Open Source Data Access for Floods Disasters

Learning Objectives:

- Demonstrate utilization of online data repositories and tools which could be accessed openly and will be helpful for decision-makers and planners for taking measures to mitigate the impact of flood disaster.

In this Hands on session we will learn about portals that provide free data:

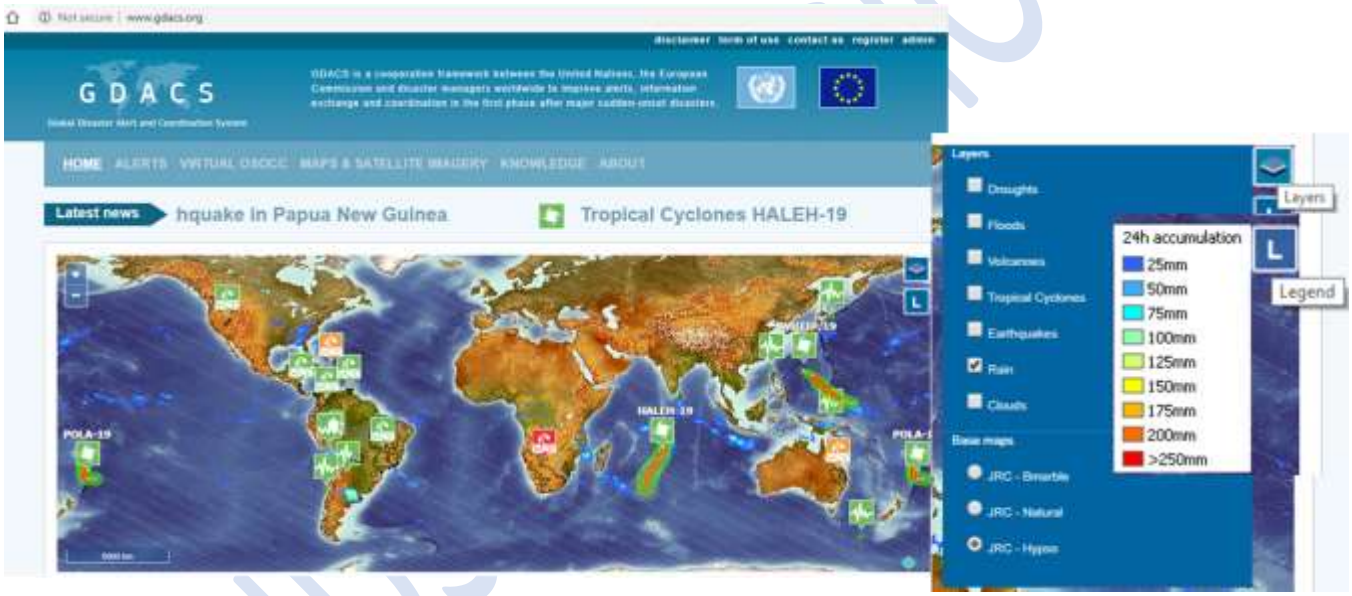
1. Disaster Alerts- GDACS
2. Visualization of Rainfall-JAXA Rainfall Watch System
3. Flood Extent-MODIS NRT Global Flood Mapping Porta
4. Visualize NRT data related to Floods- Worldview
5. Elevation Data-USGS Earth Explorer
6. Flood Satellite Data (Optical): USGS Earth Explorer
7. Flood Satellite Data (Microwave): ASF's Data Portal
8. Administrative boundaries-GADM Portal

"Role of Earth observation in Multi–hazard disaster risk assessment and monitoring targets of the Sendai Framework" 4–8 December 2019

Exercise 1: Disaster Alerts-GDACS Portal:

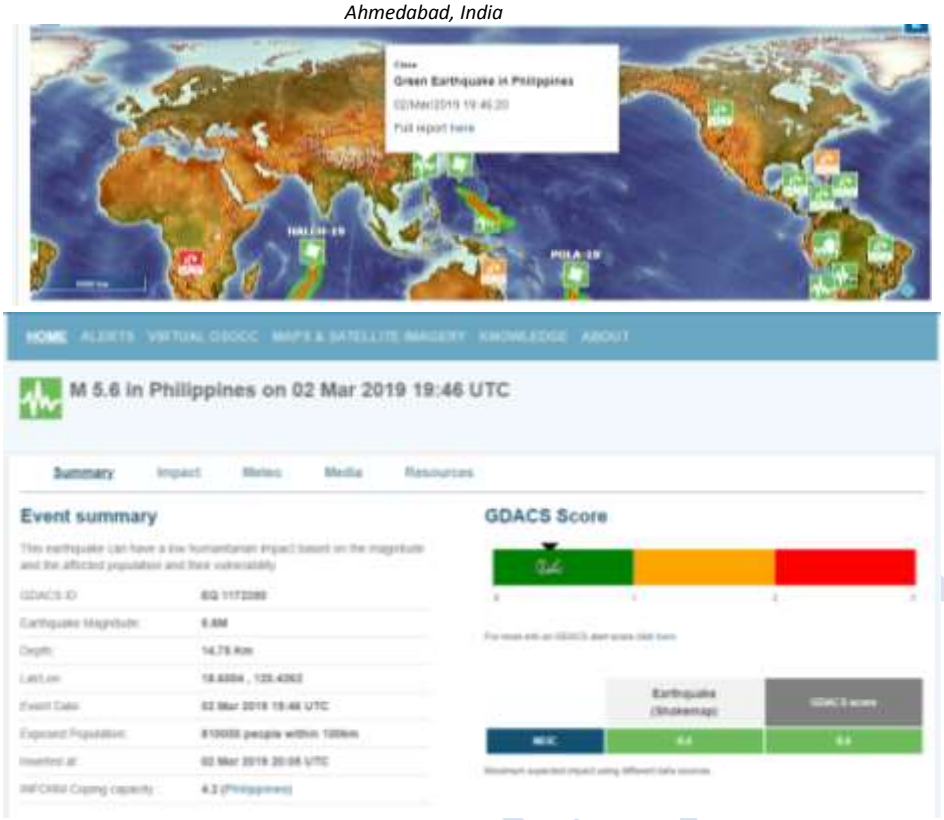
GDACS is a cooperation framework between the United Nations, the European Commission and disaster managers worldwide to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters.

1. Open link http://www.gdacs.org/
2. Home page will show latest disasters globally in spatial format in different icons and colour each representing different hazard (flood, drought, cyclone, earthquake etc.).
3. Scroll down the web page the results displayed spatially are also presented in tabular format.

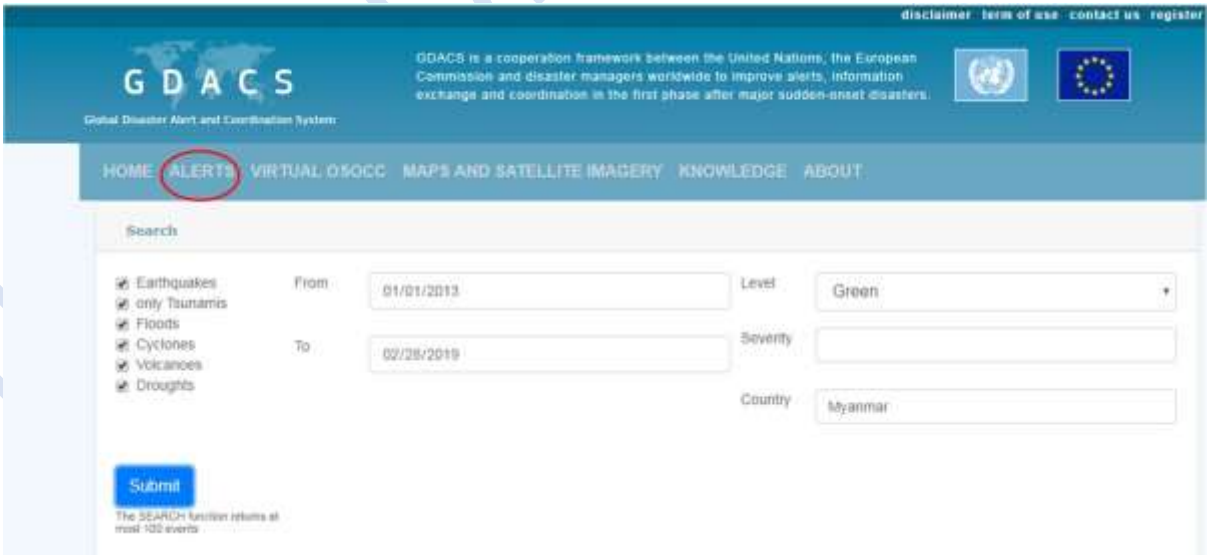


Map of disaster alerts in the past 4 days. Last 24 hours events are highlighted in yellow. Small earthquakes are shown as green boxes

4. Go to left side and click on Layers icon and toggle to see the type of hazards displayed and below it has the Legend (example Rainfall)
5. To get additional information (short description) you may click on the icon and for more details click on the Full Report link



6. Full report consists of Event Summary, Impact, Meteo, Media and other Resources
7. Scroll down the web page the results displayed spatially are also presented in tabular format.
8. Click on Alerts Tab→Go to Search→Check Disaster-Flood/Cyclone/Droughts etc→ Date (01-01-2013 to 02-28-2019); Level→Green; Country→Myanmar and then Click→Submit

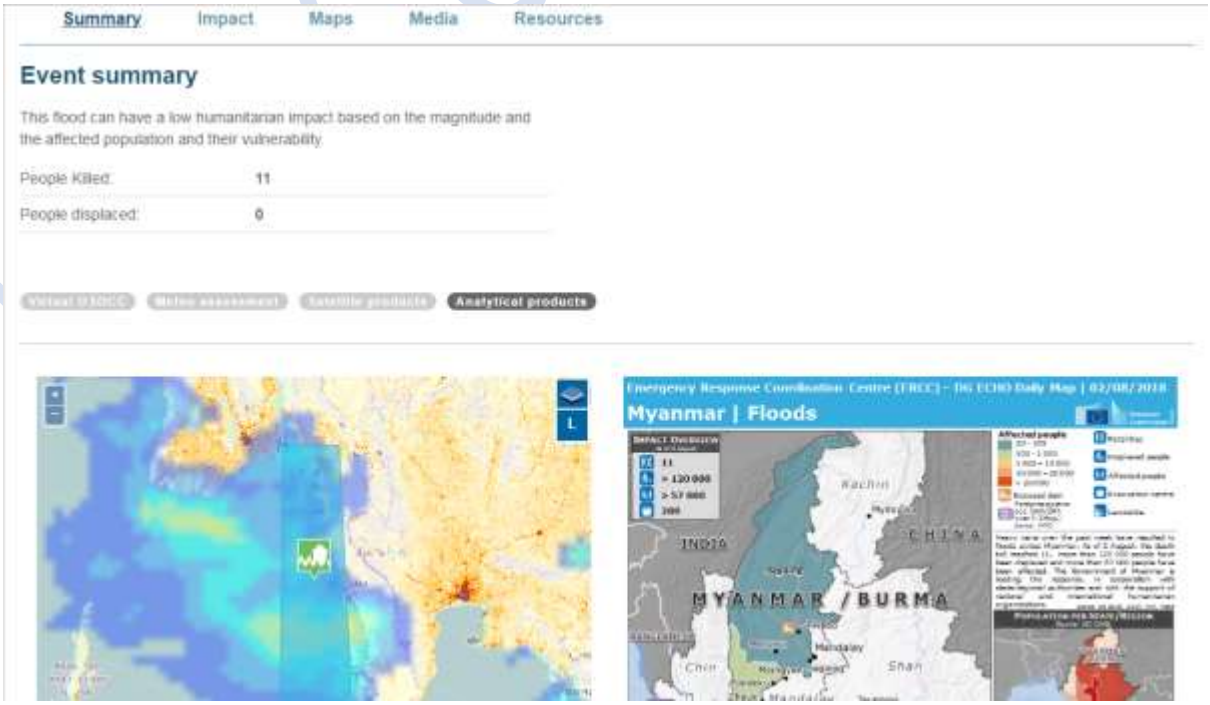


9. Scroll down the page and see Result displayed on map with different icons as well as in tabular format

RESULTS

Alert	Country	Name	Date	Severity
	China, India, Myanmar, Nepal	India-2018	13 Feb 2019	-
	Myanmar, Thailand, Malaysia, Indonesia	PABUK-18	05 Jan 2019	93(Km/h)
	Bangladesh, India, Myanmar, Nepal	Ganges Valley - Bangladesh-2018	16 Nov 2018	-
	Myanmar, Union of		01 Aug 2018	-
	Myanmar, Union of		31 May 2018	-
	Viet Nam, Laos, Thailand, China, Myanmar	TALAS-17	16 Jul 2017	93(Km/h)
	Myanmar	MAARUTHA-17	16 Apr 2017	83(Km/h)

10. Click on the icons under Alert under Results and explore the different Tabs (Summary/Impact/Maps/Resources) for 01-Aug-2018 Flood Events



Q1. Which is the recent disaster in your region observed

Q2. Find out recent flood event in your region, note down the dates

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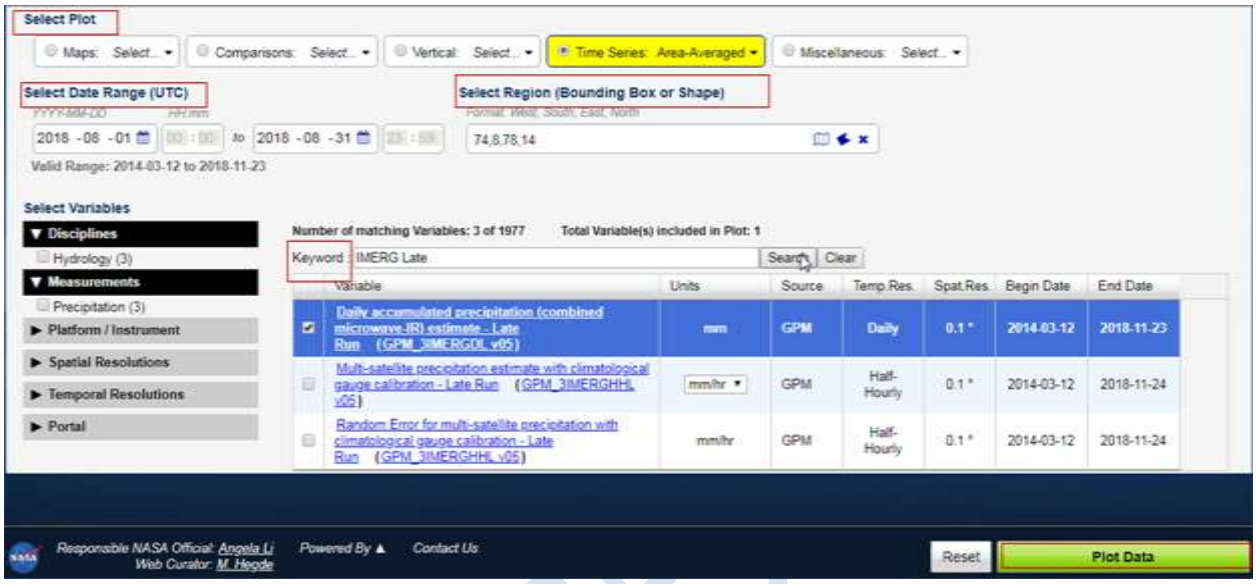
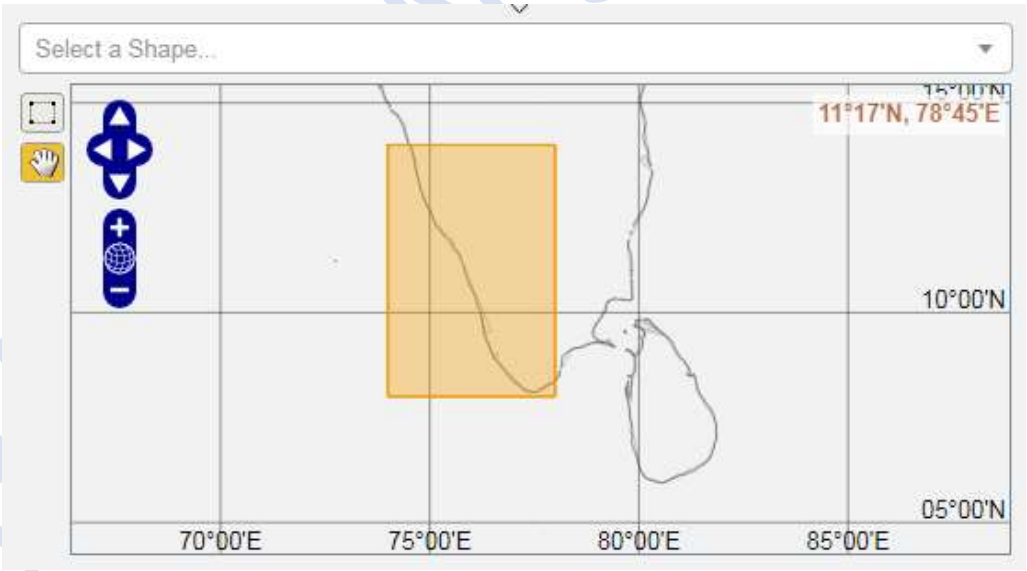
Exercise 2: Visualization of Rainfall- Using NASA Giovannni Portal

Plotting Time Series

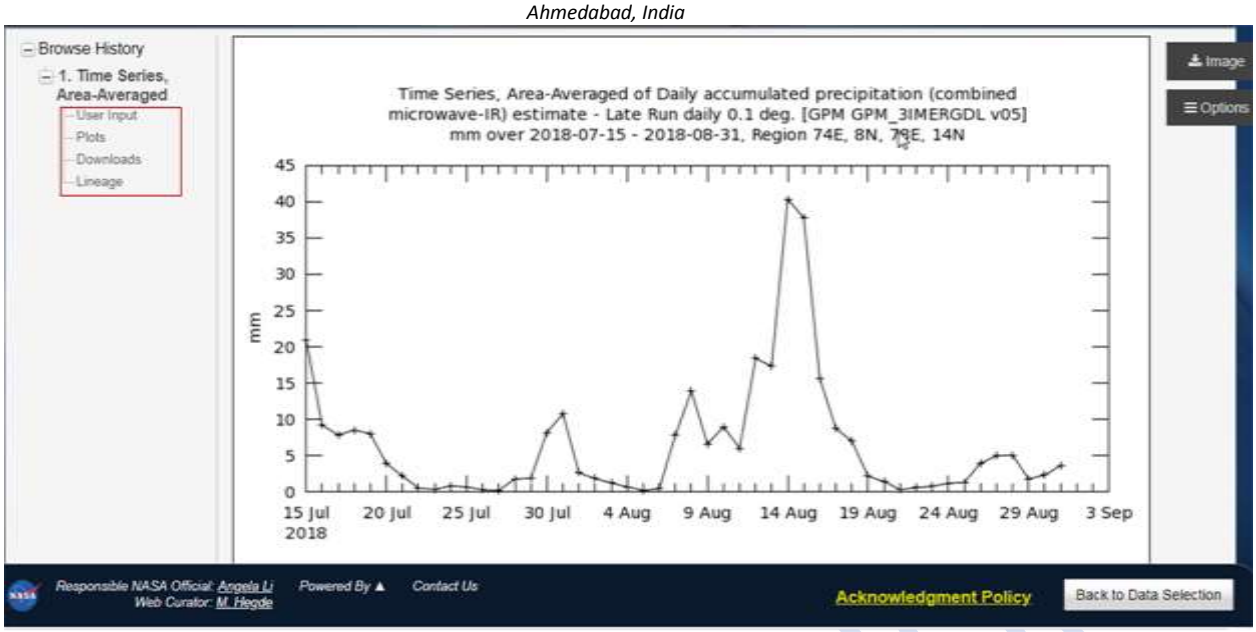
1. Go to the Giovanni website using the web browser: https://giovanni.gsfc.nasa.gov/giovanni/
2. Window shown as below will open



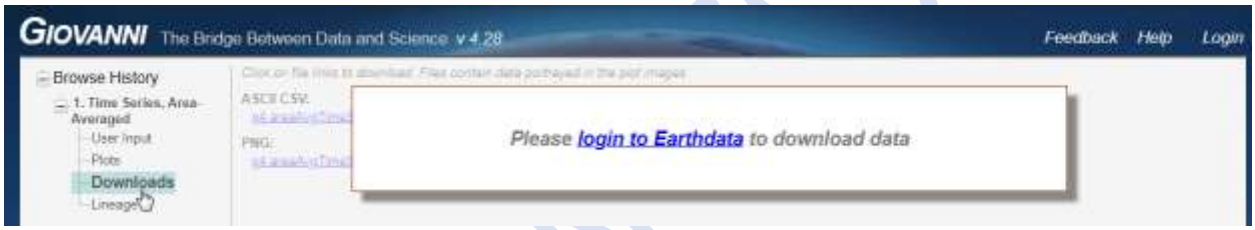
3. Enter the coordinates within Bounding Box→ 74, 8; 78, 14
4. Enter Data Range→ 2018-07-15 to 2018-08-31
5. Click on the map icon to see the region



6. Enter the following options: – Next to Keyword→Enter IMERG Late→ Click Search→ Select Daily accumulated precipitation (combined microwave-IR) estimate – Late Run (GPM_3IMERGDL_v05)
7. Click on Plot Data (on the bottom right) – You will get the time series of daily accumulated rainfall for August 2018, averaged over the selected domain



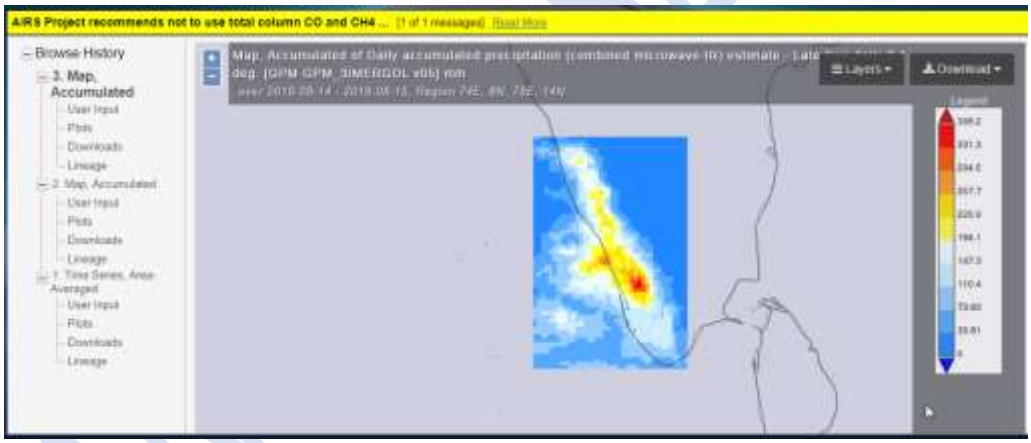
8. Click on Download (on the left menu bar) to save the time series image and also the csv file on your computer



	A	B	C	D	E	F	G	H	I	J	K	L
1	Title:	Time Seri« Area-Averaged of Daily accumulated precipitation (combined microwave-IR) estimate - ()										
2	User Start Date:	2018-07-15T00:00:00Z										
3	User End Date:	2018-08-31T23:59:59Z										
4	User Bounding Box:	74,8,78,14										
5	Date Bounding Box:	74.05,8.05,77.95,13.95										
6	URL to Reproduce Results:	https://giovanni.gsfc.nasa.gov/giovanni/#service=ArAvTs&starttime=2018-07-15T00:00:00Z&endtime=2018-08-31										
7	Fill Value (mean_GPM_3IMERGDL_05_precipitationCal): -9999.9											
8												
9	time	mean_GPM_3IMERGDL_05_precipitationCal										
10	7/15/2018	21.01318										
11	7/16/2018	9.189431										
12	7/17/2018	7.857101										
13	7/18/2018	8.525031										
14	7/19/2018	8.031585										
15	7/20/2018	3.90846										
16	7/21/2018	2.18414										
17	7/22/2018	0.534036										
18	7/23/2018	0.34083										
19	7/24/2018	0.814647										
20	7/25/2018	0.679721										
21	7/26/2018	0.29086										
22	7/27/2018	0.213338										
23	7/28/2018	1.776482										
24	7/29/2018	1.880903										
25	7/30/2018	8.207689										
26	7/31/2018	10.76972										

Plot IMERG Rainfall Maps

1. Select Plot→ Map: Accumulated
2. Select Date Range (UTC)→ 2018-08-14 to start and 2018-08-15 for the end date
3. Click on Plot Data (on the bottom right)
4. Map of accumulated rainfall gets displayed



5. Click on the Downloads link on the left→Choose the NetCDF (.nc) file by clicking on the link to save the file to your computer

Q1. Draw time series of monsoon period of your region?

Q2. Find out the month of maximum precipitation?

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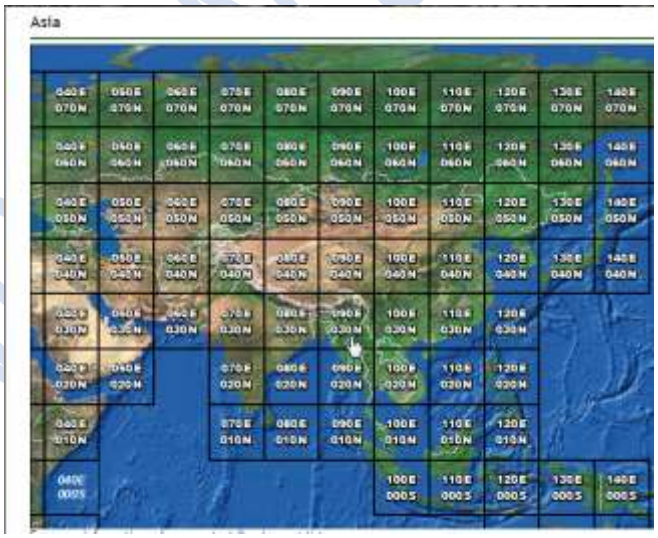
Exercise 3: Flood Extent-MODIS NRT Global Flood Mapping Portal

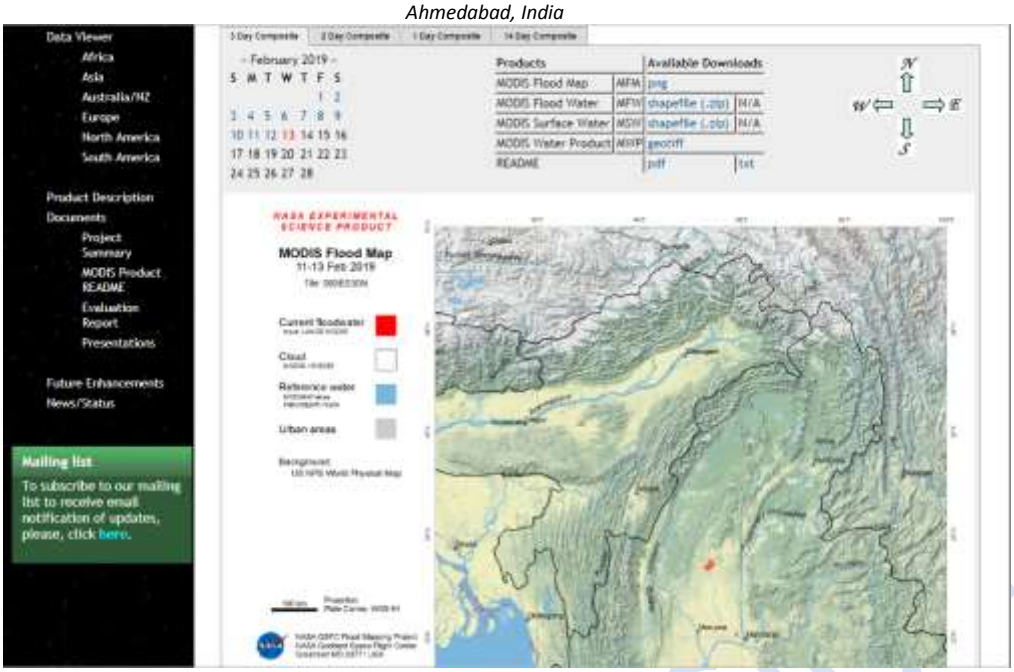
1. Open https://floodmap.modaps.eosdis.nasa.gov//

2. Click on Asia on left panel
3. Click over grid under Myanmar region i.e. 090E and 030N



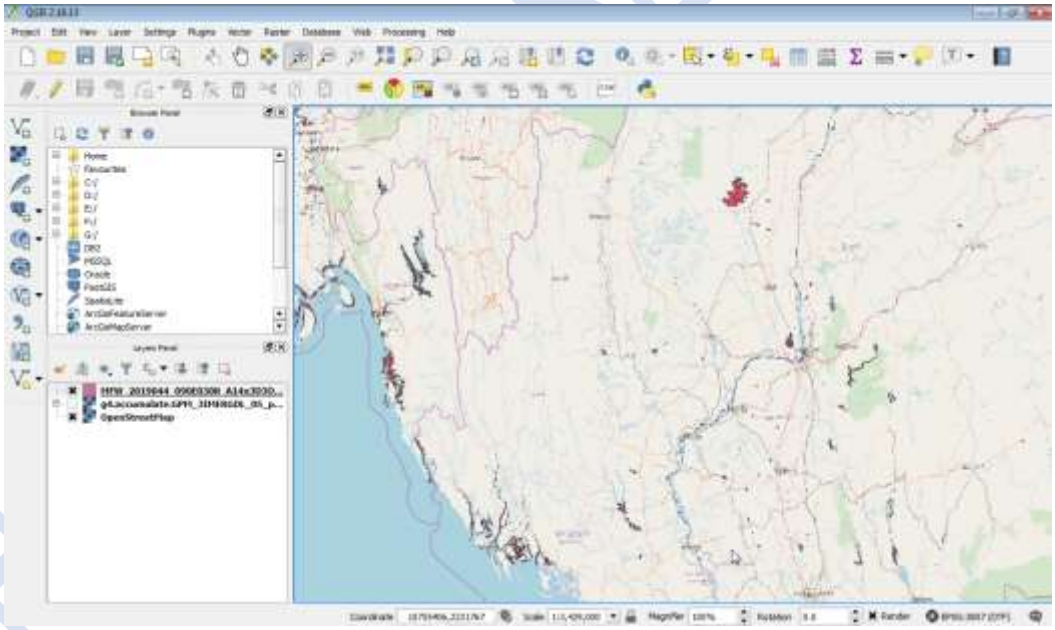
The MODIS Near Real-Time Global Flood Mapping Project produces global daily surface and flood water maps at approximately 250 m resolution, in 10x10 degree tiles.

4. A new window with different inundation products and maps opens with 4 tabs (3 Day Composite, 2 Day Composite, 1 Day Composite, and 14 Day Composite) as shown below.



5. Download Floodwater shapefile (.zip) and KMZ file for 3 days and 14 days composite.
6. Unzip the shapefiles

   MFW_2019044_090E030N_A14x3D3OT_V.zip
7. Add the layers in QGIS to see the layer
8. Zoom and navigate to see flooded polygons



Q1. Download flood data of your region when floods have impacted your region?

Q2. Add data to QGIS and visualize?

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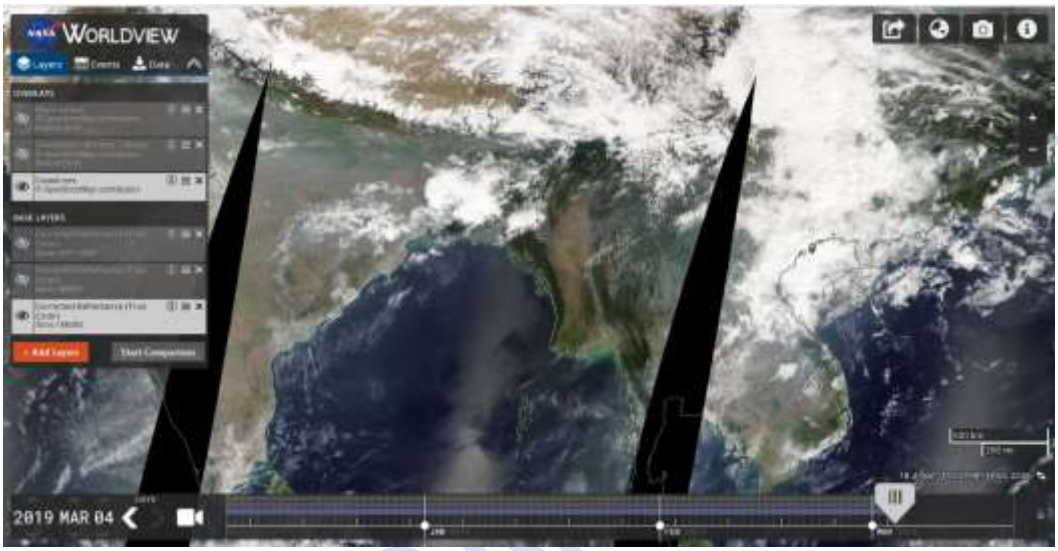
Exercise 4: Visualize NRT data Floods- Worldview

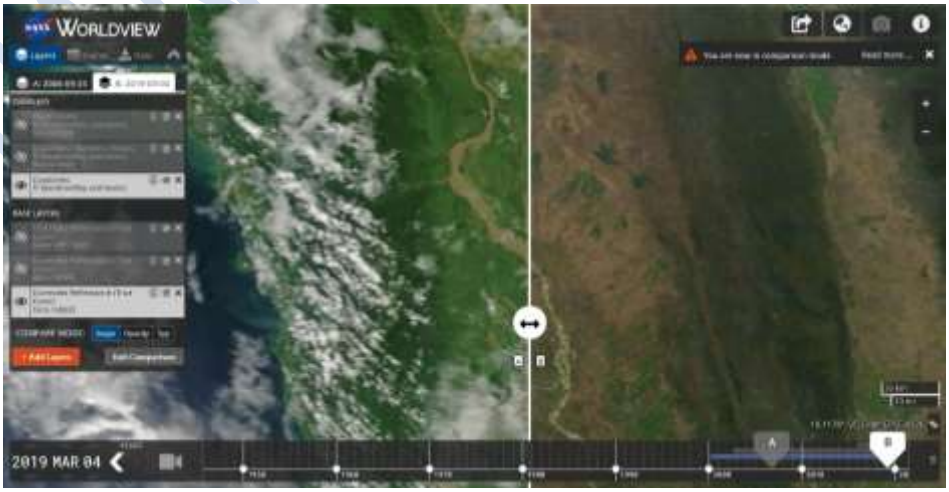
This app from NASA's EOSDIS provides the capability to interactively browse over 800 global, full-resolution satellite imagery layers and then download the underlying data. Many of the available imagery layers are updated within three hours of observation, essentially showing the entire Earth as it looks "right now". This supports time-critical application areas such as wildfire management, air quality measurements, and flood monitoring.

1. Click on https://worldview.earthdata.nasa.gov/
2. Pan to your area of interest and see the images



Displays true-color or natural color because this combination of wavelengths is similar to what the human eye would see. The images are natural-looking images of land surface, oceanic and atmospheric features. The MODIS Corrected Reflectance imagery is available only as near real-time imagery. The imagery can be visualized in Worldview and the Global Imagery Browse Services (GIBS). The sensor resolution is 500 m and 250 m (Bands 1 and 2 have a sensor resolution of 250 m, Bands 3 – 7 have a sensor resolution of 500m, and Bands 8 - 36 are 1 km. Band 1 is used to sharpen Band 3, 4, 6, and 7), imagery resolution is 250 m, and the temporal resolution is daily

3. Click on Start Comparison option on left panel at bottom. Give two dates a. Cyclone Nargis- 25-09-2006 and one normal time 04-03-2019 and see changes in inundation



4. Click on Swipe; Opacity and Spy options

Q1. Compare before and after images to visualize the chnages and areas impacted?

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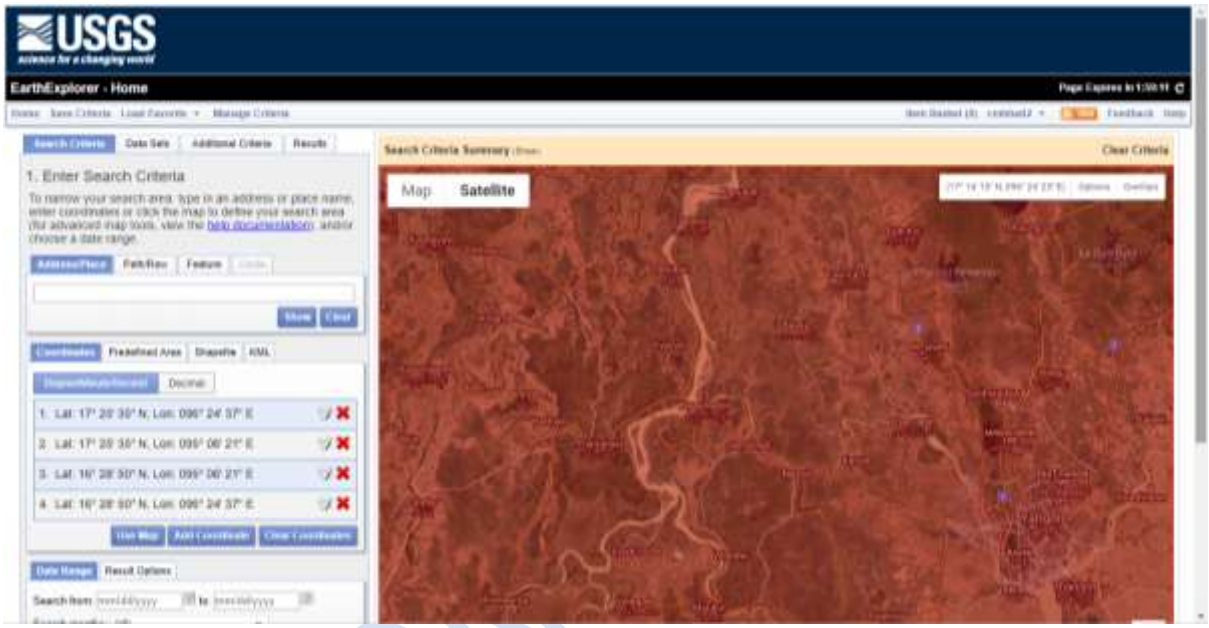
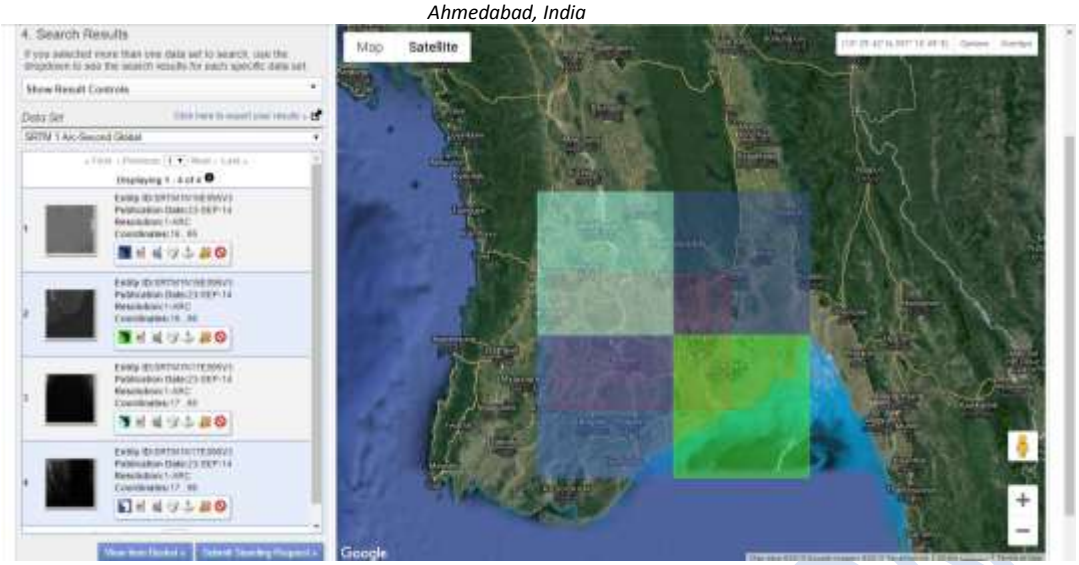
Exercise 5: Elevation Data-USGS Earth Explorer

1. Open link https://earthexplorer.usgs.gov/
2. Login to the site through Earthdata. For logging on to Earthdata website, registration is required
1. Define Area of interest using map, coordinates, shapefile etc. . or Zoom into your area of interest and Select Use Map option

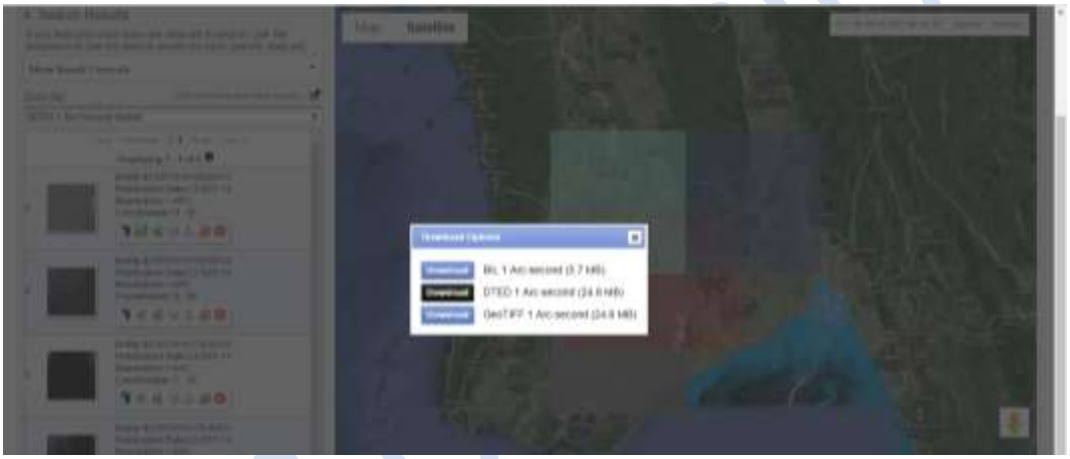


3. Select SRTM elevation data

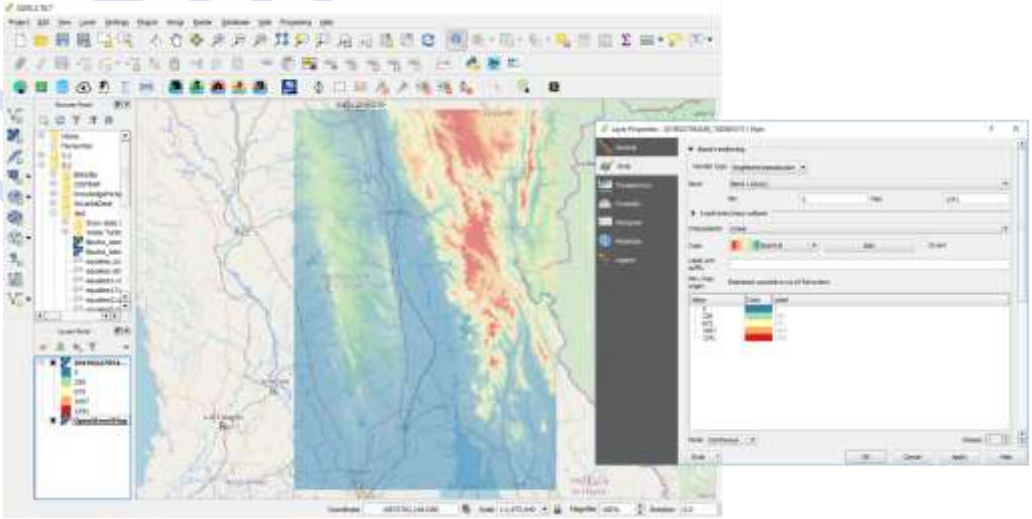
4. Click on Results at the bottom on left hand panel which will show the tiles falling within selected area



5. Click on left panel icons to see the footprint/browse data and click on download data on tile interested.



6. Add downloaded DEM tiff file to QGIS by →Clicking on the Add Raster icon→Navigate to the file location (ExerciseDEM) *.tif
7. Add colors to the SRTM terrain layer, make it transparent and visualize on OSM base



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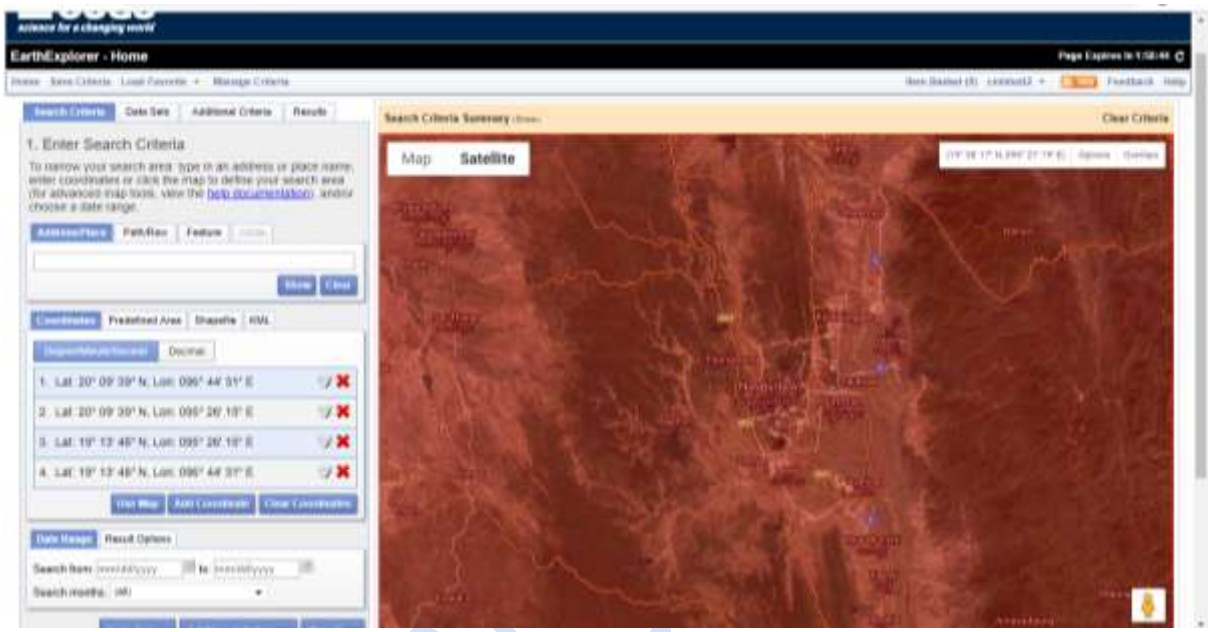
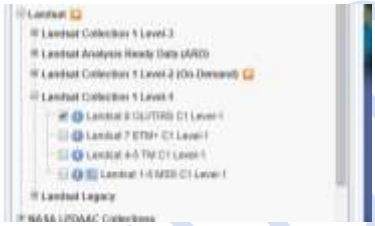
Exercise 6: Flood Satellite Data (Optical): USGS Earth Explorer

2. Open link https://earthexplorer.usgs.gov/
3. Login to the site through Earthdata. For logging on to Earthdata website, registration is required
4. Define Area of interest using map, coordinates, shapefile etc. or Zoom into your area of interest and Select Use Map option



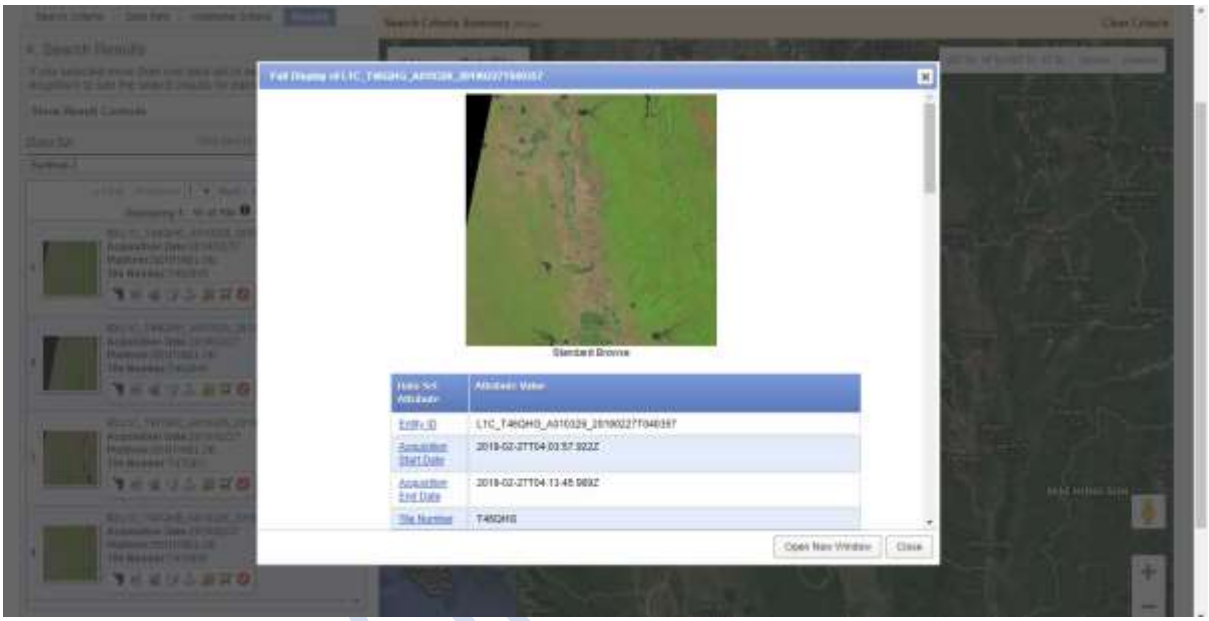
5. Go to Next Tab Datasets; Select Landsat-8 and Click on Results



6. Data available gets displayed on left panel with different icons to see footprint, metadata and browse image and download

7. Similarly repeat above steps for Sentinel-2 data searching
8. If specific time period is required, dates can be specified under Search Criteria

9. Click on metadata and browse (white icon) and see the browse image



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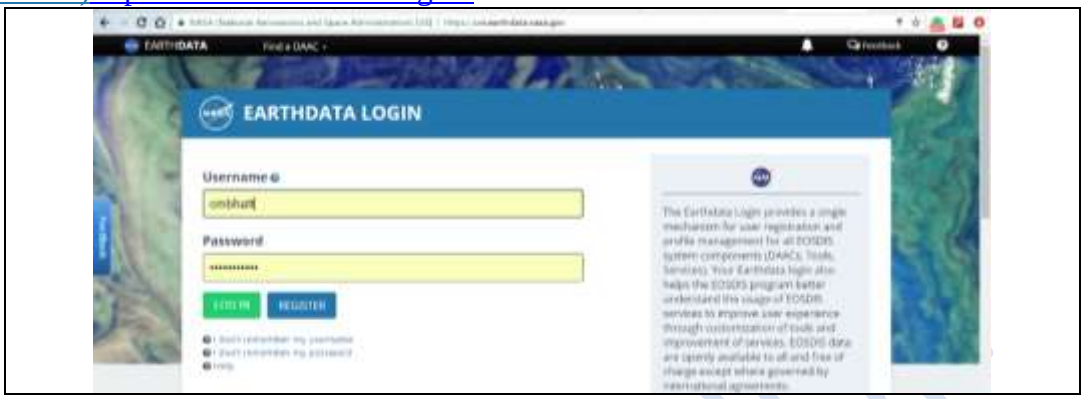
Exercise 7: Flood Satellite Data (Microwave): ASF's Data Portal

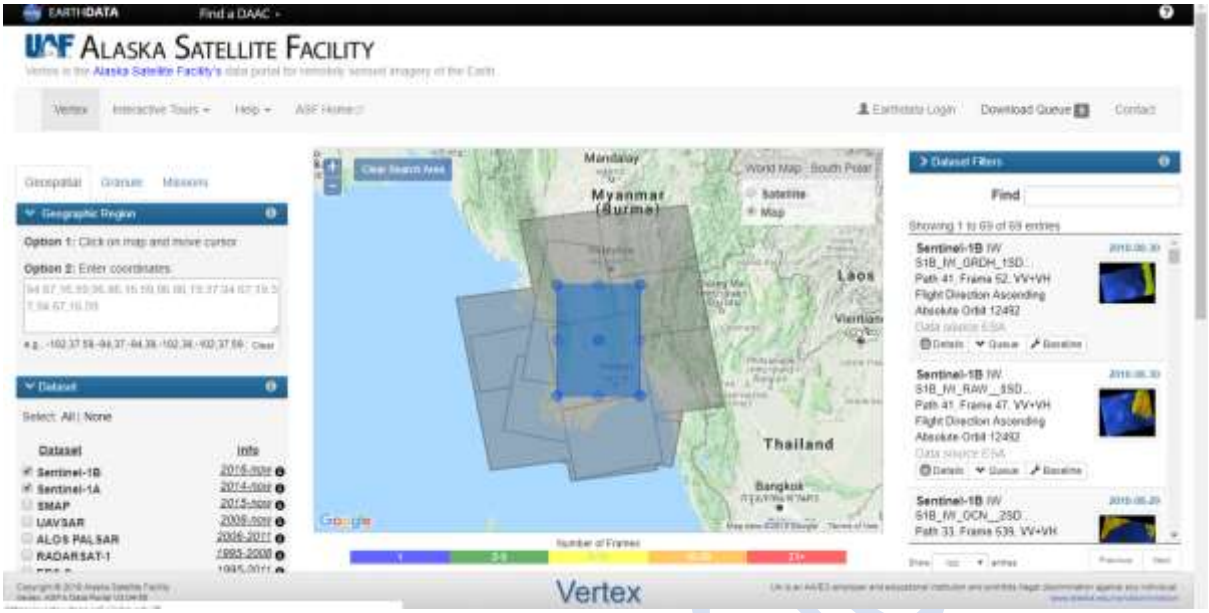
1. Download Sentinel data available through NASA's Alaska Satellite Facility (ASF) Distributed Active Archive Center (DAAC)https://www.asf.alaska.edu/sentinel/ by registering at register for Earth Observing System Data and Information System (EOSDIS)https://urs.earthdata.nasa.gov/.



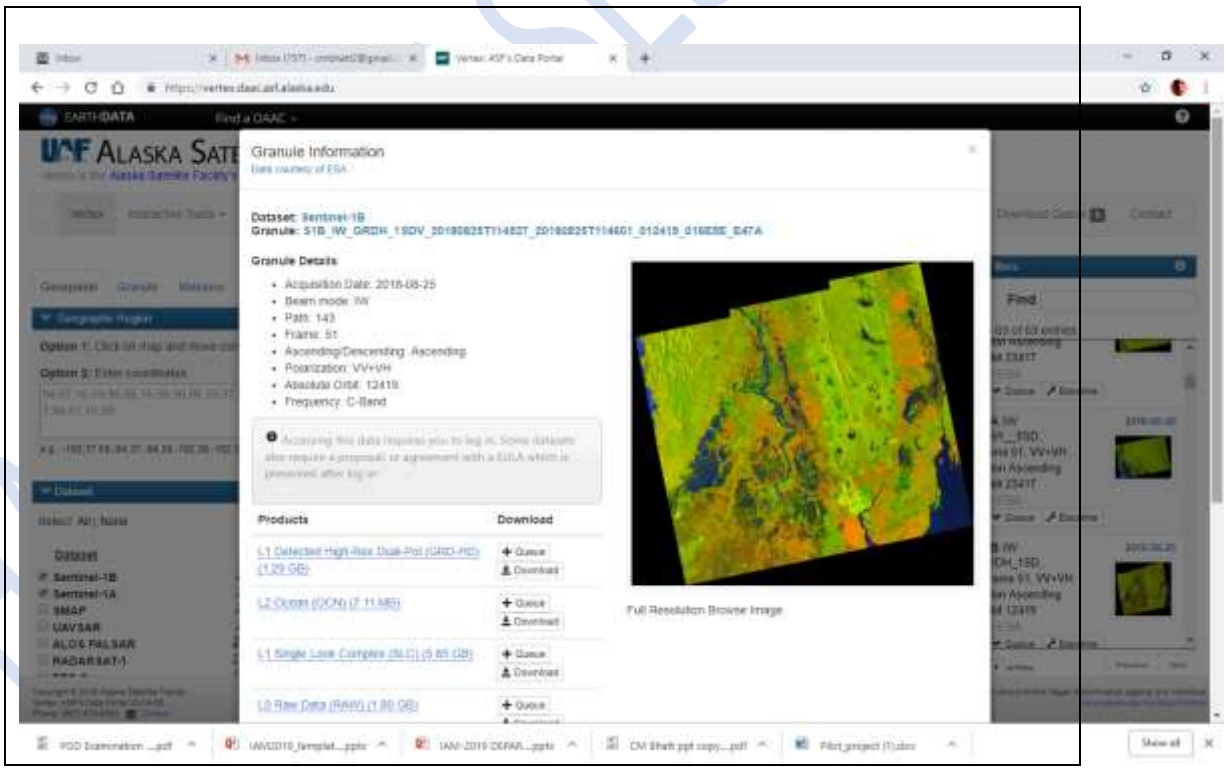
2. Go to link https://vertex.daac.asf.alaska.edu/ for browsing data. Data also can be accessed by registering at the Sentinels Scientific Data Hub (https://scihub.esa.int/dhus).
3. Click on Geographic Region Tab on Left panel →**Option 1:** Click on map and move cursor, draw the extent of region
4. Click on Dataset Tab on Left panel → Select Sentinel-1A,& B

5. Click on Optional Criteria Tab on Left panel → Select dates

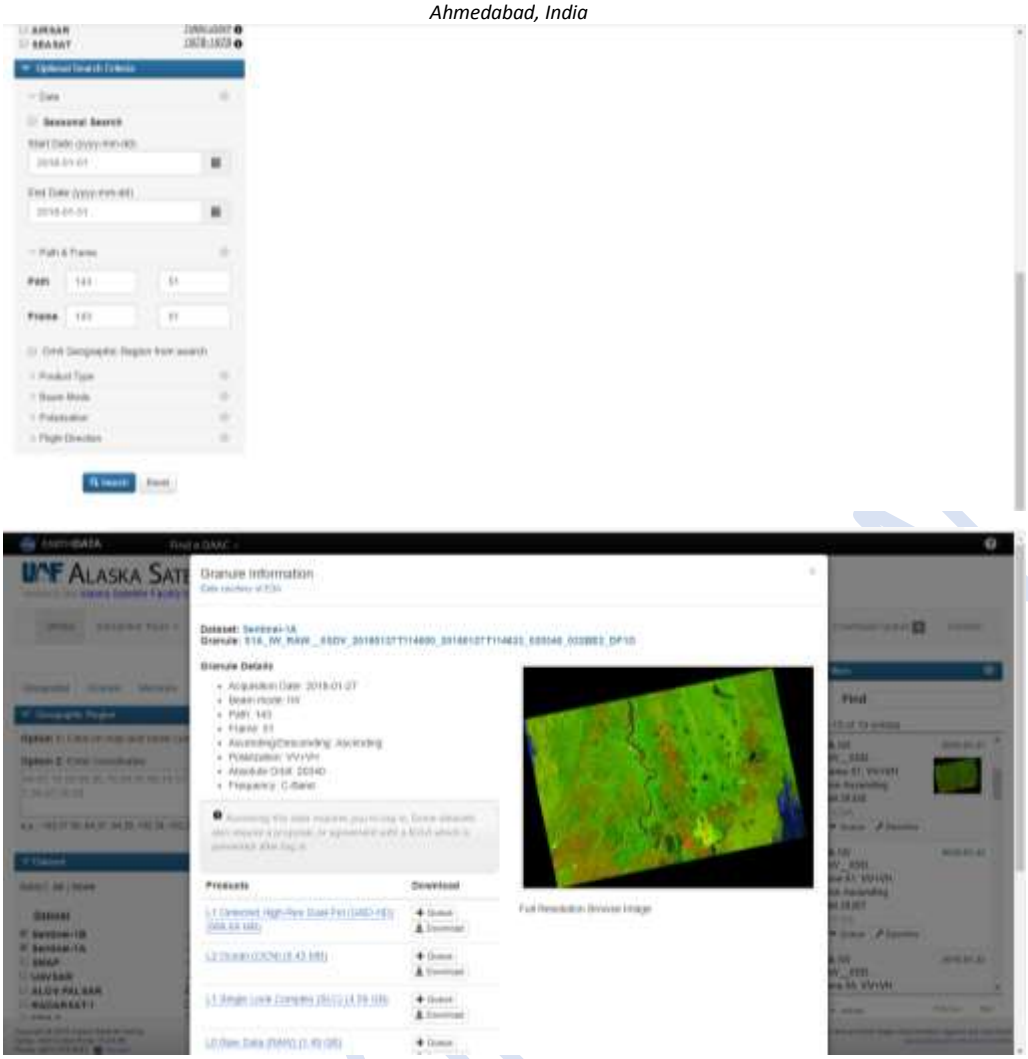
6. Click on Search



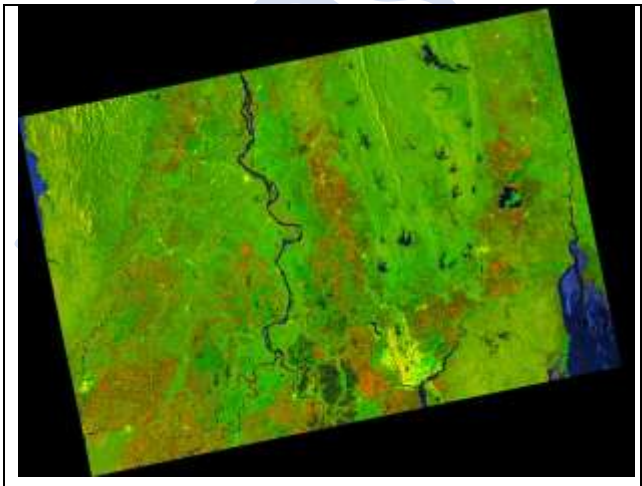
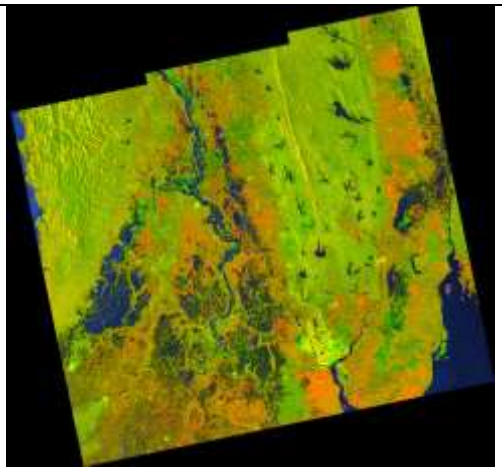
7. Search returns with scenes available for duration requested
8. Click on scene with 25-Aug-2018 date to see the metadata and preview
9. Click on full resolution browse image



10. Right Click on image to open full resolution browse image
11. Click on image to browse pre-event image



12. Right Click on image to open full resolution browse image
13. Compare two images

	
Pre-Event Image	Post-Event Image

14. For downloading data by Clicking on First data *L1 Detected High-Res-Dual-Pol (GRD-HD) under Products*. Level-1 Ground Range Detected (GRD) Sentinel-1 data incorporates already some basic preprocessing.

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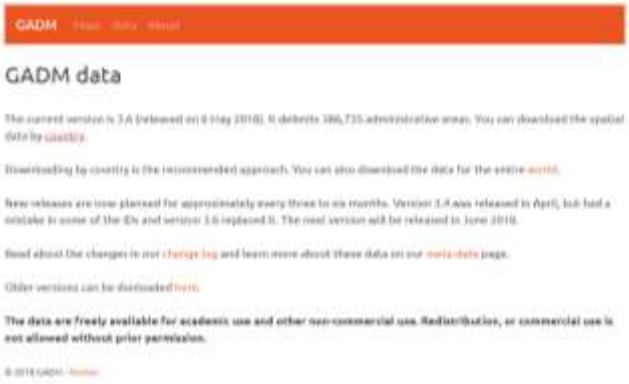
Exercise-8: Administrative Boundaries- GADM Portal

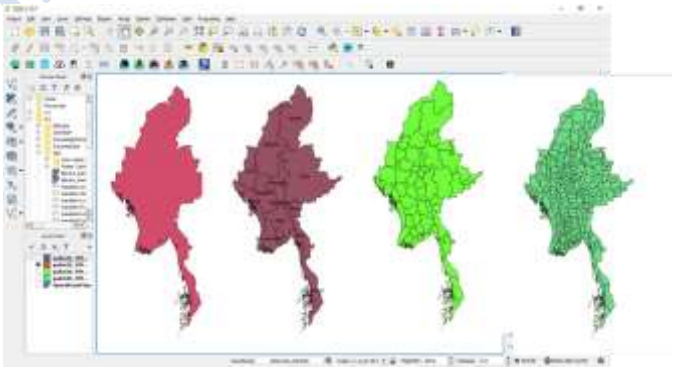
1. Click http://gadm.org

2. Click Data Tab on main page and then click on Country



3. Select Country-Myanmar

4. Click on Shapefile to download zip file
5. Go to downloads and unzip file gadm36_MMR_shp
6. Add layers to QGIS



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