Remote Sensing and GIS for Rural Development
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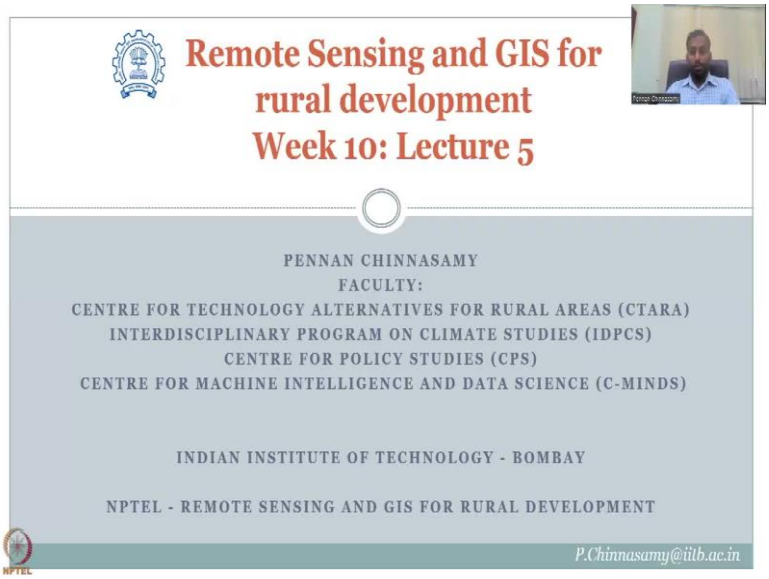
Centre for Technology Alternatives for Rural Areas (CTARA)
Indian Institute of Technology Bombay
Week 10
Lecture no. 05
NDVI data from Sentinel and NASA platforms

(Refer Slide Time: 0:17)



Hello everyone, welcome to the NPTEL course on remote sensing and GIS for rural development. This is week 10 lecture 5. In this week, we have been looking at different platforms, remote sensing platforms and remote sensing derived data for NDVI, NDVI has been a very strong indicator for assessing the vegetation health and crop acreage number of times the land has been cropped or net irrigated area and it is at a very high resolution compared to the observation data both spatially and temporally.

So, instead of getting data for once a year with a bit big lag time, here we are getting data within a month and at 15 days intervals. So, in the past, we have looked at Bhuvan's data sources, NASA's data sources, Google Earth engines database, and now we will look at one more aspect of NASA and then look into Sentinel hub.

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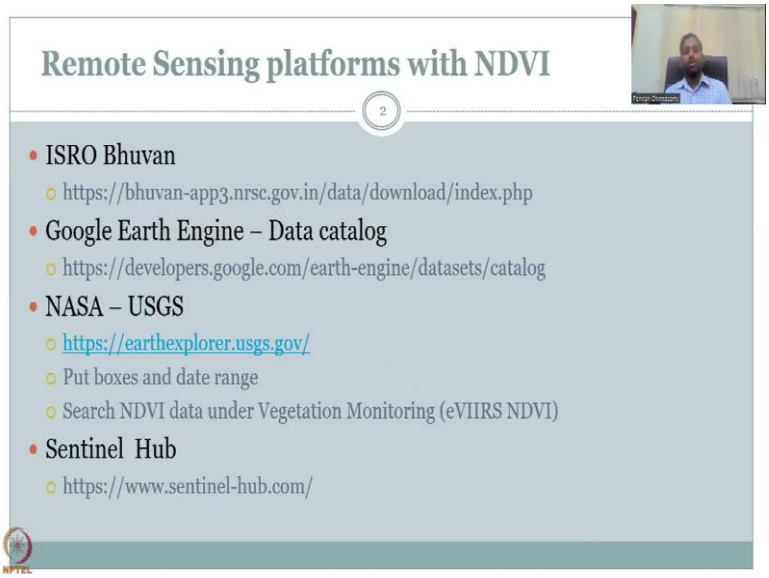

So, in the past, as I said, Bhuvan data is good for the Indian regions, it has some spatial and temporal issues in terms of resolution, it is limited to 2021, whereas we are in 2023, so approximately a year and a half lag time can be noted. Whereas Google Earth Engine catalogue gives you data for within a lag month, one month, which is you can get all the data from Jan, Feb, now we are in March, so March 2023, you can get it for Jan and Feb. And NASA's USGS focus mostly on the NASA data that is available and we also have the Sentinel, which is the European Space Agency ESA dataset, I will go through the other part of NASA's visualization and analysis tool, which is very important for understanding the groundwater and NDVI issues.

So without further ado, I will open the GS disk webpage. So we have completed the NASA Explorer, but while I was showing how to download data and access the data, I also wanted to show some parts of the integrated data that another portal can give, which is the Giovanni.

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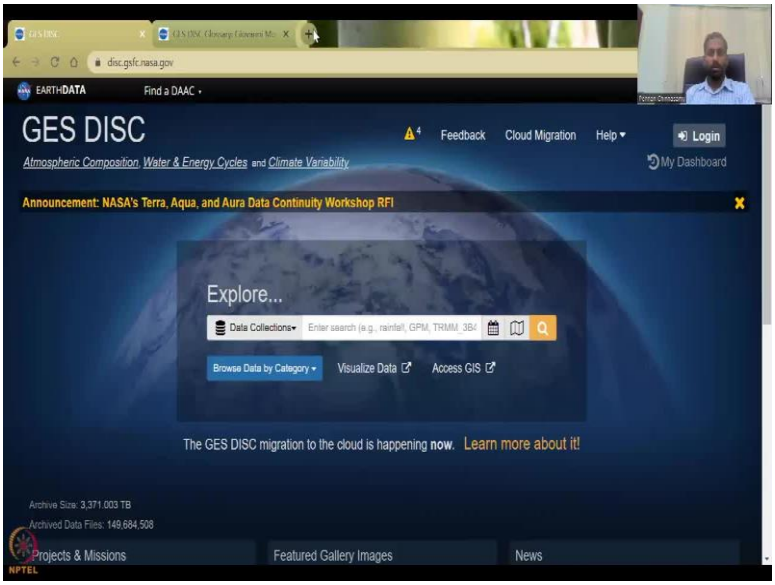

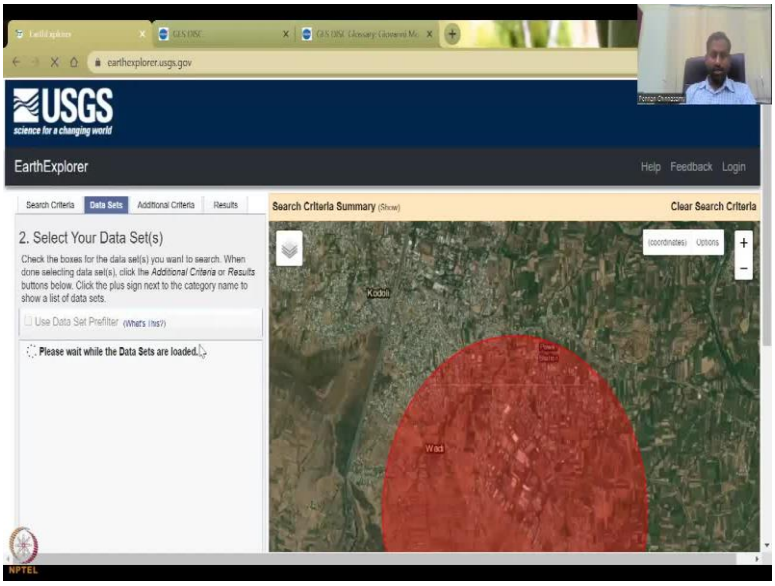

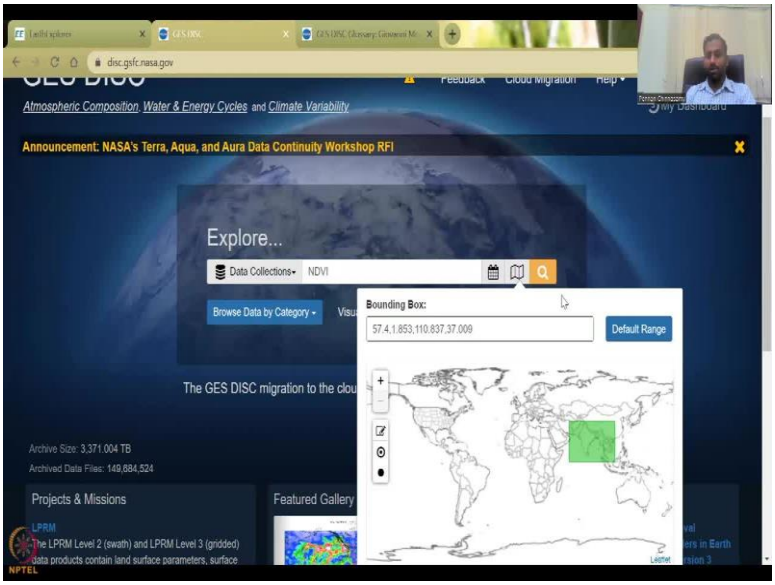

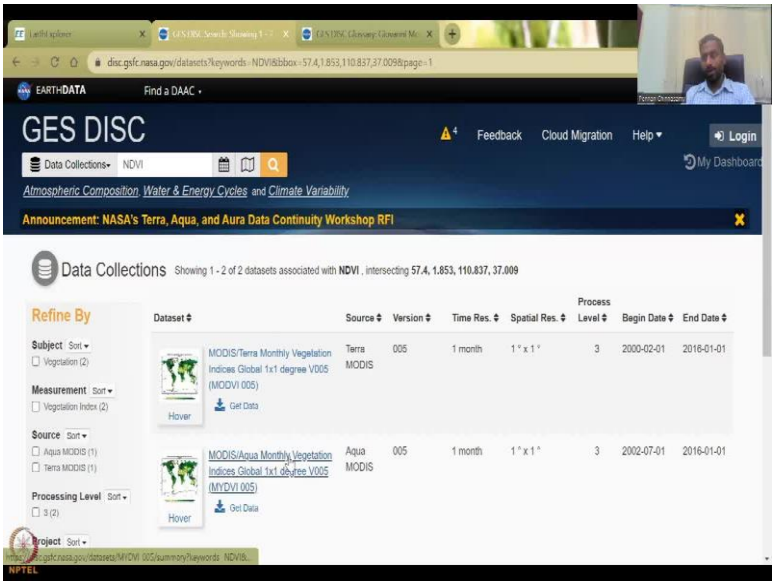
disc.gsfc.nasa.gov/datasets?keywords=NDVI&bbox=57.4,1.853,110.837,37.009&page=1
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Data Collections
NDVI
Atmospheric Composition, Water & Energy Cycles and Climate Variability
Announcement: NASA's Terra, Aqua, and Aura Data Continuity Workshop RFI
Data Collections Showing 1 - 2 of 2 datasets associated with NDVI, intersecting 57.4, 1.853, 110.837, 37.009
Refine By
Subject
Vegetation (2)
Measurement
Vegetation Index (2)
Source
Aqua MODIS (1)
Terra MODIS (1)
Processing Level
3 (2)
Project
Dataset
Source
Version
Time Res.
Spatial Res.
Process Level
Begin Date
End Date
MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI 005)
Terra MODIS
005
1 month
1 ° x 1 °
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2000-02-01
2016-01-01
Get Data
Hover
MODIS/Aqua Monthly Vegetation Indices Global 1x1 degree V005 (MYDVI 005)
Aqua MODIS
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2002-07-01
2016-01-01
Get Data
Hover
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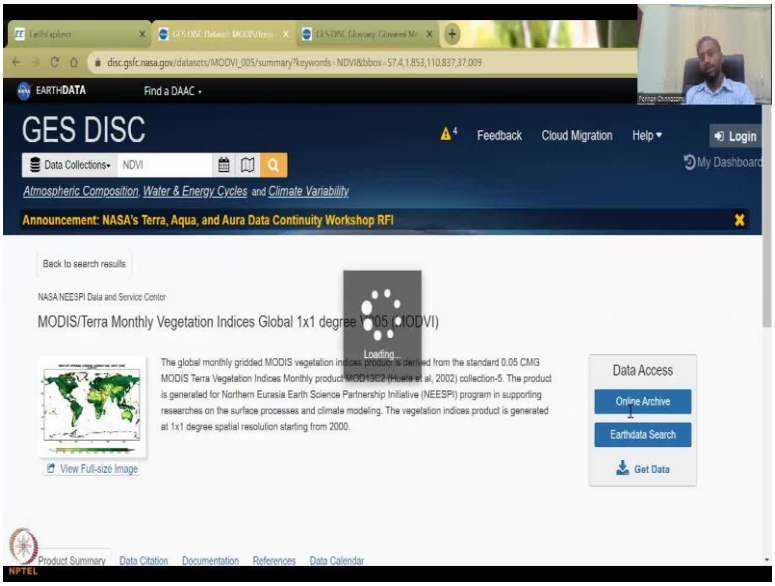
disc.gsfc.nasa.gov/datasets/MODVI_005/summary?keywords=NDVI&bbox=57.4,1.853,110.837,37.009
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MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI)
Loading...
The global monthly gridded MODIS vegetation indices product is derived from the standard 0.05 CMG MODIS Terra Vegetation Indices Monthly product MOD13C2 (Huete et al, 2002) collection-5. The product is generated for Northern Eurasia Earth Science Partnership Initiative (NEESPI) program in supporting researches on the surface processes and climate modeling. The vegetation indices product is generated at 1x1 degree spatial resolution starting from 2000.
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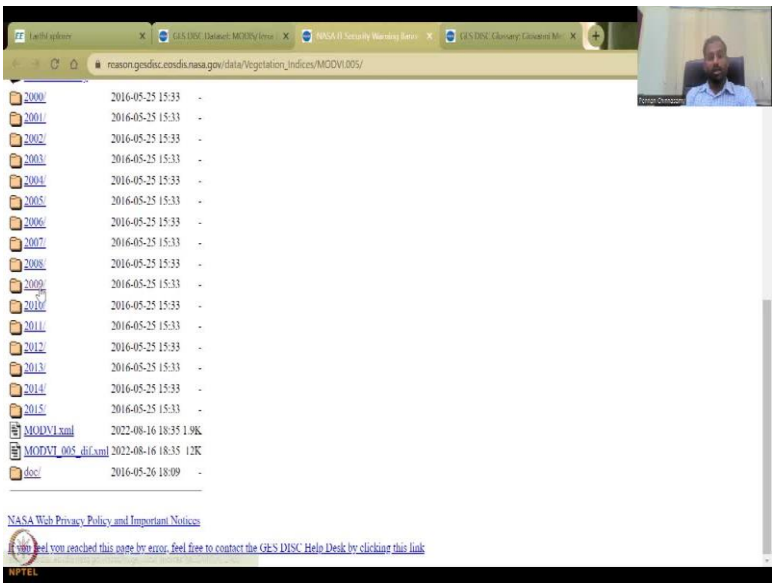
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MODVI.xml 2022-08-16 18:35 1.9K
MODVI_005_dif.xml 2022-08-16 18:35 12K
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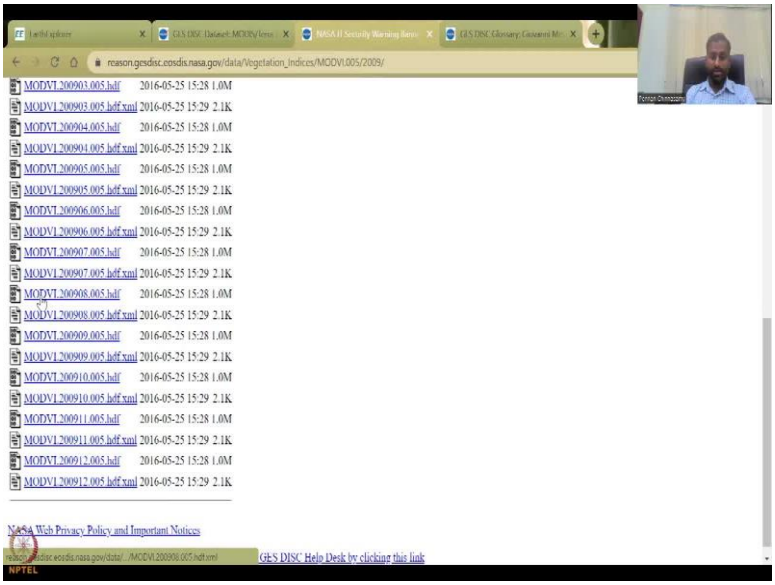
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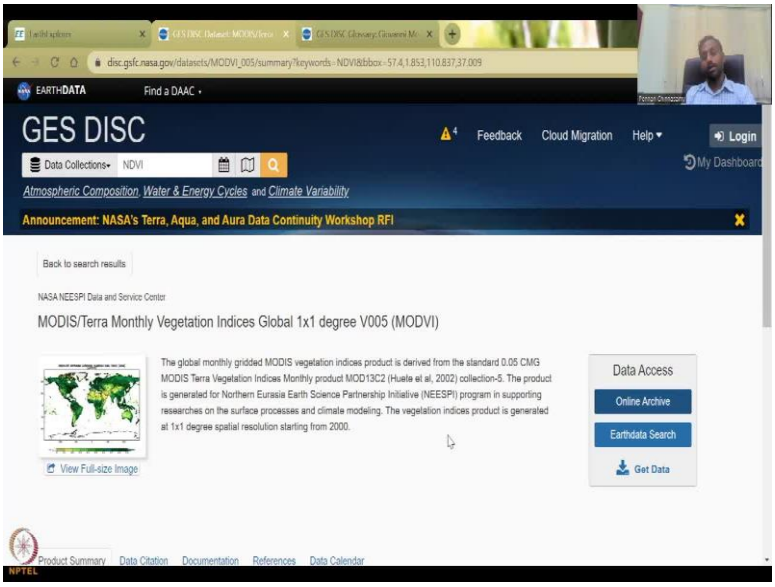
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MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI)
The global monthly gridded MODIS vegetation indices product is derived from the standard 0.05 CMG MODIS Terra Vegetation Indices Monthly product MOD13C2 (Huete et al, 2002) collection-5. The product is generated for Northern Eurasia Earth Science Partnership Initiative (NEESPI) program in supporting researches on the surface processes and climate modeling. The vegetation indices product is generated at 1x1 degree spatial resolution starting from 2000.
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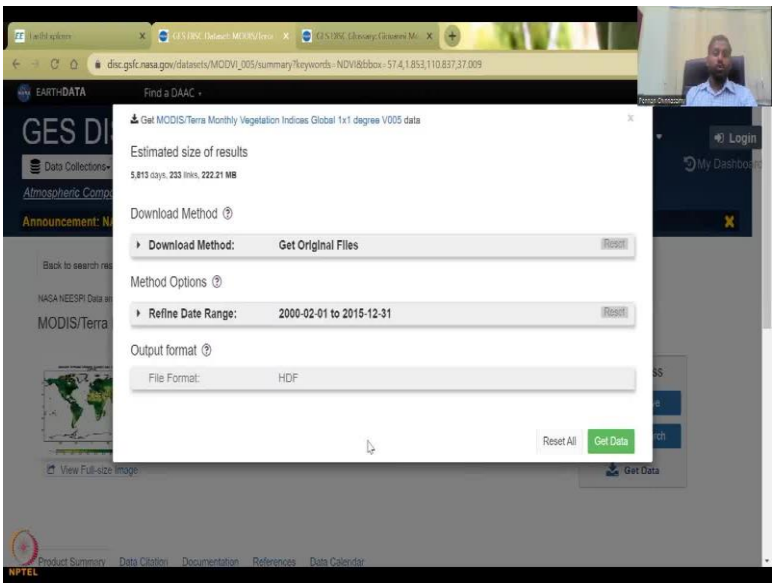
disc.gsfc.nasa.gov/datasets/MODVI_005/summary?keywords=NDVI&bbox=-57.4,1.853,110.837,37.009
Get MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 data
Estimated size of results
5,813 days, 233 links, 222.21 MB
Download Method
Download Method: Get Original Files
Method Options
Refine Date Range: 2000-02-01 to 2015-12-31
Output format
File Format: HDF
Reset All
Get Data
Product Summary
Data Citation
Documentation
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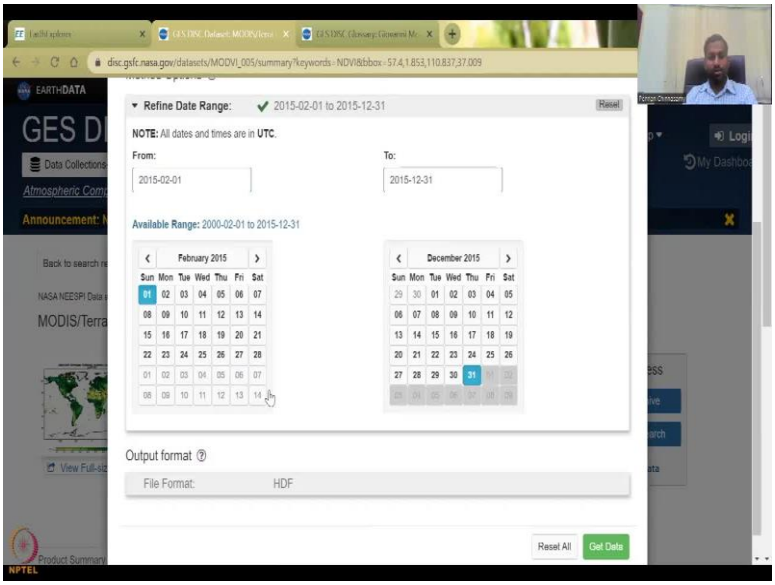
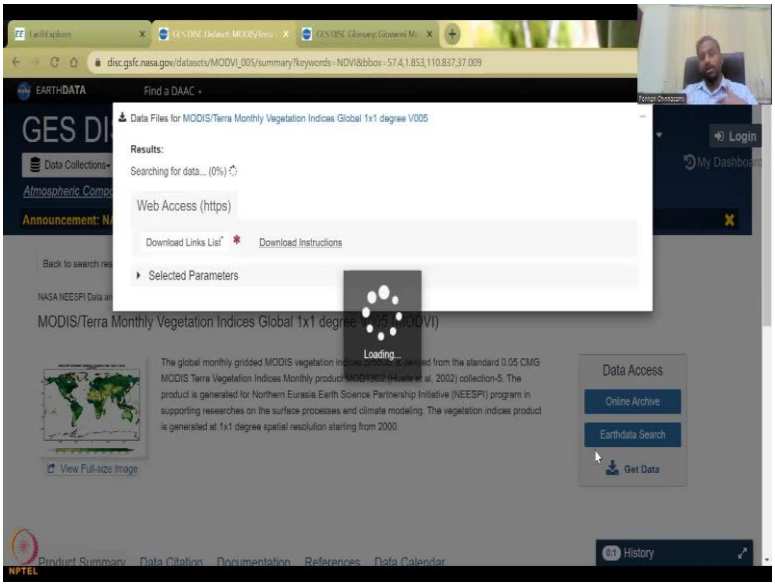

disc.gsfc.nasa.gov/datasets/MODVI_005/summary?keywords=NDVI&bbox=-57.4,1.853,110.837,37.009
EARTHDATA
Refine Date Range:
2015-02-01 to 2015-12-31
Reset
NOTE: All dates and times are in UTC.
From:
2015-02-01
To:
2015-12-31
Available Range: 2000-02-01 to 2015-12-31
February 2015
December 2015
Output format
File Format:
HDF
Reset All
Get Data
NPTEL


disc.gsfc.nasa.gov/datasets/MODVI_005/summary?keywords=NDVI&bbox=-57.4,1.853,110.837,37.009
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Results:
Searching for data... (0%)
Web Access (https)
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MODIS/Terra Monthly Vegetation Indices Global 1x1 degree
The global monthly gridded MODIS vegetation
MODIS Terra Vegetation Indices Monthly product
product is generated for Northern Eurasia Earth Science Partnership Initiative (NEESPI) program in
supporting researches on the surface processes and climate modeling. The vegetation indices product
is generated at 1x1 degree spatial resolution starting from 2000.
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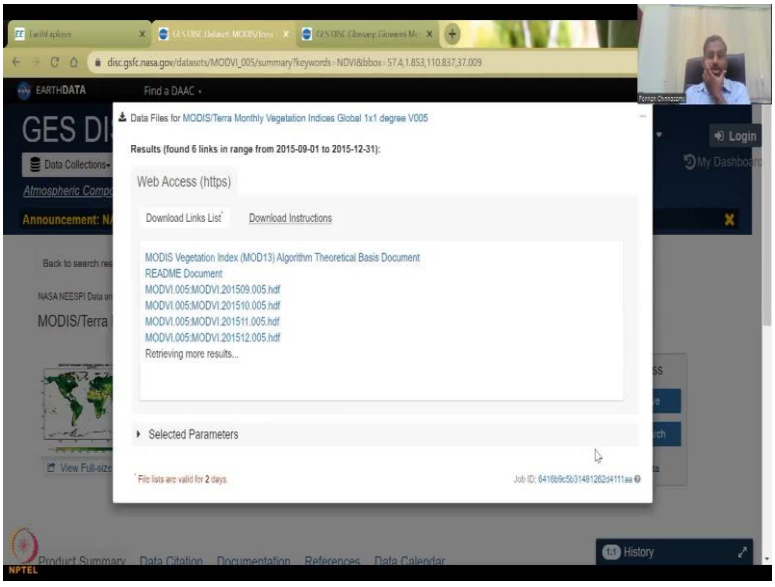
disc.gsfc.nasa.gov/datasets/MODVI_005/summary?keywords=NDVI&bbox=-57.4,1.853,110.837,37.009
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Results (found 6 links in range from 2015-09-01 to 2015-12-31):
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Download Instructions
MODIS Vegetation Index (MOD13) Algorithm Theoretical Basis Document
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MODVI.005/MODVI.201509.005.hdf
MODVI.005/MODVI.201510.005.hdf
MODVI.005/MODVI.201511.005.hdf
MODVI.005/MODVI.201512.005.hdf
Retrieving more results...
Selected Parameters
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Product Summary
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So I will continue again with the earth explorers, I am going to click this and open the Earth Explorer page. So in the Earth Explorer, we said that we have all these datasets that are available for NDVI and then we can download it as marking and done. But in the GIS this database, what we noticed is if we do NDVI, and then put our bounding box on India, the default date can be given. So you do not have to put a date, you can just click and then these 2 data sets come up.

In these 2 data sets, we clicked on the first data set and went into online archive. So the online archive, as we said, we looked at the different folders and within the folder, there is multiple data sets, you wanted to know how to download it, you can also click these links. Then you can also get data, it will ask you what type of data you want and then refine the data range, etc. So it says download method is get original files, and then you can define the range.

So let us just do a quick 2015 is the max they have for this type of data set. You can see that there is these are blacked out there is no data. So Jan 2016, you can have 30 December you can have 31 December, that is fine. So we have the whole of 2015 data, just for the sake of this exercise, we will do it and the file format is only HDF. So, this is the get data button. You do not have to go through the download HTML and stuff. So, if you say get data, what it does is it runs and talks to the database in the US and brings all the data to this page and you can see that the monthly data has been there. Instead of going to each folder and then clicking, you can also do this as one.

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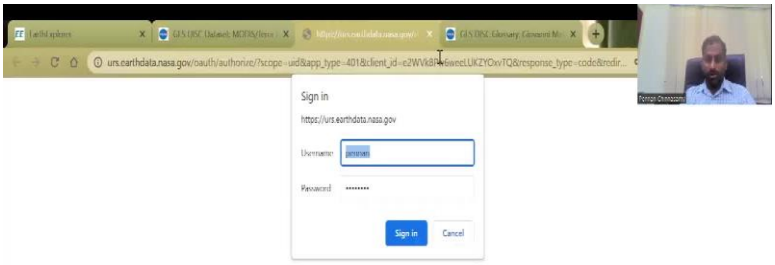

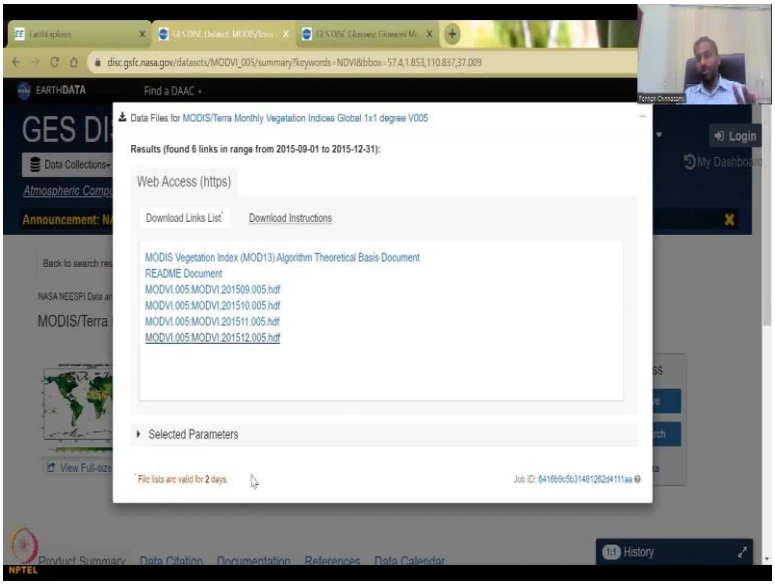
disc.gsfc.nasa.gov/datasets/MODVI_005/summary?keywords=NDVI&bbox=-57.4,1.853,110.837,37.009
EARTHDATA
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Results (found 6 links in range from 2015-09-01 to 2015-12-31):
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MODVI.005:MODVI.201512.005.hdf
Selected Parameters
File lists are valid for 2 days.
Job ID: 6416b9c5b31481262d4111aa
Product Summary
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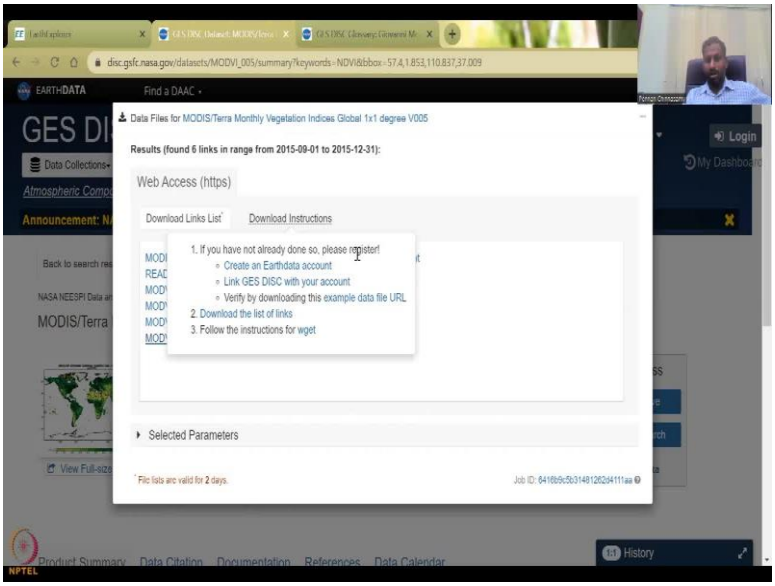
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Results (found 6 links in range from 2015-09-01 to 2015-12-31):
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Download Links List
Download Instructions
1. If you have not already done so, please register!
Create an Earthdata account
Link GES DISC with your account
Verify by downloading this example data file URL
2. Download the list of links
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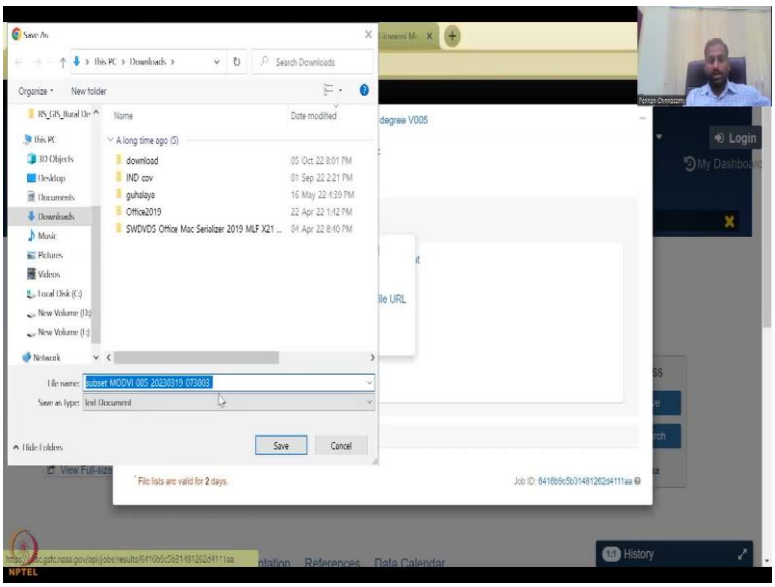
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Name
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File name: subset MODVI 005 20230319 073003
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Hide Folders
Save
Cancel
File lists are valid for 2 days.
Job ID: 6416b9c5b31481262d4111aa
History
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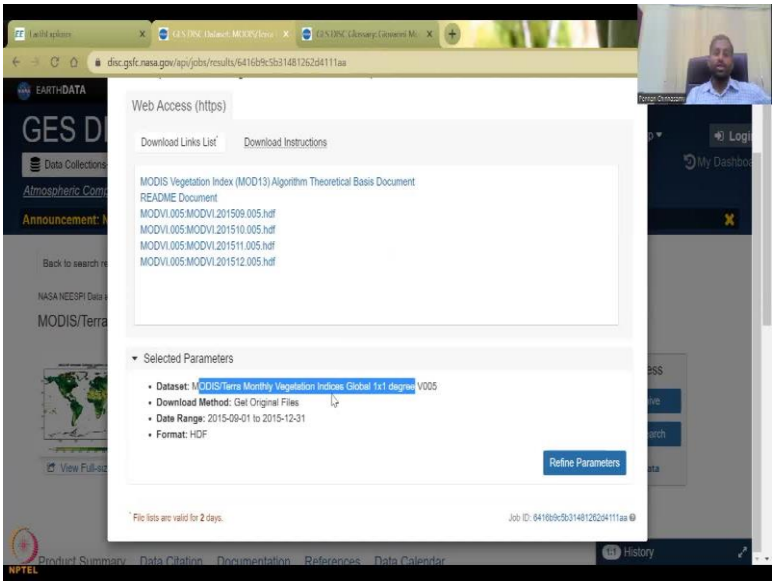

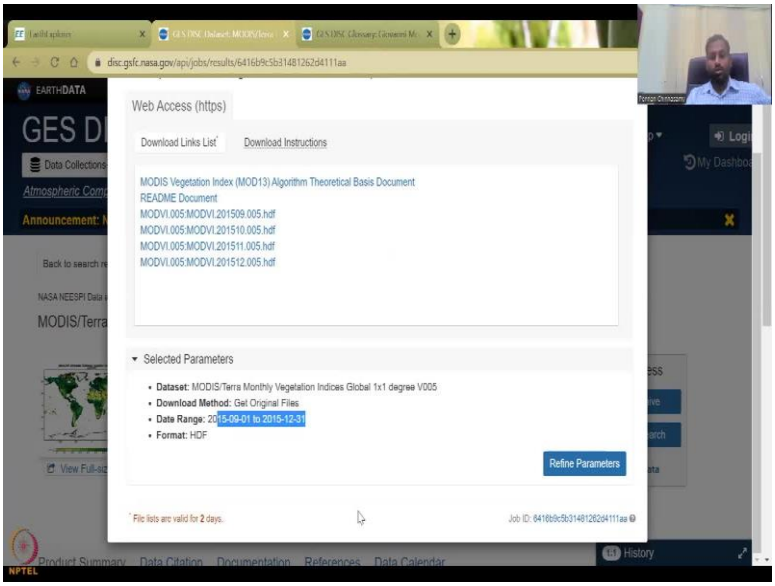

So if you just click it, it will ask you to log in and then get the data. The login is to just show how much people use the data etc. The file lists are valid for 2 days. Suppose you have slow internet and bandwidth, you can still have this page in your login, you can go to the login and download datasets, and then this will be there. So the link has been created automatically for you. It says, if you have already account, create an account, link this GES DISC to your account and then download, download list of links or how to get wget, wget is again, an automated process for getting the data, it is kind of advanced, let us not go into that, but download the list links.

So this is the list links that you can download and then it is a text document, it will give you the link for downloading the data with your login, that is a download instructions and download list is there. So these are the list links and stuff and what are the parameters you

wanted to select, you wanted the MODIS vegetation indices, so the both the indices are there, the vegetation fraction, NDVI is there, and then the date range you have given as 2015-09 to 2015 12 that is what it gives. So, we can refine and re-download it and then get the data.

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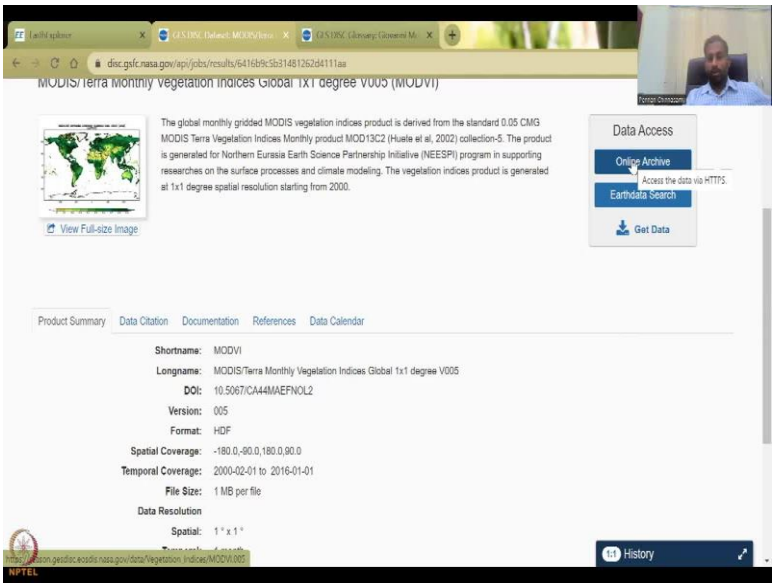

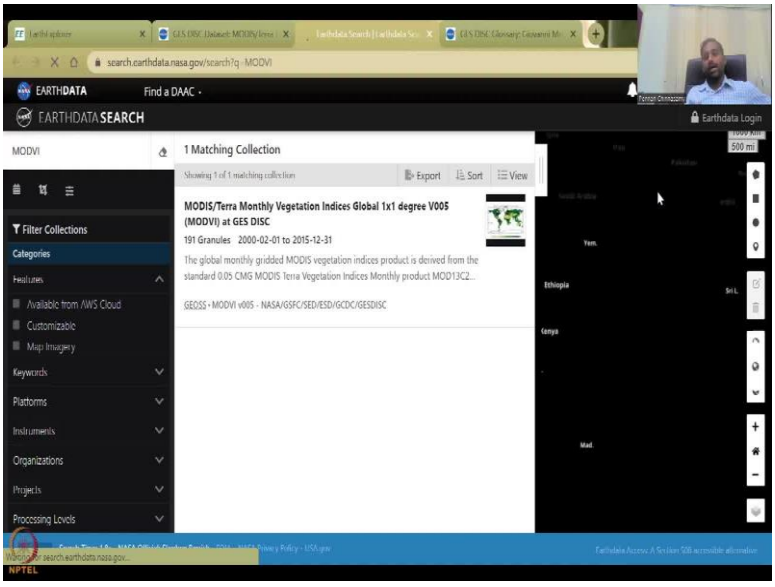

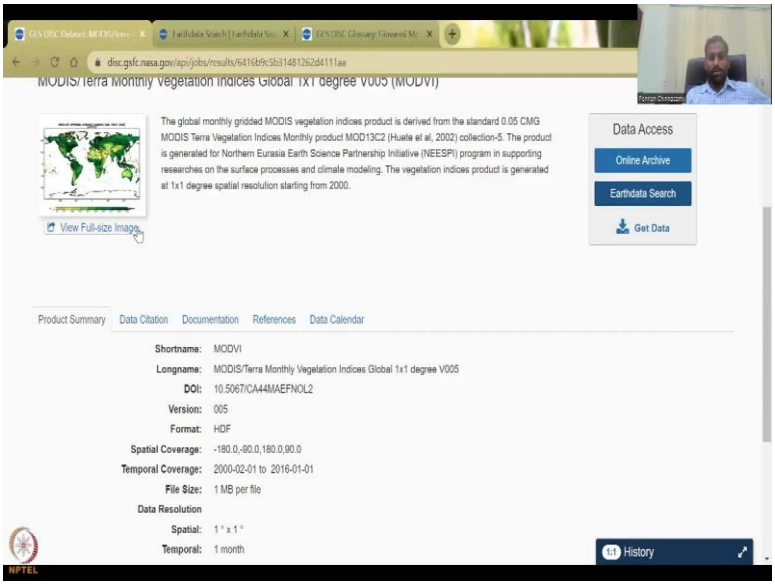
MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI)
The global monthly gridded MODIS vegetation indices product is derived from the standard 0.05 CMG MODIS Terra Vegetation Indices Monthly product MOD13C2 (Huete et al, 2002) collection-5. The product is generated for Northern Eurasia Earth Science Partnership Initiative (NEESPI) program in supporting researches on the surface processes and climate modeling. The vegetation indices product is generated at 1x1 degree spatial resolution starting from 2000.
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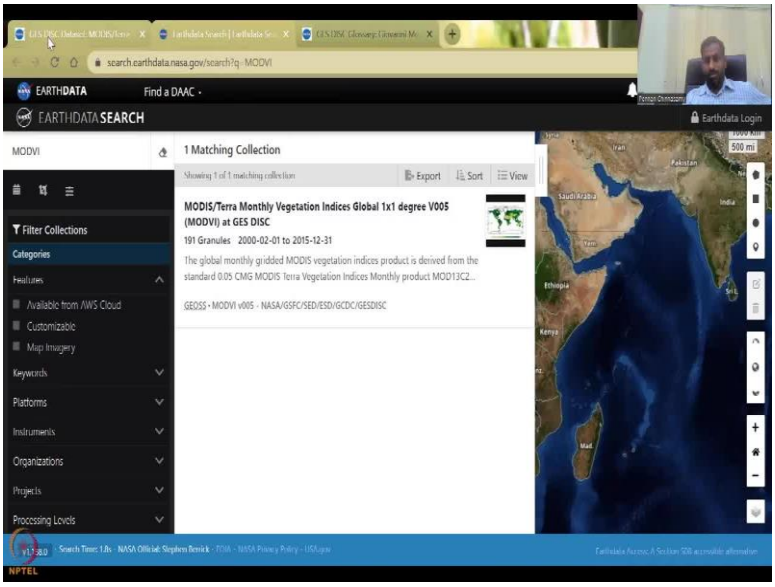
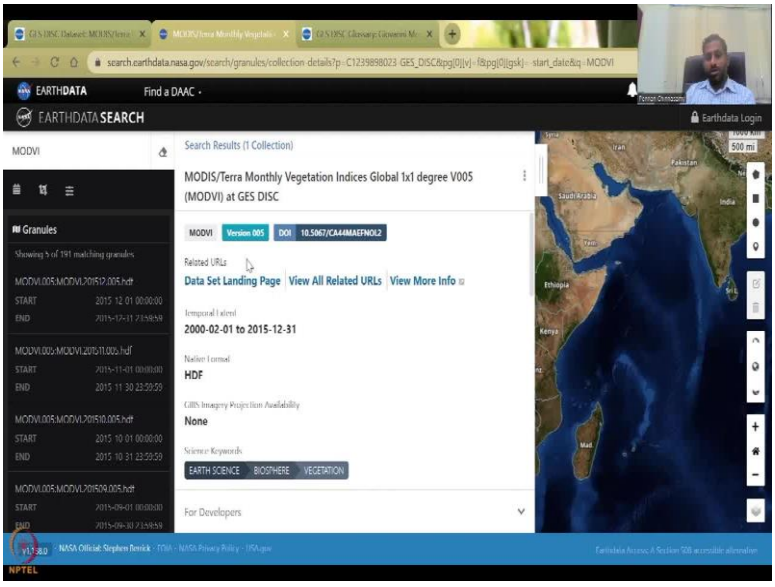
Shortname: MODVI
Longname: MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005
DOI: 10.5067/CA44MAEFNOL2
Version: 005
Format: HDF
Spatial Coverage: -180.0,-90.0,180.0,90.0
Temporal Coverage: 2000-02-01 to 2016-01-01
File Size: 1 MB per file
Data Resolution
Spatial: 1 ° x 1 °
Temporal: 1 month
History


EARTHDATA
Find a DAAC
EARTHDATA SEARCH
Earthdata Login
MODVI
1 Matching Collection
Export
Sort
View
MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI) at GES DISC
191 Granules 2000-02-01 to 2015-12-31
The global monthly gridded MODIS vegetation indices product is derived from the standard 0.05 CMG MODIS Terra Vegetation Indices Monthly product MOD13C2...
GEOSS · MODVI v005 · NASA/GSFC/SED/ESD/GCDC/GESDISC
Filter Collections
Categories
Features
Available from AWS Cloud
Customizable
Map Imagery
Keywords
Platforms
Instruments
Organizations
Projects
Processing Levels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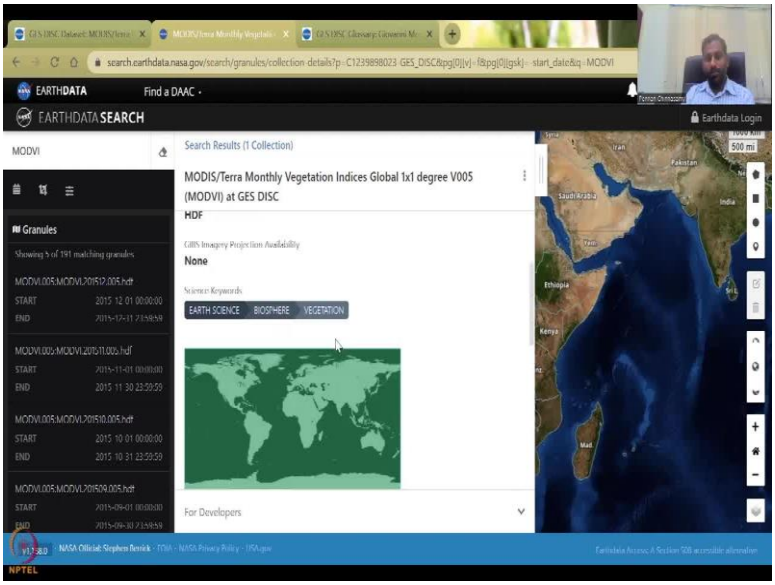
Find a DAAC
EARTHDATA SEARCH
Earthdata Login
MODVI
Search Results (1 Collection)
MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI) at GES DISC
MODVI
Version 005
DOI 10.5067/CA44MAEFNOL2
Related URLs
Data Set Landing Page
View All Related URLs
View More Info
Temporal Extent
2000-02-01 to 2015-12-31
Native Format
HDF
GIBS Imagery Projection Availability
None
Science Keywords
EARTH SCIENCE
BIOSPHERE
VEGETATION
For Developers
Granules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EARTHDATA SEARCH
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MODVI
Search Results (1 Collection)
MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI) at GES DISC
HDF
None
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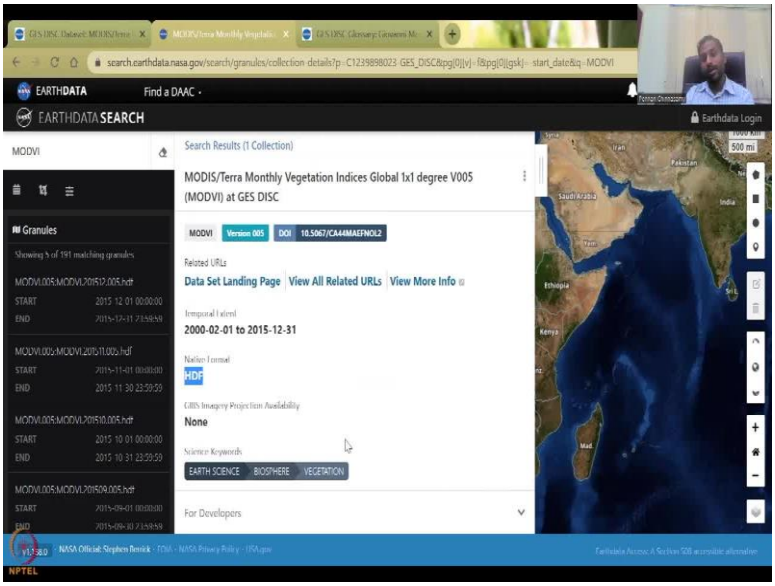
VEGETATION
Granules
For Developers


EARTHDATA
Find a DAAC
EARTHDATA SEARCH
Earthdata Login
MODVI
Search Results (1 Collection)
MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI) at GES DISC
MODVI
Version 005
DOI
Data Set Landing Page
View All Related URLs
View More Info
2000-02-01 to 2015-12-31
HDF
None
EARTH SCIENCE
BIOSPHERE
VEGETATION
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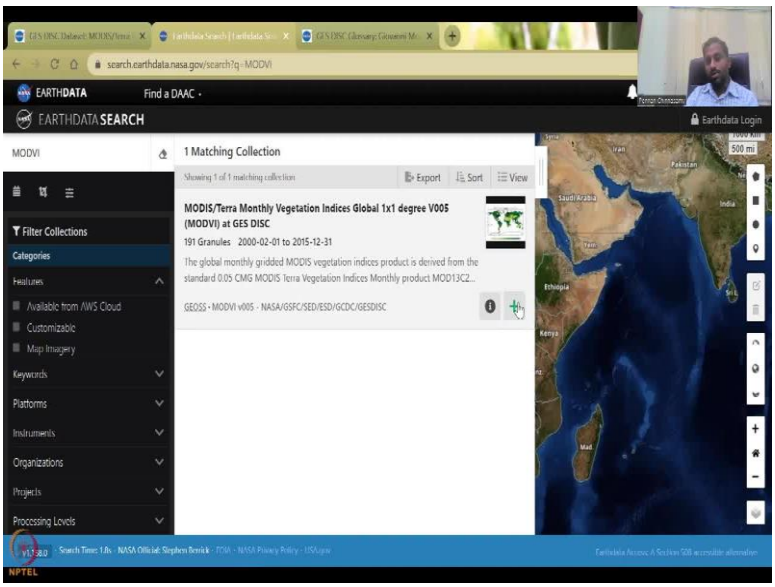
For Developers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Earthdata Login
MODVI
1 Matching Collection
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MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI) at GES DISC
191 Granules 2000-02-01 to 2015-12-31
Filter Collections
Categories
Features
Available from AWS Cloud
Customizable
Map Imagery
Keywords
Platforms
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Organizations
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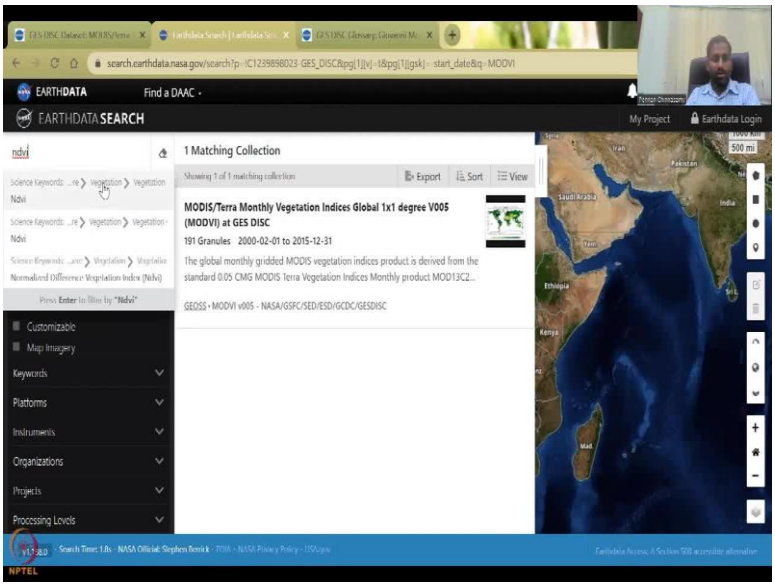
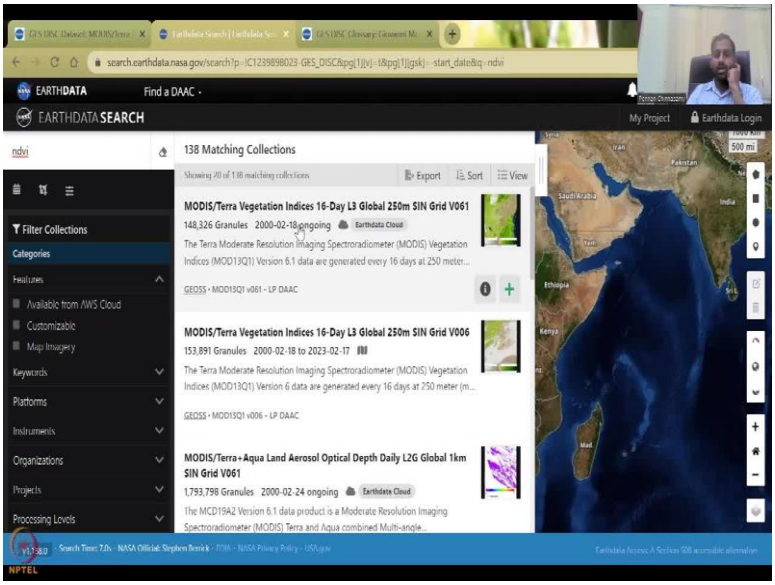
Processing Levels

So this is the one way of getting it. So 3 options are given online archive where you go to the folder you downloaded, get data is also there. The Earth data search is also good. The Earth data search opens the dashboard at once and in the dashboard, it has already searched for you because it is linking to the GES DISC database. So what happens is? From here, it has linked the data to the Earth data search box and that particular refinement is not there, but you can still get it. So this is the data set and so there is one match for your data set which is NDVI and for your particular link.

However, you could see that the date is still at 2000 to 2015. So you will need to refine it. You can click on the metadata to see what the data is about. So this is the version 5 and then the data is given for the whole globe and then some other keywords what is the format HDF format, etc. So you can go back to your search, and then say I want to download so this is to add collection to the current project, you can add the collection and then it will be there in your account for download, my project, my download.

(Refer Slide Time: 07:47)




EARTHDATA
Find a DAAC
EARTHDATA SEARCH
My Project
Earthdata Login
ndvi
138 Matching Collections
Filter Collections
Categories
Features
Available from AWS Cloud
Customizable
Map Imagery
Keywords
Platforms
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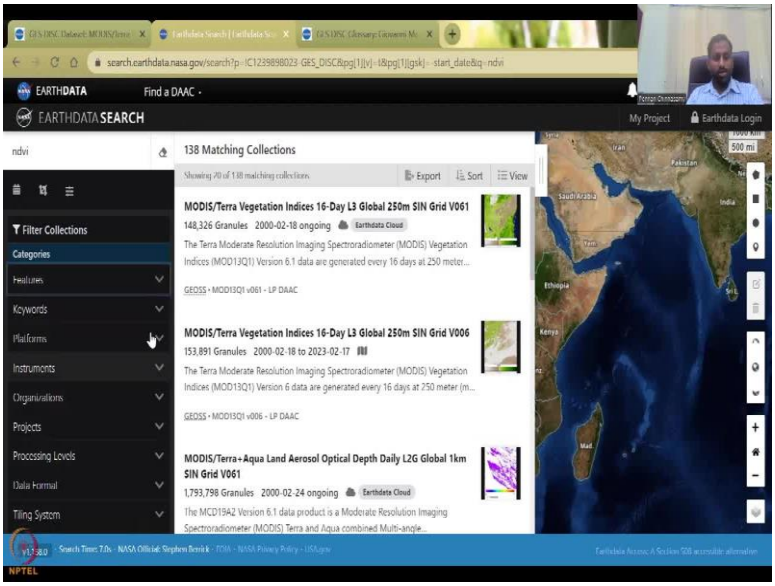
Projects
Processing Levels
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
148,326 Granules 2000-02-18 ongoing
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006
153,891 Granules 2000-02-18 to 2023-02-17
MODIS/Terra+Aqua Land Aerosol Optical Depth Daily L2G Global 1km SIN Grid V061
1,793,798 Granules 2000-02-24 ongoing
NPTEL


EARTHDATA
Find a DAAC
EARTHDATA SEARCH
My Project
Earthdata Login
ndvi
138 Matching Collections
Filter Collections
Categories
Features
Keywords
Platforms
Instruments
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Data Format
Tiling System
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
148,326 Granules 2000-02-18 ongoing
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006
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MODIS/Terra+Aqua Land Aerosol Optical Depth Daily L2G Global 1km SIN Grid V061
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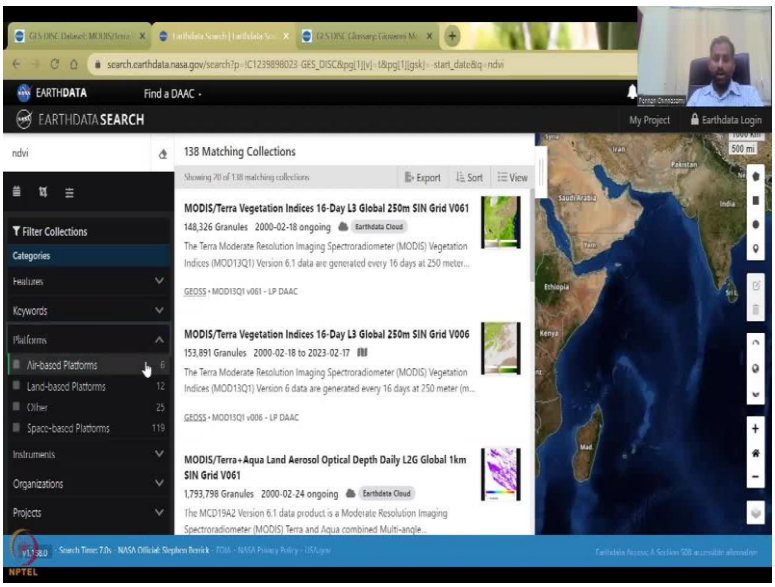
NPTEL


EARTHDATA
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Earthdata Login
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138 Matching Collections
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Categories
Features
Keywords
Platforms
Air-based Platforms 6
Land-based Platforms 12
Other 25
Space-based Platforms 119
Instruments
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MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
148,326 Granules 2000-02-18 ongoing
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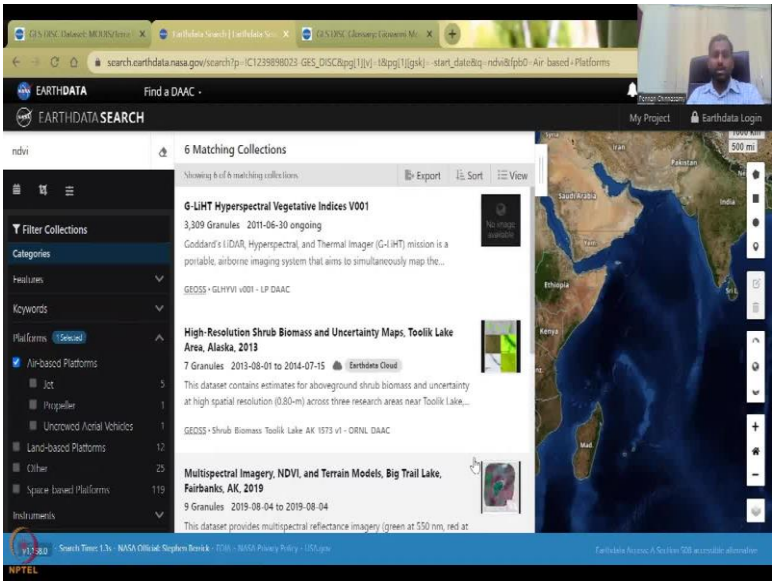
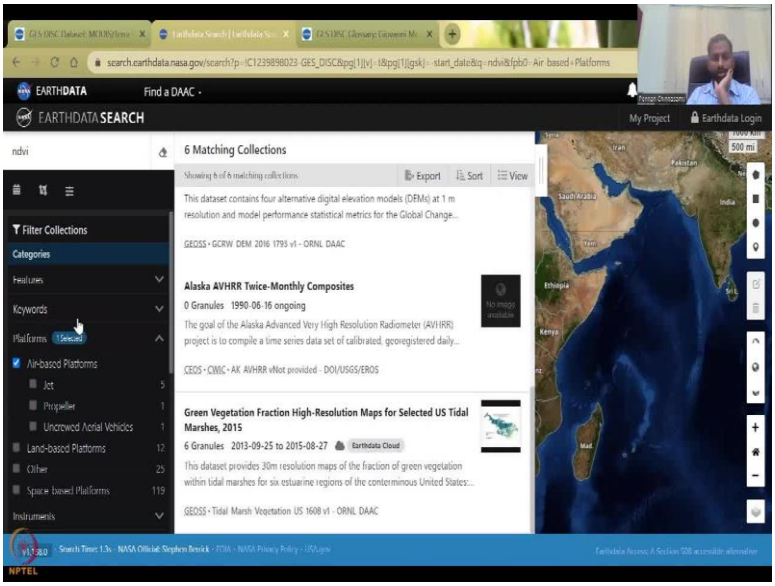
MODIS/Terra+Aqua Land Aerosol Optical Depth Daily L2G Global 1km SIN Grid V061
1,793,798 Granules 2000-02-24 ongoing
NPTEL

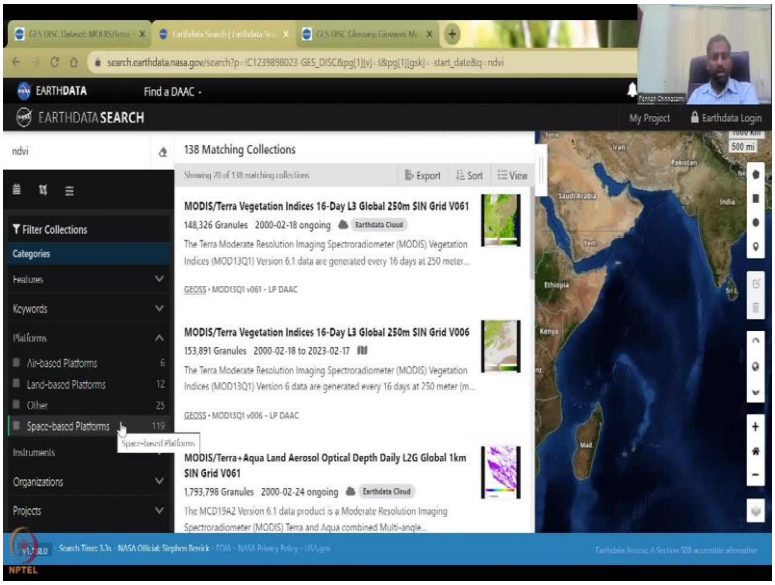


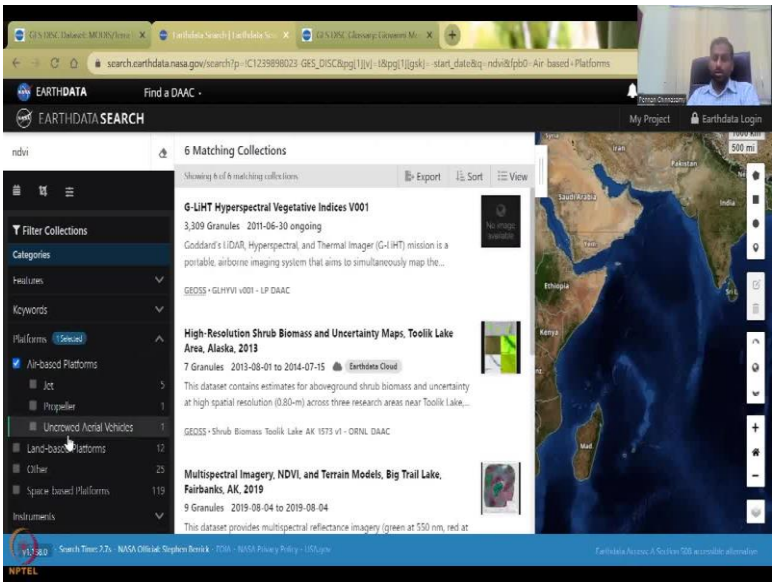


So but before that, let us also show how this can be used, I am going to say I just want NDVI and then a lot of NDVI is coming. And then let us say I am going to press enter it will show you what are the data search database tags with NDVI. So, one thing which is clear is coming out is that there are multiple databases same the same data or process data in online version, the all of these are open source, all you have to do is just click on a particular link and get the data if you have the login credentials.

So here what we are seeing is there are features available from the cloud, customer those are map imagery, instrumentations platforms, if you want airborne platforms or land based platforms, space platforms, let us say airborne and air base is mostly the hyper spectral from drone and other imagery. And then very-very small lakes for example Big Trail Lake is done using the drones and very-very small area coverage is there.

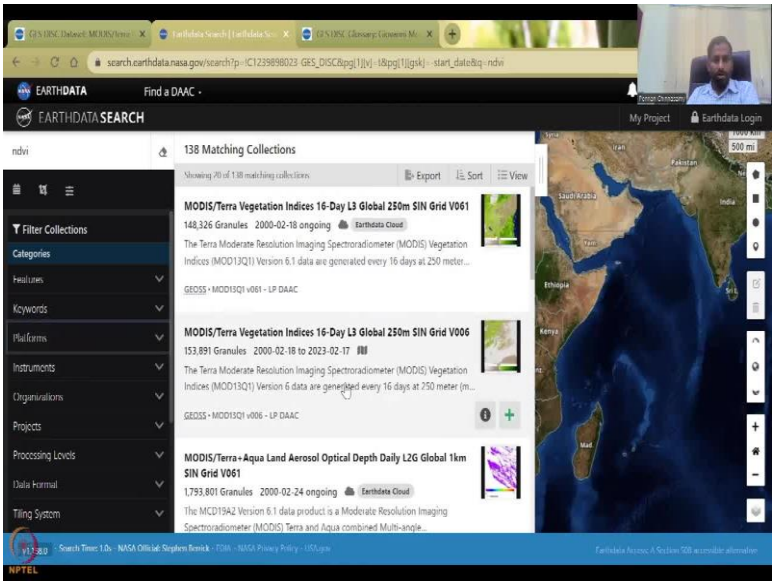
(Refer Slide Time: 09:00)

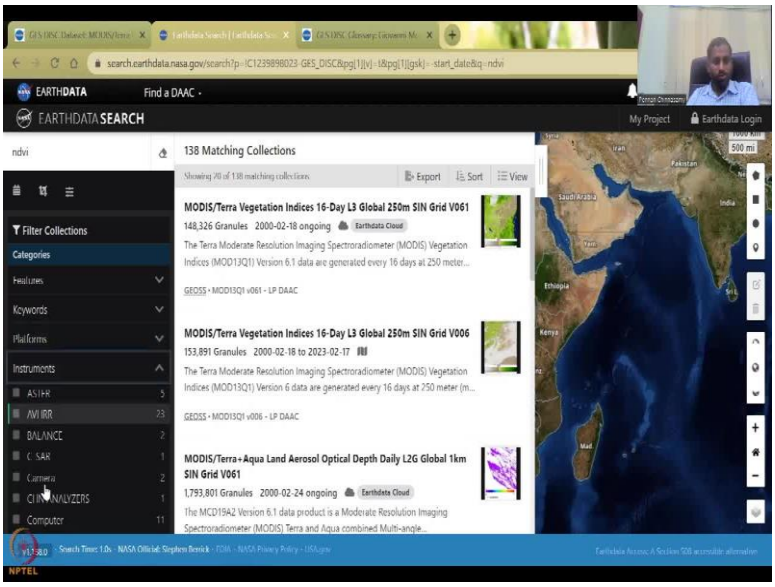


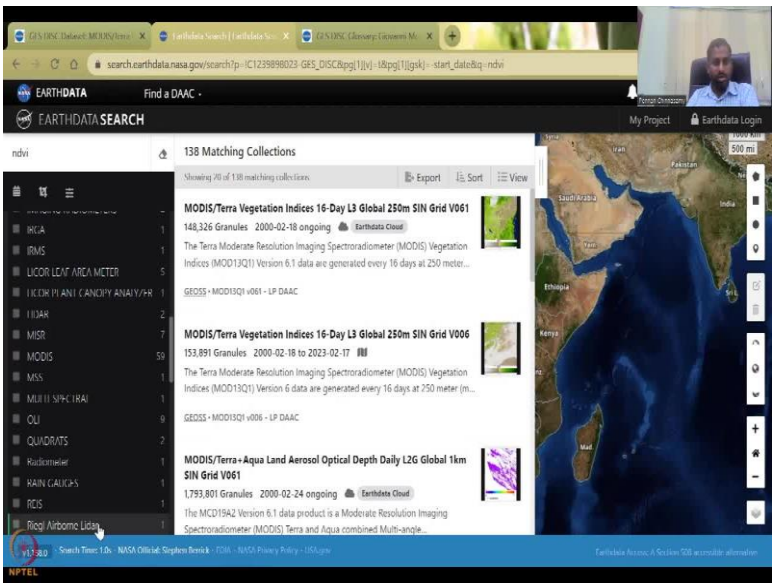


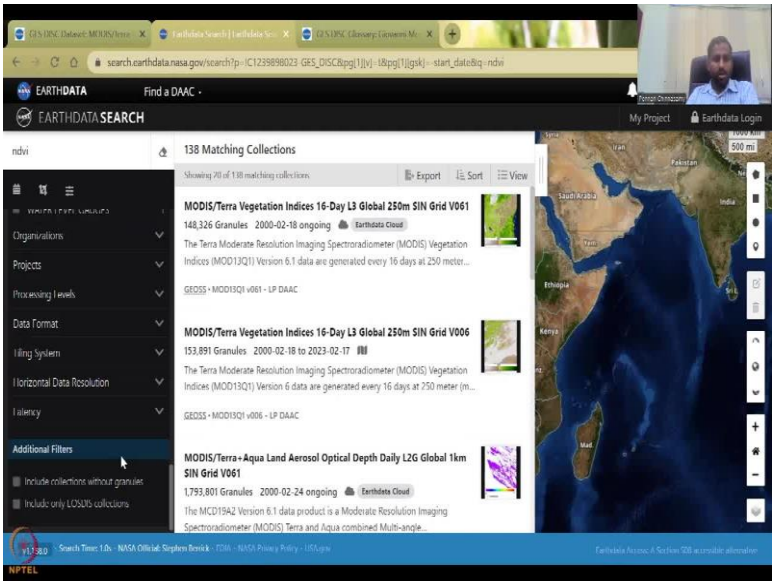
So if I just take it all so here you can see jet propeller unmanned vehicles is also there, see here. Click it then click it you can see jet, propeller, unproved aerial vehicles or unmanned resources, so UA however they want they can use it. Unmanned aircraft vehicles or unmanned aerial vehicles and here they say another term which is new also for me, which is the un… let me see if we can read it. It is not coming up that it come up a bit. Yes, so it says unscrewed, so unmanned and unscrewed, people not there, that is all it says.

(Refer Slide Time: 09:46)








EARTHDATA
Find a DAAC
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My Project
Earthdata Login
ndvi
138 Matching Collections
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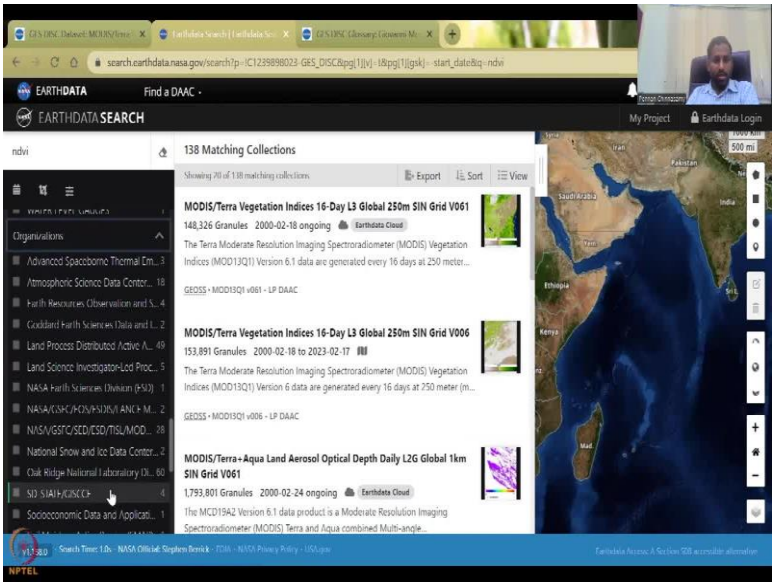
Processing Levels
Data Format
Tiling System
Horizontal Data Resolution
Latency
Additional Filters
Include collections without granules
Include only LOSDIS collections
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
148,326 Granules 2000-02-18 ongoing
Earthdata Cloud
The Terra Moderate Resolution Imaging Spectroradiometer (MODIS) Vegetation Indices (MOD13Q1) Version 6.1 data are generated every 16 days at 250 meter...
GEOSS · MOD13Q1 v061 - LP DAAC
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006
153,891 Granules 2000-02-18 to 2023-02-17
The Terra Moderate Resolution Imaging Spectroradiometer (MODIS) Vegetation Indices (MOD13Q1) Version 6 data are generated every 16 days at 250 meter (m...
GEOSS · MOD13Q1 v006 - LP DAAC
MODIS/Terra+Aqua Land Aerosol Optical Depth Daily L2G Global 1km SIN Grid V061
1,793,801 Granules 2000-02-24 ongoing
Earthdata Cloud
The MCD19A2 Version 6.1 data product is a Moderate Resolution Imaging Spectroradiometer (MODIS) Terra and Aqua combined Multi-angle...
Search Time: 1.0s · NASA Official: Stephen Berrick · FOIA · NASA Privacy Policy · USA.gov
Earthdata Access: A Section 508 accessible alternative
NPTEL


EARTHDATA
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EARTHDATA SEARCH
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138 Matching Collections
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Advanced Spaceborne Thermal Em... 3
Atmospheric Science Data Center... 18
Earth Resources Observation and S... 4
Goddard Earth Sciences Data and I... 2
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Land Science Investigator-Led Proc... 5
NASA Earth Sciences Division (ESD) 1
NASA/GSFC/ESD/ESD/TISL/MOD... 28
National Snow and Ice Data Center... 2
Oak Ridge National Laboratory DI... 60
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Socioeconomic Data and Applicati... 1
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
148,326 Granules 2000-02-18 ongoing
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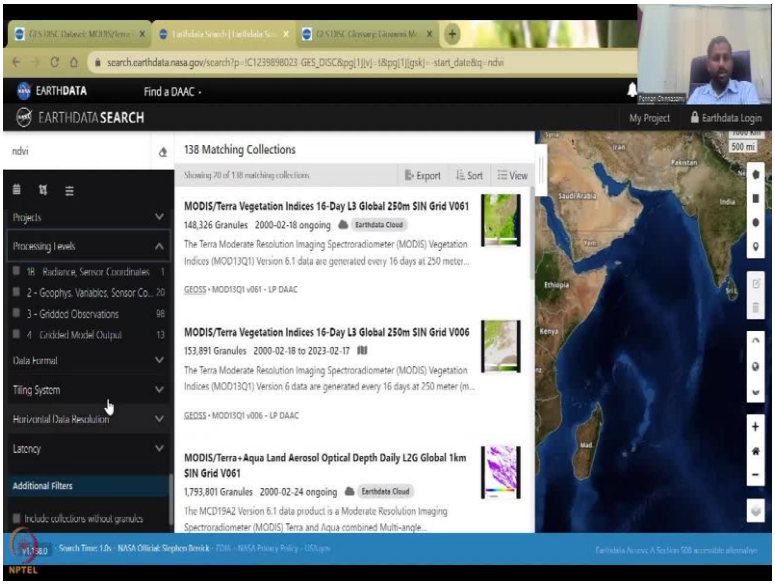
EARTHDATA
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138 Matching Collections
Export
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Projects
Processing Levels
1R - Radiance, Sensor Coordinates 1
2 - Geophys. Variables, Sensor Co... 20
3 - Gridded Observations 98
4 - Gridded Model Output 13
Data Format
Tiling System
Horizontal Data Resolution
Latency
Additional Filters
Include collections without granules
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
148,326 Granules 2000-02-18 ongoing
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GEOSS · MOD13Q1 v061 - LP DAAC
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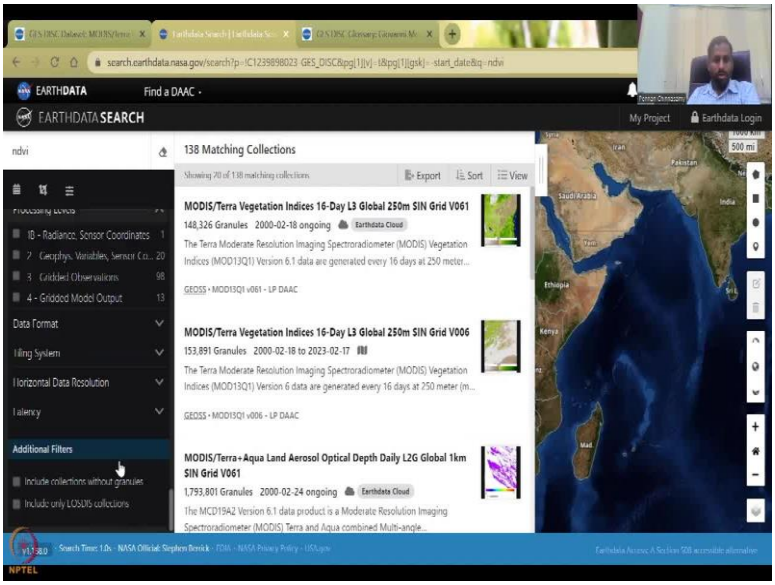
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GEOSS • MOD13Q1 v006 - LP DAAC
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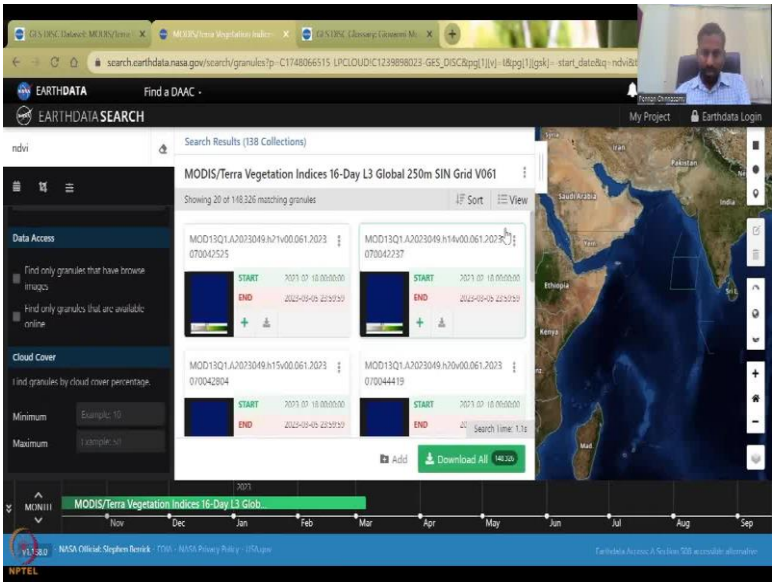
Data Format
Filing System
Horizontal Data Resolution
Latency
Additional Filters
Include collections without granules
Include only LOSDIS collections
NPTEL


EARTHDATA
Find a DAAC
EARTHDATA SEARCH
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Earthdata Login
ndvi
Search Results (138 Collections)
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
Showing 20 of 148,326 matching granules
Sort
View
Data Access
Find only granules that have browse images
Find only granules that are available online
Cloud Cover
Find granules by cloud cover percentage.
Minimum
Maximum
START
END
Add
Download All
MODIS/Terra Vegetation Indices 16-Day L3 Glob...
Nov
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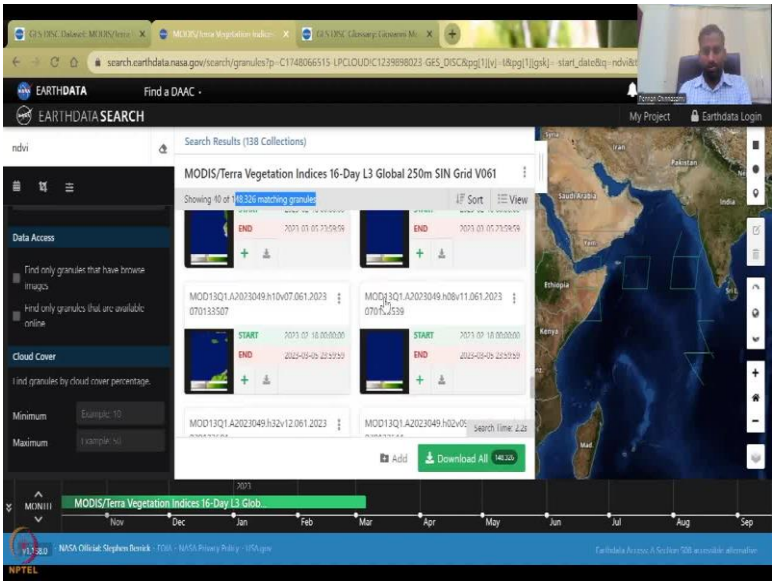
NPTEL


EARTHDATA
Find a DAAC
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My Project
Earthdata Login
ndvi
Search Results (138 Collections)
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
Showing 40 of 148,326 matching granules
Sort
View
Data Access
Find only granules that have browse images
Find only granules that are available online
Cloud Cover
Find granules by cloud cover percentage.
Minimum
Maximum
START
END
Add
Download All
MODIS/Terra Vegetation Indices 16-Day L3 Glob...
Nov
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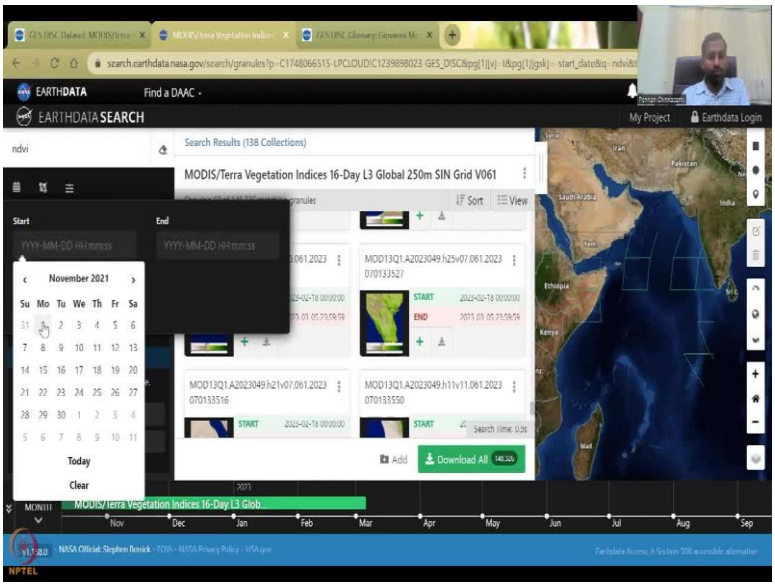
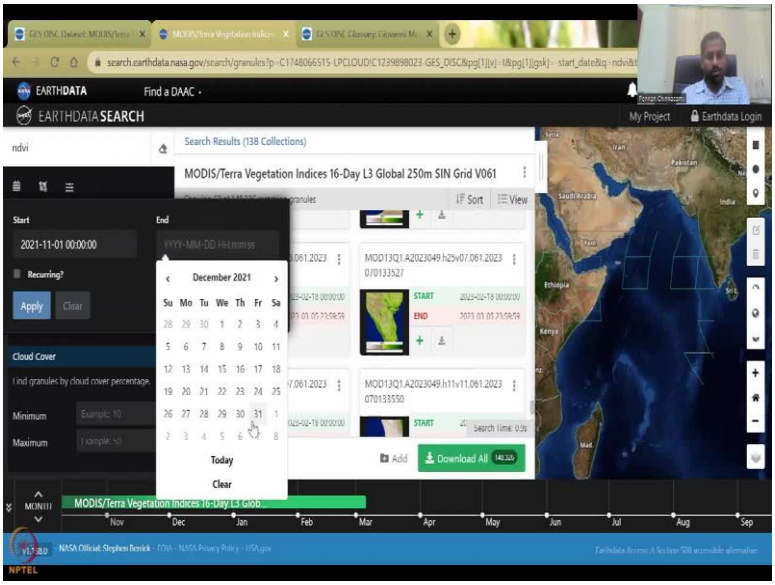
NPTEL

So these are different platforms. I am going to click all so all the platforms can come up. So you see all platforms are there instrumentations, which sensor, which satellite sensor you need, camera centre, multispectral hyper-spectral and all the systems. And then organization is at NASA, NASA is the Oak Ridge National Laboratory crossing levels. And then projects it was particular projects NASA's project, data format, HDF, all the formats are open able in QGIS. So that is the beauty of using the open source system QGIS all formats can be opened or converted. So you can readily convert these formats in QGIS, I have not seen that spent in proprietary software's yet. Later see is how delay you want the data, one to 3 hours is there, and then you can use it.

So for example, you can click the 16 day graded data, just click on it, it will show you how many grids are there for every 16 days. And then you can download every data set that you want, you do not have to download all the 1400 datasets, because this is 15 days and then sometimes it double duplicate data. So this from 2023, to forever. So 2013, it is still going on.

(Refer Slide Time: 11:07)

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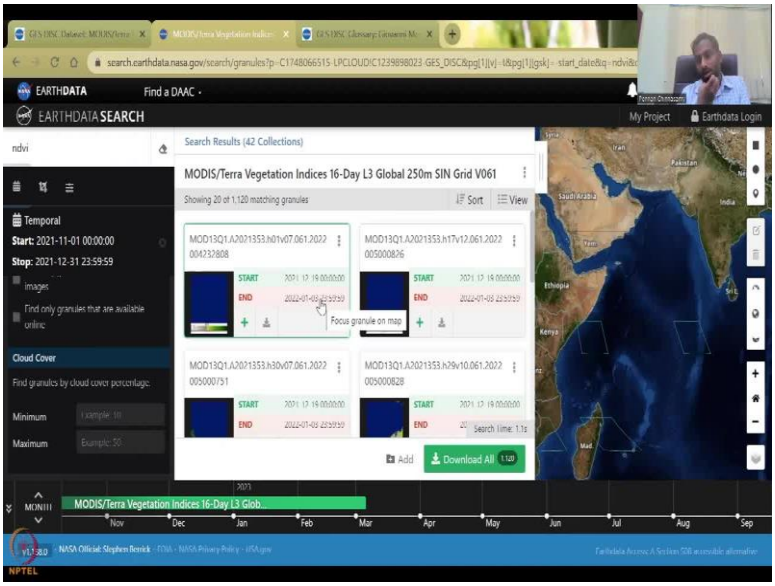
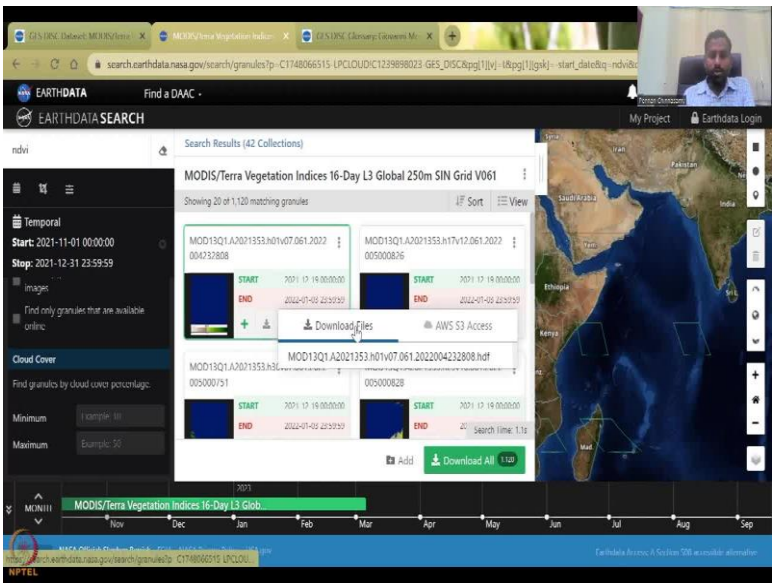
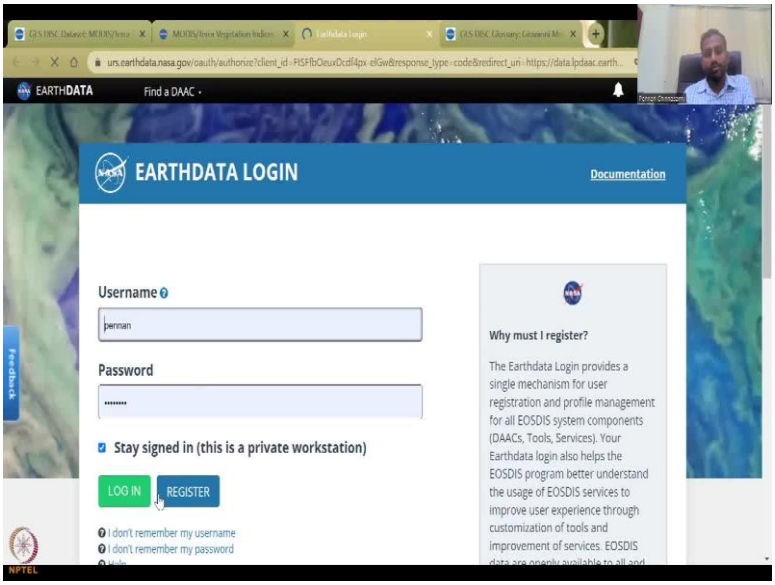
Find a DAAC
EARTHDATA SEARCH
My Project
Earthdata Login
ndvi
Search Results (138 Collections)
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
Start
2021-11-01 00:00:00
End
YYYY-MM-DD HH:mm:ss
Recurring?
Apply
Clear
December 2021
Today
Clear
Cloud Cover
Minimum
Maximum
Download All
Add
MODIS/Terra Vegetation Indices 16-Day L3 Glob...
NPTEL

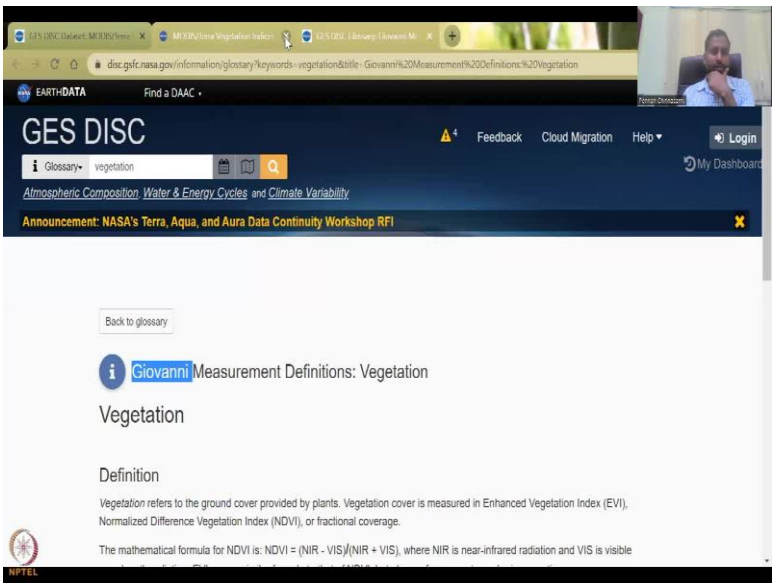

EARTHDATA
Find a DAAC
EARTHDATA SEARCH
My Project
Earthdata Login
ndvi
Search Results (42 Collections)
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
Showing 20 of 1,120 matching granules
Temporal
Start: 2021-11-01 00:00:00
Stop: 2021-12-31 23:59:59
Cloud Cover
Minimum
Maximum
Focus granule on map
Download All
Add
MODIS/Terra Vegetation Indices 16-Day L3 Glob...
NPTEL

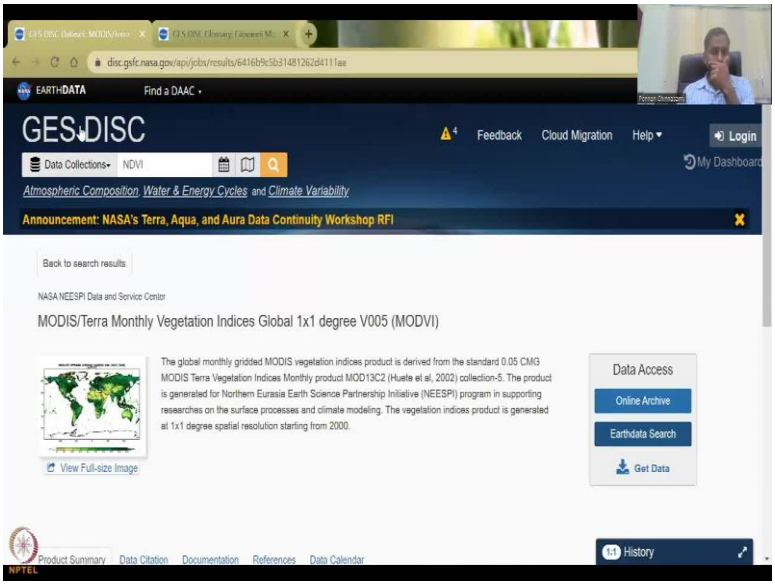

EARTHDATA
Find a DAAC
EARTHDATA SEARCH
My Project
Earthdata Login
ndvi
Search Results (42 Collections)
MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V061
Showing 20 of 1,120 matching granules
Temporal
Start: 2021-11-01 00:00:00
Stop: 2021-12-31 23:59:59
Cloud Cover
Minimum
Maximum
Download Files
AWS S3 Access
MOD13Q1.A2021353.h01v07.061.2022004232808.hdf
Download All
Add
MODIS/Terra Vegetation Indices 16-Day L3 Glob...
NPTEL

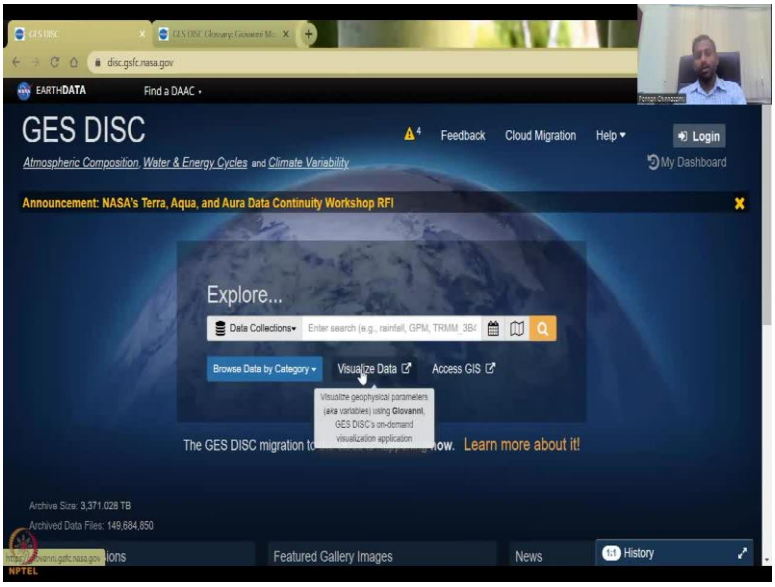


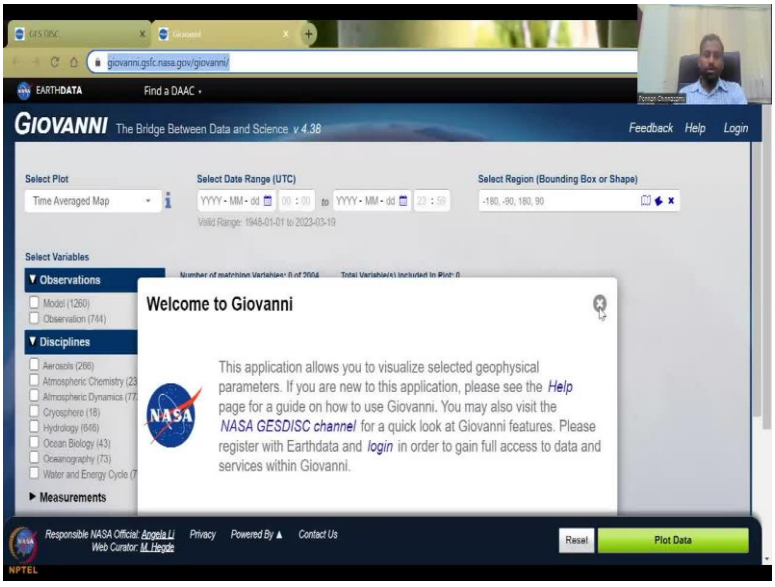
So what we could do is you can actually filter by date. So here you can put the date, let us say I will put November 1 to December 2021, December 31, and then apply. And so now it is going to get reset, so now from 148,000 to now 42 collections, which is good manageable, you can download each one. So you just add it to your download page, or you can just quickly download it after you have the scissors populating the link, and then it will let you download the file. So as I said, you can download the file after you have the login and that is what it is asking your login passwords and stuff. So you do have to have an account. So make sure you create one account pretty soon for this database. So there is a lot of data that can be taken up for NDVI.

(Refer Slide Time: 12:07)




EARTHDATA
Find a DAAC
GES DISC
Feedback
Cloud Migration
Help
Login
My Dashboard
Data Collections
NDVI
Atmospheric Composition, Water & Energy Cycles and Climate Variability
Announcement: NASA's Terra, Aqua, and Aura Data Continuity Workshop RFI
Back to search results
NASA NEESPI Data and Service Center
MODIS/Terra Monthly Vegetation Indices Global 1x1 degree V005 (MODVI)
The global monthly gridded MODIS vegetation indices product is derived from the standard 0.05 CMG MODIS Terra Vegetation Indices Monthly product MOD13C2 (Huete et al, 2002) collection-5. The product is generated for Northern Eurasia Earth Science Partnership Initiative (NEESPI) program in supporting researches on the surface processes and climate modeling. The vegetation indices product is generated at 1x1 degree spatial resolution starting from 2000.
View Full-size Image
Data Access
Online Archive
Earthdata Search
Get Data
Product Summary
Data Citation
Documentation
References
Data Calendar
History
NPTEL


EARTHDATA
Find a DAAC
GES DISC
Feedback
Cloud Migration
Help
Login
My Dashboard
Atmospheric Composition, Water & Energy Cycles and Climate Variability
Announcement: NASA's Terra, Aqua, and Aura Data Continuity Workshop RFI
Explore...
Data Collections
Browse Data by Category
Visualize Data
Access GIS
Learn more about it!
Archive Size: 3,371.028 TB
Archived Data Files: 149,684,850
Featured Gallery Images
News
History
NPTEL


giovanni.gsfc.nasa.gov/giovanni/
EARTHDATA
Find a DAAC
GIOVANNI The Bridge Between Data and Science v 4.38
Feedback
Help
Login
Select Plot
Time Averaged Map
Select Data Range (UTC)
Select Region (Bounding Box or Shape)
-180, -90, 180, 90
Select Variables
Observations
Model (1260)
Observation (744)
Disciplines
Aerosols (266)
Ocean Biology (43)
Oceanography (73)
Measurements
Welcome to Giovanni
This application allows you to visualize selected geophysical parameters. If you are new to this application, please see the Help page for a guide on how to use Giovanni. You may also visit the NASA GESDISC channel for a quick look at Giovanni features. Please register with Earthdata and login in order to gain full access to data and services within Giovanni.
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Web Curator: M. Hegde
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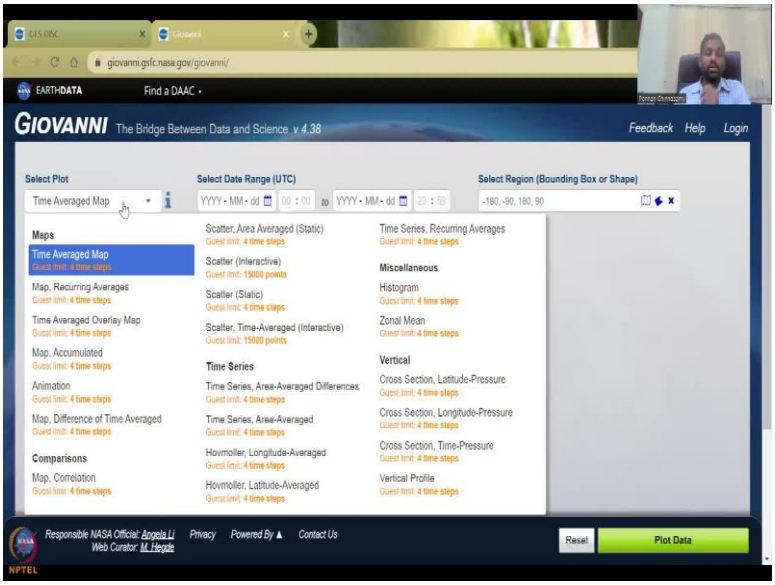
Plot Data
NPTEL


giovanni.gsfc.nasa.gov/giovanni/
EARTHDATA
Find a DAAC
GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Averaged Map
Select Data Range (UTC)
YYYY - MM - dd 00 : 00 to YYYY - MM - dd 23 : 59
Select Region (Bounding Box or Shape)
-180, -90, 180, 90
Maps
Time Averaged Map
Map, Recurring Averages
Time Averaged Overlay Map
Map, Accumulated
Animation
Map, Difference of Time Averaged
Comparisons
Map, Correlation
Scatter, Area Averaged (Static)
Scatter (Interactive)
Scatter (Static)
Scatter, Time-Averaged (Interactive)
Time Series
Time Series, Area-Averaged Differences
Time Series, Area-Averaged
Hovmoller, Longitude-Averaged
Hovmoller, Latitude-Averaged
Time Series, Recurring Averages
Miscellaneous
Histogram
Zonal Mean
Vertical
Cross Section, Latitude-Pressure
Cross Section, Longitude-Pressure
Cross Section, Time-Pressure
Vertical Profile
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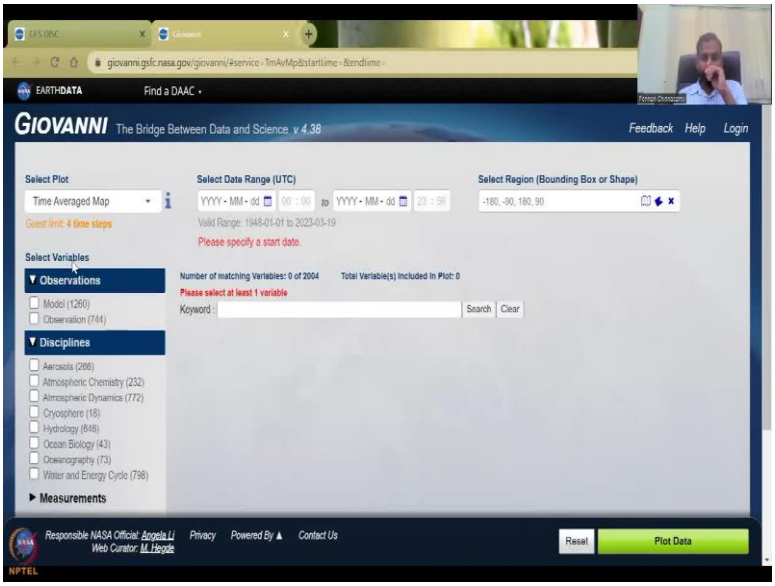
giovanni.gsfc.nasa.gov/giovanni/#service=TmAvMp&startTime=&endTime=
EARTHDATA
Find a DAAC
GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Averaged Map
Guest limit: 4 time steps
Select Data Range (UTC)
YYYY - MM - dd 00 : 00 to YYYY - MM - dd 23 : 59
Valid Range: 1948-01-01 to 2023-03-19
Please specify a start date.
Select Region (Bounding Box or Shape)
-180, -90, 180, 90
Select Variables
Observations
Model (1260)
Observation (744)
Disciplines
Aerosols (266)
Atmospheric Chemistry (232)
Atmospheric Dynamics (772)
Cryosphere (18)
Hydrology (646)
Ocean Biology (43)
Oceanography (73)
Water and Energy Cycle (798)
Measurements
Number of matching Variables: 0 of 2004
Total Variable(s) included in Plot: 0
Please select at least 1 variable
Keyword :
Search
Clear
Responsible NASA Official: Angela Li
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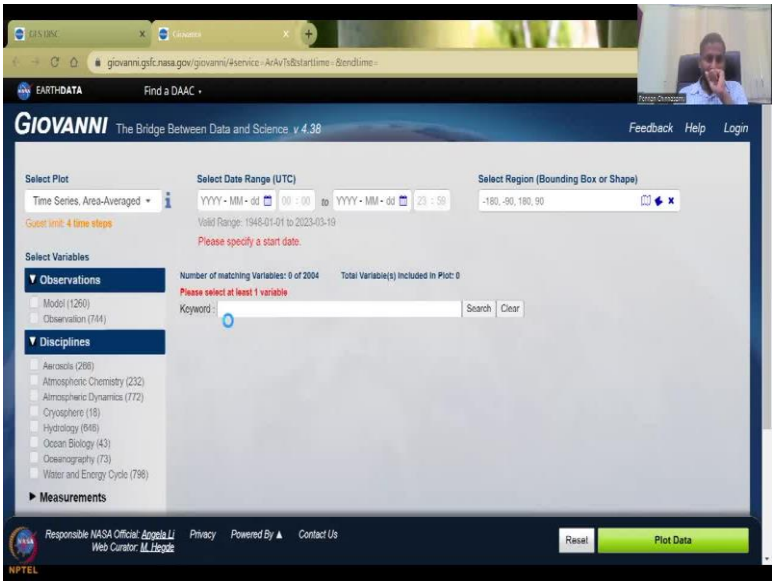
giovanni.gsfc.nasa.gov/giovanni/#service=ArAvTs&startTime=&endTime=
EARTHDATA
Find a DAAC
GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Series, Area-Averaged
Guest limit: 4 time steps
Select Data Range (UTC)
YYYY - MM - dd 00 : 00 to YYYY - MM - dd 23 : 59
Valid Range: 1948-01-01 to 2023-03-19
Please specify a start date.
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-180, -90, 180, 90
Select Variables
Observations
Model (1260)
Observation (744)
Disciplines
Aerosols (266)
Atmospheric Chemistry (232)
Atmospheric Dynamics (772)
Cryosphere (18)
Hydrology (646)
Ocean Biology (43)
Oceanography (73)
Water and Energy Cycle (798)
Measurements
Number of matching Variables: 0 of 2004
Total Variable(s) included in Plot: 0
Please select at least 1 variable
Keyword :
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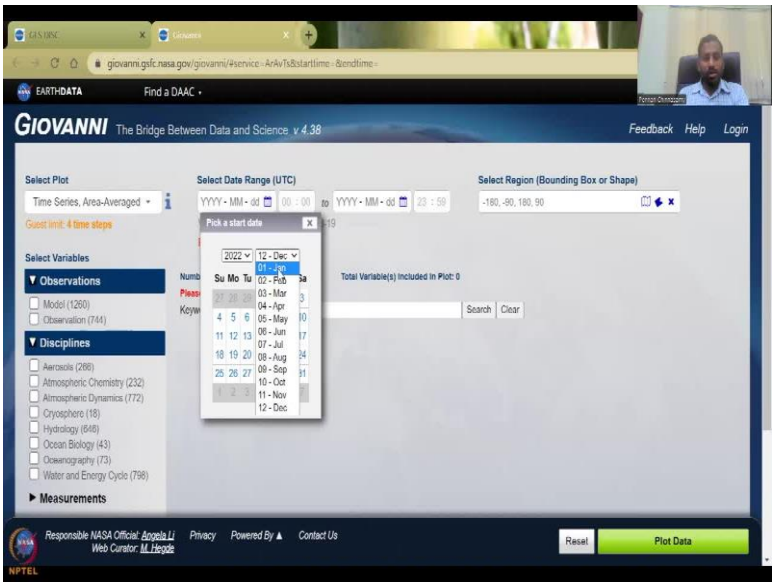
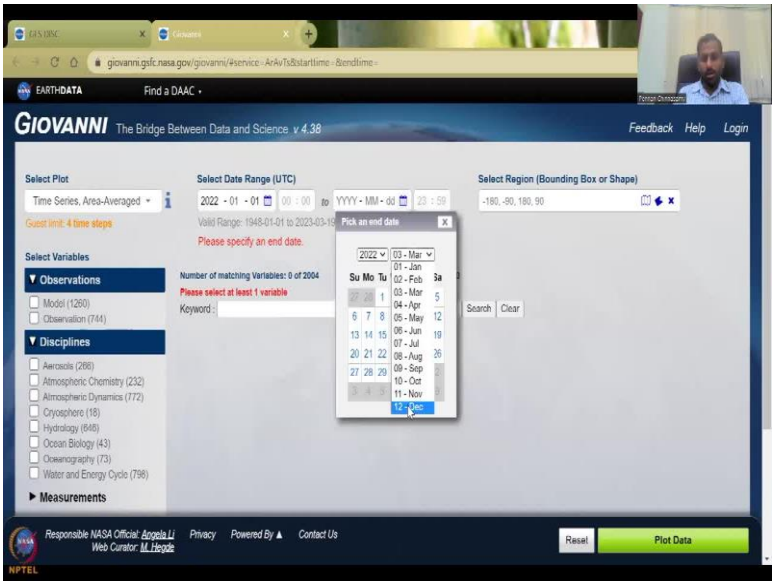
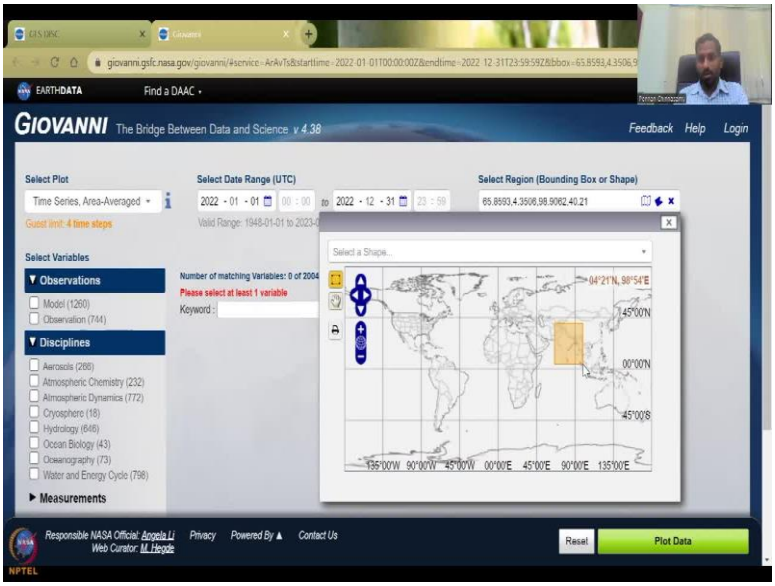
And one more thing I would like to show is a readymade a product where it will do some quick analysis. So let us do visualize data. If you click on visualize data in GIS this thing it open as Giovanni, you can also go to Giovanni, just this link, it will take you there. Giovanni is an application. Let us see if we can do that again, because there is a note which comes up says what it is.

So this application allows us to visualize the parameters and you can have a help page to look at how to do it, I will quickly do this, but you can definitely read it for your future understanding and then you have to have a login. So let me close this here. You can hear this is the type of analysis you can do. You can do a time average map time average overlay map, accumulated comparison between 2 maps, selected area, average time series, average, etc. etc. So this is the analysis type.

(Refer Slide Time: 13:14)




GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Series, Area-Averaged
Select Date Range (UTC)
2022 - 01 - 01 to YYYY - MM - dd
Select Region (Bounding Box or Shape)
-180, -90, 180, 90
Pick an end date
Select Variables
Observations
Model (1260)
Observation (744)
Disciplines
Aerosols (266)
Atmospheric Chemistry (232)
Atmospheric Dynamics (772)
Cryosphere (18)
Hydrology (646)
Ocean Biology (43)
Oceanography (73)
Water and Energy Cycle (798)
Measurements
Number of matching Variables: 0 of 2004
Please select at least 1 variable
Keyword :
Search
Clear
Reset
Plot Data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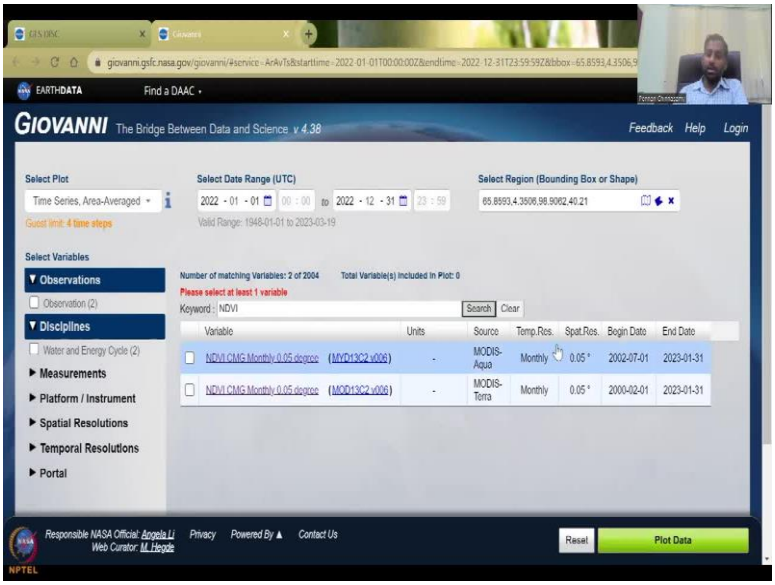
Feedback Help Login
Select Plot
Time Series, Area-Averaged
Select Date Range (UTC)
2022 - 01 - 01 to 2022 - 12 - 31
Select Region (Bounding Box or Shape)
65.8593,4.3506,98.9062,40.21
Select a Shape...
Select Variables
Observations
Disciplines
Measurements
Number of matching Variables: 0 of 2004
Please select at least 1 variable
Keyword :
Reset
Plot Data

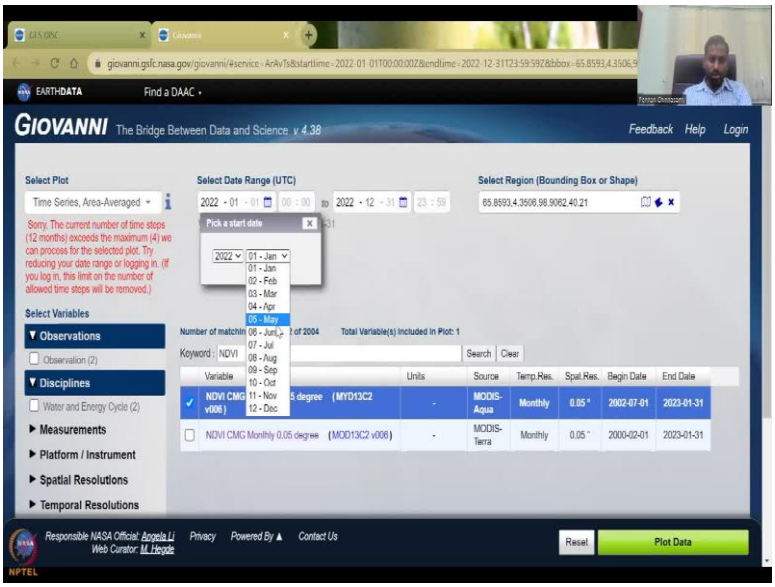

GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Series, Area-Averaged
Select Date Range (UTC)
2022 - 01 - 01 to 2022 - 12 - 31
Select Region (Bounding Box or Shape)
65.8593,4.3506,98.9062,40.21
Select Variables
Observations
Observation (2)
Disciplines
Water and Energy Cycle (2)
Measurements
Platform / Instrument
Spatial Resolutions
Temporal Resolutions
Portal
Number of matching Variables: 2 of 2004
Total Variable(s) included in Plot: 0
Please select at least 1 variable
Keyword : NDVI
Search
Clear
Variable
Units
Source
Temp.Res.
Spat.Res.
Begin Date
End Date
NDVI.CMG.Monthly.0.05.degree (MYD13C2.v006)
MODIS-Aqua
Monthly
0.05 °
2002-07-01
2023-01-31
NDVI.CMG.Monthly.0.05.degree (MOD13C2.v006)
MODIS-Terra
Monthly
0.05 °
2000-02-01
2023-01-31
Reset
Plot Data

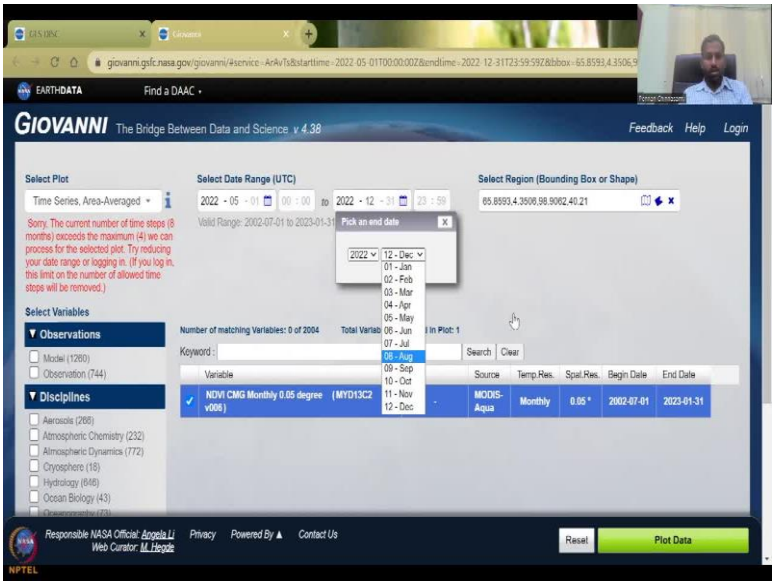
So let us say time averaged map or time series, let us say time series, time series area averaged. And then we are going to say that I am going to have 2022, just to make sure the data is available, we will just say it first Jan, to you do not have to put the time, time is not needed to 2022 December, December 31. And we are going to say the bounding box I said the numbers for India, if you do not remember it, it is okay we can just use the box and then click the box, the box symbol is different here. So you can just say around 64, 63, 40, 104. So 64, 63, 4, 5, 98, which is 100 and then 40.

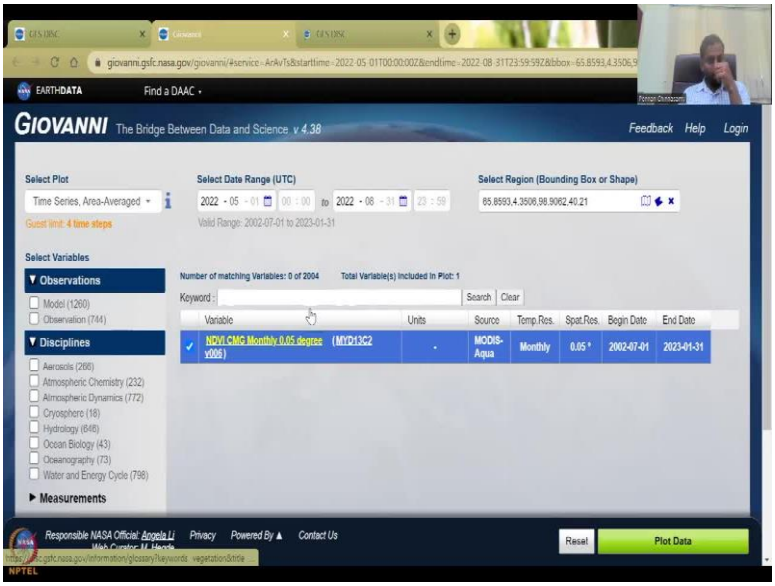
So, you can click this box again and this is it is like a shape file if you have a shape file let us say for India, Maharashtra boundary, you can add it here and then you can do this. And here as I said you can type NDVI, and it has come up NDVI, and then it says Search. So when you click Search all this will come into account. So from one year time period for the India platform, this data is coming up and it has monthly resolutions of 0.05 degrees, 2000-02 to Jan.

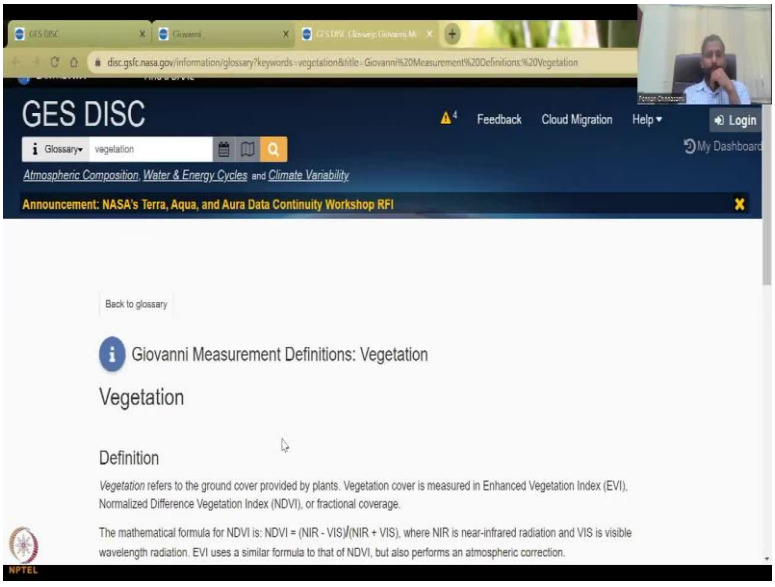
As I said clearly, Jan, Feb data is still getting populated so which is very-very good. So we are now in March, mid March, so within one and a half months you have the data, whereas you do not have to wait one and a half years in other datasets. So you could is 12 months exceeds the maximum number 4 can only be processed. So we will have to reduce it, we can reduce it as monthly, so monthly is 12. So it says 12 months you have selected we can only do 4 months.

(Refer Slide Time: 14:56)




GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Series, Area-Averaged
Select Date Range (UTC)
Select Region (Bounding Box or Shape)
Select Variables
Observations
Disciplines
Reset
Plot Data


GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Series, Area-Averaged
Select Date Range (UTC)
Select Region (Bounding Box or Shape)
Select Variables
Observations
Disciplines
Measurements
Reset
Plot Data


GES DISC
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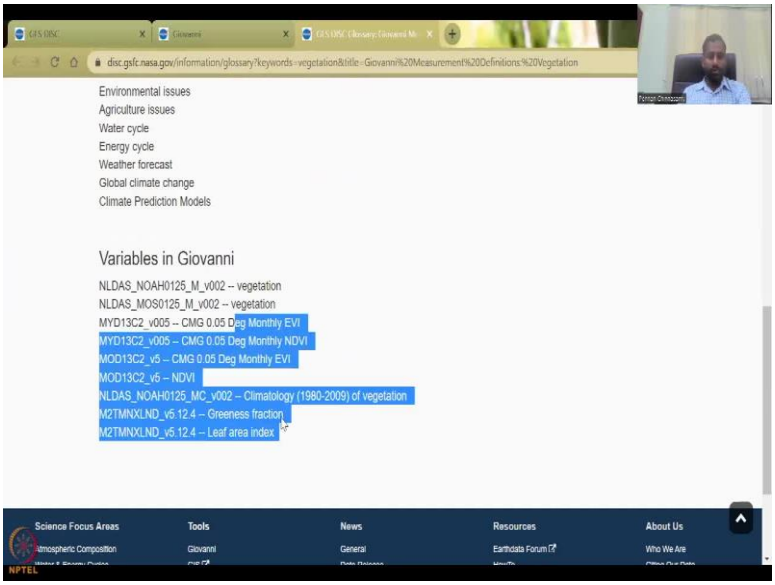
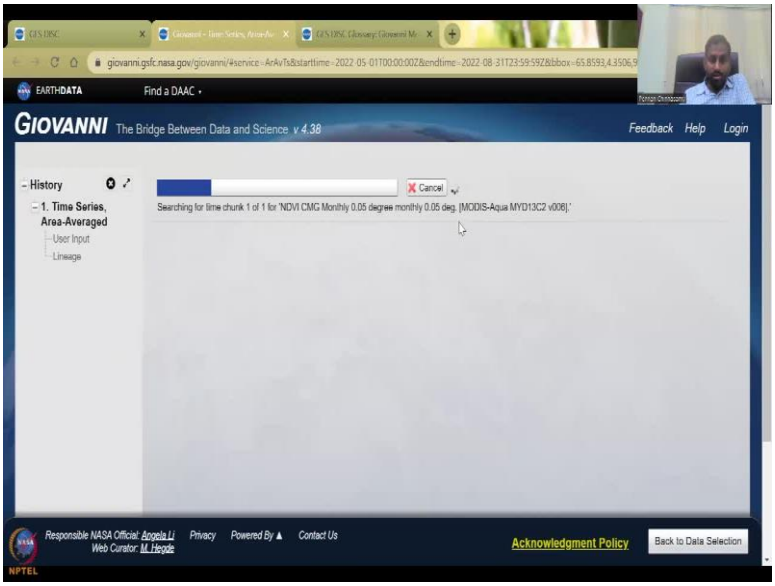
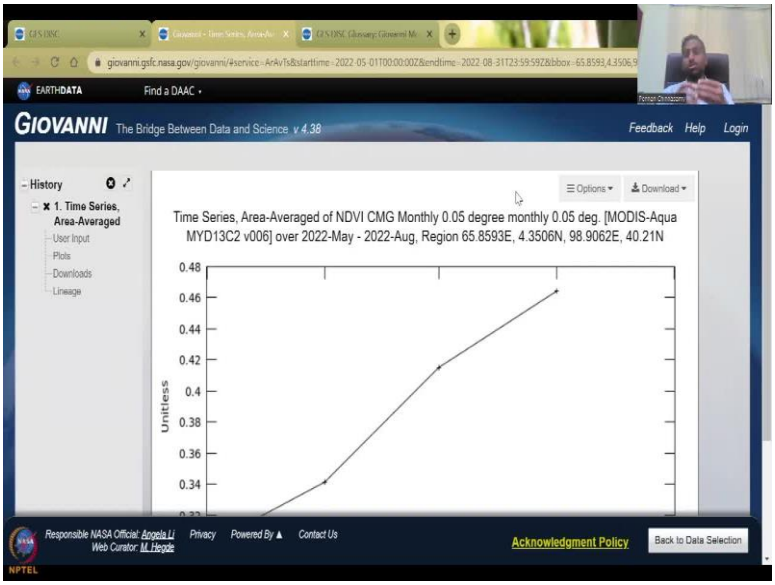
Cloud Migration
Help
Login
Announcement: NASA's Terra, Aqua, and Aura Data Continuity Workshop RFI
Back to glossary
Giovanni Measurement Definitions: Vegetation
Vegetation
Definition
Vegetation refers to the ground cover provided by plants. Vegetation cover is measured in Enhanced Vegetation Index (EVI), Normalized Difference Vegetation Index (NDVI), or fractional coverage.
The mathematical formula for NDVI is: NDVI = (NIR - VIS)/(NIR + VIS), where NIR is near-infrared radiation and VIS is visible wavelength radiation. EVI uses a similar formula to that of NDVI, but also performs an atmospheric correction.



So let us reduce this time now from let us say June, May to so that is the monsoon period to May, June, July, August. So we can do August, May, June, July, August, so 4 months. And then it populates the same thing again and now it says yes we are a guest so we can only do this much and if you have an account you will get more. So, this is what I will be clicking on to understand what this data is. So if you want to read the metadata about the data, you can click the link, it will open here. And you do have a good analysis of vegetation derived from a model and then multiple types of vegetation indexes. You have Greenness Fraction, Leaf Area Index, Climatology, etc.

(Refer Slide Time: 15:49)

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Feedback Help Login
EARTHDATA Find a DAAC
History
1. Time Series, Area-Averaged
User Input
Plots
Downloads
Lineage
Options
Download
Time Series, Area-Averaged of NDVI CMG Monthly 0.05 degree monthly 0.05 deg. [MODIS-Aqua MYD13C2 v006] over 2022-May - 2022-Aug, Region 65.8593E, 4.3506N, 98.9062E, 40.21N
Unitless
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
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Web Curator: M. Hegde
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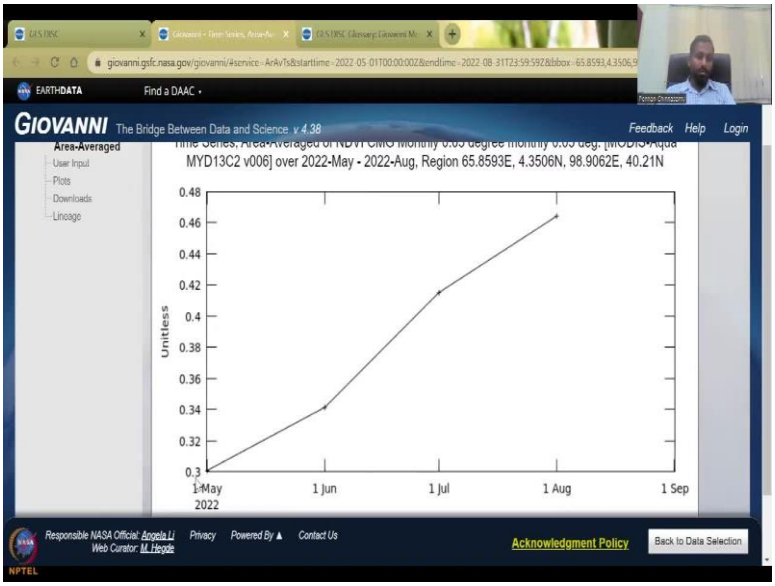
Back to Data Selection
NPTEL


GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
EARTHDATA Find a DAAC
Area-Averaged
User Input
Plots
Downloads
Lineage
MYD13C2 v006] over 2022-May - 2022-Aug, Region 65.8593E, 4.3506N, 98.9062E, 40.21N
Unitless
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
0.32
0.3
1 May 2022
1 Jun
1 Jul
1 Aug
1 Sep
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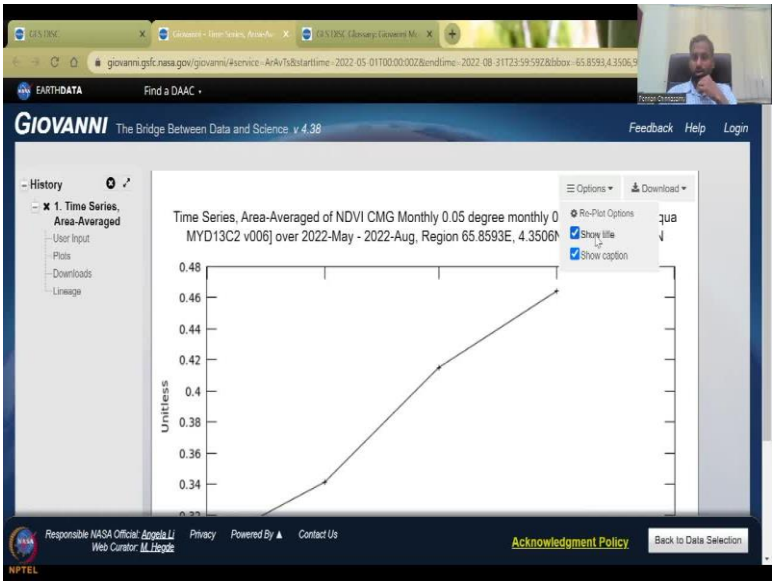
NPTEL


GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
EARTHDATA Find a DAAC
History
1. Time Series, Area-Averaged
User Input
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Re-Plot Options
Show title
Show caption
Unitless
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Responsible NASA Official: Angela Li
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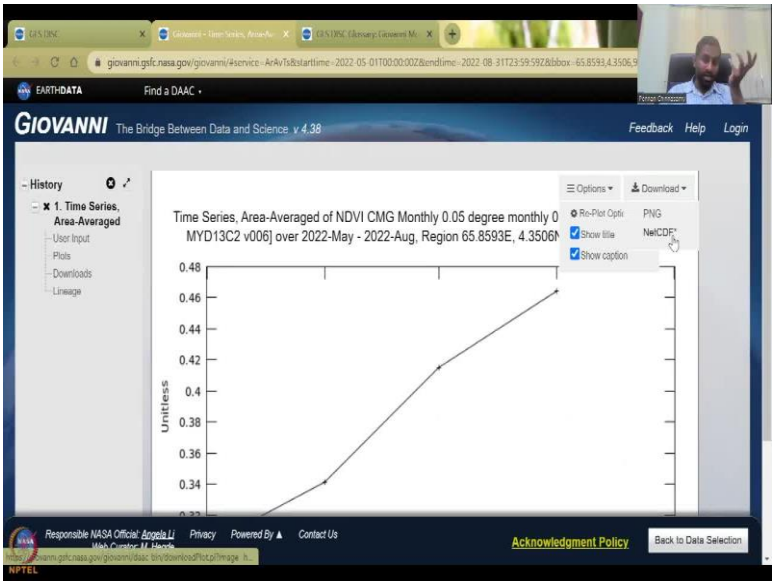
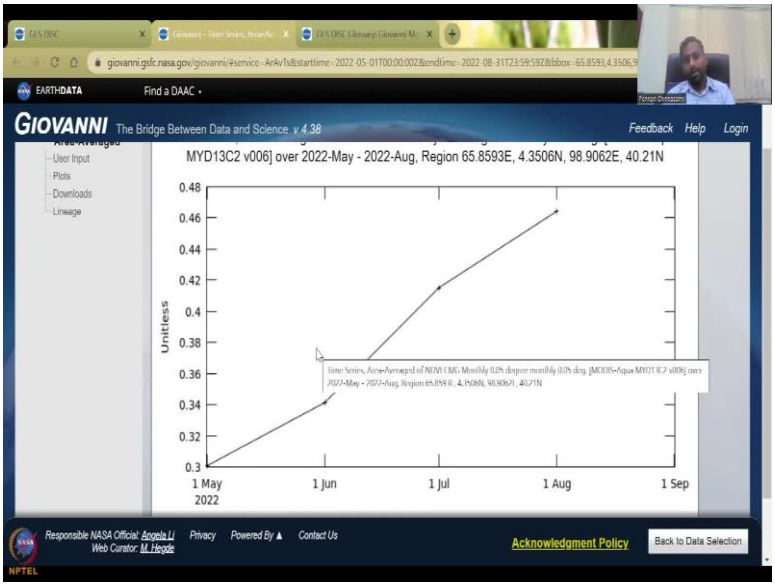
NPTEL





So, once we have this begin date end date, you can say plot data, the plot data will plot the data as I said, we needed time, series, area, average. So it is now running you can see it is running, it is not using your computer's memory or software, you given the code. So when you click the boxes, automatically the code is developed and sent to the NASA computers and there it is actually processing. So this processing is there. So your internet speed and your memory power does not get affected.

So here you are analysis for India scale, it just took 10 seconds, maybe my internet was fast the uploading and downloading is fast, I just checked the upload download speed before we started this class, mine is pretty good. But in a normal situation using your mobile internet, Wi-Fi, you can get this within a minute.

So you can see here from May the NDVI is increasing, that is what it say, the unit less NDVI does not have units and it starts from minus 1 to plus 1, the time series average of NDVI for the entire India at 0.05 degree resolution, everything is given here, you do not even have to type this in your reports. But you did it because you actually plotted the boundary and you said this is the time series, this is the NDVI I want to see. And this can be done this Giovanni can be used for multiple-multiple parameters, not only NDVI, I am only showing NDVI because this week is linked to NDVI, so I will be showing this.

So you have different options, you will show the title show the caption or remove it if you want, but let us keep the title, let us keep the caption which is here, the resolution was defined as this is this, which is India, India boundary if you can take the lat-longs of this and put it on the lat-long calculators you can see it is India, and then the visualizations results. You can download this as an image, the data can come as an image, you can see that the time series average area average output was taken. So for the entire India all the pixels to do this, it takes a lot of computing power, but you have done it within a couple of seconds because of the supercomputers linked to NASA.

So beautifully you can explain that from first may, first June, July, and August, the NDVI is increasing that is because most of the monsoon happens here. So in Maharashtra, the monsoon onset is June, let us say June 1 and then June 6, the first week, so June 6, normally it comes. So you can see that after that it peaks starts to pick up and now the plant is growing healthy well.

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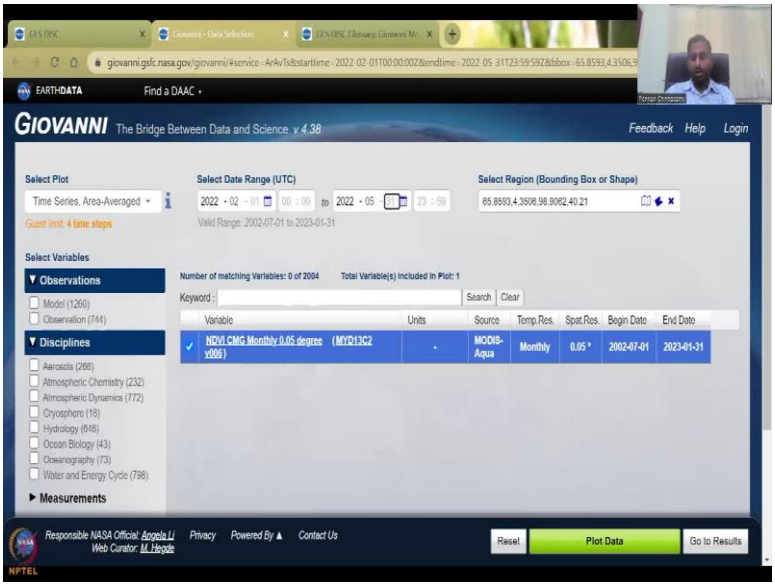

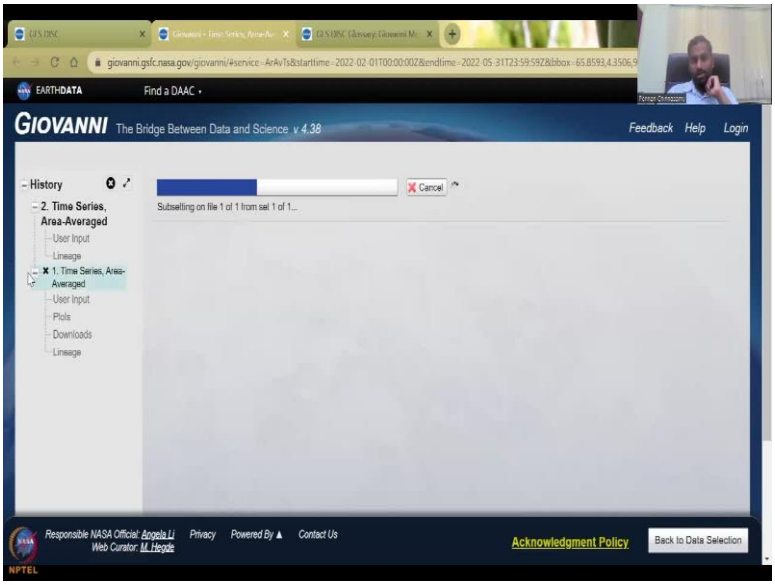
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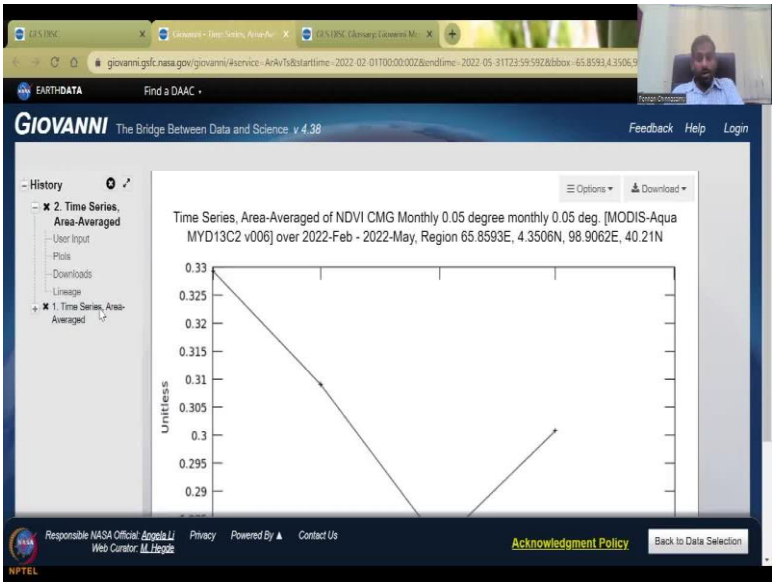
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Time Series, Area-Averaged of NDVI CMG Monthly 0.05 degree monthly 0.05 deg. [MODIS-Aqua MYD13C2 v006] over 2022-Feb - 2022-May, Region 65.8593E, 4.3506N, 98.9062E, 40.21N
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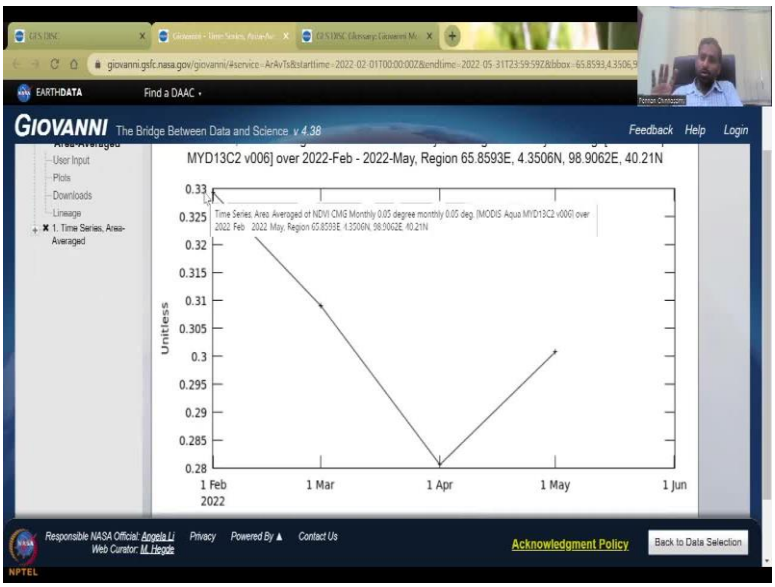
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So let us do another one. Let us do Jan, Feb, March, April, to see how it comes back down and then you can say back to data selection. And here you can go to, let us say, 2 Feb to 5 times and then I am just going to go to results will go to the original results and go to plot data. So when you do plot data, so the previous exercise is here, you can see that input, plots, download, lineage, everything is there, but we will keep it out for now is the history. And now our other file is downloading getting access successfully ran the time series average for the entire India within 10-15 seconds.

And now we have this. So can you understand this now what is happening is initially the winter crops were slightly growing there was irrigation happening and after irrigation, it plummets it shoots down because of people harvesting it and the summer kicks in in March. So you see from February, March, April, May. So may slightly there is another round of irrigation because a lot of people do some groundwater irrigation subsistence farming etc. And there is some other summer monsoons in some region.

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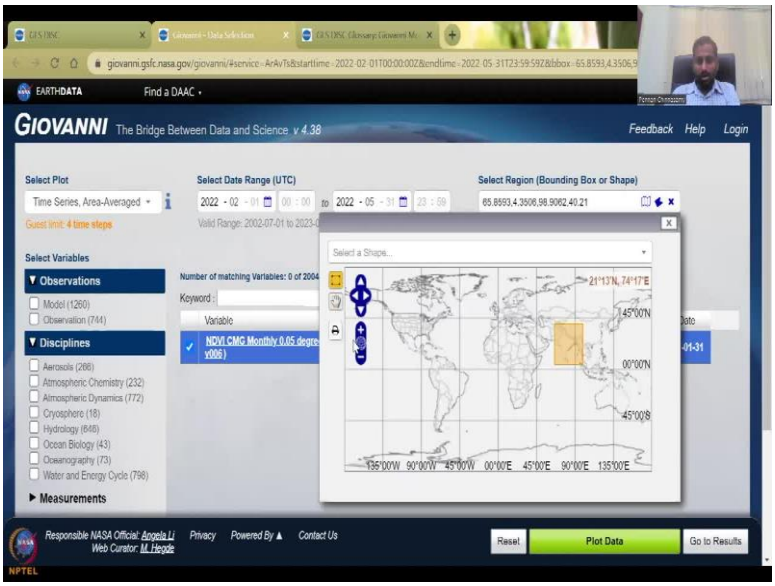

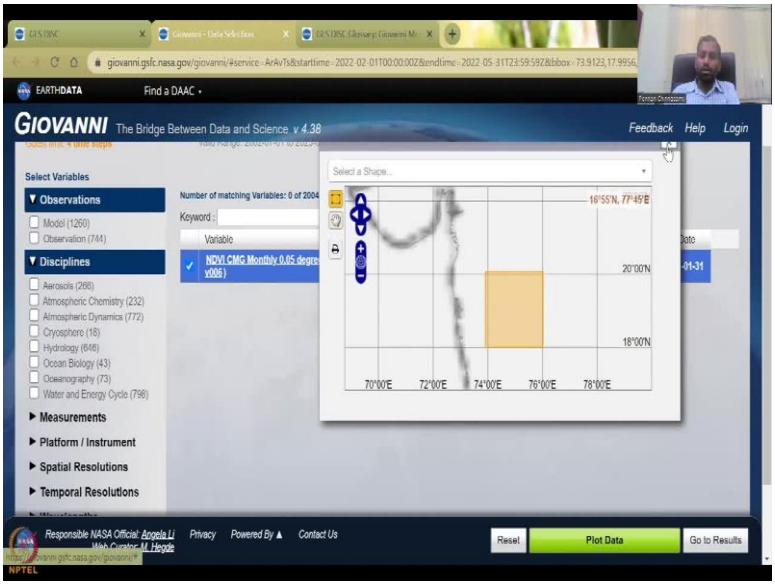
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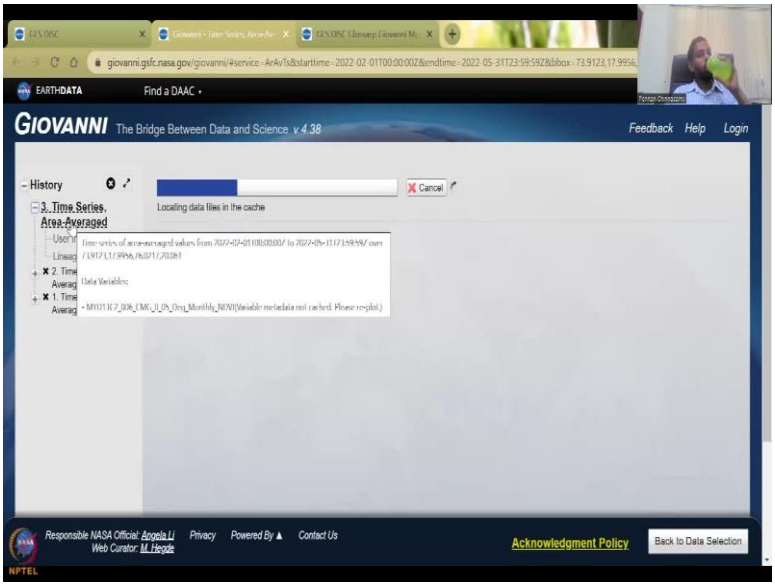
Go to Results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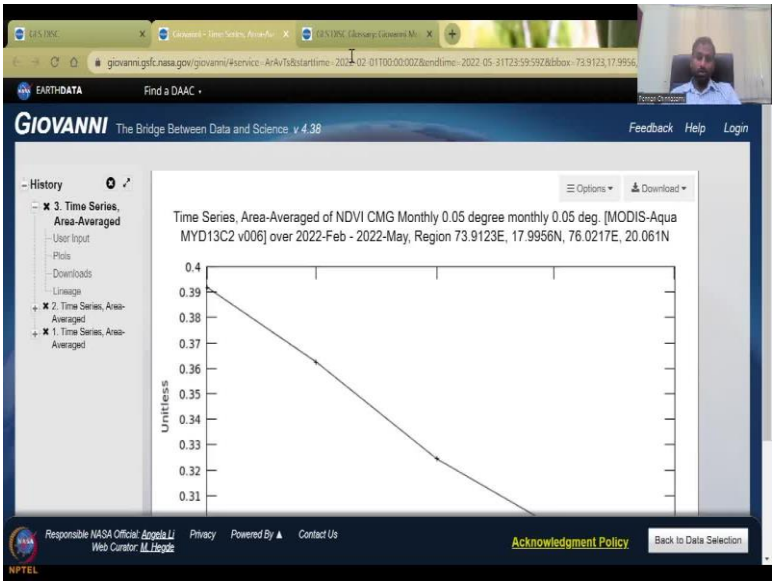
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Time Series, Area-Averaged of NDVI CMG Monthly 0.05 degree monthly 0.05 deg. [MODIS-Aqua MYD13C2 v006] over 2022-Feb - 2022-May, Region 73.9123E, 17.9956N, 76.0217E, 20.061N
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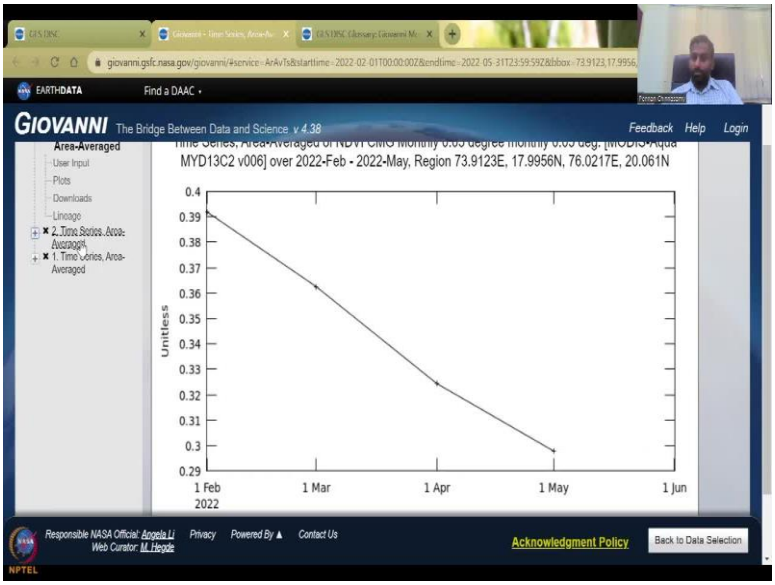
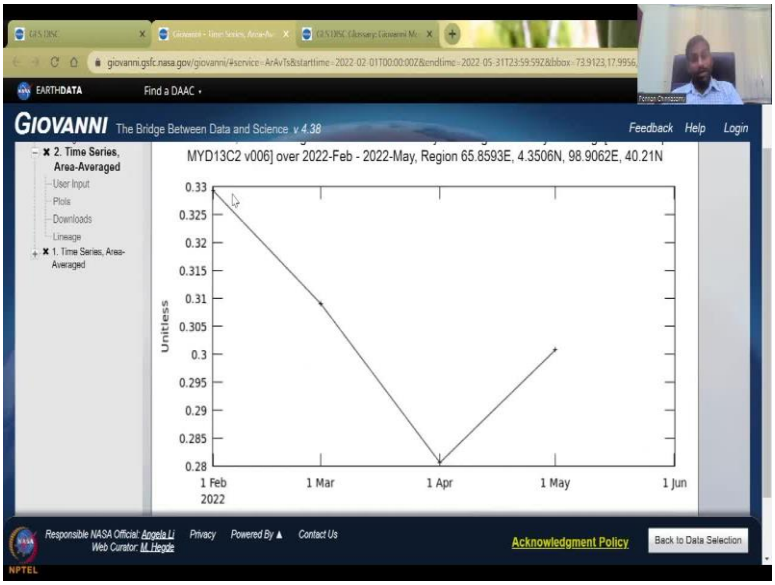
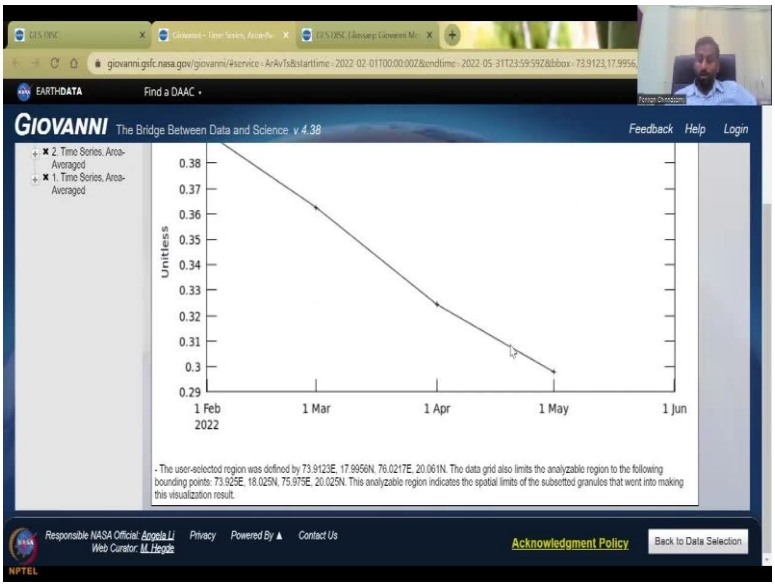


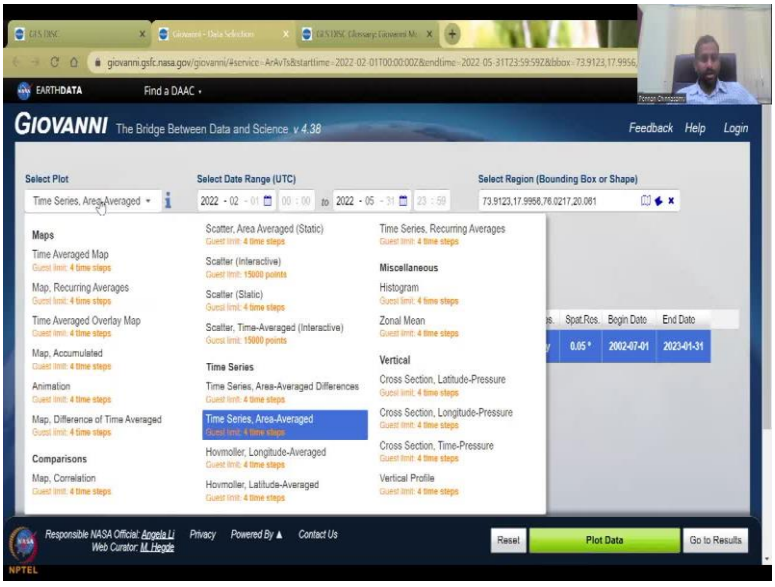
To reduce this what you do is go back to data selection, you can go up and just put a bounding box near, you can zoom in. So let us zoom in text box out and pick this hand and now you can move. Let us say you want this Maharashtra region, this part, this style is enough, let us say the style is enough. So I just draw a box here. And then I close this map, and NDVI is fine, the data ranges that and then let us say plot data.

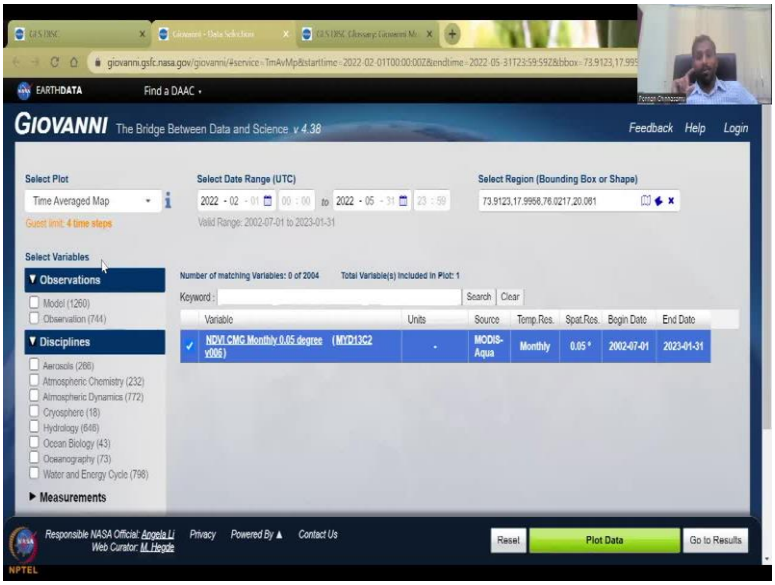
So this is the third time series we are doing that is why he is saying 3. Again, this, I am not using GIS, but when you download this time series, this is an analysis, this is a plot, you can actually put it in your reports, if you want to do it from scratch, you will have to download it. So if you take Maharashtra region, you see how it goes really down. So for my region, I know there is no summer monsoon, there is only really drought at that time. So it just goes down, there is even irrigation does not happen because there is no water groundwater is going down also. So if you take the entire India, it is a different ballgame.

(Refer Slide Time: 21:27)









Like for example, this one, the entire India is different, let us click this one for analysis. So we have the same timeframe, for entire India, it starts at 0.33 and then comes down and then goes up. Whereas for Maharashtra region, it is just going down. This is purely because we do not have a monsoon in the summer, it comes only in June. So until then it is just really, really dry region in that part of the world. So you can download the data etc. you can change the type of results you analysis you want. If you do not want time series average, you can see a time series map.

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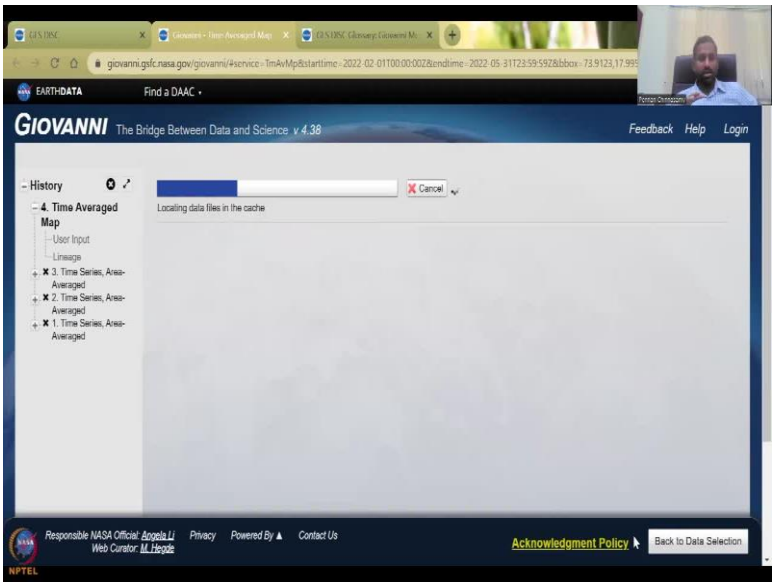

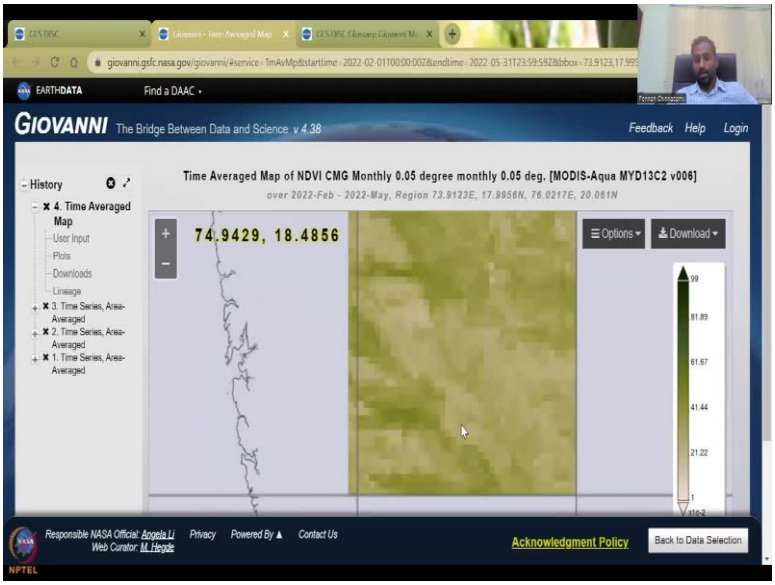
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Time Averaged Map of NDVI CMG Monthly 0.05 degree monthly 0.05 deg. [MODIS-Aqua MYD13C2 v006]
over 2022-Feb - 2022-May, Region 73.9123E, 17.9956N, 76.0217E, 20.061N
74.9429, 18.4856
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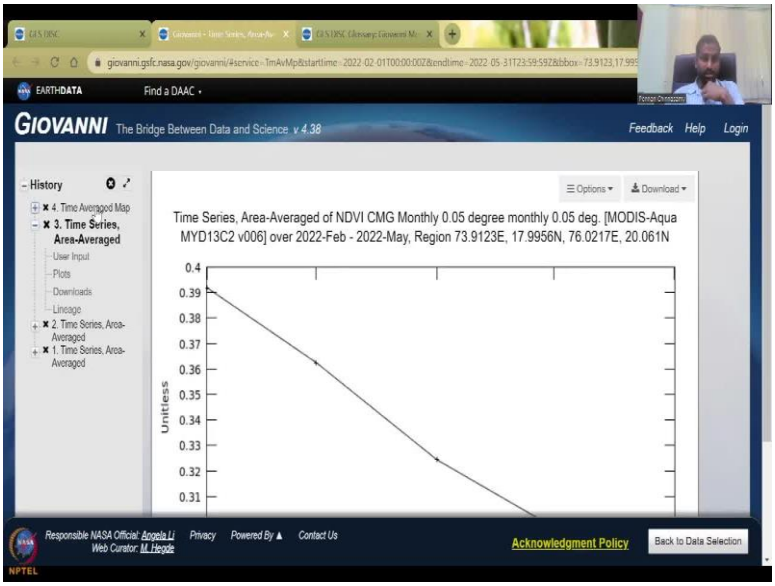
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Time Series, Area-Averaged of NDVI CMG Monthly 0.05 degree monthly 0.05 deg. [MODIS-Aqua MYD13C2 v006] over 2022-Feb - 2022-May, Region 73.9123E, 17.9956N, 76.0217E, 20.061N
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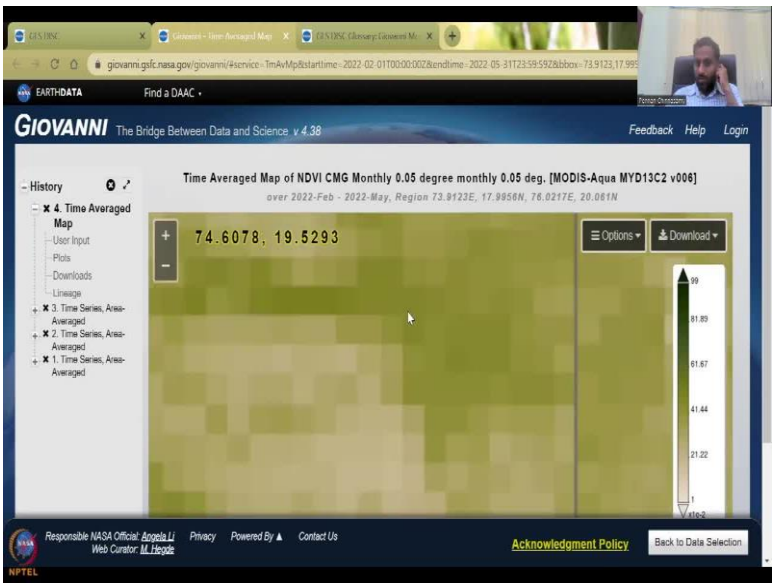
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Time Averaged Map of NDVI CMG Monthly 0.05 degree monthly 0.05 deg. [MODIS-Aqua MYD13C2 v006]
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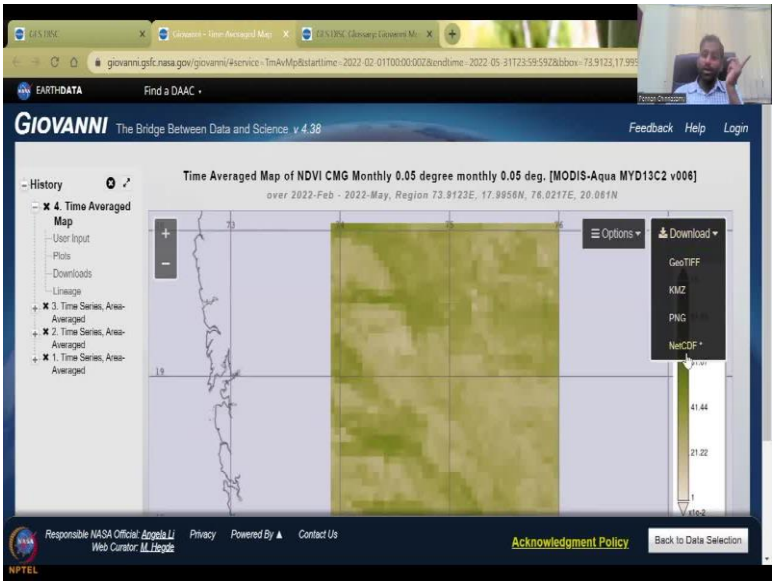

So now what you are going to see is a map for that area, I am going to say plot data. So this is not a time series data, this is not points, but you are going to see a map. Takes a little bit more time, because you are launching so look at what it is saying it is launching the work. Attaching the data files the cache from here to there and then doing the time averaged map takes a little bit more time, because now you are going to see a map that wants to come up successfully run the image.

Now it is computer, visualizations is been created. So this is the GIS step, you do the analysis, you do the visualizations, and then you plot it, and all of this is done for you automatically. So, this is the region we said, and in this region, so the entire thing is average to one value in this time series. This is an average of this, but now if you see it is a every pixel in count, so every pixel is taken, you can zoom in to see the pixels and where the green color is you can download this as a GeoTIFF. In the previous download, you only see image but here GeoTIFF, KMZ, PNG, NETCDF all these are usable in GIS as a raster. So now it is a raster data, you can download it and then put it up in your database.

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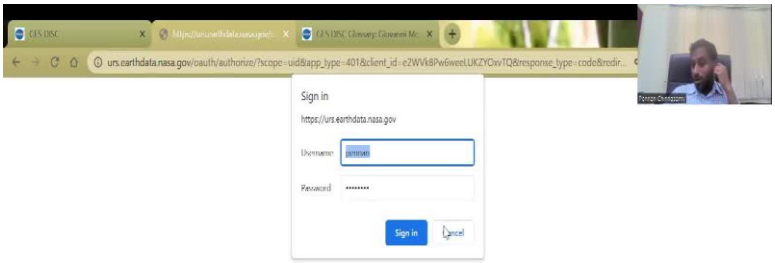

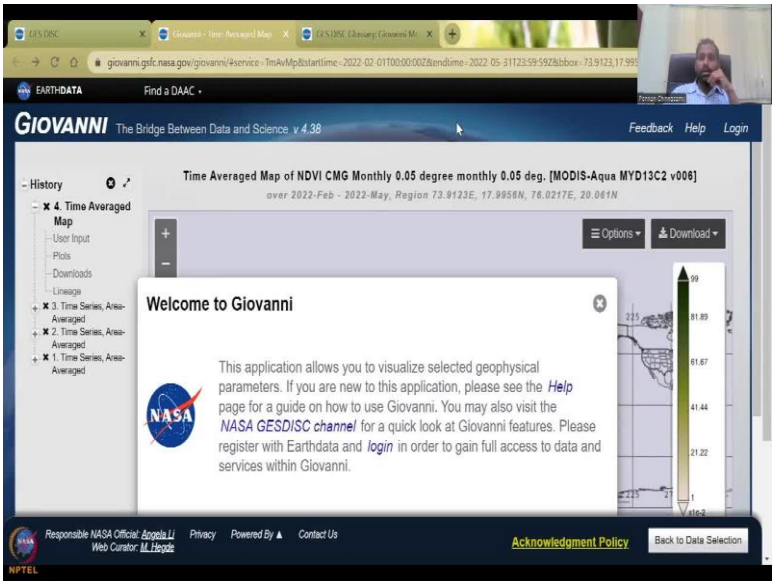

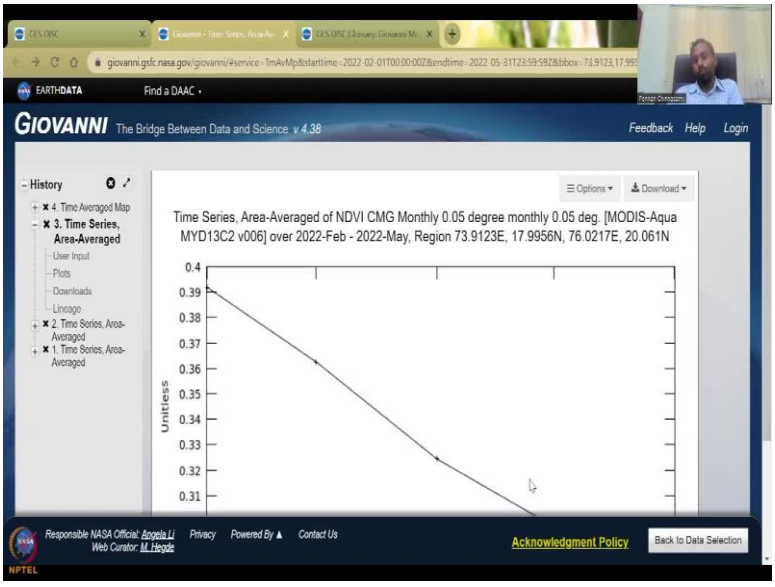

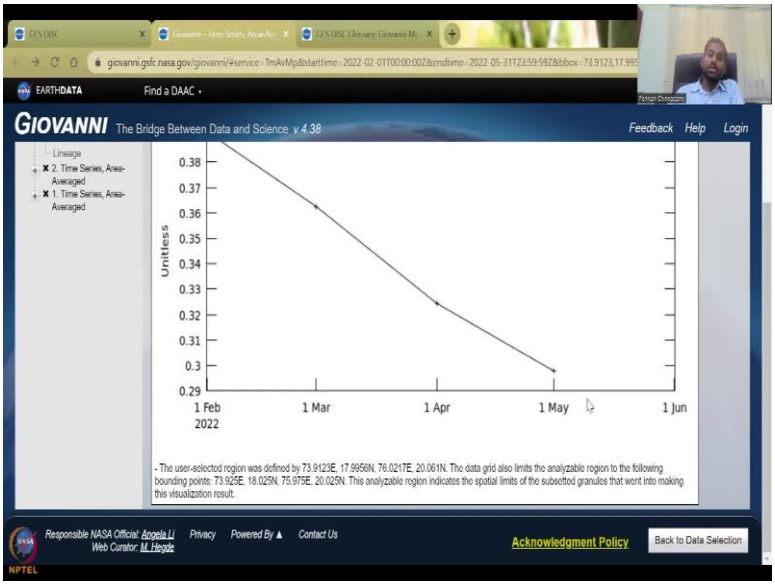
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- The user-selected region was defined by 73.9123E, 17.9956N, 76.0217E, 20.061N. The data grid also limits the analyzable region to the following bounding points: 73.925E, 18.025N, 75.975E, 20.025N. This analyzable region indicates the spatial limits of the subsetted granules that went into making this visualization result.
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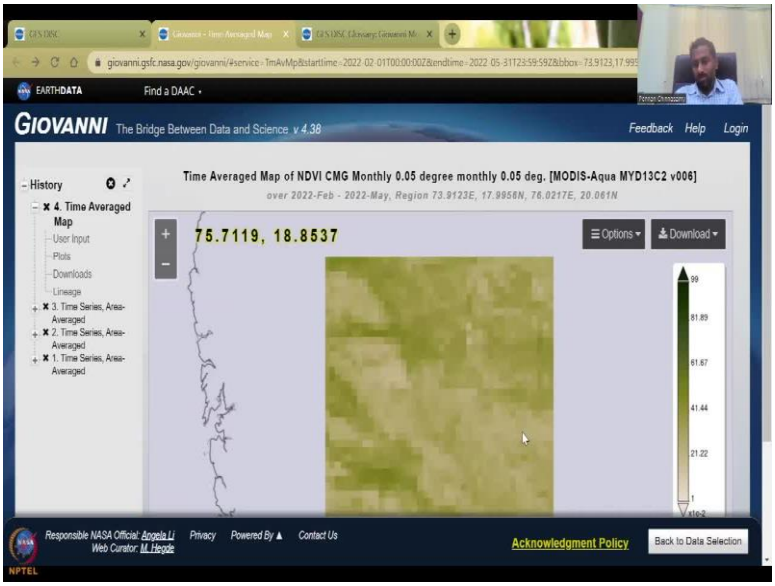
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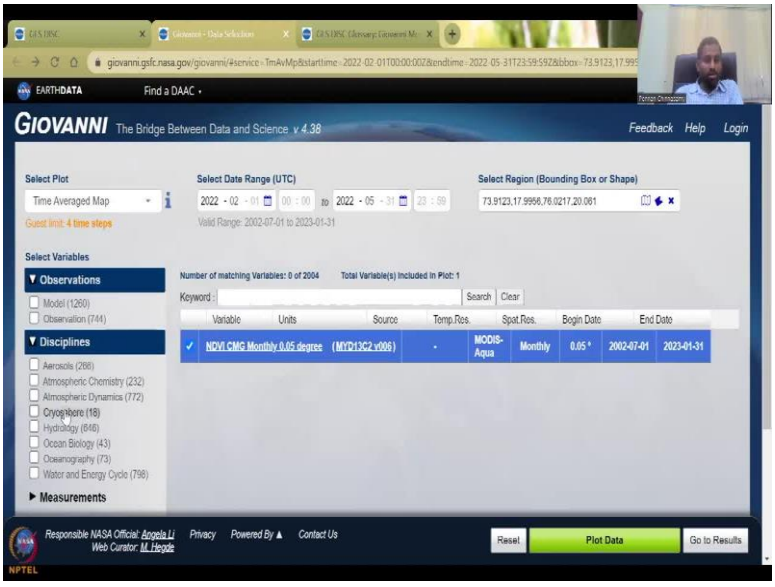
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Valid Range: 2002-07-01 to 2023-01-31
Select Region (Bounding Box or Shape)
73.9123,17.9956,76.0217,20.061
Select Variables
Observations
Model (1260)
Observation (744)
Disciplines
Aerosols (286)
Atmospheric Chemistry (232)
Atmospheric Dynamics (772)
Cryosphere (18)
Hydrology (646)
Ocean Biology (43)
Oceanography (73)
Water and Energy Cycle (798)
Measurements
Number of matching Variables: 0 of 2004
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Search
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NDVI CMG Monthly 0.05 degree (MYD13C2 v006)
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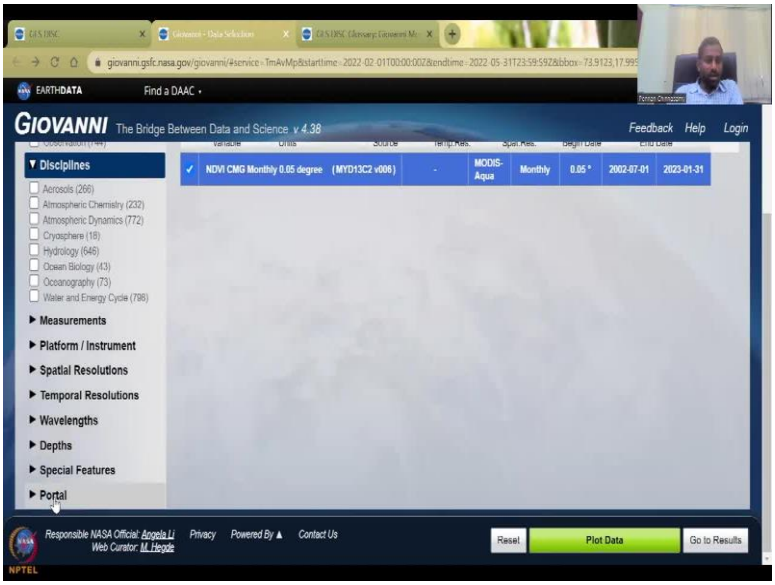
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Measurements
Platform / Instrument
Spatial Resolutions
Temporal Resolutions
Wavelengths
Depths
Special Features
Portal
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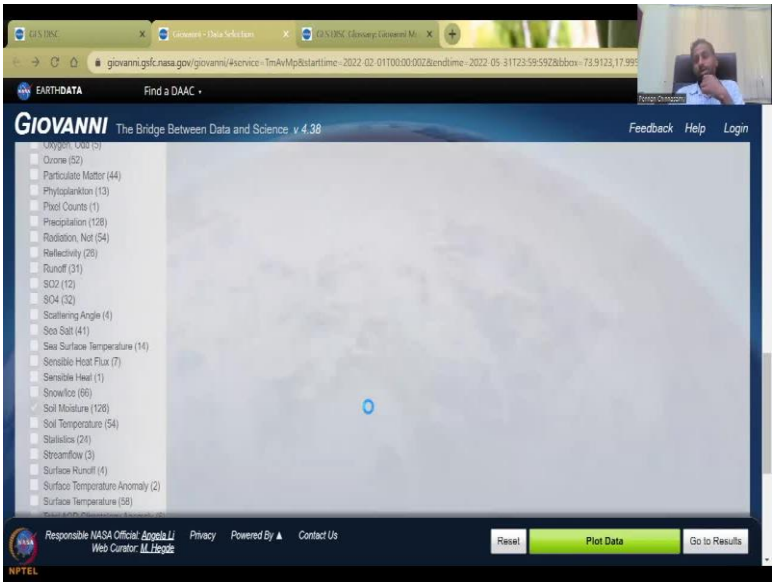
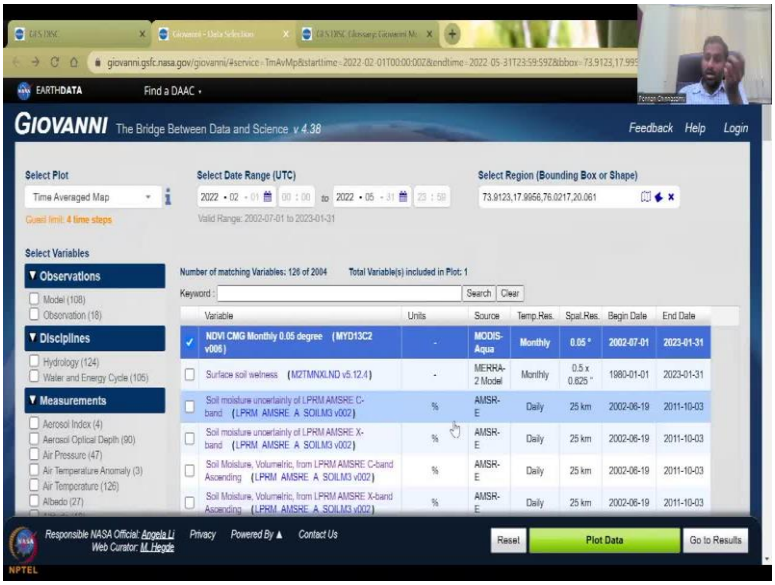
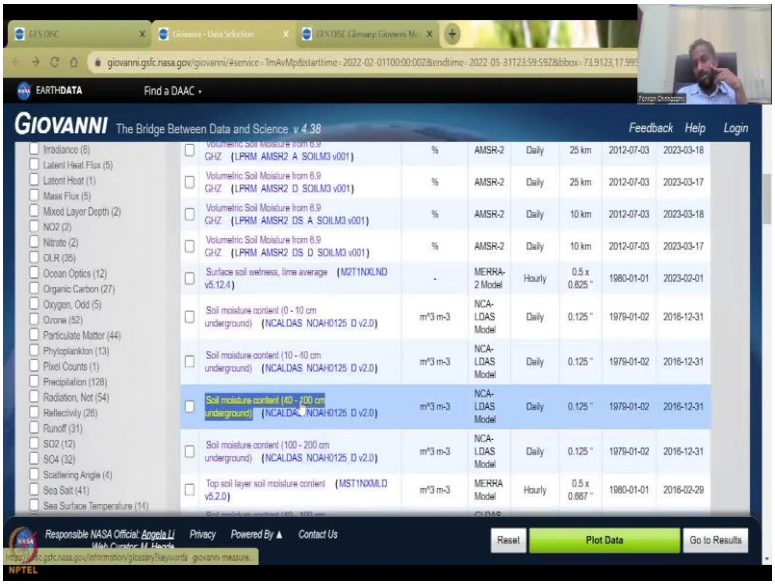
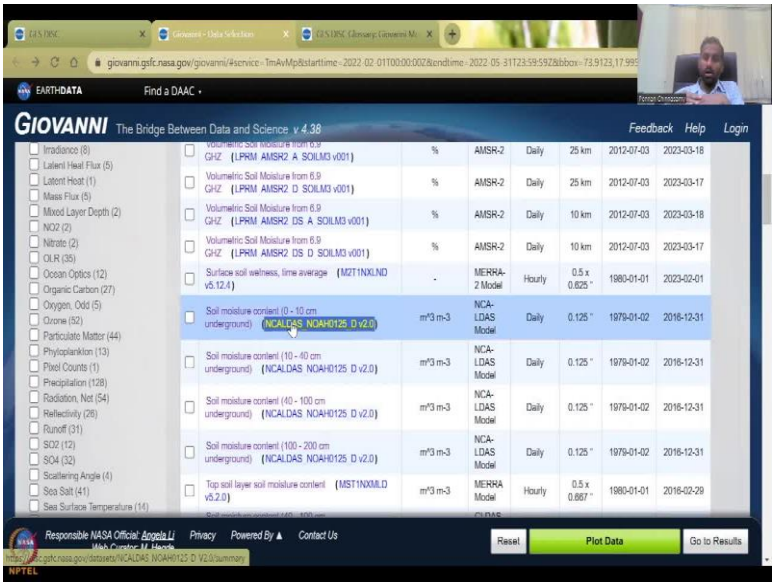
Plot Data
Go to Results


GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Ozone (52)
Particulate Matter (44)
Phytoplankton (13)
Pixel Counts (1)
Precipitation (128)
Radiation, Net (54)
Reflectivity (26)
Runoff (31)
SO2 (12)
SO4 (32)
Scattering Angle (4)
Sea Salt (41)
Sea Surface Temperature (14)
Sensible Heat Flux (7)
Sensible Heat (1)
Snow/Ice (66)
Soil Moisture (128)
Soil Temperature (54)
Statistics (24)
Streamflow (3)
Surface Runoff (4)
Surface Temperature Anomaly (2)
Surface Temperature (58)
Reset
Plot Data
Go to Results


GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Select Plot
Time Averaged Map
Select Date Range (UTC)
Select Region (Bounding Box or Shape)
73.9123,17.9956,76.0217,20.061
Select Variables
Observations
Disciplines
Measurements
Number of matching Variables: 126 of 2004
Total Variable(s) included in Plot: 1
Keyword :
Search
Clear
Variable
Units
Source
Temp.Res.
Spat.Res.
Begin Date
End Date
NDVI CMG Monthly 0.05 degree (MYD13C2 v006)
MODIS-Aqua
Monthly
0.05 °
2002-07-01
2023-01-31
Surface soil wetness (M2TMNXLND v5.12.4)
MERRA-2 Model
Monthly
0.5 x 0.625 °
1980-01-01
2023-01-31
Soil moisture uncertainly of LPRM AMSRE C-band (LPRM_AMSRE_A_SOILM3 v002)
AMSR-E
Daily
25 km
2002-06-19
2011-10-03
Soil moisture uncertainly of LPRM AMSRE X-band (LPRM_AMSRE_A_SOILM3 v002)
Soil Moisture, Volumetric, from LPRM AMSRE C-band Ascending (LPRM_AMSRE_A_SOILM3 v002)
Soil Moisture, Volumetric, from LPRM AMSRE X-band Ascending (LPRM_AMSRE_A_SOILM3 v002)
Reset
Plot Data
Go to Results





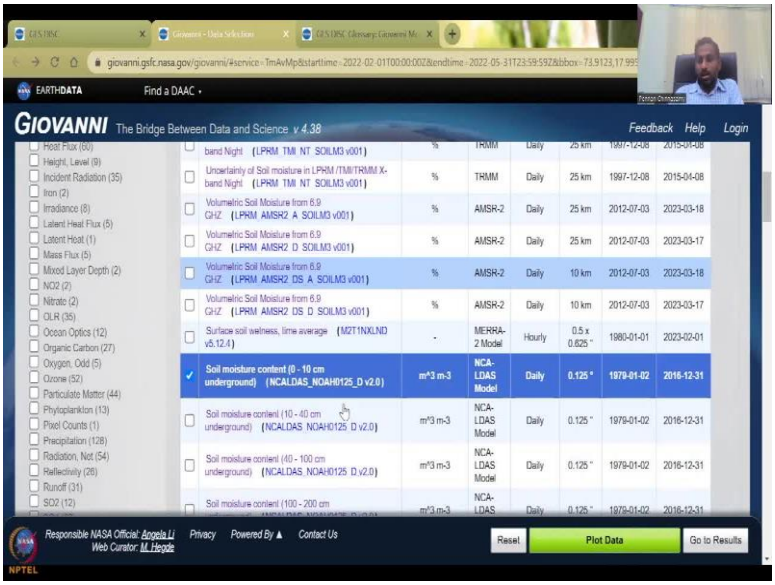
So again, it will ask for your online links for downloading the data, but make sure you have the link already when you start just log in and start. So this is about Giovanni as I said, you can use multiple-multiple datasets all this will be stored in the cache in memory, and once you go to a new page, all this will be deleted, so all the history will be deleted. And this is really cool analysis that you can do within a couple of seconds and the units would be different here you can see that 0.39 to 1, whereas here the units are different, but again, as I said, there is a scaling which needs to be done, you will have to look at the data, what is the range and then scale it.

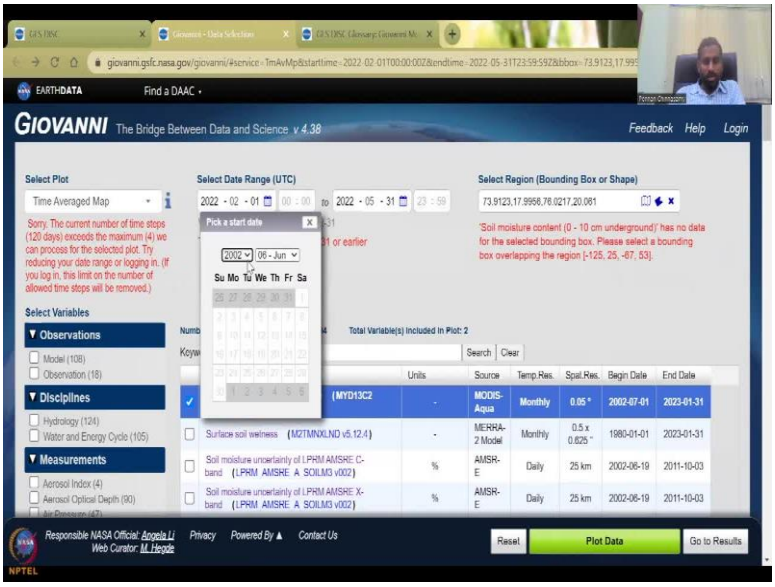
So the value is minus 1 to plus 1, it cannot go above and beyond that. So this is scaling that they have used. So I would recommend using the Giovanni you can go to back to data selection, you can collect different disciplines and then do the same thing if not NDVI, you

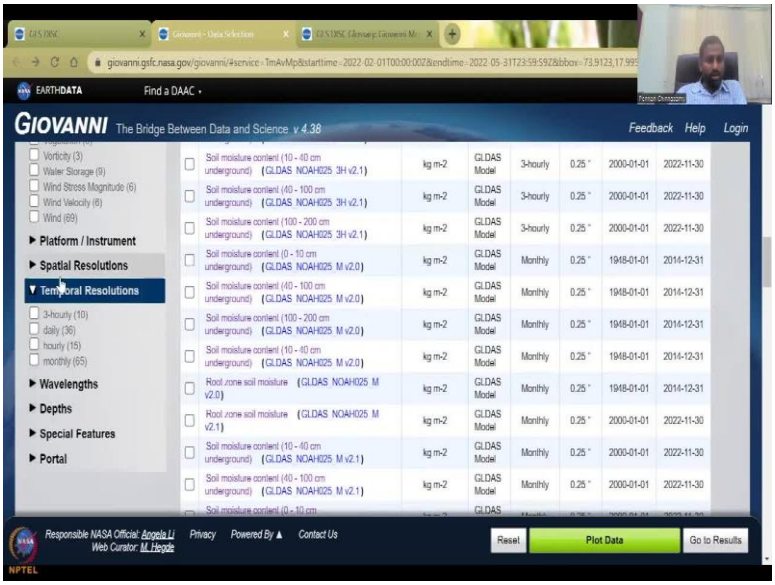
can say vegetation fraction, you can say measurements, what type of measurements you want, let us say soil moisture, you can do soil moisture also, soil moisture is there.

So if you know soil moisture is very high, you do not have to irrigate so that is the understanding of soil moisture. And for that say same location, we can say that this is soil moisture plus percentage at 25 kilometers, it is pretty large compared to the NDVI and then it gives you at different depths also. So you can say at 0 to 40 to 100 centimeters depth. So 0 to 10, 10 to 40, 40 to 100, 100 to 200, so 200 centimeters is divided into 4 data sets and then given. This is also meter by meter cube, so it is kind of you can say unitless, but normally people express it as meter by meter cube. Let us say 0 to 10 percent, which shows the initial part.

(Refer Slide Time: 25:42)






GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Find a DAAC
Vorticity (3)
Water Storage (9)
Wind Stress Magnitude (6)
Wind Velocity (6)
Wind (69)
Platform / Instrument
Spatial Resolutions
Temporal Resolutions
3-hourly (10)
daily (36)
hourly (15)
monthly (65)
Wavelengths
Depths
Special Features
Portal
Soil moisture content (10 - 40 cm underground) (GLDAS NOAH025 3H v2.1)
Soil moisture content (40 - 100 cm underground) (GLDAS NOAH025 3H v2.1)
Soil moisture content (100 - 200 cm underground) (GLDAS NOAH025 3H v2.1)
Soil moisture content (0 - 10 cm underground) (GLDAS NOAH025 M v2.0)
Soil moisture content (40 - 100 cm underground) (GLDAS NOAH025 M v2.0)
Soil moisture content (100 - 200 cm underground) (GLDAS NOAH025 M v2.0)
Soil moisture content (10 - 40 cm underground) (GLDAS NOAH025 M v2.0)
Root zone soil moisture (GLDAS NOAH025 M v2.0)
Root zone soil moisture (GLDAS NOAH025 M v2.1)
Soil moisture content (10 - 40 cm underground) (GLDAS NOAH025 M v2.1)
Soil moisture content (40 - 100 cm underground) (GLDAS NOAH025 M v2.1)
kg m-2
GLDAS Model
3-hourly
Monthly
0.25 °
2000-01-01
1948-01-01
2014-12-31
2022-11-30
Responsible NASA Official: Angela Li
Web Curator: M. Hegde
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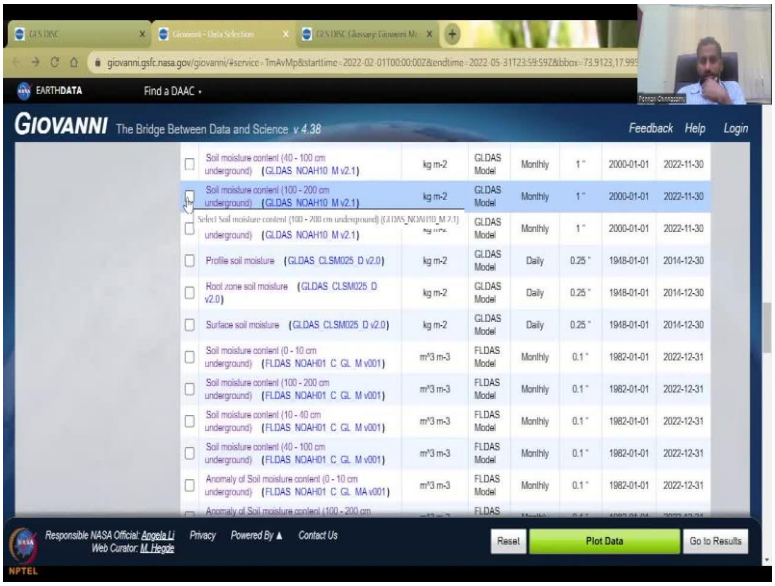
Plot Data
Go to Results
NPTEL


GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Find a DAAC
Soil moisture content (40 - 100 cm underground) (GLDAS NOAH10 M v2.1)
Soil moisture content (100 - 200 cm underground) (GLDAS NOAH10 M v2.1)
Soil moisture content (100 - 200 cm underground) (GLDAS NOAH10 M v2.1)
Profile soil moisture (GLDAS CLSM025 D v2.0)
Root zone soil moisture (GLDAS CLSM025 D v2.0)
Surface soil moisture (GLDAS CLSM025 D v2.0)
Soil moisture content (0 - 10 cm underground) (FLDAS NOAH01 C GL M v001)
Soil moisture content (100 - 200 cm underground) (FLDAS NOAH01 C GL M v001)
Soil moisture content (10 - 40 cm underground) (FLDAS NOAH01 C GL M v001)
Soil moisture content (40 - 100 cm underground) (FLDAS NOAH01 C GL M v001)
Anomaly of Soil moisture content (0 - 10 cm underground) (FLDAS NOAH01 C GL MA v001)
kg m-2
m^3 m-3
GLDAS Model
FLDAS Model
Monthly
Daily
1 °
0.25 °
0.1 °
2000-01-01
1948-01-01
1982-01-01
2022-11-30
2014-12-30
2022-12-31
Responsible NASA Official: Angela Li
Web Curator: M. Hegde
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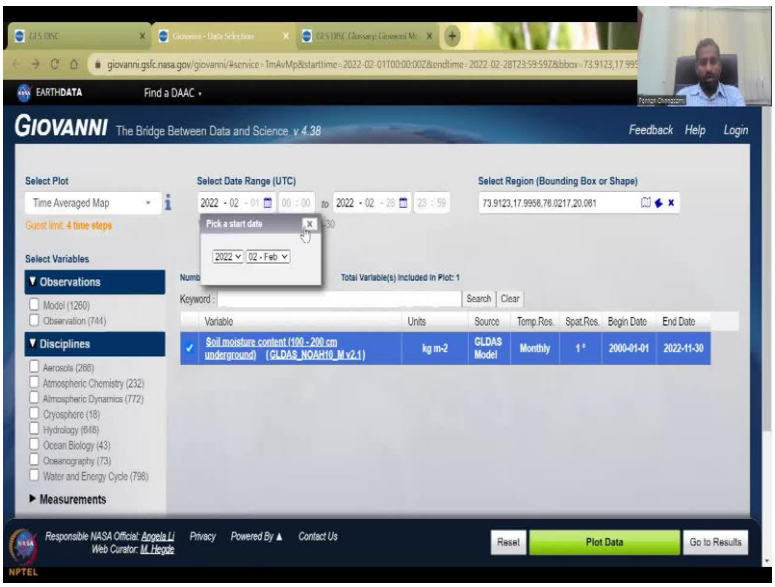
Reset
Plot Data
Go to Results
NPTEL


GIOVANNI The Bridge Between Data and Science v 4.38
Feedback Help Login
Find a DAAC
Select Plot
Time Averaged Map
Guest limit: 4 time steps
Select Date Range (UTC)
2022 - 02 - 01 00 : 00 to 2022 - 02 - 28 23 : 59
Pick a start date
2022 02 - Feb
Select Region (Bounding Box or Shape)
73.9123,17.9956,76.0217,20.061
Select Variables
Observations
Model (1260)
Observation (744)
Disciplines
Aerosols (280)
Atmospheric Chemistry (232)
Atmospheric Dynamics (772)
Cryosphere (18)
Hydrology (648)
Ocean Biology (43)
Oceanography (73)
Water and Energy Cycle (798)
Measurements
Total Variable(s) included in Plot: 1
Keyword :
Search
Clear
Variable
Units
Source
Temp.Res.
Spat.Res.
Begin Date
End Date
Soil moisture content (100 - 200 cm underground) (GLDAS_NOAH10_M v2.1)
kg m-2
GLDAS Model
Monthly
1 °
2000-01-01
2022-11-30
Responsible NASA Official: Angela Li
Web Curator: M. Hegde
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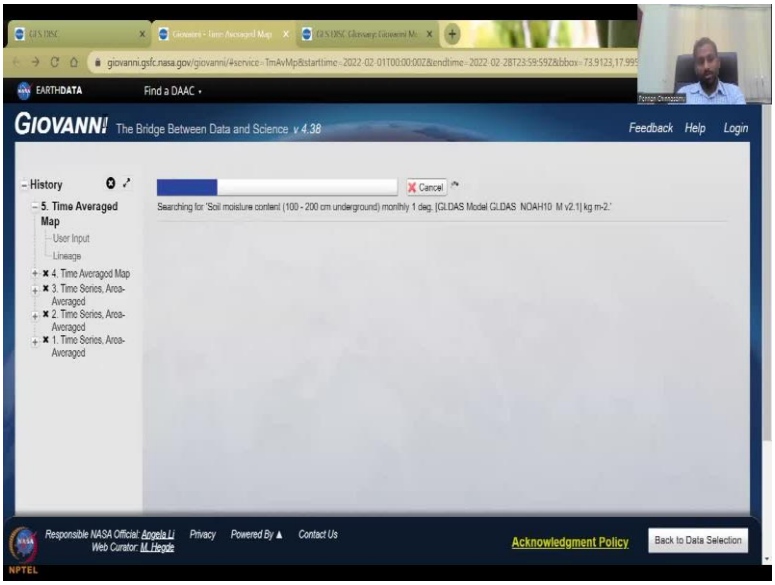
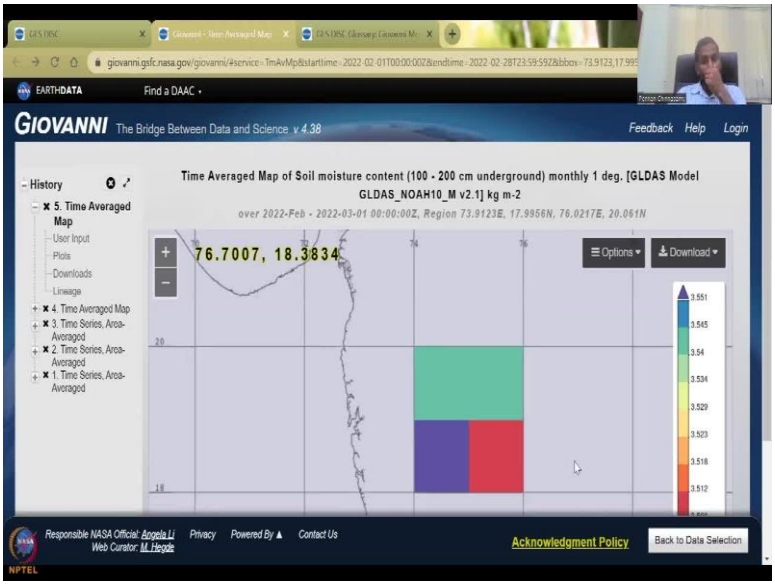
Reset
Plot Data
Go to Results
NPTEL



This is daily, so you can see here that the soil moisture data that we click is daily and it says only 4 days you can click. So let us see what data rates they have. You can see the most recent one is 2016 for that data, is that correct? Yes, it has 1979 to 2016, so it stops at 2016. So we cannot use if you want it and use it, but I would go for more 2023 data so that we can have some soil moisture. So there is a soil moisture 2011, you can limit the data here in temporal resolutions, monthly spatial resolutions, etc.

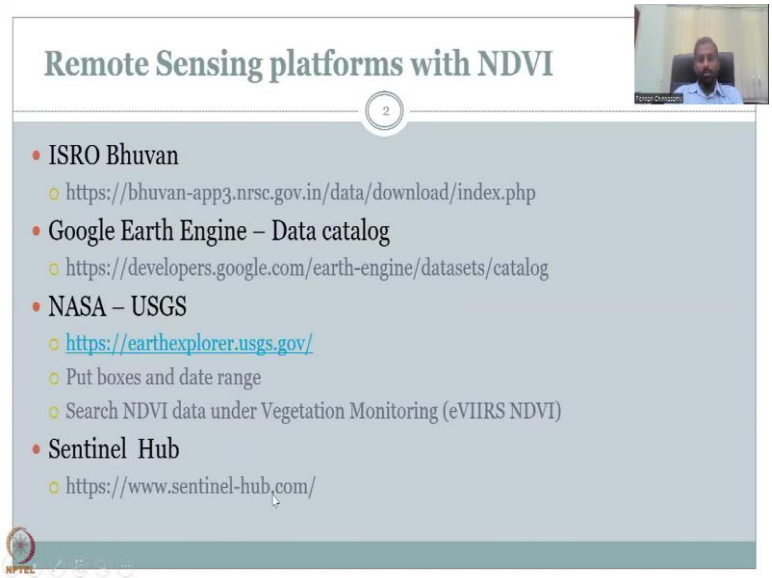
So these are for 2022, so this we can do 2022 November is available. Let us click this one and unclick the other one. And then let us say date cannot have so much date. So we will have to say 2, and then only daily. So daily, you can say these are the 2 datasets and NDVI I am taking out. So, let us pick a date and plot data, it will plot the data within February whatever data is available, and then plot the maps for that particular thing. So it says scanning data for that particular data set.

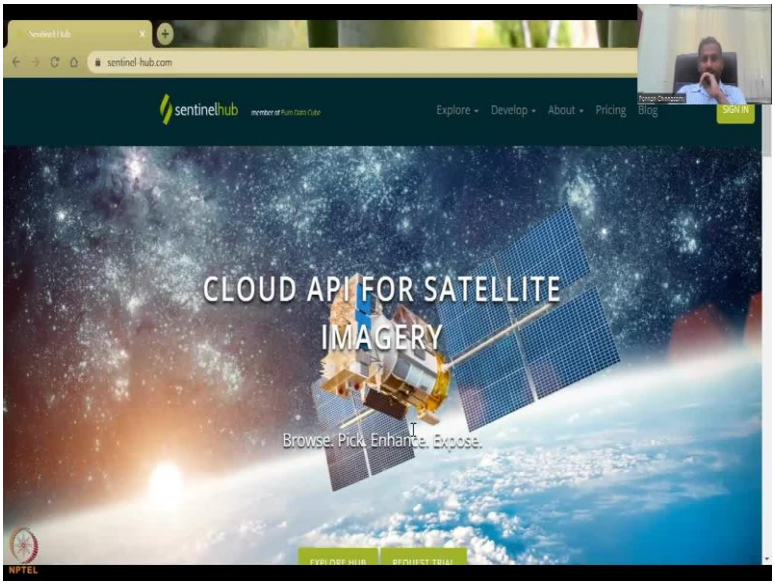
(Refer Slide Time: 27:13)



Giovanni is very-very important for understanding different sectors. So now you could see that this is 100 to 200 centimeters underground soil moisture value at 25 by 25 kilometer grid. So this is pretty big, but it is pretty useful because these are based on long penetration data. So, even if we have this you can tell the district collectors that if there is need to be water released or groundwater is going to be used can be told by these images. So with this, I will stop the Giovanni exercise and NASA exercise from US now let us go to Sentinel hub, as we discussed in the slide.

(Refer Slide Time: 27:56)

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CLOUD API FOR SATELLITE IMAGERY
Browse. Pick. Enhance. Expose.
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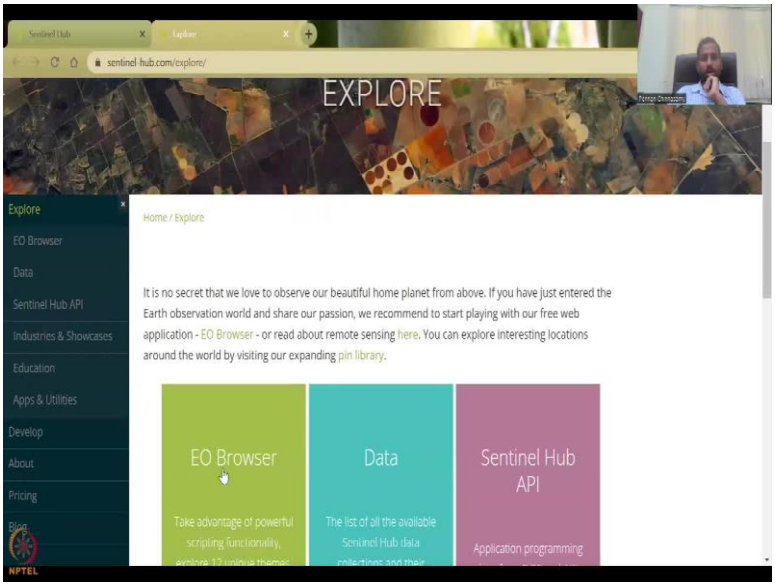
sentinel-hub.com/explore/
EXPLORE
Explore
EO Browser
Data
Sentinel Hub API
Industries & Showcases
Education
Apps & Utilities
Develop
About
Pricing
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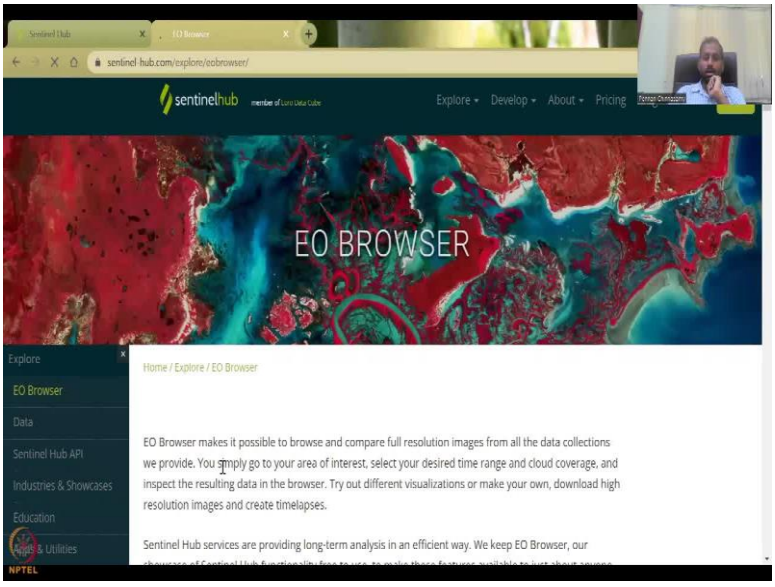
Home / Explore
It is no secret that we love to observe our beautiful home planet from above. If you have just entered the Earth observation world and share our passion, we recommend to start playing with our free web application - EO Browser - or read about remote sensing here. You can explore interesting locations around the world by visiting our expanding pin library.
EO Browser
Take advantage of powerful scripting functionality,
Data
The list of all the available Sentinel Hub data
Sentinel Hub API
Application programming
NPTEL


sentinel-hub.com/explore/eobrowser/
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Explore
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About
Pricing
EO BROWSER
Explore
EO Browser
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EO Browser makes it possible to browse and compare full resolution images from all the data collections we provide. You simply go to your area of interest, select your desired time range and cloud coverage, and inspect the resulting data in the browser. Try out different visualizations or make your own, download high resolution images and create timelapses.
Sentinel Hub services are providing long-term analysis in an efficient way. We keep EO Browser, our
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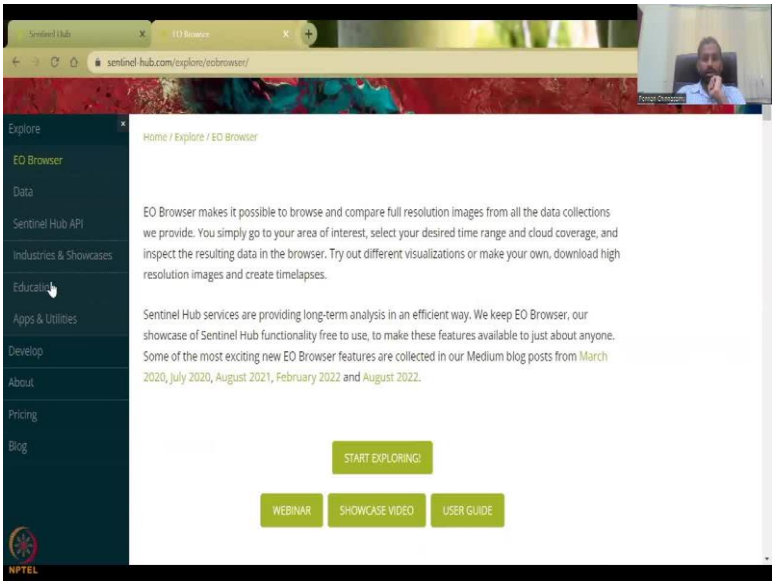
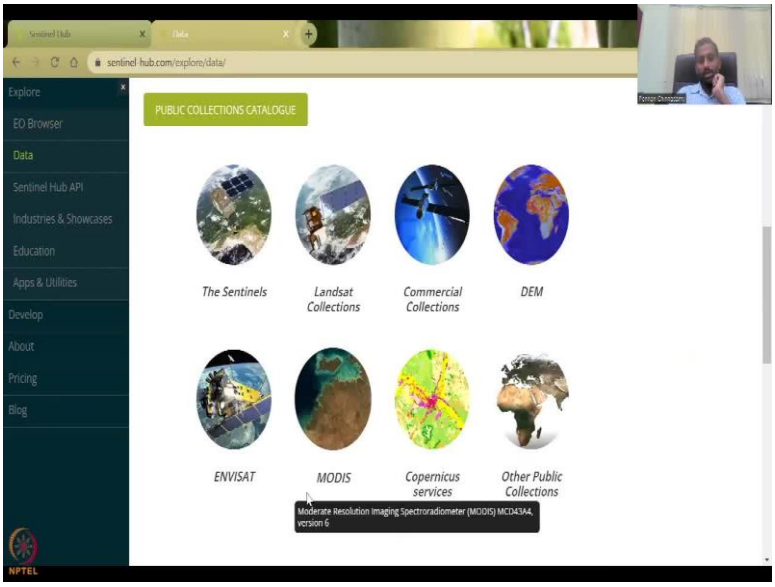
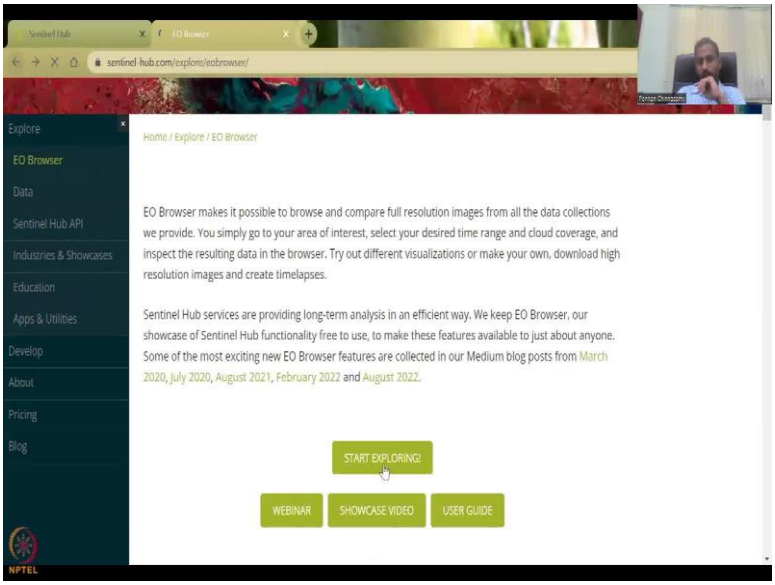


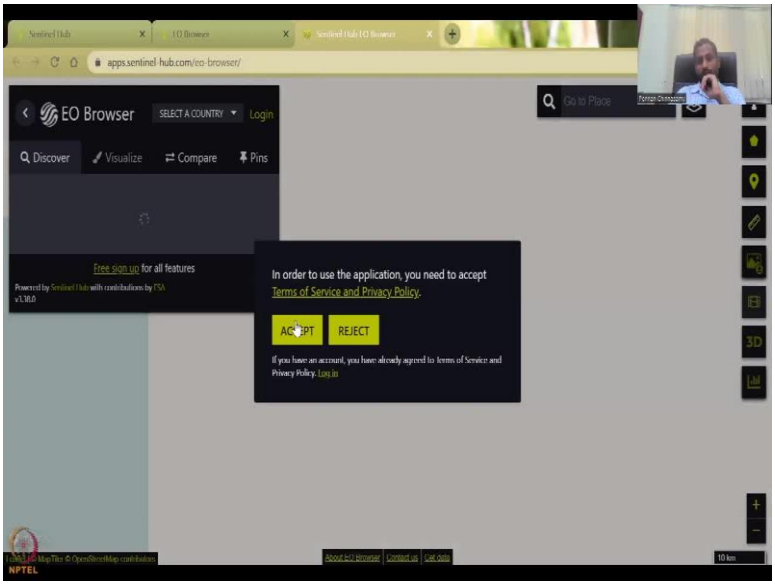


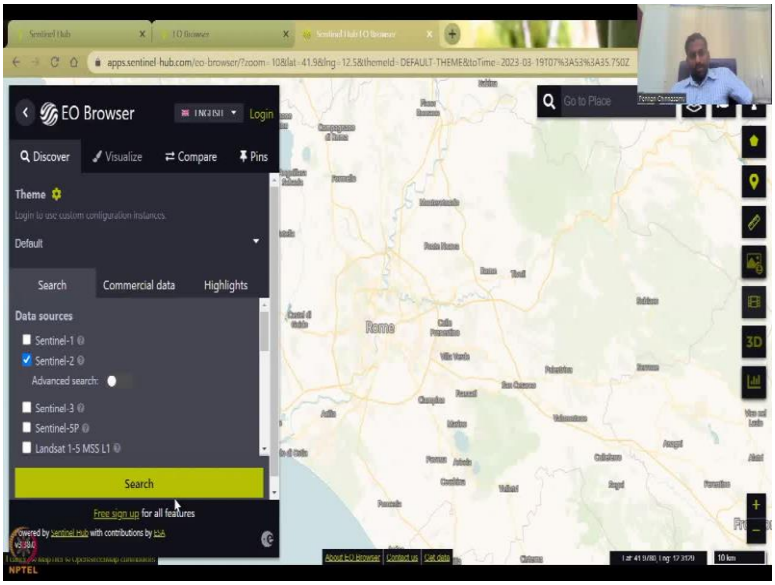
So this is the link that we will be using the Sentinel hub. So we are going to go to the Sentinel hub now by opening a new tab. So from here we sent in a hub, sentinel-hub.com which I have given the link in the presentation. So it says a cloud API for satellite imagery and you can use for explorer hub, request a trial, you can go to the Explore the hub part.

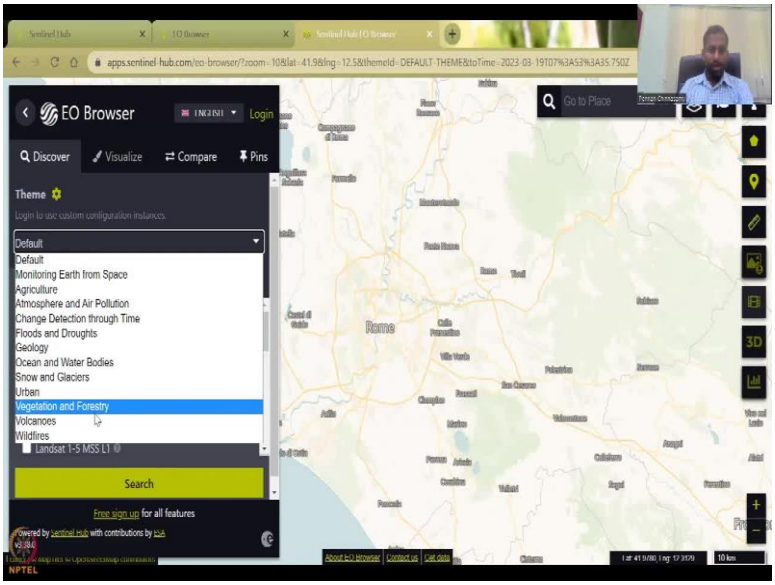
So here is the, what the data is about. I would like you to take you to the EU Observer which is the Earth observation browser. And all these data sets are there, what data is available, etc. We will just jump into the data section and you can see that the Sentinel which is European, Landsat, NASA, commercial collections, DEM, Copernicus, again service database from Europe, what is ME SAT US etc. So you can also bring your own data and then undo it.

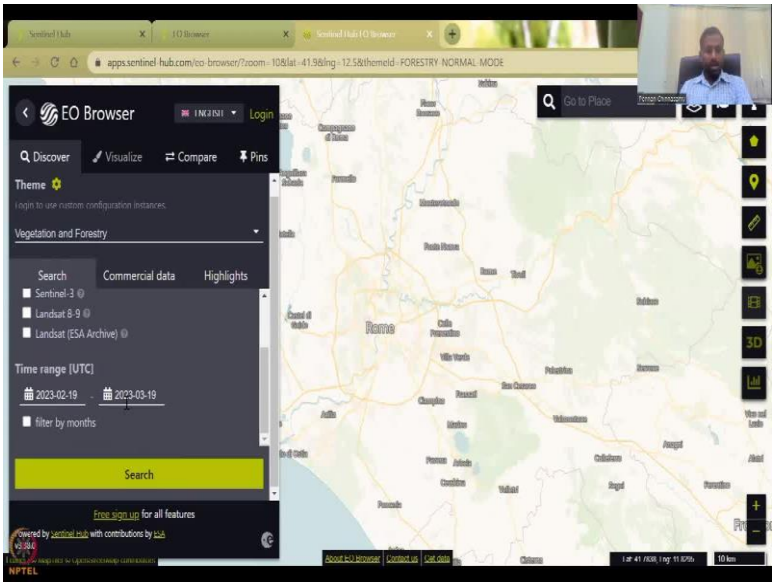
(Refer Slide Time: 29:01)








EO Browser
Login
Discover
Visualize
Compare
Pins
Theme
Default
Monitoring Earth from Space
Agriculture
Atmosphere and Air Pollution
Change Detection through Time
Floods and Droughts
Geology
Ocean and Water Bodies
Snow and Glaciers
Urban
Vegetation and Forestry
Volcanoes
Wildfires
Search
Free sign up for all features
Go to Place
Rome


EO Browser
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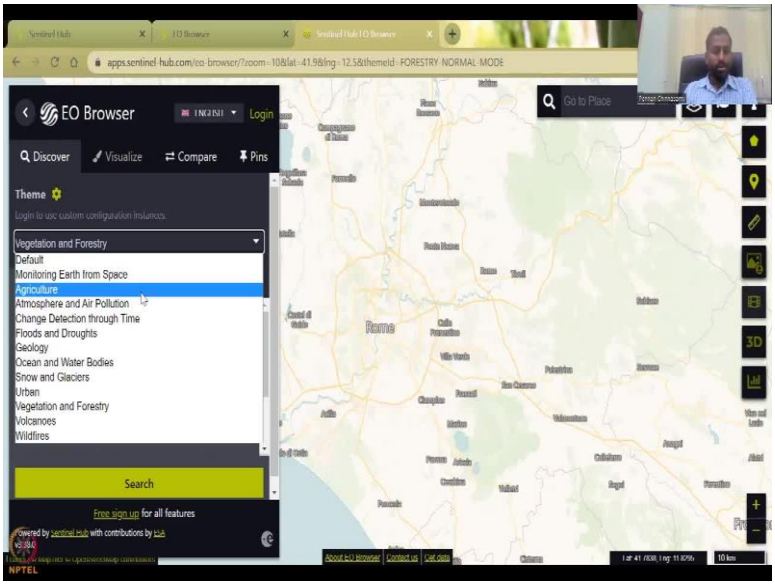
Discover
Visualize
Compare
Pins
Theme
Vegetation and Forestry
Search
Commercial data
Highlights
Sentinel-3
Landsat 8-9
Landsat (ESA Archive)
Time range [UTC]
2023-02-19
2023-03-19
filter by months
Search
Free sign up for all features
Go to Place
Rome


EO Browser
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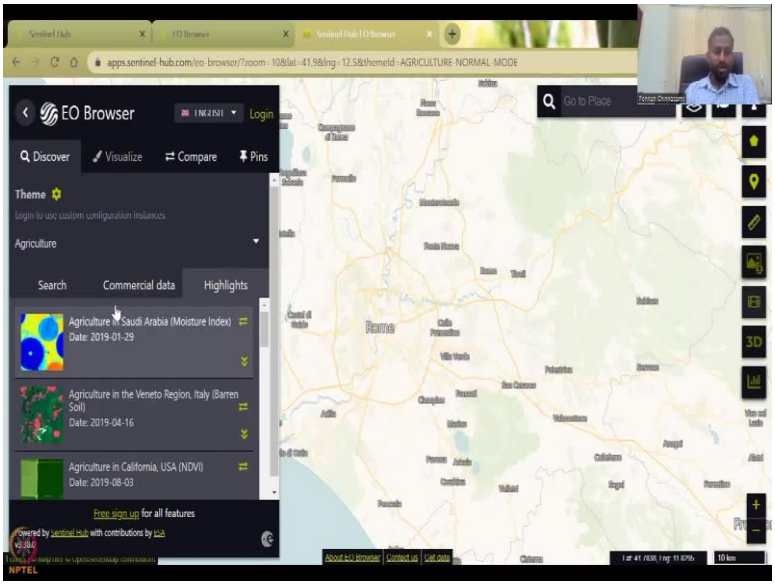
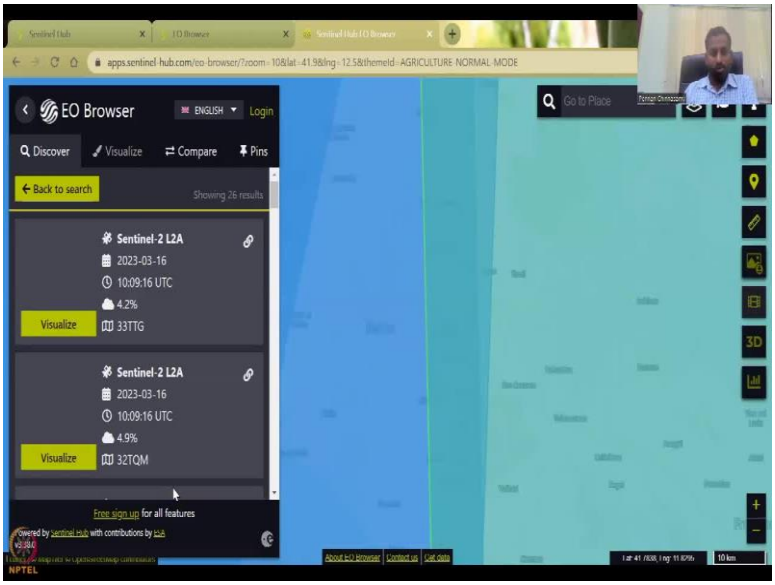
Compare
Pins
Theme
Vegetation and Forestry
Default
Monitoring Earth from Space
Agriculture
Atmosphere and Air Pollution
Change Detection through Time
Floods and Droughts
Geology
Ocean and Water Bodies
Snow and Glaciers
Urban
Vegetation and Forestry
Volcanoes
Wildfires
Search
Free sign up for all features
Go to Place
Rome

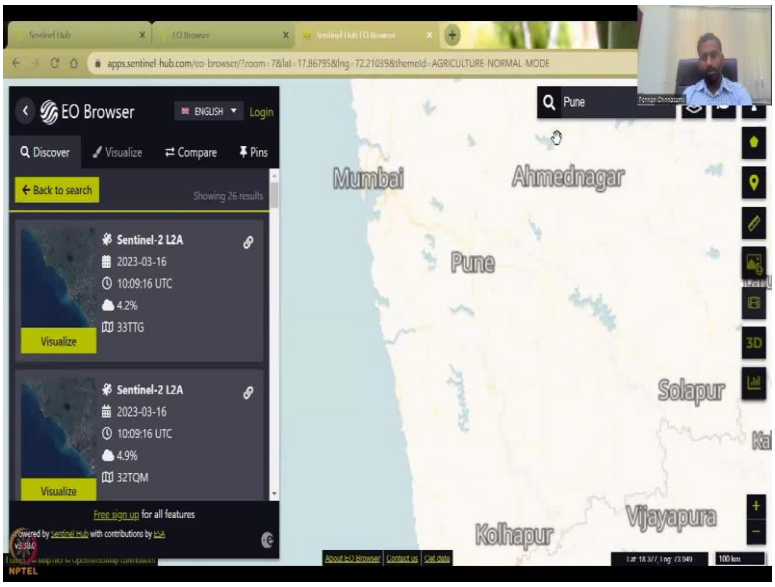


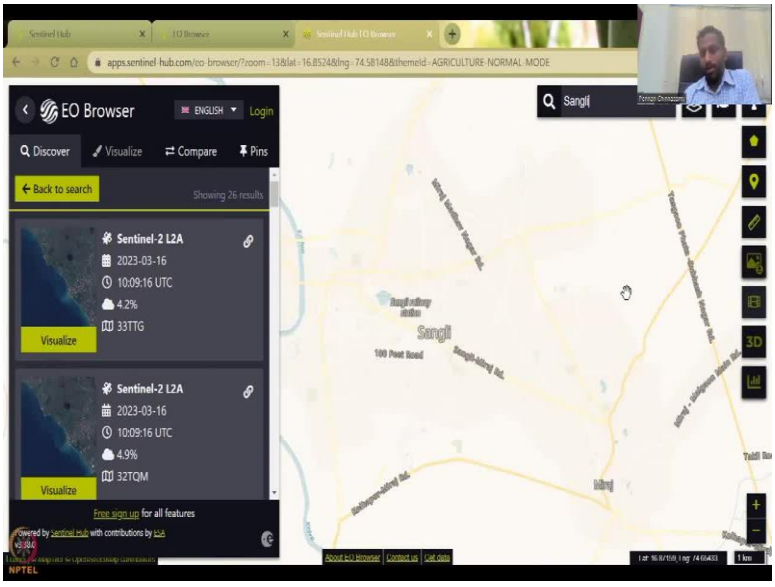
So we will go back and then launch the Explorer, EU Explorer is what we need to open please note the browser extensions etc. So you can accept the I will not use the tutorial so just go here and then use it. So here we have already done a couple of exercises but let us see what we want. You can say that you want these are the different indicators you have, you have agriculture vegetation, that is good vegetation. In the vegetation, you see certain data sources that are existing and up to 2023, 19 March which is kind of today where we are doing the range, we can say February to March is good and that is the data that is available.

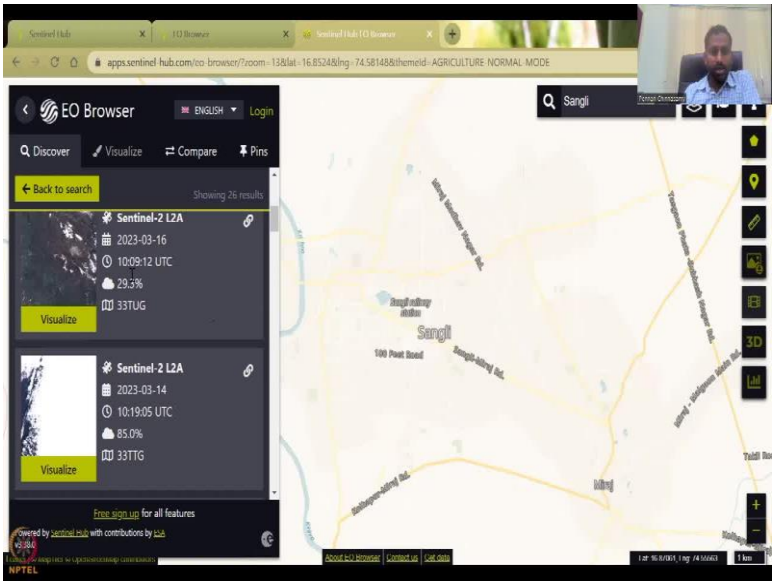
So you can say that you can say advanced search for Sentinel, etc. or we can say agriculture and then agriculture is only sentinel to and then we can get this data. So commercial data is also available if you want you can sign up and then do it you have to pay for some of it and then highlights is what agricultural regions. Then recent news articles they have written published using this data.

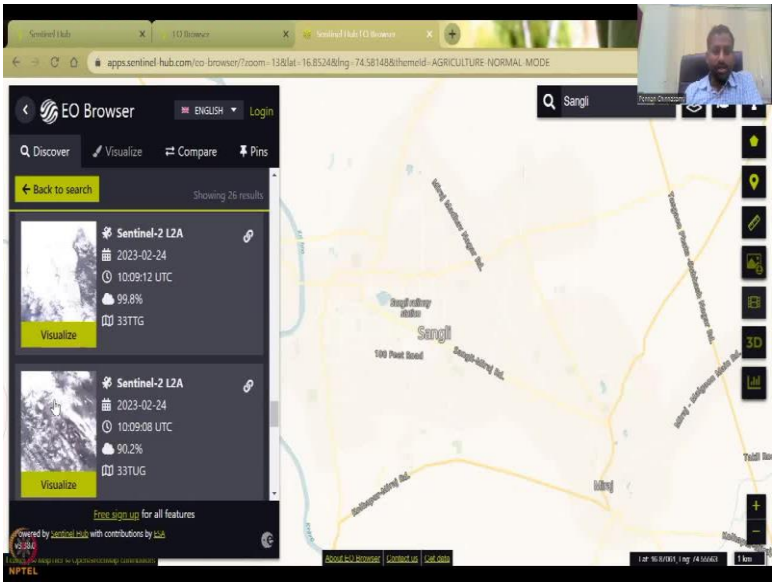
(Refer Slide Time: 30:21)









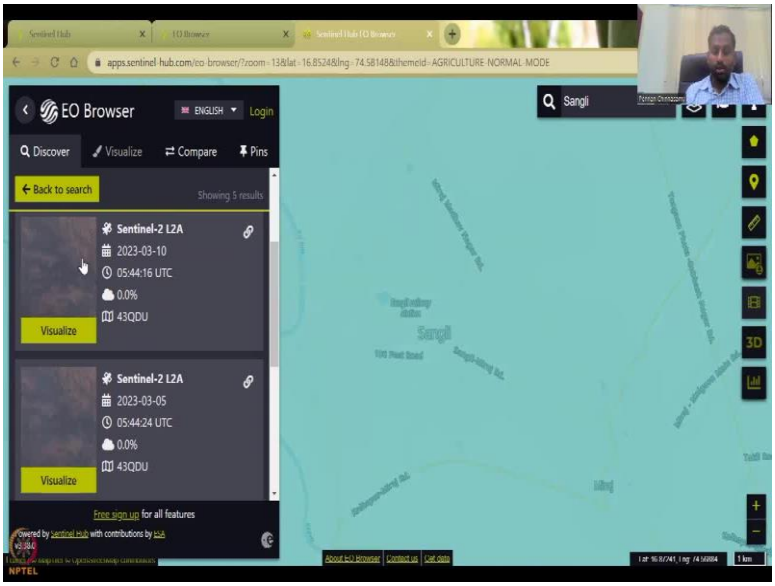


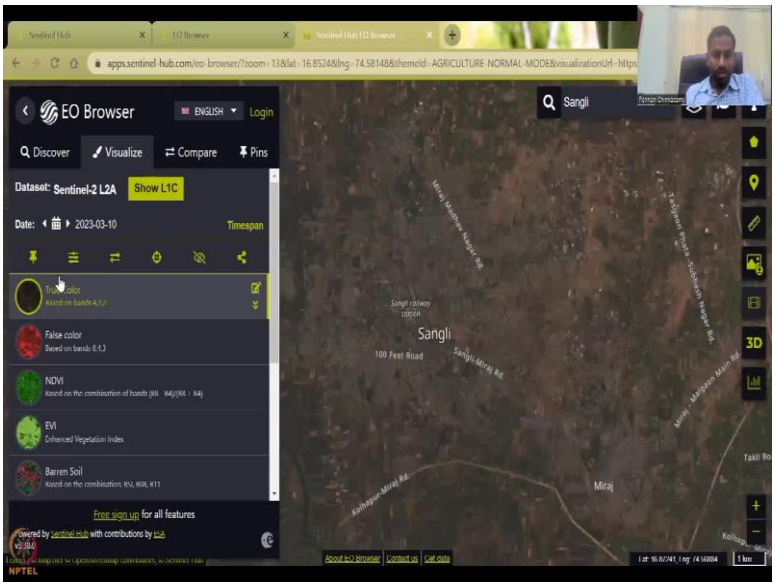
So let us go to search and then this data fine, we will just search let us see how much data we have. So this is 19th of March we are on and you can see this is just 3 days ago this image was taken and you can already access it here. So this is very-very interesting and cool, because before that, I should have done Pune just to keep it in Pune, Maharashtra. So we are in Pune, so you can see Pune is coming when you click on a Maharashtra.

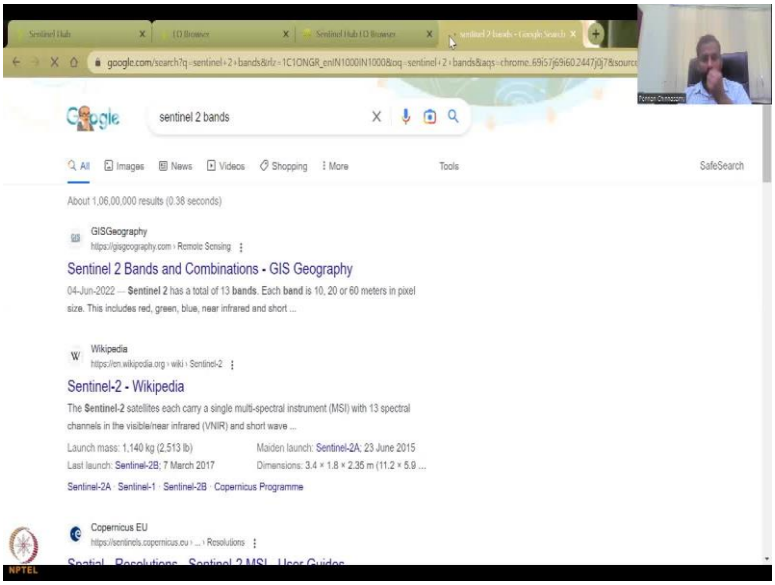
So Pune region, let us say Sangli, Sangli why? Because it has a lot of sugar cane. So you can see where NDVI for the sugar cane. So until now, now we are in Sangli, so you can see that these are the other tools that are available, you can also do the plot as we did in Giovanni, you can plot the data, but first we have to select the layer. So here we have 36 datasets based on the data date. And look at this, you have already cloud cover. So do you use it? We do not

want to use all these cloud cover data. So normally the best data sets are coming on the top. So, we will go to back to search and then search now for Pune Sangli region.

(Refer Slide Time: 31:36)



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04-Jun-2022 — Sentinel 2 has a total of 13 bands. Each band is 10, 20 or 60 meters in pixel size. This includes red, green, blue, near infrared and short ...
Wikipedia
https://en.wikipedia.org › wiki › Sentinel-2
Sentinel-2 - Wikipedia
The Sentinel-2 satellites each carry a single multi-spectral instrument (MSI) with 13 spectral channels in the visible/near infrared (VNIR) and short wave ...
Launch mass: 1,140 kg (2,513 lb)
Maiden launch: Sentinel-2A; 23 June 2015
Last launch: Sentinel-2B; 7 March 2017
Dimensions: 3.4 × 1.8 × 2.35 m (11.2 × 5.9 ...
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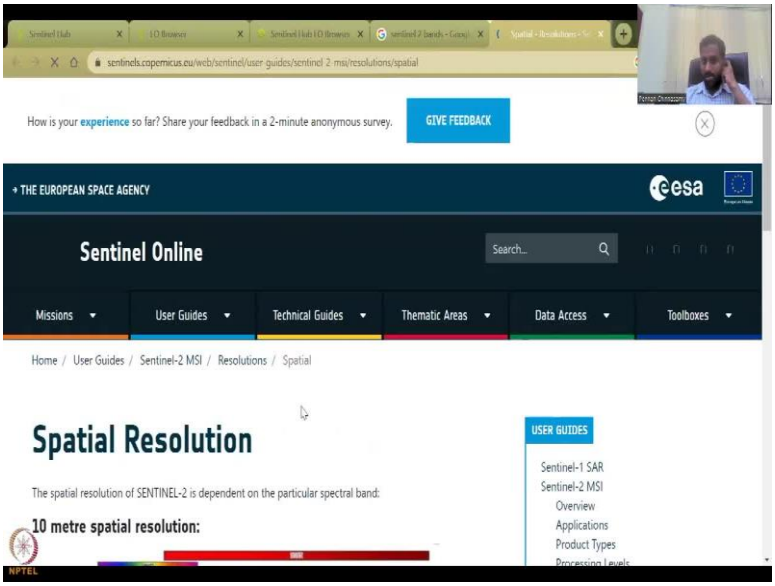
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10 metre spatial resolution:
USER GUIDES
Sentinel-1 SAR
Sentinel-2 MSI
Overview
Applications
Product Types

The spatial resolution of SENTINEL-2 is dependent on the particular spectral band:
10 metre spatial resolution:
Band 8 (842 nm)
Band 4 (665 nm)
Band 3 (560 nm)
Band 2 (490 nm)
Figure 1: SENTINEL-2 10 m spatial resolution bands: B2 (490 nm), B3 (560 nm), B4 (665 nm) and B8 (842 nm)
20 metre spatial resolution:
Sentinel-2 MSI
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Anomaly Database
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Sentinel-3 OLCI
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Document Library
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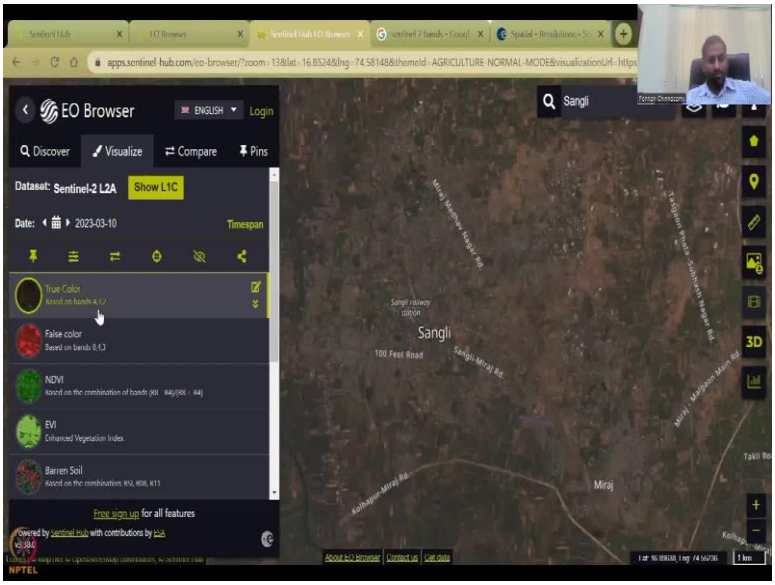
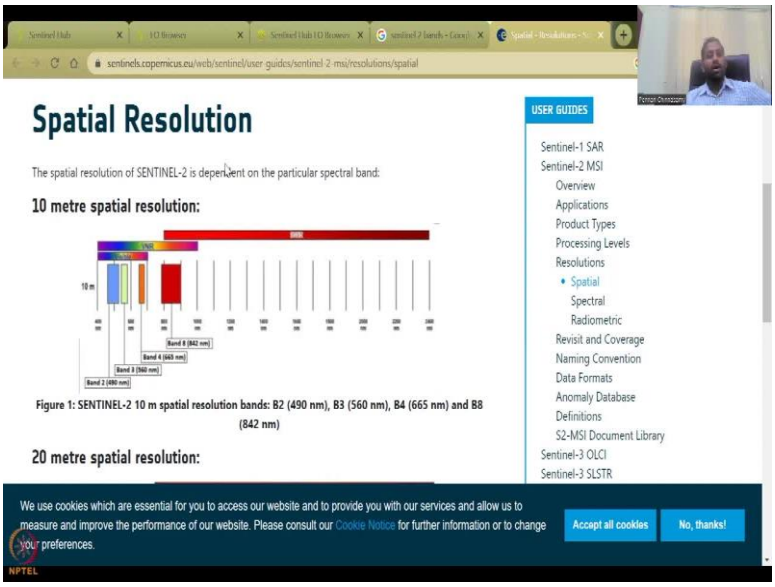
So, now the data is getting updated, because Sangli we did not type initially. So now Sangli and we have around only 5 results and this is good, this is really good because March 10 this data has been taken. So let us do visualize. So, the Sentinel 2 data has been visualized again Sentinel 2 data has multiple bands. And this true color is made up only the 3 bands 4, 3 and 2, which is giving you the true color and if you want we can look at what are the band's Sentinel 2 bands, and then you will see a list of the bands in Sentinel 2 that are available.

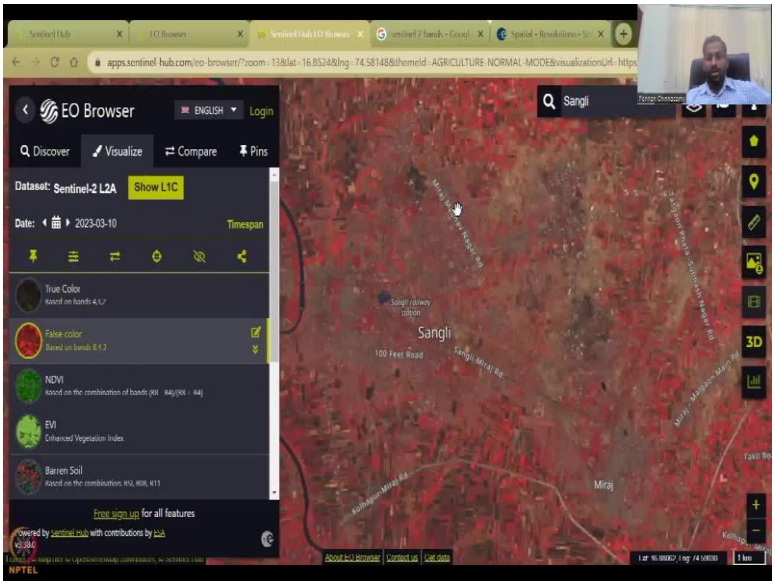
So Copernicus is good because that is where the European Space Agency is having. And then you have all these central 2 has 10 spatial resolution bands B 2, B 3, B 4 and B 8, etc. And then 20 meters spatial resolutions, these are the other 20 meters spatial resolution. So, some bands are high resolution, some bands are low resolution. So the 10 meter spatial resolution is B 2, B 3, B 4, B 8, B 8 is kind of your red, we will check what it is. And then your 2 meter 20 meters multiple bands and then you have these bands also.

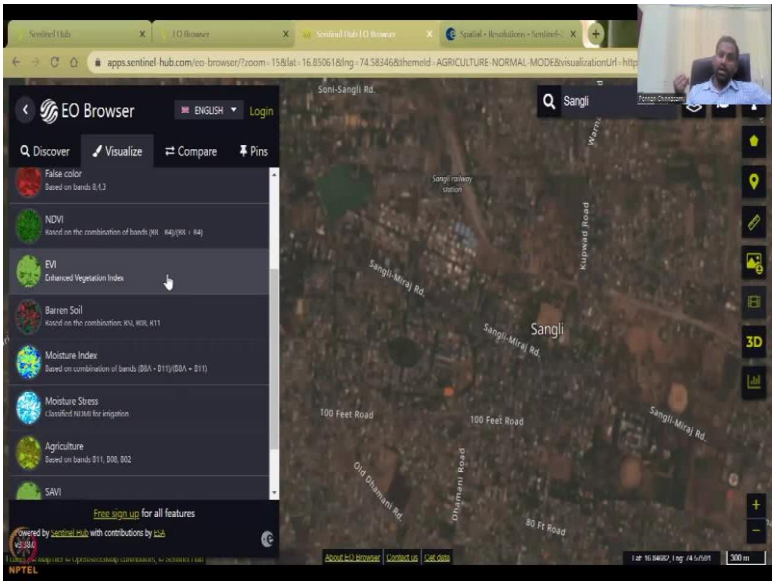
So you can see here it is given here as B 8 is if we can zoom in, that would be great, we cannot. So B 8 is here B 3, B 4, B 8, so B 8 is in the red, visible near red, near infrared, along the red side. And then B 2 is your blue and all these are visible. So visible is what we can see vibgyor, the vibgyor colors we can see and then the B 3 is your green light green you have and then the B 4 is your orange kind of red, and then the B 8 we cannot see by human eye and that is your red color. So this is mixed in the composite.

(Refer Slide Time: 33:38)





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EVI
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Barren Soil
Based on the combination: #12, #08, #11
Moisture Index
Based on combination of bands (B8A - B11)/(B8A + B11)
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Classified NDMI for irrigation
Agriculture
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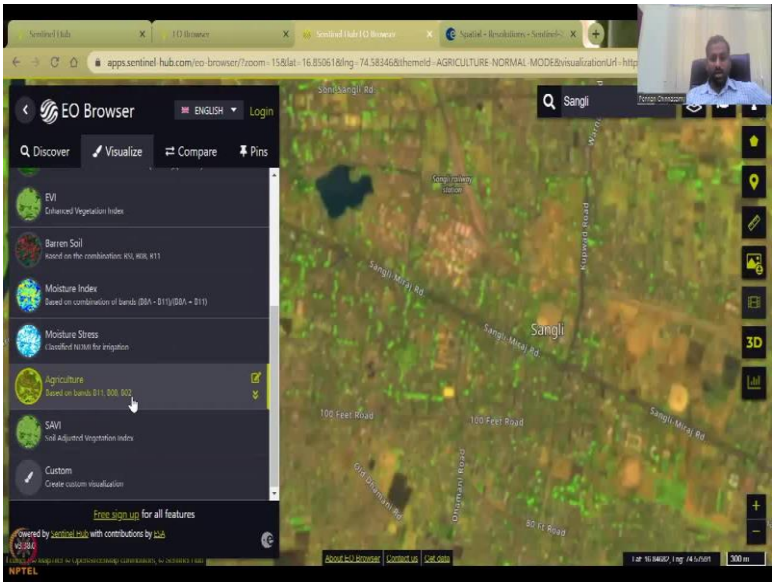
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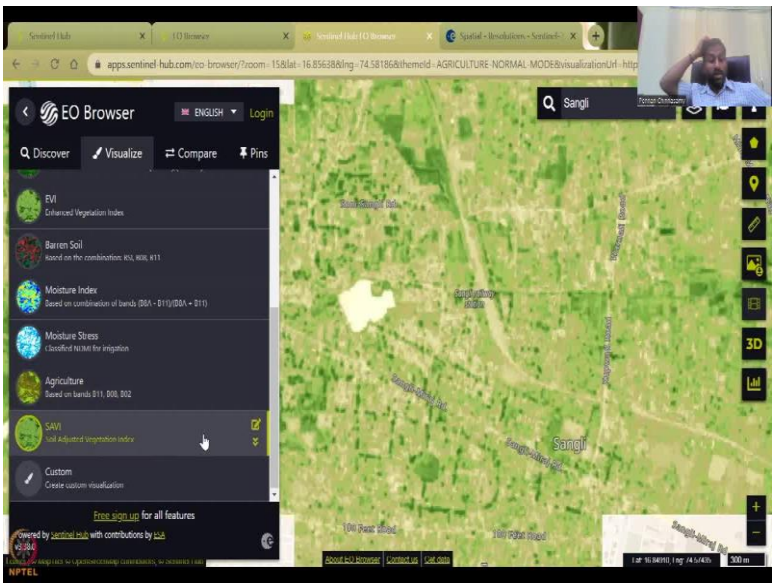
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Moisture Index
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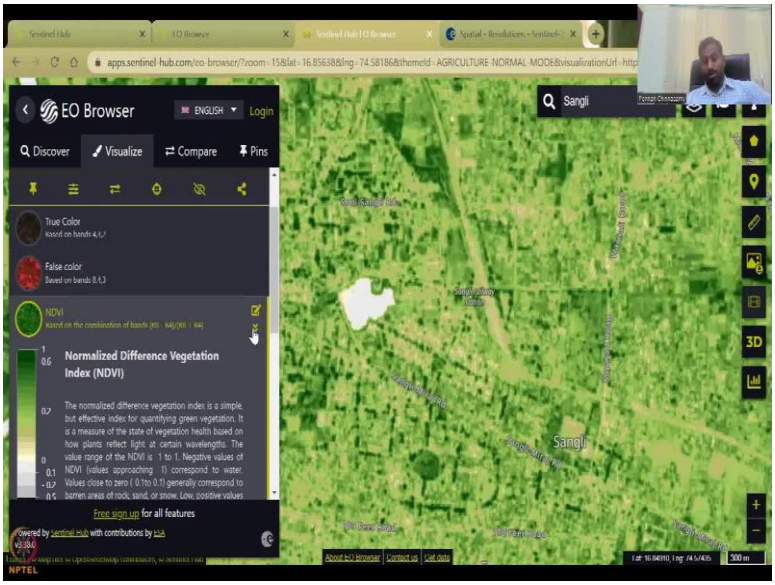
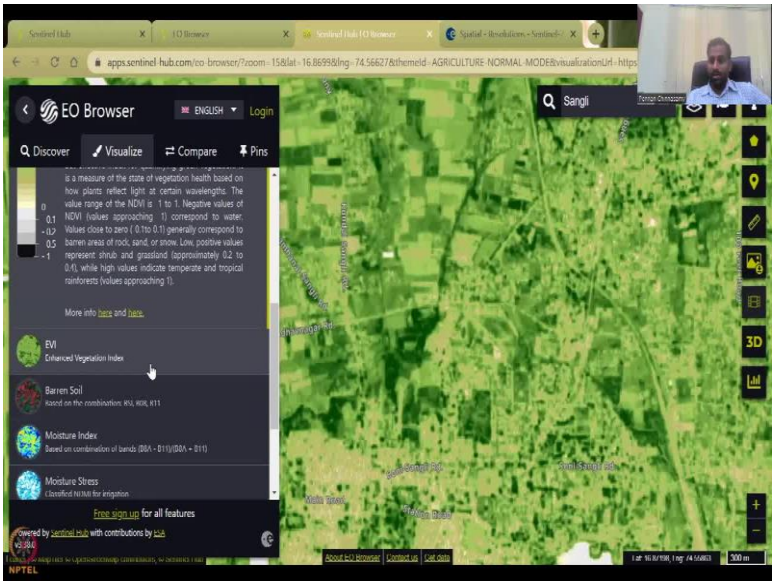


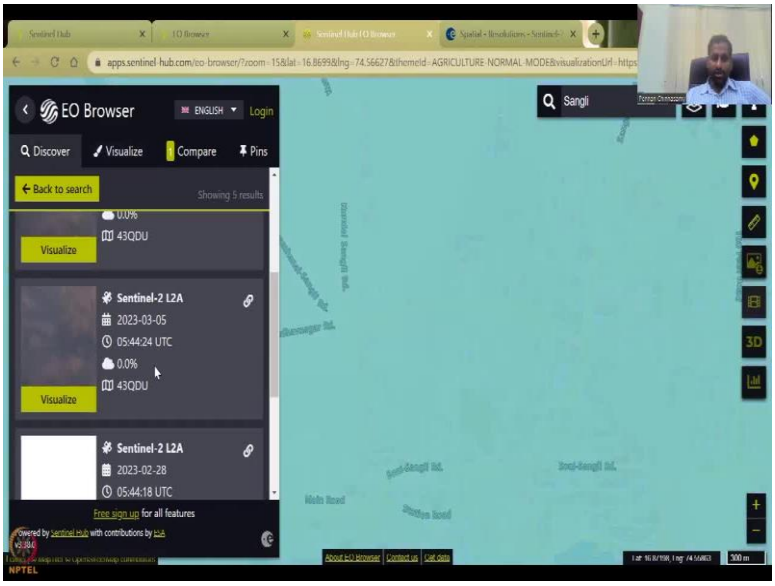
So now if we go to the Sentinel hub, it says 432. So, the 432 is 432 are mixed, so red, blue green are mixed and then the primary colors are mixed to make this image which is the true color. The false color is 843, so 843 is a false color it uses the infrared region data. So 8 data is red which is the visible near infrared some part of it is visible and that is why you see the red. It gives you the growing period, growing color, etc.

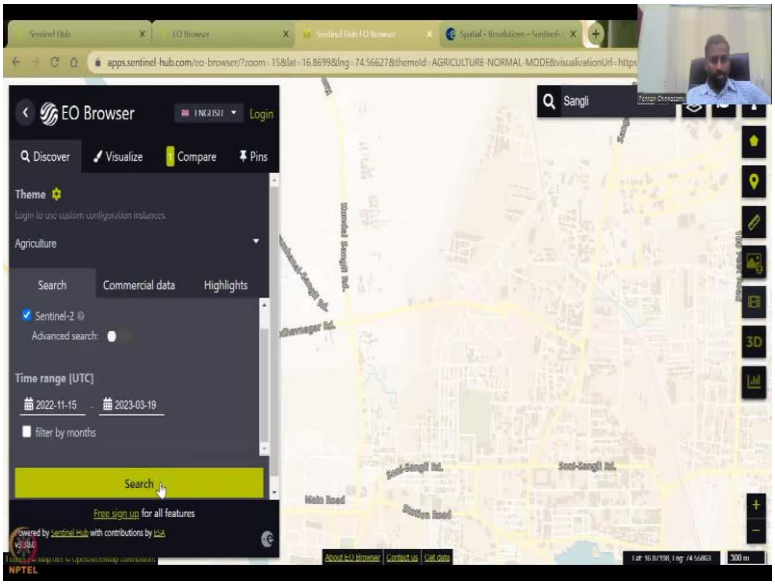
So let us go to true color you can see all these land parcels, Sangli is very, very known for sugarcane. So you will see a lot of sugarcane in Sangli coming up soon. And then the indicators, so these are the indicators you have NDVI, EVI, enhance vegetation index, the normal is different vegetation index, and then the moisture stress.

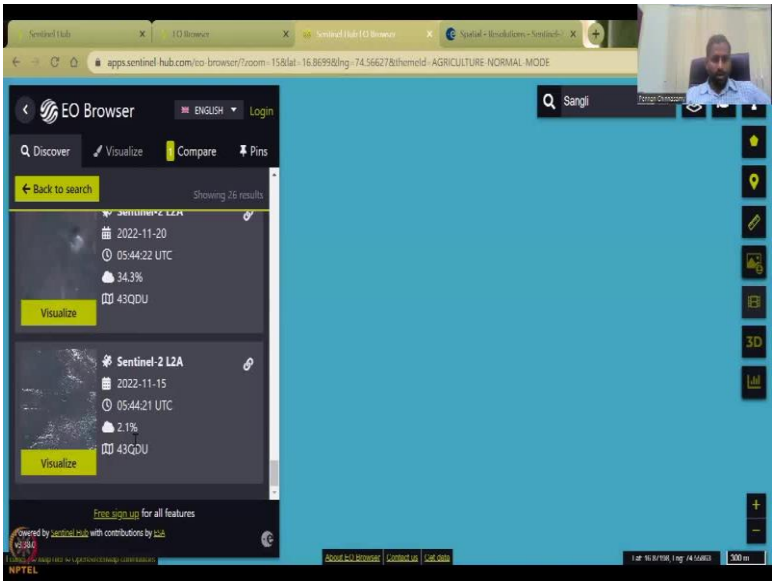
Agriculture is B 11, B 8, B 2, so you can see where the agriculture is happening around the area. And then you have SAVI, Soil Adjusted Vegetation Index. So just by clicking the interior just populates the metrics, the indicators just populate and this is the beauty of using the Sentinel-hub. So every platform has its own use and benefits because they do not want to redo what others are doing. We are more interested in NDVI, so beautifully NDVI comes and for that particular date, which is just 15 days ago we are looking at.

(Refer Slide Time: 35:11)





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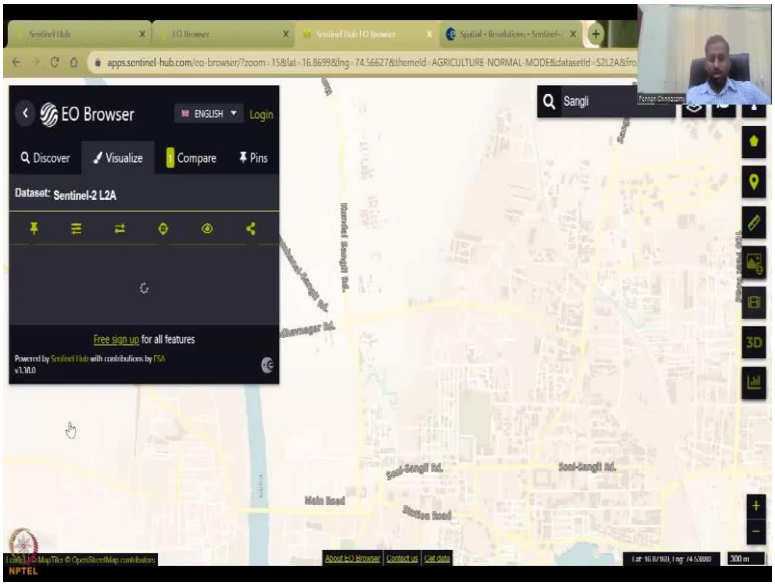
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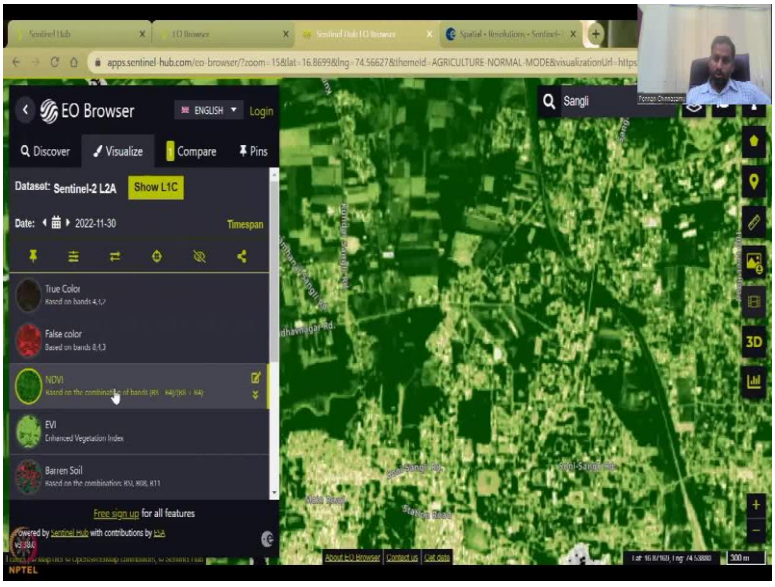
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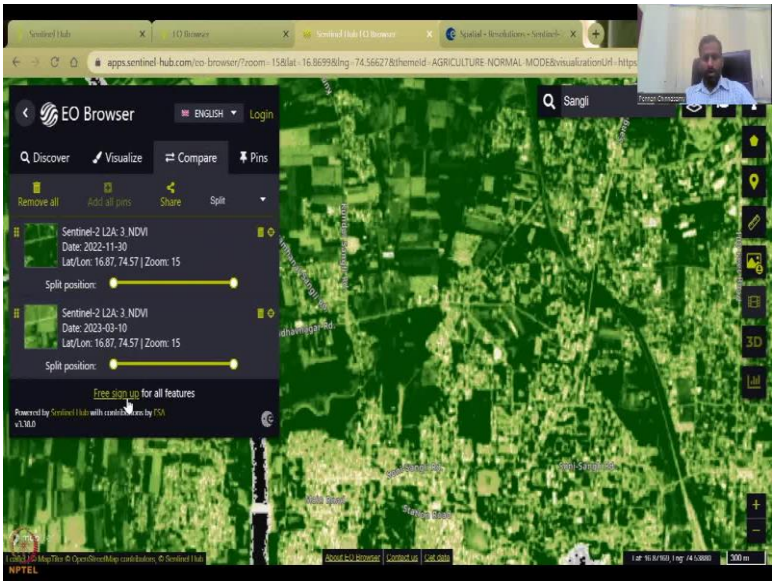
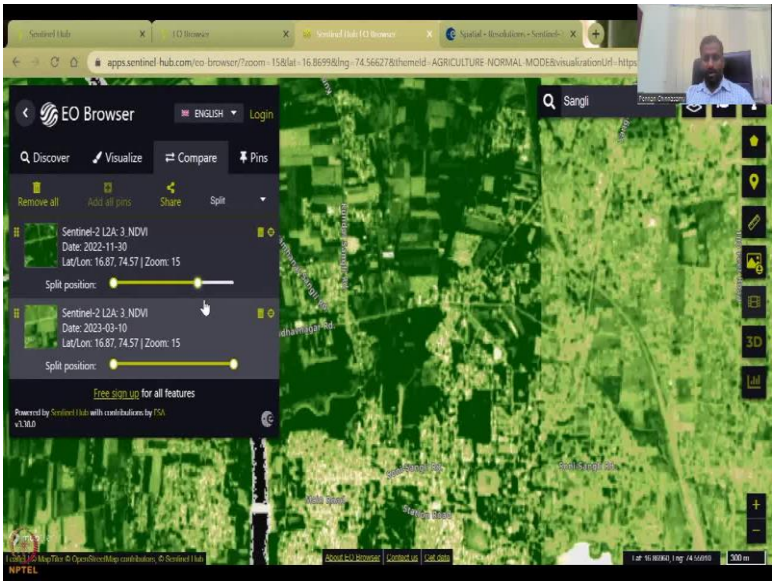


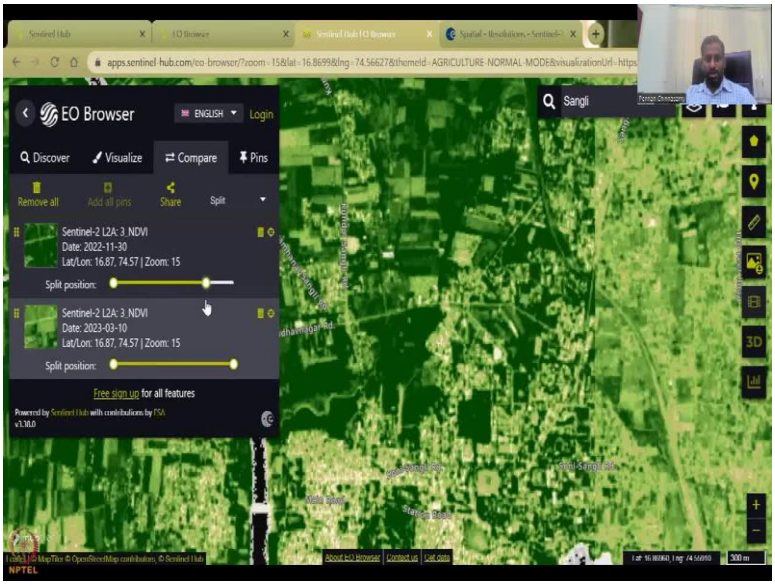
So let us look at the date. So this is 2023-10, 9 days ago, not even 2 weeks and you can also say how we can compare. So this is March, and you could see that there is a lot of parcels of land that is being under cultivation, I have been there, so I have seen a lot of sugarcane and literally a lot of sugarcane being harvested. So one thing we can do is beautifully we can add to the compare. So I am adding, it adds to compare here also, you can do a log in but to visualize is a guest, it is you do not have to do all these things.

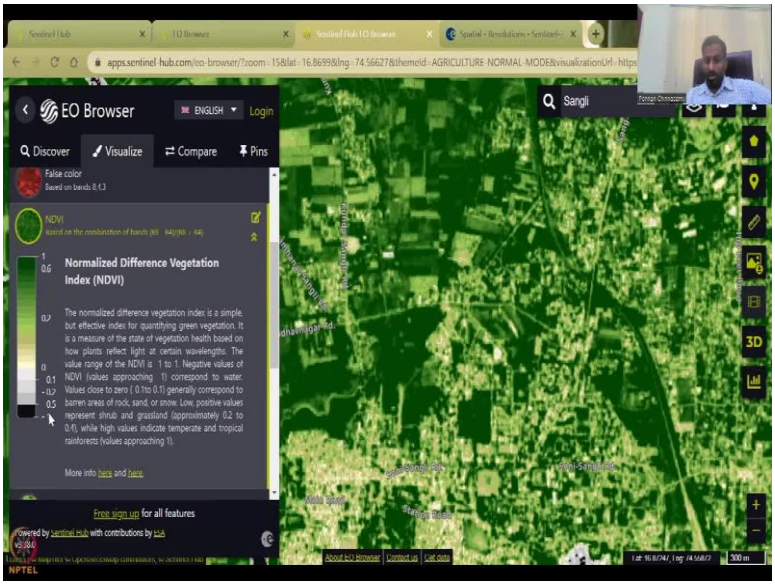
So you can go to back to search. So one dataset we have created, you are going to discover you to take the other datasets. And then this is in February, what we could do is we could realign our back to search and then say maybe pick a previous date in 2022 let us say November and then say search, you can see search for the same dates November 15. So it search and then you get the November month at the bottom. So you have a November months, you can sort it by date or the best data, so this data is good.

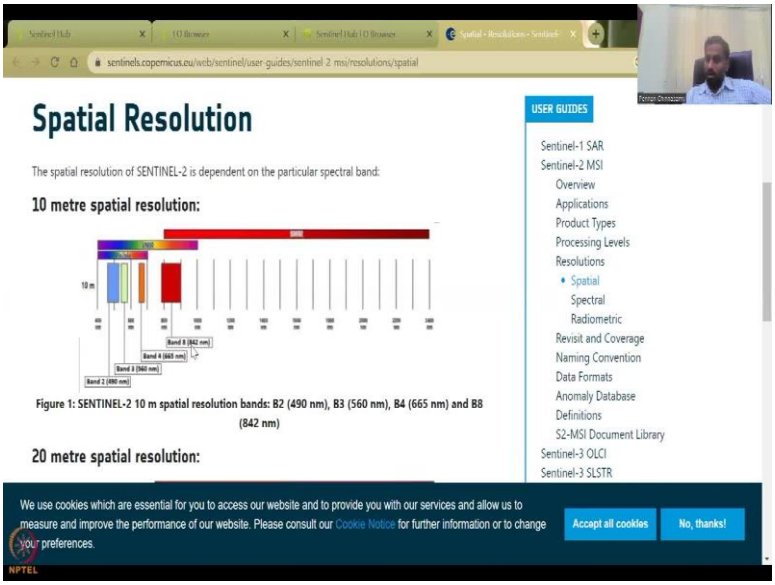
So all these data have some issues, cloud cover, some white is there we do not want that we can use this color so clean image, you can say visualize, the same visualizations comes up, let us say NDVI, and then NDVI gets populated and I am go direct to the compare. So compare is we want to compare live the to NDVI data visually, and then we can download it if we want to download. So free to sign up so that you can download all these datasets.

(Refer Slide Time: 36:59)





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The spatial resolution of SENTINEL-2 is dependent on the particular spectral band:
10 metre spatial resolution:
Band 2 (490 nm)
Band 3 (560 nm)
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Band 8 (842 nm)
Figure 1: SENTINEL-2 10 m spatial resolution bands: B2 (490 nm), B3 (560 nm), B4 (665 nm) and B8 (842 nm)
20 metre spatial resolution:
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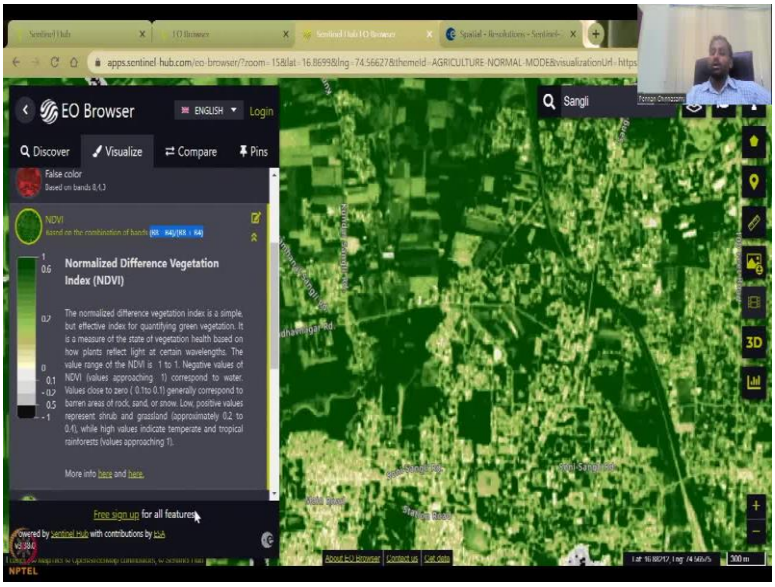
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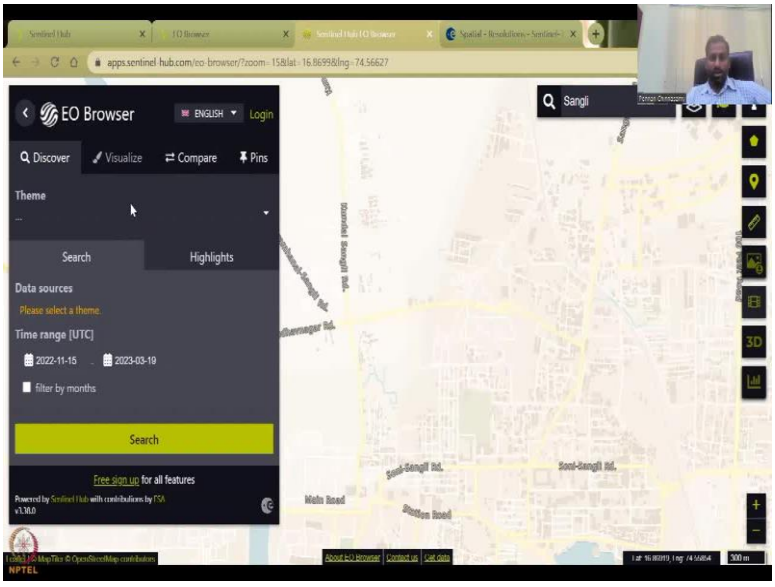
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Sangli
Main Road
3D
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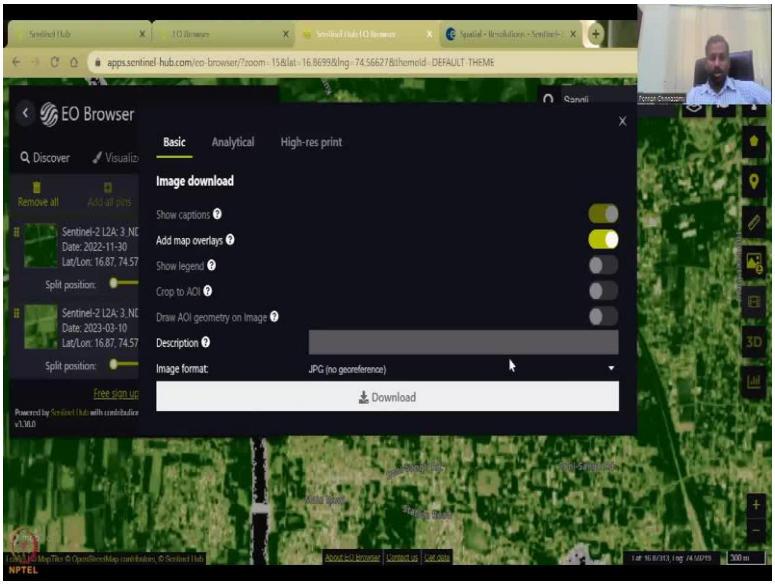
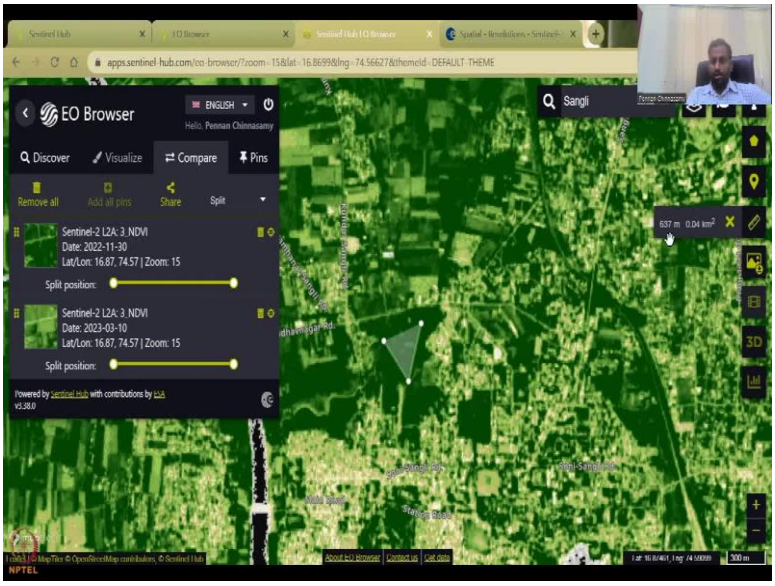
So here we have the compare, and let us say this left side, what I am going to do is I am going to keep the left side image. So, this part of my computer is going to be my NDIV from November and this part is going to be my NDIV from current date March. So, you could see that the data set is converting more to green because during November you still have a lot of moisture in the ground, soil moisture that contributes to agriculture and that can be used widely for the sugarcane, whereas groundwater recharges at.

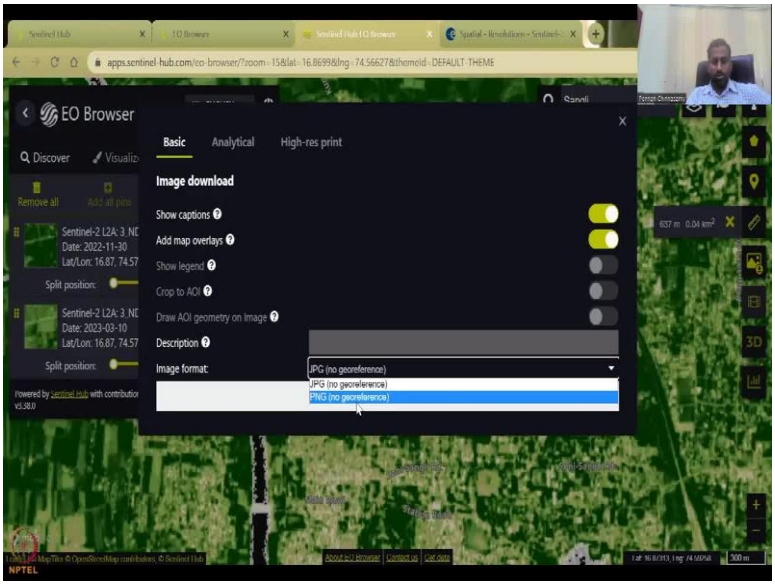
March is almost setting into the summer, so you will have less vegetation growing and that is what this color difference is saying. Remember, this is the same bands we are not changing the bands, we are taking the NDVI let us go here to see what this NDVI is about. You can see here it is a normalization index range, minus 1 to 1, it gives you these colors. And it has been more info you see here B 8, B 4, B 8, B 4, so B 8 is your visible near infrared NIR, let us say NIR minus red, B 4 is red, it is not orange, it is red color. So B 8 minus B 4 by B 8 plus B 4 that is what the equation we shown in class you can see here the equation given.

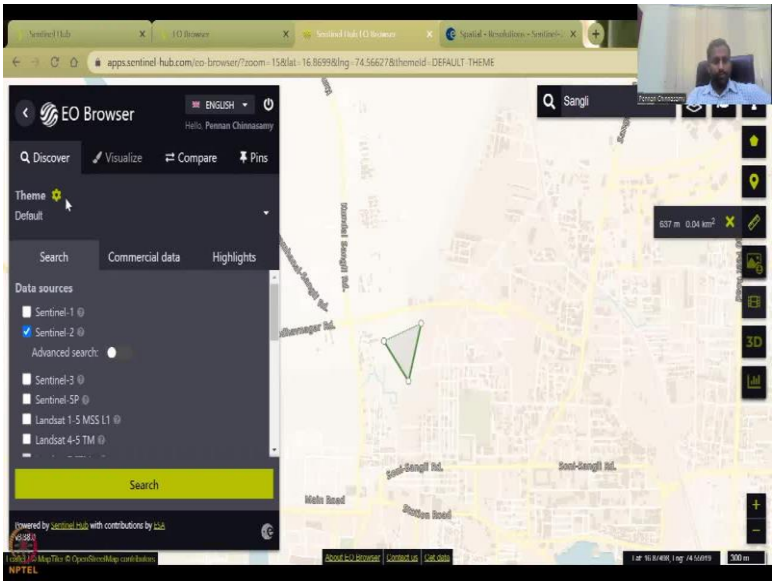
So in the compiler, we have seen beautifully the 2 datasets being compared. And once you have the education mode can also be turned on where you have better access to some data and theme also can be done. So I will take this normal mode. So in the compare we have this dataset, and you can draw in the search ones you can have, in the search ones, you can draw and then see where how big the polygon is, instead of saying Pune, Sangli you can actually draw and that box can go in, so it is kind of like a bounding box. You can upload a shape file to do it save like Giovanni, you can upload a shape file and download the data. And then you can have point of interest and then other resources you can also measure and download the image.

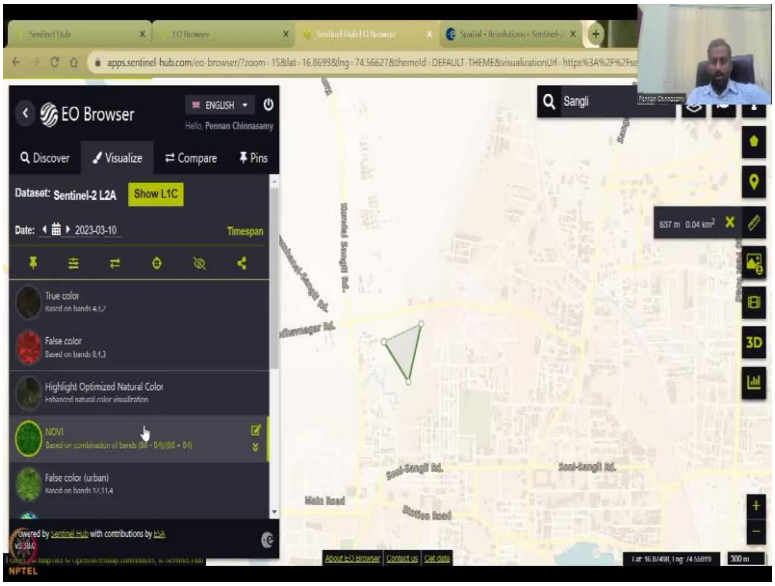
(Refer Slide Time: 39:30)

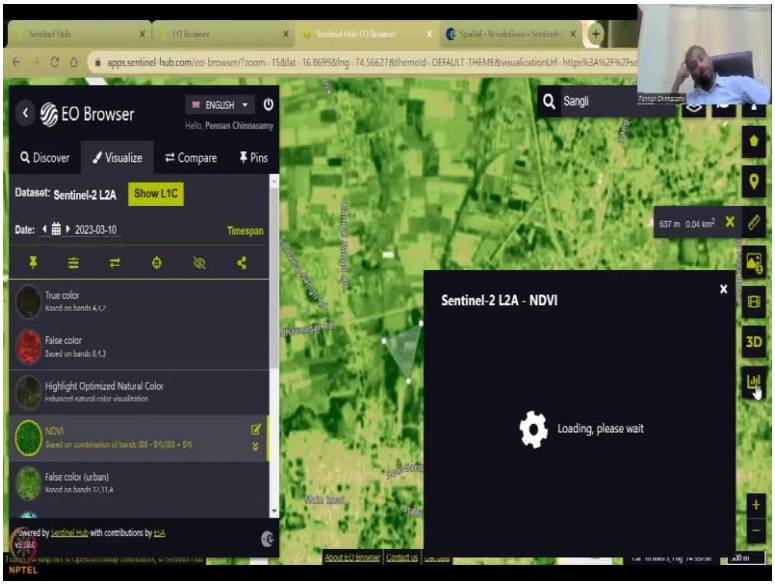


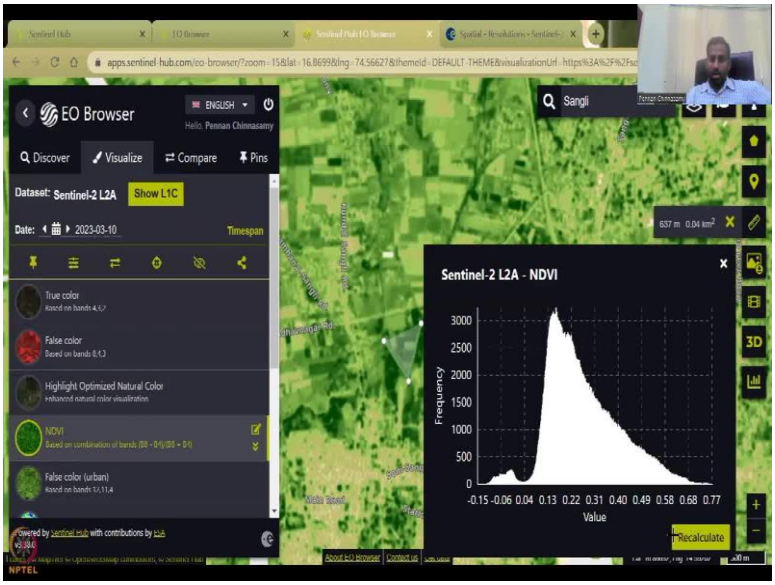


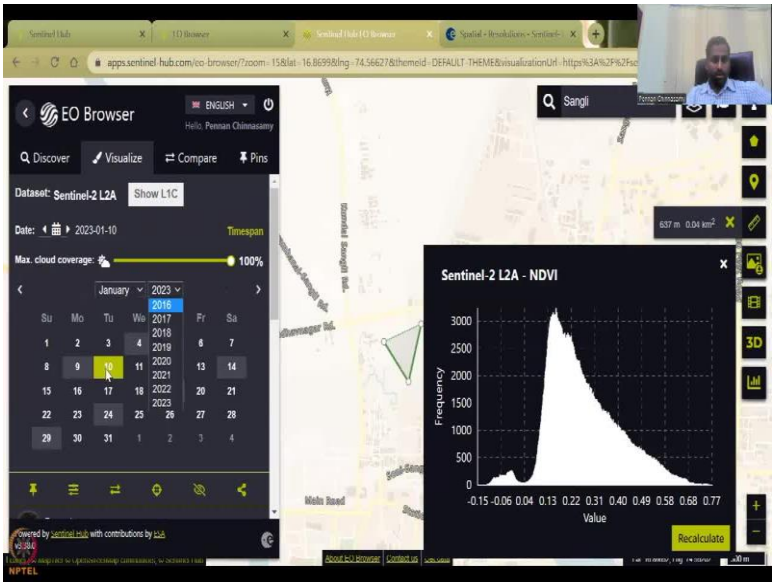


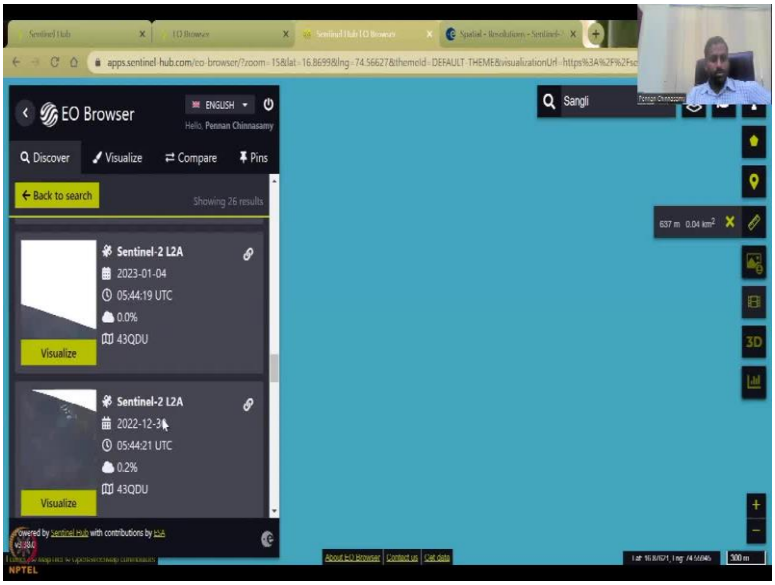

EO Browser
ENGLISH
Hello, Pennan Chinnasamy
Discover
Visualize
Compare
Pins
Theme
Default
Search
Commercial data
Highlights
Data sources
Sentinel-1
Sentinel-2
Advanced search:
Sentinel-3
Sentinel-5P
Landsat 1-5 MSS L1
Landsat 4-5 TM
Search
Sangli
Main Road
Station Road
NPTEL

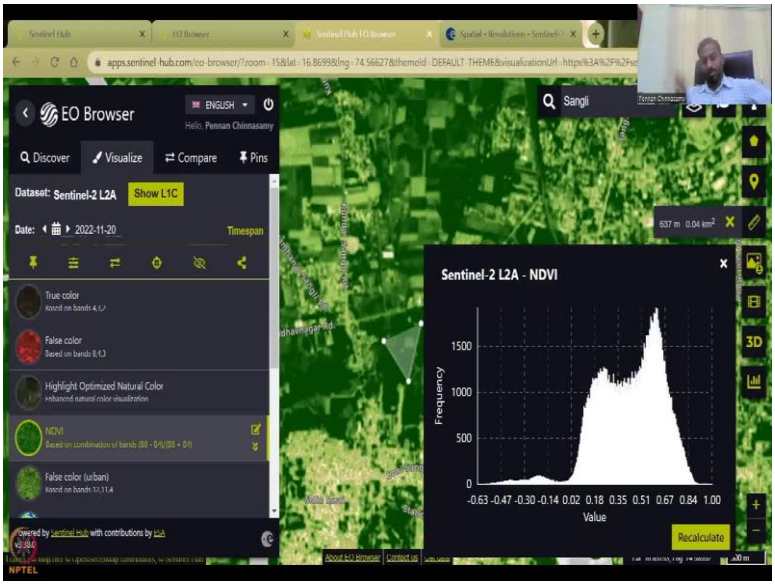

EO Browser
ENGLISH
Hello, Pennan Chinnasamy
Discover
Visualize
Compare
Pins
Dataset: Sentinel-2 L2A
Show L1C
Date: 2023-03-10
Timespan
True color
False color
Highlight Optimized Natural Color
NDVI
False color (urban)
Sangli
Main Road
Station Road
NPTEL


EO Browser
ENGLISH
Hello, Pennan Chinnasamy
Discover
Visualize
Compare
Pins
Dataset: Sentinel-2 L2A
Show L1C
Date: 2023-03-10
Timespan
True color
False color
Highlight Optimized Natural Color
NDVI
False color (urban)
Sangli
Sentinel-2 L2A - NDVI
Loading, please wait
NPTEL


EO Browser
ENGLISH
Hello Pennan Chinnasamy
Discover
Visualize
Compare
Pins
Dataset: Sentinel-2 L2A
Show L1C
Date: 2023-03-10
Timespan
True color
False color
Highlight Optimized Natural Color
NDVI
False color (urban)
Sangli
Sentinel-2 L2A - NDVI
Frequency
Value
Recalculate
3D
NPTEL


EO Browser
ENGLISH
Hello Pennan Chinnasamy
Discover
Visualize
Compare
Pins
Dataset: Sentinel-2 L2A
Show L1C
Date: 2023-01-10
Timespan
Max. cloud coverage:
100%
January
2023
2016
2017
2018
2019
2020
2021
2022
2023
Sangli
Sentinel-2 L2A - NDVI
Frequency
Value
Recalculate
3D
NPTEL


EO Browser
ENGLISH
Hello Pennan Chinnasamy
Discover
Visualize
Compare
Pins
Back to search
Showing 26 results
Sentinel-2 L2A
2023-01-04
05:44:19 UTC
0.0%
43QDU
Visualize
Sentinel-2 L2A
2022-12-3
05:44:21 UTC
0.2%
43QDU
Visualize
Sangli
3D
NPTEL



You can download the image without much problem. You can say you want to overlay maps and article you want an article maps, it is currently available only the basic image, so you have a higher spent also you will not have. But at least you can download the image and then do it in particular formats. You can also animate all these you have login, you do a 3D map, analyse histograms, colors etc.

So this is pretty cool in terms of using a free open source system without login I have done to show some people might have some issues in logging in, but it is pretty safe I do have login accounts I will just show you how it is done. So I have logged in now and now all these come up. So, you can say that you can have just this area I want the you can measure the area for a plot say 637 meters perimeter 0.05 kilometer square, you can now download some of the images, geo-reference, PNG, no geo reference is there and then you can also do it with geo referencing that we have taught in class, some analytics cannot be done.

Let us say you visualize, discover, will go back to discover, go back to search, come back here, come back NDVI and now the analytics can be done. So this is basically the area I wanted and it is just calculating the analysis. So you can see here the green values are here and they say there is more green. So now if I use a different data set from my previous example, let us say or you can say just 10 and then let it populate you will have a better histogram because has not populated.

These are in the Jan month, so let us use one in the Jan and then the population comes up. So you can see now better high green number of greens because it is good for on other side. So 6

is around green, will have a lot of green because there is a lot of NDVI calculated. So this I will stop. I will see you in the next class with some more indicators. Thank you.