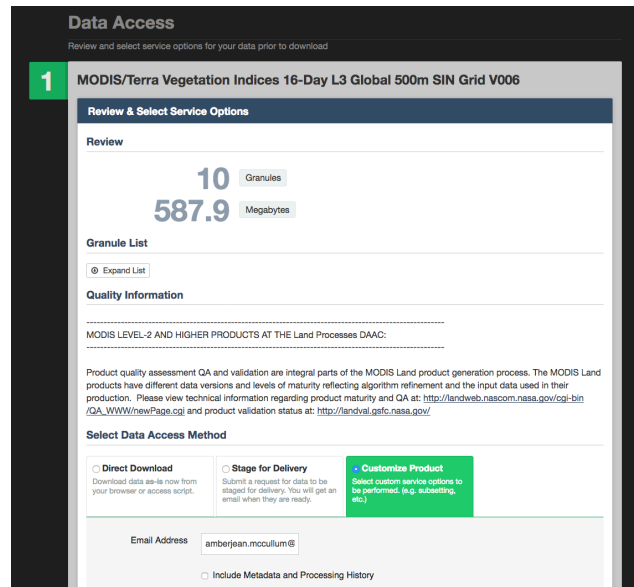


16. Click on the **Download Data** button on the bottom right

You will then be directed to the **Data Access** page. Here you can select specific options for your data type and delivery method.



17. Under **Select Data Access Method**, choose the **Customize Product** option.



18. Make sure that your email address is correct

19. For the **Reformat Output (Optional)** option, select **GeoTIFF**

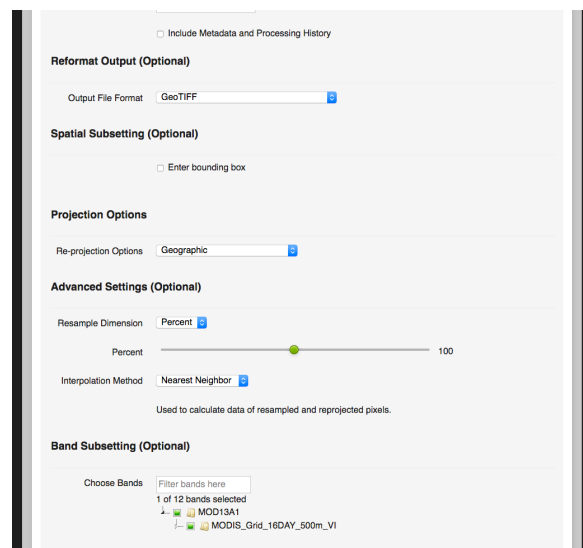
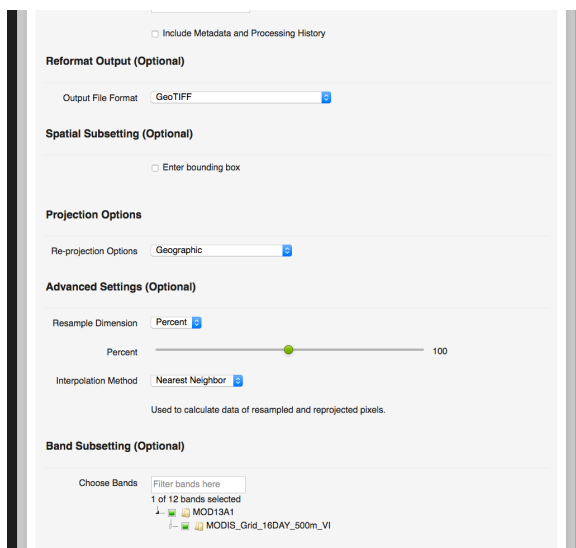
20. Leave **Spatial Subsetting (Optional)** unchecked

21. Under **Projection Options**, **Reprojection Options**, select **Geographic**

22. Leave the **Advanced Settings** as default

23. Under **Band Subsetting (Optional)**, click on the arrow next to **MODIS\_Grid\_16DAY\_500m\_VI**. This should display all the bands, or products, available. We are only interested in downloading the **500 m 16 days NDVI** option. Uncheck every other band option.

24. Click **Continue**



25. Review your contact information on the next page and click **Submit**.

Your data download will then begin to process. Keep this page open. You will be sent an email when the processing is complete and you will be provided with a download link directly on the processing webpage.

26. Once the processing is complete, click on the .zip file and save to your computer.

- You should be provided with a folder and a .tif file for each year from 2001-2010.

The screenshot shows a web interface with the following content:

- The following collections are being processed**
- When the data becomes available, an email containing download links will be sent to the address you provided.
- **MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006** Complete
- Your request is complete and can be downloaded using the following urls:
  - <https://e5eil01.cr.usgs.gov/esir/14357.html>
  - <https://e5eil01.cr.usgs.gov/esir/14357.zip>
- [View Browse Image Links](#)
- Additional Resources and Documentation**
- **MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006**
  - <https://pdaac.usgs.gov/>
- Next Steps**
- [Back to Earthdata Search Results](#)
- [Start a New Earthdata Search Session](#)
- [View Your Recent Data Retrievals](#)

We will use these NDVI images from mid-July from 2001-2010 to create an average NDVI image (in week 2). In preparation for calculating the NDVI anomalies for that year (in week 2), you will also need to download the image for mid-July 2015.

27. On your data processing page, in the bottom green panel under **Next Steps**, click on **Back to Earthdata Search Results**.

28. Complete the same steps you did previously and change the date in the **Temporal** search to only select July 17-19, 2015.

29. Download the July 2015 NDVI image and save to your computer.

### Data Access

Review and select service options for your data prior to download

## 1 MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006

#### Review & Select Service Options

**Review**

1 Granule  
191.5 Megabytes

#### Quality Information

MODIS LEVEL-2 AND HIGHER PRODUCTS AT THE Land Processes DAAC:

Product quality assessment QA and validation are integral parts of the MODIS Land product generation process. The MODIS Land products have different data versions and levels of maturity reflecting algorithm refinement and the input data used in their production. Please view technical information regarding product maturity and QA at: [http://landweb.nascom.nasa.gov/cgi-bin/QA\\_WWW/newPage.cgi](http://landweb.nascom.nasa.gov/cgi-bin/QA_WWW/newPage.cgi) and product validation status at: <http://landval.gsfc.nasa.gov/>

#### Select Data Access Method

Direct Download  
 Download data as-is now from your browser or access script.

Stage for Delivery  
 Submit a request for data to be staged for delivery. You will get an email when they are ready.

Customize Product  
 Select custom service options to be performed. (e.g. subsetting, etc.)

Email Address:

Include Metadata and Processing History

#### Reformat Output (Optional)

Output File Format:

#### Spatial Subsetting (Optional)

Enter bounding box

North:   
 West:   
 East:   
 South:

#### Projection Options

Re-projection Options:

#### Set Parameters for Universal Transverse Mercator (Optional)

CAUTION: Re-projection parameters may alter results.

Leave blank to choose default values for each re-projected granule.

NOTE: Zone parameter(s) are calculated automatically when spatial subsetting is active.

#### Advanced Settings (Optional)

Resample Dimension:

Percent:

Interpolation Method:

Used to calculate data of resampled and reprojected pixels.

#### Band Subsetting (Optional)

Choose Bands:

1 of 12 bands selected

- MOD13Q1
  - MODIS\_Grid\_16DAY\_250m\_500m\_VI
    - 250m 16 days blue reflectance
    - 250m 16 days composite day of the year
    - 250m 16 days EVI
    - 250m 16 days MIR reflectance
    - 250m 16 days NDVI
    - 250m 16 days NIR reflectance
    - 250m 16 days pixel reliability
    - 250m 16 days red reflectance
    - 250m 16 days relative azimuth angle
    - 250m 16 days sun zenith angle
    - 250m 16 days view zenith angle
    - 250m 16 days VI Quality

Access these granules again with different options

#### The following collections are being processed

When the data becomes available, an email containing download links will be sent to the address you provided.

- MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006  Complete
 

Your request is complete and can be downloaded using the following uris:

<https://e5ell01.cr.usgs.gov/esri/14358.html>

<https://e5ell01.cr.usgs.gov/esri/14358.zip>

#### Additional Resources and Documentation

- MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006
 

<https://lpdaac.usgs.gov/>


#### Next Steps

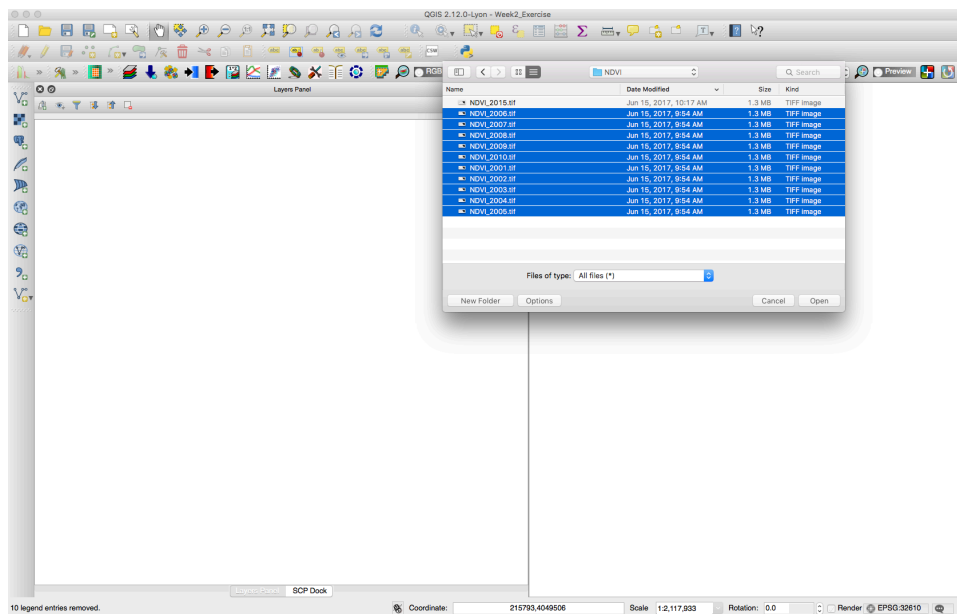
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## Part 2: Open MODIS NDVI Imagery in QGIS

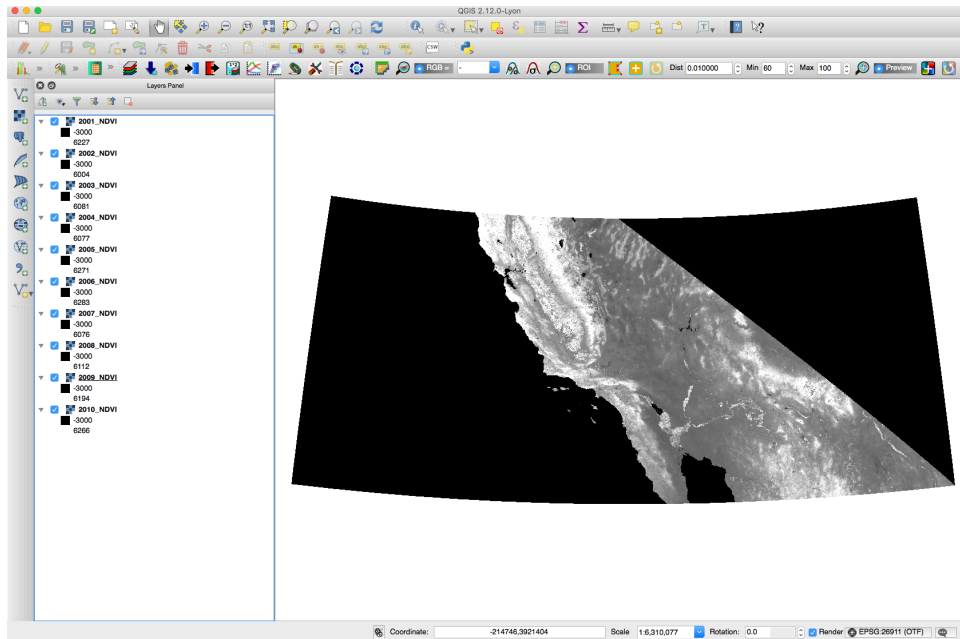
We will use QGIS to check the imagery to ensure you have the correct files for next week's exercise. Make sure you have QGIS installed and working properly. You should also familiarize yourself with the features of the software.


If you have stored your images in a folder with a long directory, you may want to copy all images to one folder and rename your images with a short name (e.g. NDVI\_2001.tif). This will keep you from receiving errors when you add the data and will look cleaner in your map.

1. In QGIS, click on the **Add Raster**  function on the left
2. Navigate to your saved MODIS NDVI images and click on **Open** to add each image from 2001-2010. You can do this all at once by highlighting each image.



3. Reorder your images in the **Layers** panel by selecting and dragging them into chronological order



4. It is very important to save your QGIS projects along the way so that you do not lose any important processing steps. At the top of your screen click on **Project**, then **Save As**. Navigate to your data folder for this webinar and save the project as Drought\_Week1 or something similar. We recommend that throughout this exercise and your homework assignments, that you regularly click on the **Save** icon .

Next week we will scale the MODIS data, display the data with a color ramp, calculate a long-term NDVI average (2001-2010), and calculate an anomaly (2015).