Geographic Information Systems
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Lecture – 54
Bhuvan Geoportal and Google Earth

Welcome to the course on geographic information system, this is module 11 GIS as a software, in this module, we are going to look at Bhuvan geoportal and Google earth.

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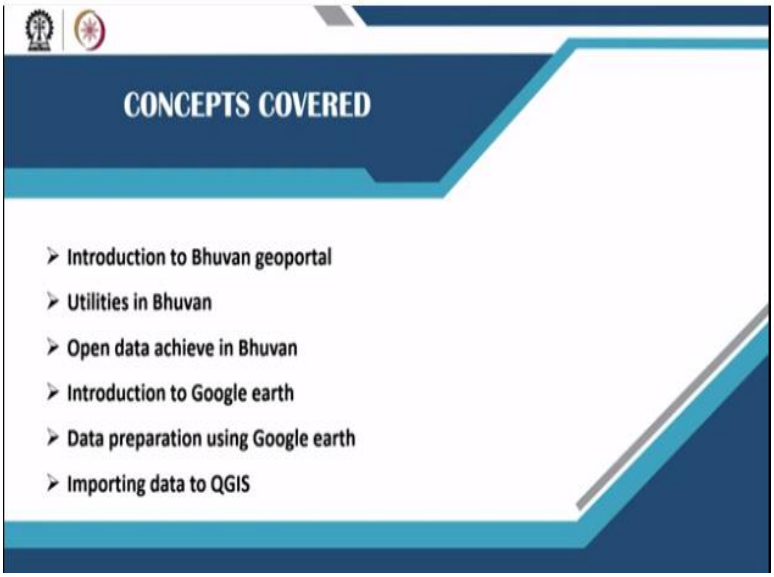

The concept covered in this session are introduction to Bhuvan geoportal, utilities; various utilities in the Bhuvan and open data achieve in Bhuvan and introduction to Google earth and how to prepare data using Google earth and importing the prepared data to QGIS platform.

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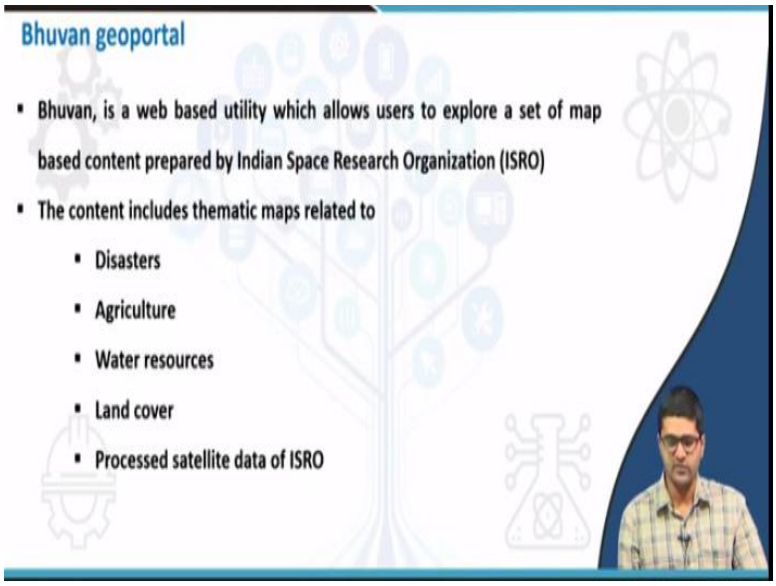

So, Bhuvan is a web based utility that allows user to explore and set a map based content prepared by ISRO or Indian space research organisation. The content it includes not only the open data archive, it also include thematic map services such as disaster related agriculture, water resources, land cover, processed data of ISRO as well.

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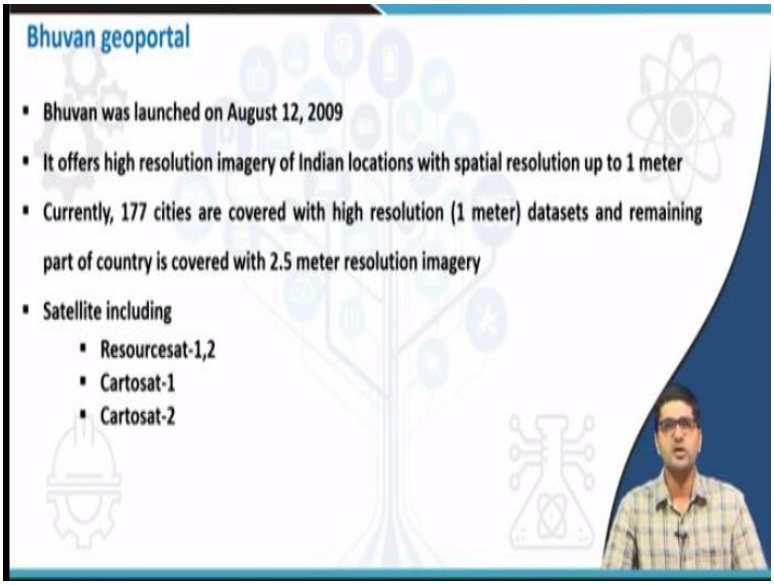

So, Bhuvan is launched in the year 2009, it offers high resolution spatial imagery for Indian locations with the spatial resolution up to 1 metre, so currently 177 cities are covered with high resolution data sets and remaining part of the country is covered with 2.5 metre resolution. The satellites includes resource at 1 and 2, Cartosat 1 and 2 and thematic products of these satellites are hosted in Bhuvan geoportal.

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So, with this introduction to Bhuvan, we will directly jump to Bhuvan web page and try to explore the contents in the Bhuvan.

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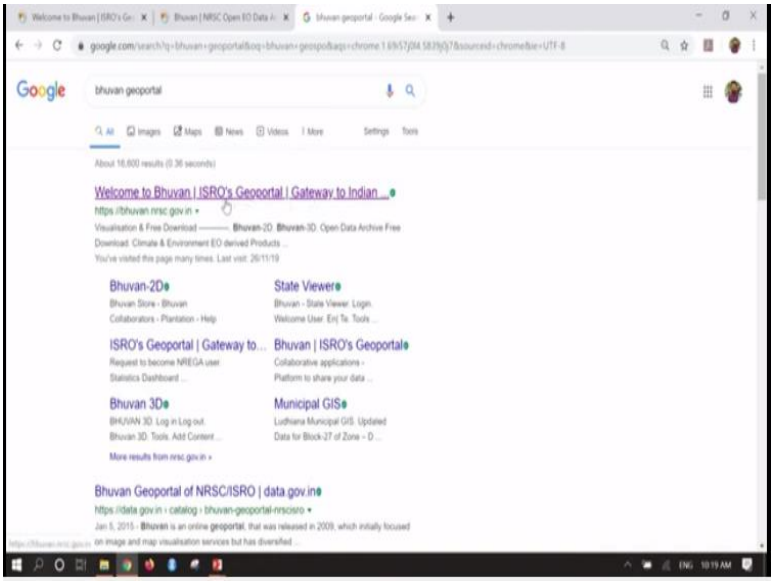

So, if you do a Google research of Bhuvan geoportal, this particular website will come, so that is called Bhuvan geoportal or welcome to Bhuvan.

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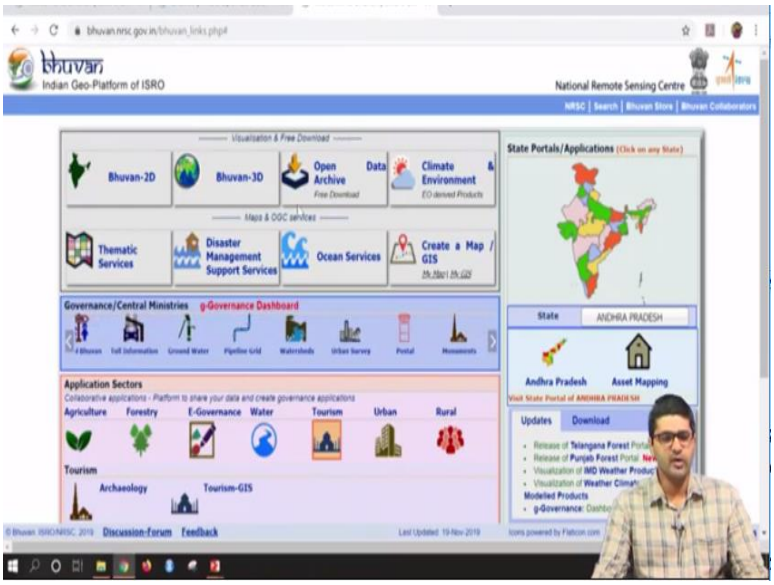

So, if you click on that, Bhuvan geoportal will get open, so this is the landing page of Bhuvan geoportal, so here left side you can see, Indian geo platform of ISRO, so this is hosted by National remote sensing centre which is the nodal agency towards Indian geospatial data. So, in this landing page, there are shortcut for many of the major applications for example, Bhuvan 2D, Bhuvan 3D open data archive and disaster management services.

Or various line departments or government departments they hosted their services or the data sets in the Bhuvan platform, so if you go to this link such as central or government or central ministries, so all these data are hosted here, the link or the shortcuts are given in the landing page itself, we will try to explore one by one.

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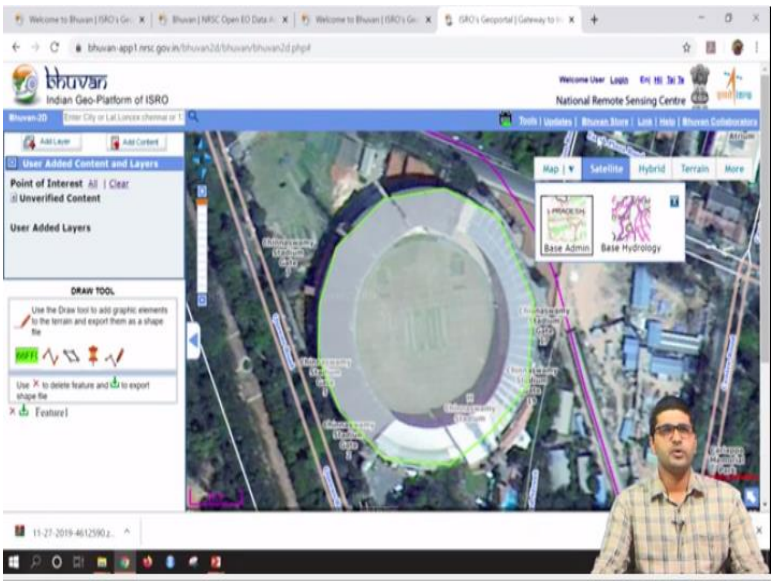

First, let us go to Bhuvan 2D, so if you go to Bhuvan 2D, the map of India will appear in the landing page, so you can convert these, you can zoom to any place and start exploring, for example I will zoom to somewhere in Bangalore. If you zoom to Bangalore area, you will be able to see the detailed map, so not only as a map, if you want to see a satellite imagery with a high resolution data that also can be done.

For example, if I click on the satellite imagery, if the satellite imagery with the spatial resolution up to 1 metre can be seen, so this is a place where the Chinnaswamy stadium is existing, so you can zoom to this particular place and start exploring the pages. So for example, if you go tools, so let us try to explore what are different aspects are in this particular page, so if you go to tools, you can add your own photos or you can add a panorama or you can add a special layer.

So, if you want to; if you know that, at that particular place, some feature is there, then you can add these layer to Bhuvan geoportal, this will be published after proper authentication by ISRO, so that can be viewed by many other users as well, this is the contribution platform, where users can contribute their data to the Bhuvan platform. So not only that, if you want to suppose, if you want to shape file of this particular stadium for your analysis or any other feature in the map.

So, what you can do; you can go to tools and you can use draw tool, using the draw tool, you can create a point line or polygons and start downloading the data sets, so it gives how to use the tab,

so I will close the tab and start using the maybe start creating a polygon for example, so to create a polygon, I need to select this particular button, so then start creating the polygon. So, for example, I will create a polygon for the stadium, you need to zoom to this particular level and then start creating the polygon.

For example, the circular polygon I will create now, once you complete the polygon what you need to do; you just need to right click to complete the feature. So, once you right click, the feature will appear in the left side, so this feature you can download directly by clicking here, so once you click here, it asked for attribute, it asked for name, so I can say it as Kanteerava stadium and I can give a message, I can say it a Bangalore; it is in Bangalore.

And then I can create the feature and then by clicking download, that particular feature will get downloaded to your desktop or your particular system, so I can just download it to my folder, I will go to NPTEL, datasets and output, here I will download the feature, it will get downloaded as a zip file. So, if you go to that particular folder, so the downloaded file will appear, you can unzip it and start using it.

So, the particular shape is existing here, so here you can see all shape files, this one we can directly put into QGIS that will see in subsequent slides, we will go back to Bhuvan now, so this is one feature in which you can create your own shape file using Bhuvan and downloaded it and start using it for your further applications. Not only that if some new updates are there in Bhuvan, that will be published under this publish button, where new products which are published by Bhuvan.

For example, any disaster management services or any other environment related services those are; those will come up here.

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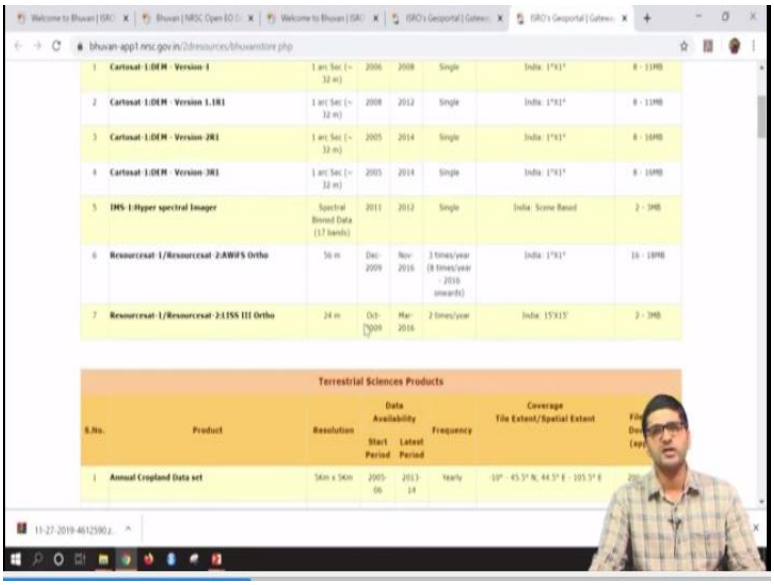

So, if you want to know about Bhuvan store or the data hosted in Bhuvan, you can click on Bhuvan store, here it completely list out all the data sets which are published by ISRO, for example all the digital elevation models or satellite products are listed here in the front page, so if you go here, so it shows; first it shows cartosat digital elevation models for various cartosat census starting from the year 2005 to 2008.

And even 2011 hyper spectral data is also available, so not only that it has imagery products of AWIFS having 56 meter spatial resolution and LISS 3 data having 24 meter spatial resolution, this can be you should to perform any kind of land use or land cover analysis for any cities or non-urban area as well. So, similarly if you know USGS website, so there you will download land use, there you will download landsat imagery. Similarly, LISS 4 provides at 24 meter resolution from Indian satellite; from Indian resource and satellite.

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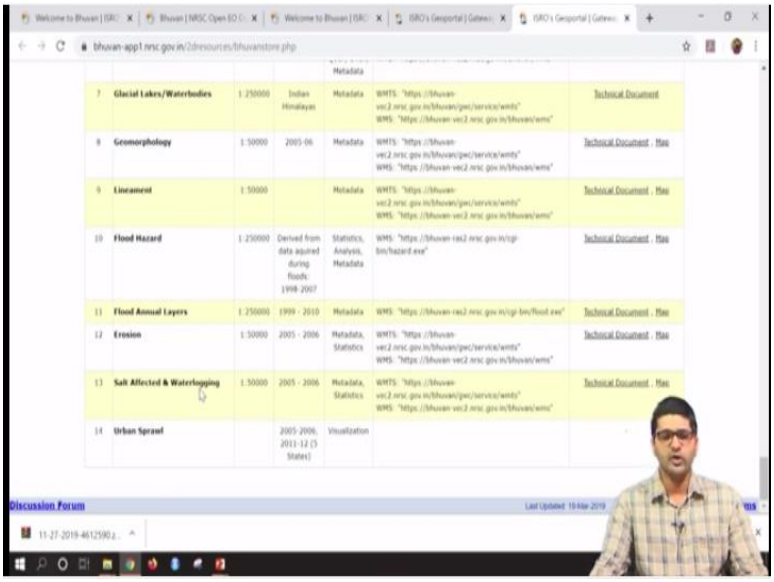

Similarly, so if you go down there are some more terrestrial science products which are listed from these datasets, so you can go through these products and start exploring in the Bhuvan website. So, all these datasets is hosted in Bhuvan websites, not only the datasets even the products such as land use land cover maps, if you come down, so Bhuvan thematic services, it provides land use land cover maps and waste land maps or geomorphology maps, flood hazard maps, so even urban sprawl map is also there.

What you can do; you can go to that particular place and start creating your polygons, to that polygon, it will give the land use land cover statistics along with the map, so this is about the Bhuvan store, so what and all different datasets is hosted by Bhuvan website.

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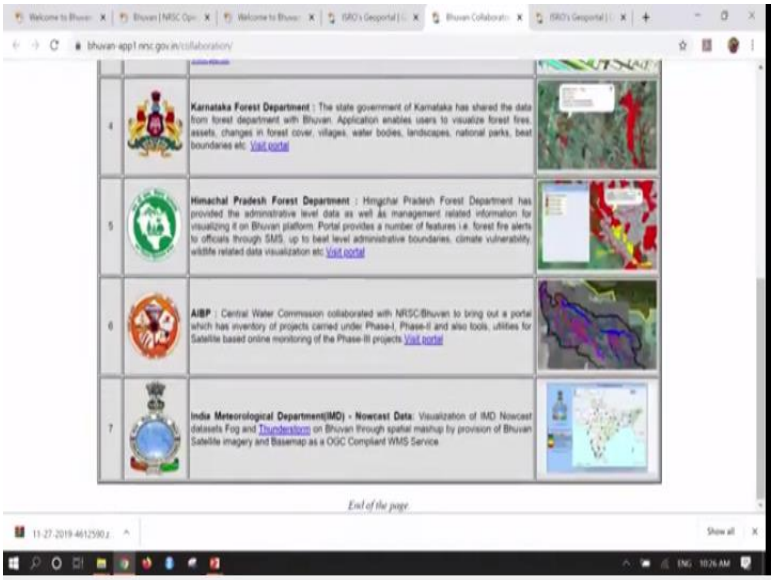

So not only that Bhuvan also lists out its collaborators, so various government departments, those who hosted their website or their data in the Bhuvan portal, so those government department website agency and their contribution is listed in the Bhuvan contributor; contributor page, this also we can explore. So, this is about, till now we have seen about Bhuvan 2D and various open data available in Bhuvan.

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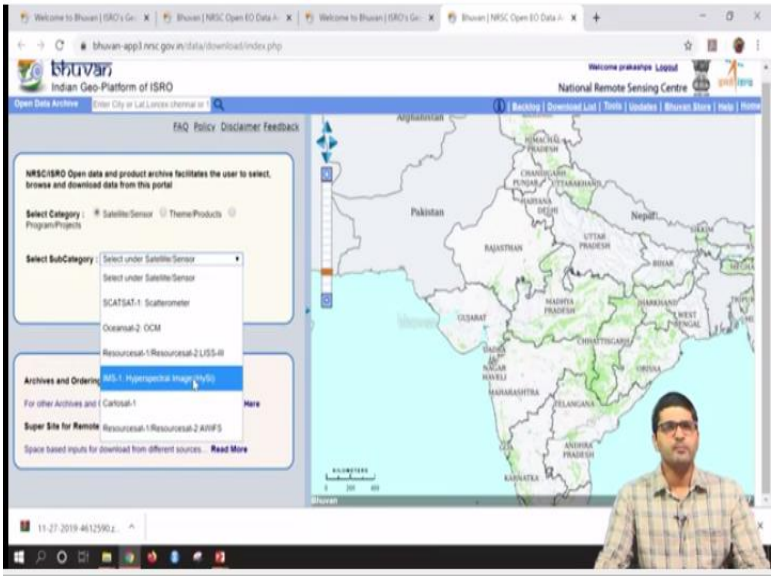

So, now what we do; we will try to download one open data from the Bhuvan website, so for that you need to click on open data archive page, so if you come to this page it asked for your login details or you need to create one Bhuvan account to download open data from the Bhuvan, so

currently I have logged into the Bhuvan page, since I already have an account, so if you do not have an account, you need to create one and then log in.

So, to create account, there will be an option called sign in option or option will be available at the right top in the Bhuvan page, so what as we seen earlier, in Bhuvan store, it mentions all cartosats and LISS images or resource sat 10:32 images, where it is available for the download, so if you go to this particular window, so here we can filter out different datasets and start downloading the datasets.

So, we can filter out using satellite or sensor, we can filter out using thematic; theme or products as well for example, if we filter out using satellite and sensor, so it gives options as Cartosat 1 or LISS 4 or LISS 3 or ocean sat or hyper spectral imagery as well.

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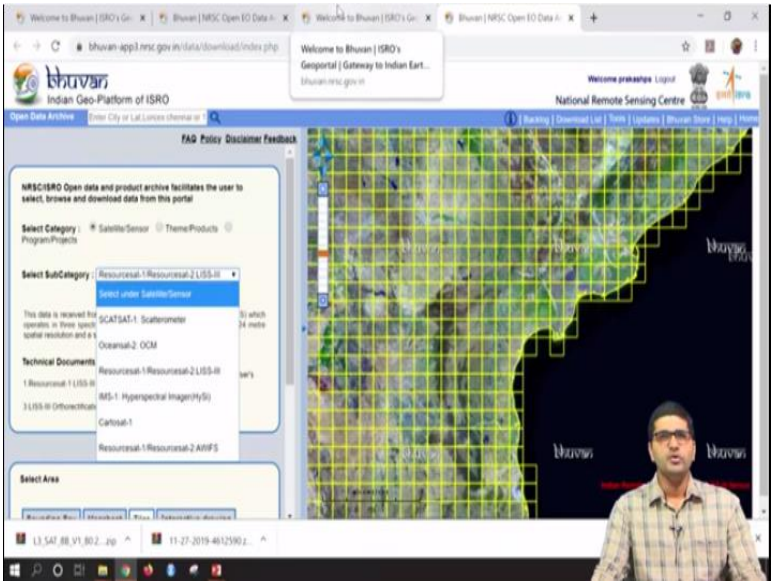

For example, we will try to download a LISS 3 imagery, just to; just as an example, so if you click LISS 3 imagery, all tiles are listed, all tiles can be viewed across Indian country. So, if you zoom to any place, those imagery will, those grids will be visible to you, so if you come down a little bit, so you can select the area using 4 different methods; you can either select using a bounding box, so with the minimum longitude, minimum and maximum latitude and longitude.

Or you can select by map sheet, so if you know the map sheet of the area or you can select interactively or tiles you can select, so currently what I will do; I will just select 1 tile for an example and try to show you how to download the datasets. So, if you select tiles, we need to start selecting the tiles, for example I will select somewhere here, so this particular tile I will select and then go to next.

So, it lists out all the datasets visible in different timelines, if you see date of pass, so this is the date at which, satellite has passed and took the imagery for that particular area, so you can view the imagery here as a thumbnail and then start downloading the datasets, we can view the imagery, we can view the metadata of the data, so metadata is data about the data it describes what are the data set it contains, what is a spatial resolution; a spectral resolution and their parameters, we can inspect the data before downloading it.

So, once you comfortable with the data set which you want to download, then you can click on download; you can click on download to download the data set, so if you click download, so it will directly get downloaded to your system in a zip format, so this one we can start using it for your projects in future. So, if you go and inspect the dataset which are downloaded, we will just try to see what kind of data it has tide, using any of the unzipped software we can extract the folder, so this can be viewed here.

This is the folder which is downloaded, here we can clearly see different bands, different bands of the dataset is visible, so this is not a colour composite, so if you want to create a true colour composite or a false colour composite, so you can use either R or GRASS or QGIS any of the platforms or software tools to create a false colour composite and start using in your projects, so this is about open data archive of the Bhuvan.

So, this is one of the example here we showed how to download LISS 3 data using Bhuvan portal. So, not only LISS 3 data you can download even hyper spectral data or Cartosat DEM, so if you want to create contours for area for example, in this coastal region, this particular tile, if I want to create contours of somewhere around 90 meters or more than 90 meters, so this cartosat digital elevation model will help you to perform any kind of elevation related modelling.

So, in a nutshell, Bhuvan provides; Bhuvan is a geoportal which provides geo data for Indian scenario in various domains not only in open data archive.

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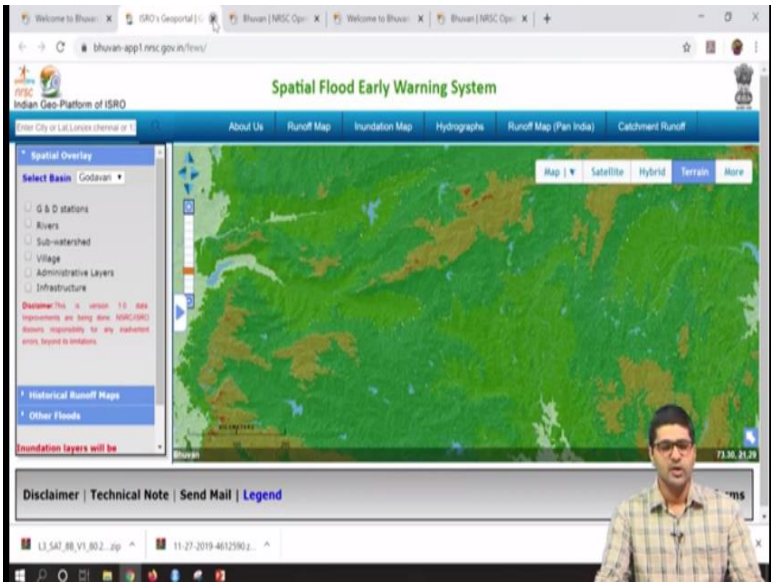

For example, if you go to disaster management and services, if somewhere in flood is happening or landslide, earthquake or earthquake prone area or flood warning, so these kind of things which is being monitored by ISRO is being hosted in the Bhuvan. So, for example recent earthquake in Nepal or the flooding happened in Karnataka, all those things were hosted here, so if you click here, you will be able to see the recent happenings along with the geo-tagged photos as well. So, till now we have seen Bhuvan geoportals properties, so let us next go to the Google earth and try to see what kind of a data we can create using Google earth and what kind of feature it gives.

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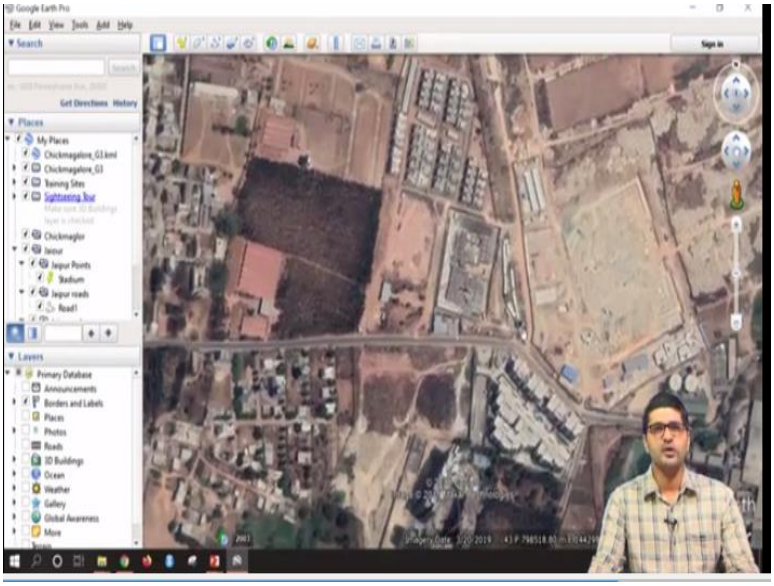

So, let us just go to Google earth now, so I hope the installing of Google earth will be very easy and you can just go to Google website and download the Google earth software, so if you open Google earth software, so it will open something like this. So, you can zoom to any place and start creating the datasets, so I will show you how to do it. For example, I will zoom to one of the place in Bangalore and try to explore the datasets in the Google earth.

For example, so this is the same place which I will show you a Kanteerava stadium place, so if you want to see the timeline of this particular data or for example, if you want to visualise some older data for some outskirts of the Bangalore for example, this particular date, for example so for this particular place, the image radiate is 320 and 29, some March 20th, 2019, so at that date, the imagery is captured at this particular place.

Suppose, if you want to view the imagery for some 2, 3 years back, so how do that; you just need to go here, there is an option to show historical imagery, if you go here, it gives a timeline, so if you just a slide back to somewhere around 2014 and 2014 it looks something like this, so you can clearly see that there was a high rise building which is; which disappeared from this particular place.

So, this is how, still we can go back to some more years and see; here you can see the high rise building which is appearing, so if you go to somewhere in 2009, so the entire scene in that

particular image will changes, so this is how we can explore a different timeline of the datasets in Google earth, so let us try to measure using Google earth, so how to measure feature; for example, if you want to measure this particular road length using Google earth, how to do that?

So, there is a tool for measuring, I will switch of the timeline and there is a tool for measuring here, show ruler, so it gives option for measuring the path line or polygon, so for example if you want to measure this particular road from here to here, you just need to click, drag and double click here, it shows 339 meters or if you want to change the units, you can do that as well. So, if you want to change it to kilometres, so this is 0.34 kilometre.

Or if you want to change it to feet, so that also can be done, so for example if you want to measure the area of the any particular place, so that also can be done, we will just close this one's and again I will click, so if you want to measure you just need to click on the polygon button and for example, if you are having the site or any property here, you can measure that property by clicking here in the 4 corners or any shape we can create.

If you double click it, the area in square meter we choose, so the length is the total length of the line, area in square metres or if you want to measure it in hectares or even acres is also possible, so this is around 1.96 acres, so this is how you can effectively use Google earth imagery or Google earth tools to measure length and areas and also to view the timelines of the imagery, not only that if you want to create some polygons and bring it into QGIS that it is also possible.

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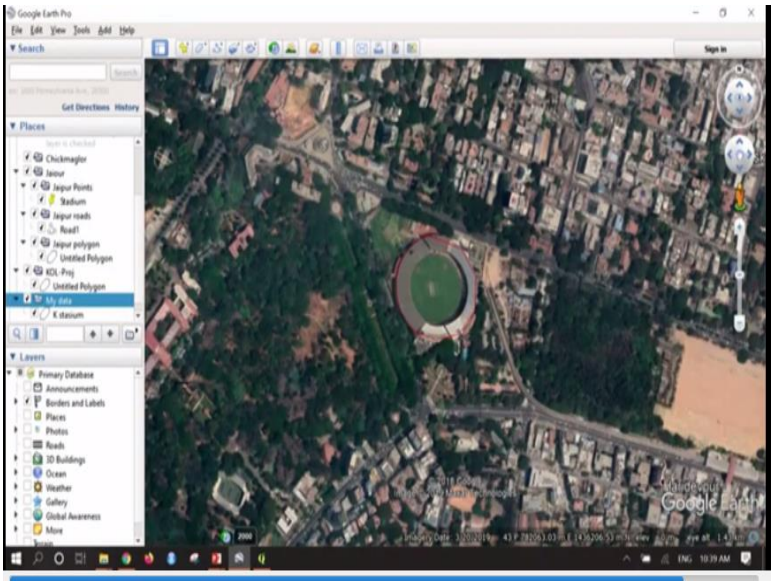

Suppose, for example, I want to create that Bangalore stadium for example, if I want to create this one as a polygon and bring it into QGIS that also possible, for that I need to go to my place and create one folder, I will go to my place and create a folder, I will create my data, so my data folder is created; in this folder, I am going to create; I am going to add polygon, I can add a line point or a polygon, I will add a polygon, using polygon feature, you can trace the stadium.

So, suppose if you want to make it a transparent, so that also can be done, you can go to style and colour, so area you can make, instead of filled and outline, if you just make it outline, only outline is visible, so even the lines colour also can be changed to any other colour which is you are comfortable with for digitising purposes. So, once you do this and we can just name this as stadium; k stadium and then press okay, this particular polygon is added.

So, how do we bring this into QGIS, for example so once the feature is created, we just need to export this one as a KML file, just save places as, I will save it into our folder that is in desktop NPTEL folder, datasets, output, here I will save as my data, so instead of KMZ, you need to select as KML, so that we can bring it into QGIS platform, my data Google earth I will rename it, so now the data is saved in KML format in the folder.

So, now we will try to open QGIS and try to bring the datasets QGIS and we will try to view there, so Google earth is not only helpful for creating the shape files or creating the shapes or

measuring the data, it is also useful in getting the latitude and longitude of the place for many applications for example, if you move your mouse around the area, since it is giving very high resolution imagery, you can get the latitude and longitude of that particular place in Northing or Easting or geographic lateral systems.

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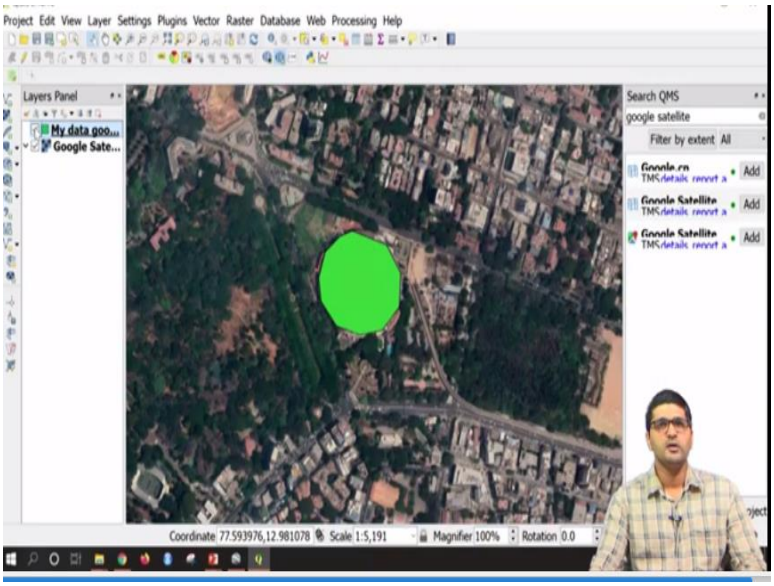

And also, you can see the altitude of the viewing angle as well, so now the QGIS is open, so how do we bring the dataset here; so we just need to go to layers, add layer, add vector data and browse to the folder, our folder is in datasets, output, so here we can see my data Google earth, which is visible, I will click this and open, so once we try to open this, the stadium which we created in a Google earth is opened here.

So, here also we can bring in Google earth as an background image which we have seen it in the earlier classes, so we can go here and bring Google satellite as a base imagery and visualise, similarly you can create any number of features for example, if you want to bring lot of building, roof tops or for any kind of analysis such as solar assessment or if you want to doing; if you want to; if you are doing land use land cover analysis, so to get the signature of the places, to get the land use of the places, you can create in Google earth and bring it into QGIS or GRASS platform to perform analysis.

So, now I will try to add Google sat imagery as base map, so once we add here, we can clearly see this particular stadium what we created is overlapping the place correctly, so this is how we can use Google earth as a base imagery and for performing many analysis.

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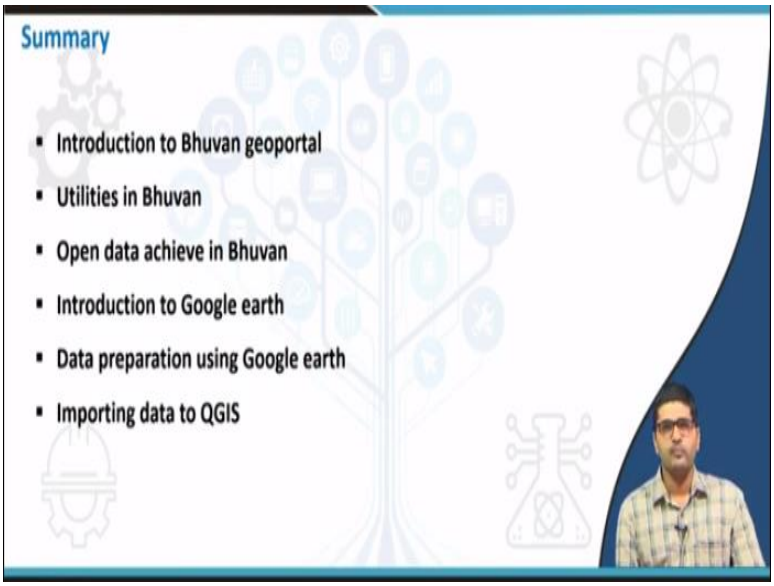

So, till now we have seen introduction to Bhuvan geoportal and we have seen the properties of geoportal and different utilities provided by geoportal, not only that we have seen open data archive in the open data in the geo, so where it is providing different kind of datasets to download, not only that and finally, we have seen introduction to Google earth and how to prepare the datasets in the Google earth.

And importing the prepared datasets from the Google earth to QGIS and of measuring different land features using Google earth and Bhuvan, so these things we have seen in this particular session and thank you.