

# Google Earth Engine (GEE) Lab practicals

## Module 1

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# Contents

- Register to GEE
- Creation of Region of Interest (ROI)
- Satellite Data fetching
- Visualization

# Register to GEE

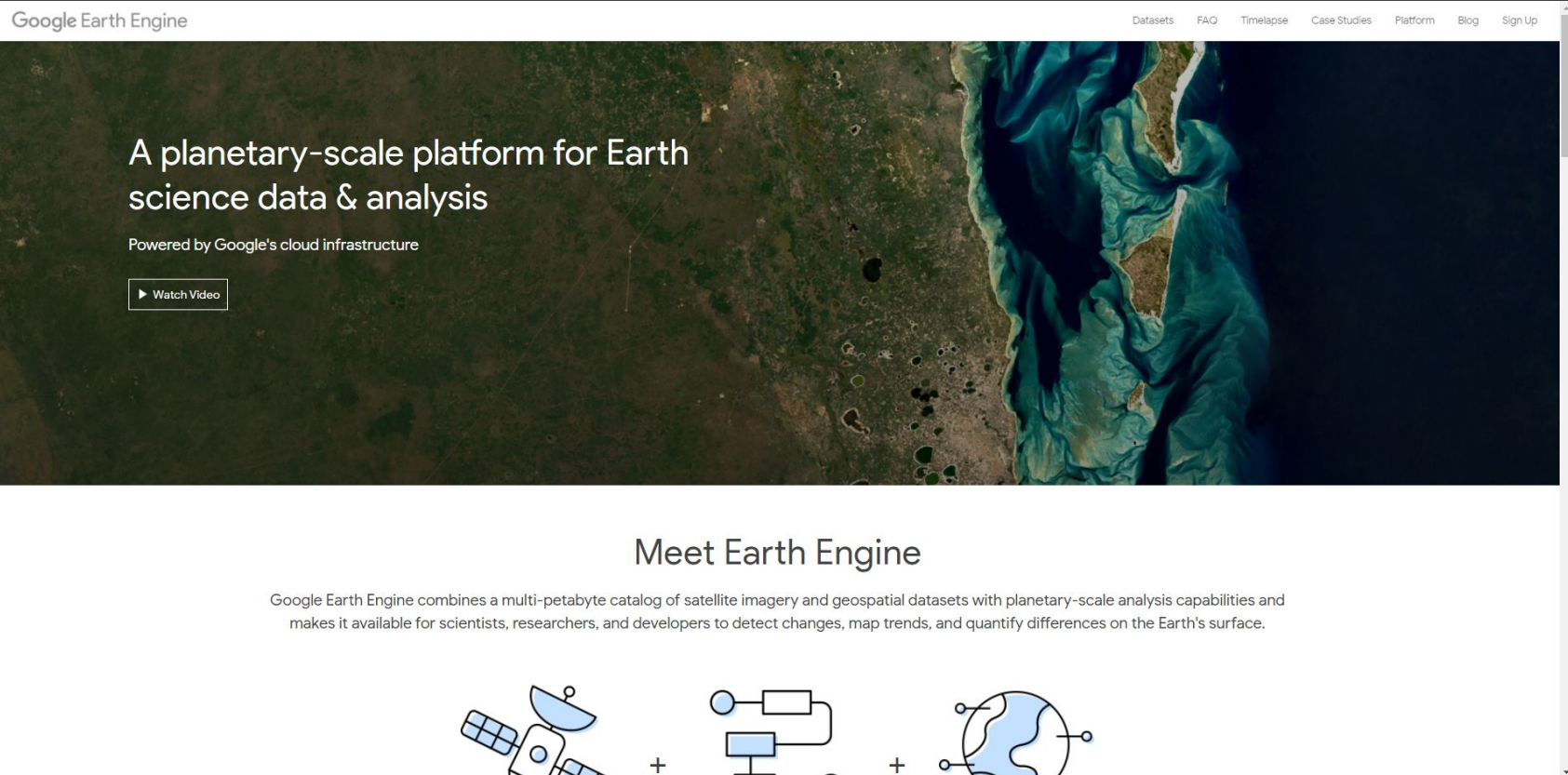
The following steps have to be followed for creating an account in GEE.

1. Open the Google Earth Engine ([GEE](https://earthengine.google.com/)) website. (<https://earthengine.google.com/>)
2. From the Menu, move cursor to Platform
  - a. Select “Code Editor”
3. Sign in with your Gmail account
4. Create your GEE user name. (Can't be change later)
5. Create your first repository
6. Create your first folder.
7. Create your first file.

**Step by step process is given  
in the following slides**

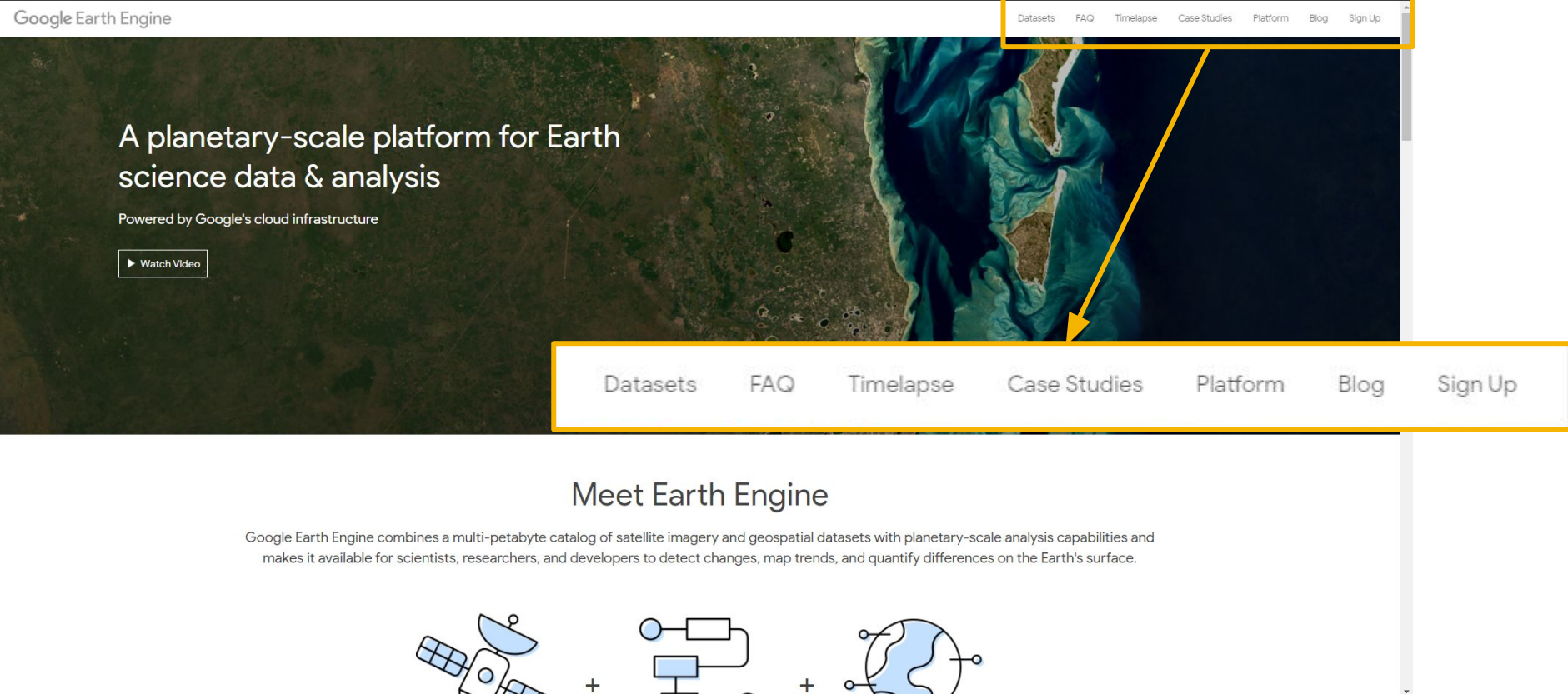
# Register to GEE

1. Open the Google Earth Engine ([GEE](#)) website.



# Register to GEE

1. Open the Google Earth Engine ([GEE](#)) website.



# Register to GEE

## 2. Select “Code Editor”

Google Earth Engine

Datasets FAQ Timelapse Case Studies Platform Blog Sign Up

A planetary-scale platform for Earth science data & analysis

Powered by Google's cloud infrastructure

▶ Watch Video

Datasets

FAQ

Timelapse

Case Studies

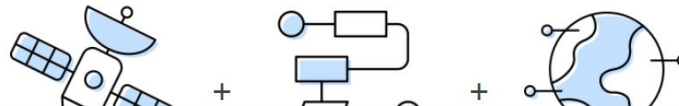
Platform

Blog

Sign Up

### Meet Earth Engine

Google Earth Engine combines a multi-petabyte catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities and makes it available for scientists, researchers, and developers to detect changes, map trends, and quantify differences on the Earth's surface.



**Move the mouse  
cursor here**



# Register to GEE

## 2. Select “Code Editor”

Google Earth Engine

Datasets FAQ Timelapse Case Studies Platform Blog Sign Up

A planetary-scale platform for Earth science data & analysis

Powered by Google's cloud infrastructure

▶ Watch Video

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### Meet Earth Engine

Google Earth Engine combines a multi-petabyte catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities and makes it available for scientists, researchers, and developers to detect changes, map trends, and quantify differences on the Earth's surface.

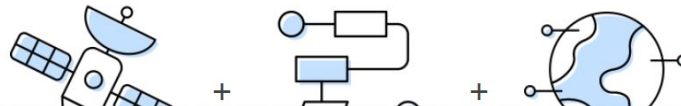
Overview

Code Editor

Explorer

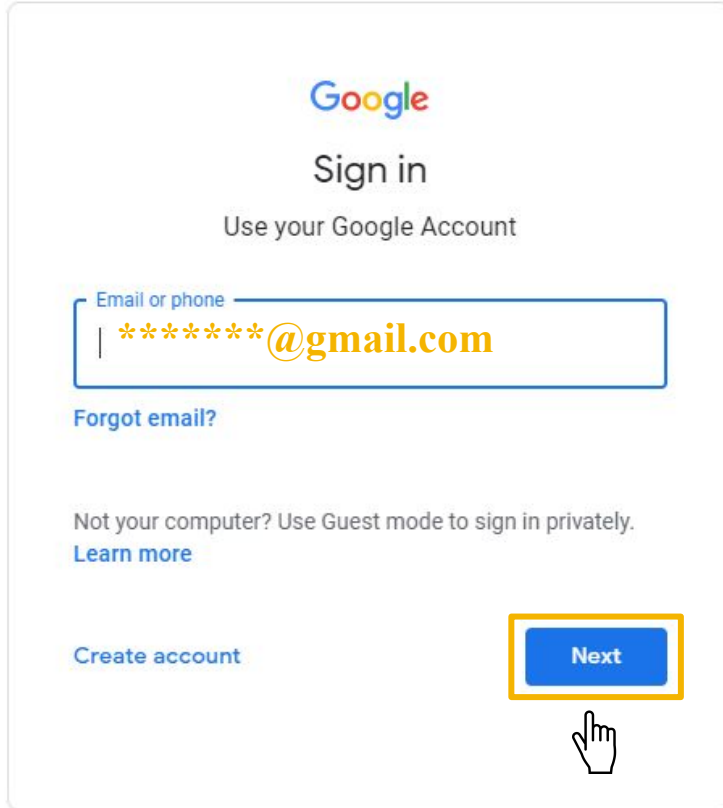
Documentation

Click here



# Register to GEE

## 3. Sign in with your Gmail account



Google

Sign in

Use your Google Account

Email or phone

\*\*\*\*\*@gmail.com

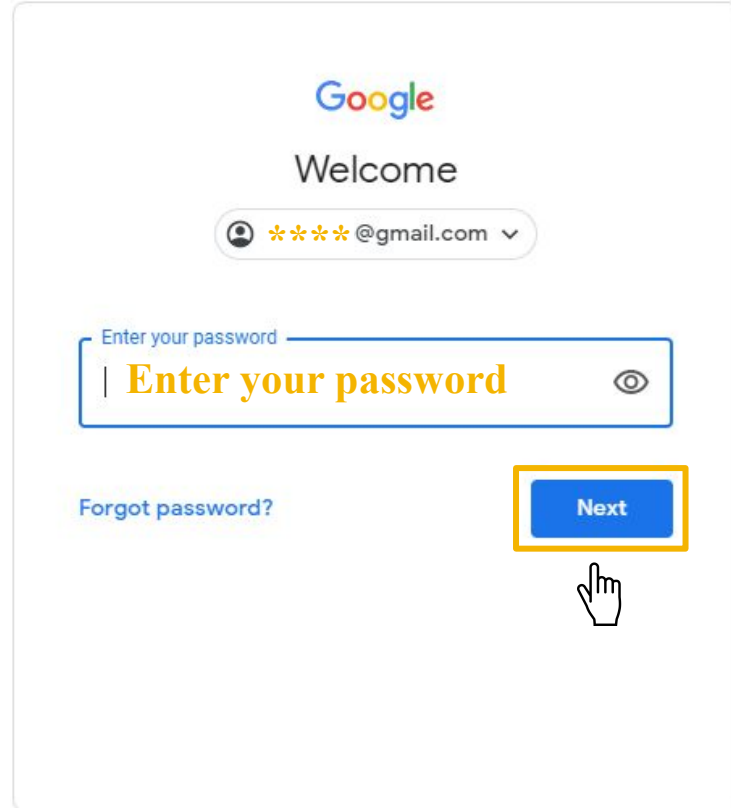
[Forgot email?](#)

Not your computer? Use Guest mode to sign in privately.  
[Learn more](#)

Create account

Next

A hand cursor icon is pointing at the 'Next' button.



Google

Welcome

\*\*\*\*\*@gmail.com

Enter your password

[Forgot password?](#)

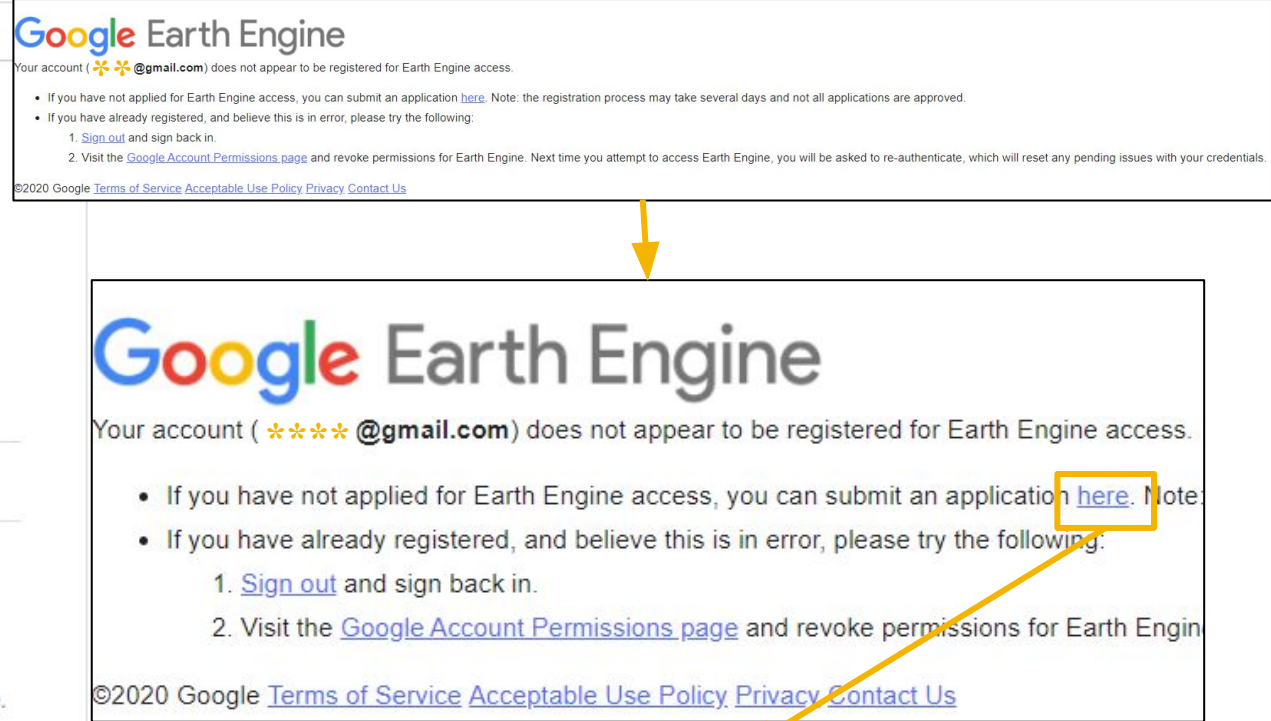
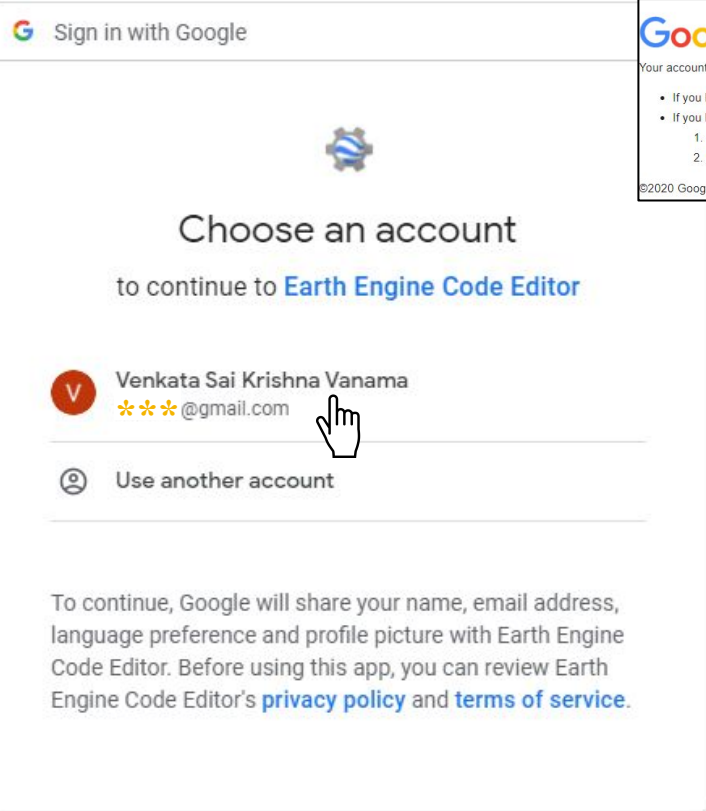
Next

A hand cursor icon is pointing at the 'Next' button.



# Register to GEE

## 3. Sign in with your Gmail account



The first time users, have to fill the form. Google will review and accept your request, but it may take some time

# Register to GEE

## 3. Sign in with your Gmail account

**SIGN UP**

Sign up for Earth Engine

If you'd like to become an Earth Engine developer, please sign up by providing the following information. We can't accept all applications, so please fill out all fields as best you can so we can evaluate your request for access. If you are accepted, you will receive an email within one week.

Email  
vskitb@gmail.com

Want to use a different account? [Log out](#) or use an Incognito tab.

Full name\*  
Venkata Sai Krishna Vanama

Please tell us your first and last name.

Affiliation/Institution\*  
Indian Institute of Technology Bombay

Institution type\*  
Academia

Which organization are you a part of? Give a homepage URL, if possible.

Country/Region\*  
India

Please tell us where you live.

What would you like to accomplish with Earth Engine?\*

Disease prediction modelling through machine learning algorithm in GEE.


Please describe in a few sentences how you intend to use Earth Engine.

Earth Engine may only be used for development, research, or educational purposes. It may not be used for sustained commercial purposes, but may be evaluated in a production environment.

☒ I agree that my use of the Earth Engine services and related APIs is subject to my compliance with the applicable [Terms of Service](#). In particular, I acknowledge that creating multiple Earth Engine accounts to circumvent quota restrictions is a violation of the Terms of Service.

☒ I am interested in commercial use of Earth Engine.

☒ I'm not a robot

 reCAPTCHA

SUBMIT

Email  
\*\*\*\*\*@gmail.com

Want to use a different account? [Log out](#) or use an Incognito tab.

Full name\*  
Venkata Sai Krishna Vanama

Please tell us your first and last name.

Affiliation/Institution\*  
Indian Institute of Technology Bombay

Institution type\*  
Academia

Which organization are you a part of? Give a homepage URL if possible.

Country/Region\*  
India

Please tell us where you live.

What would you like to accomplish with Earth Engine?\*

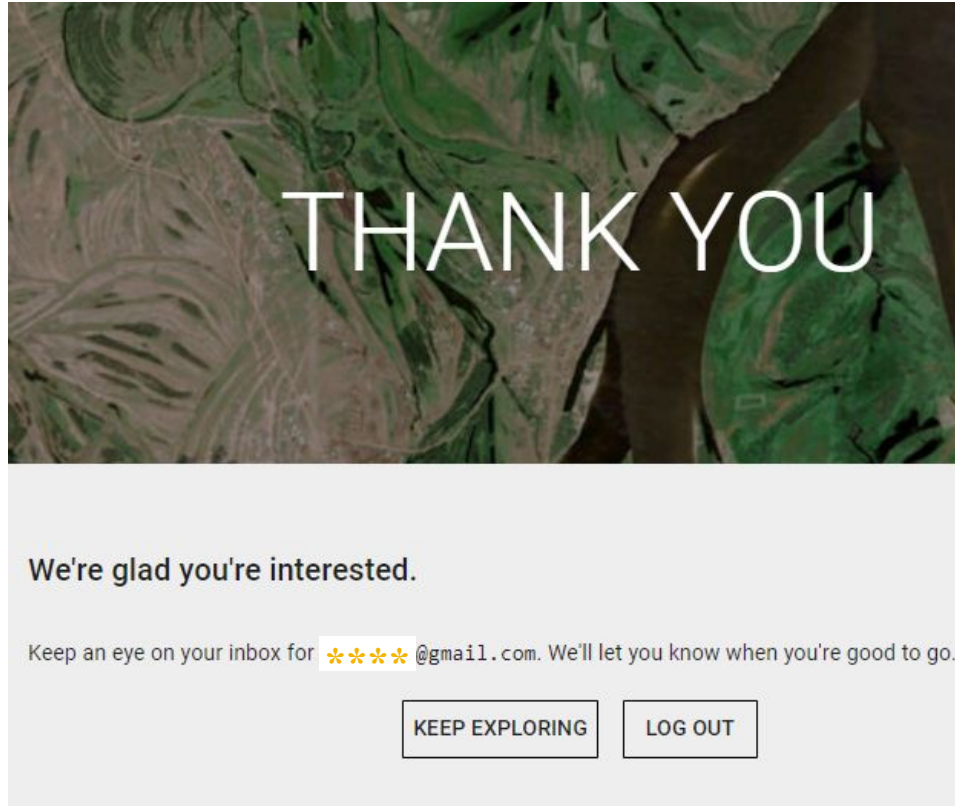
Disease prediction modelling through machine learning algorithm in GEE.

Please describe in a few sentences how you intend to use Earth Engine.

Write some description of your project here.

# Register to GEE

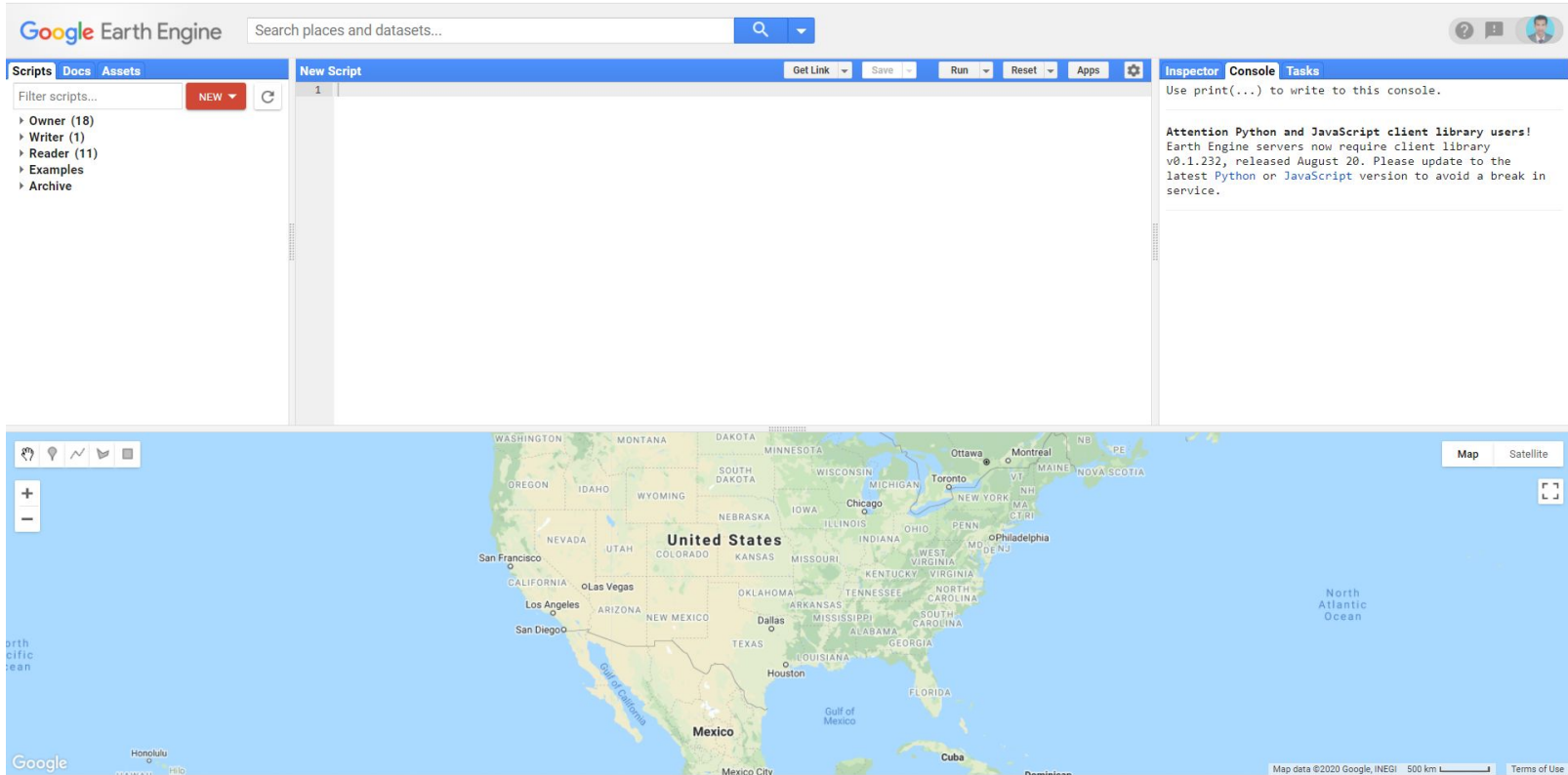
## 3. Sign in with your Gmail account



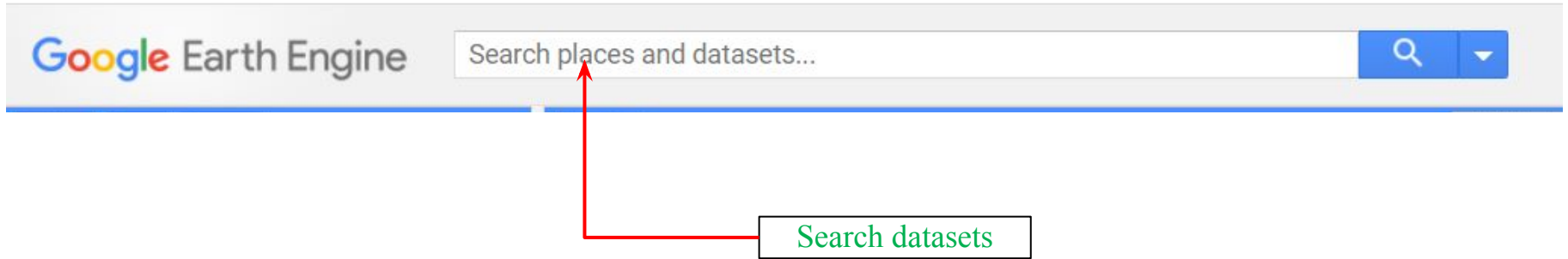
Wait for the google team to activate your request. It may be accepted immediately or may take 1 day time.

# GEE Interface

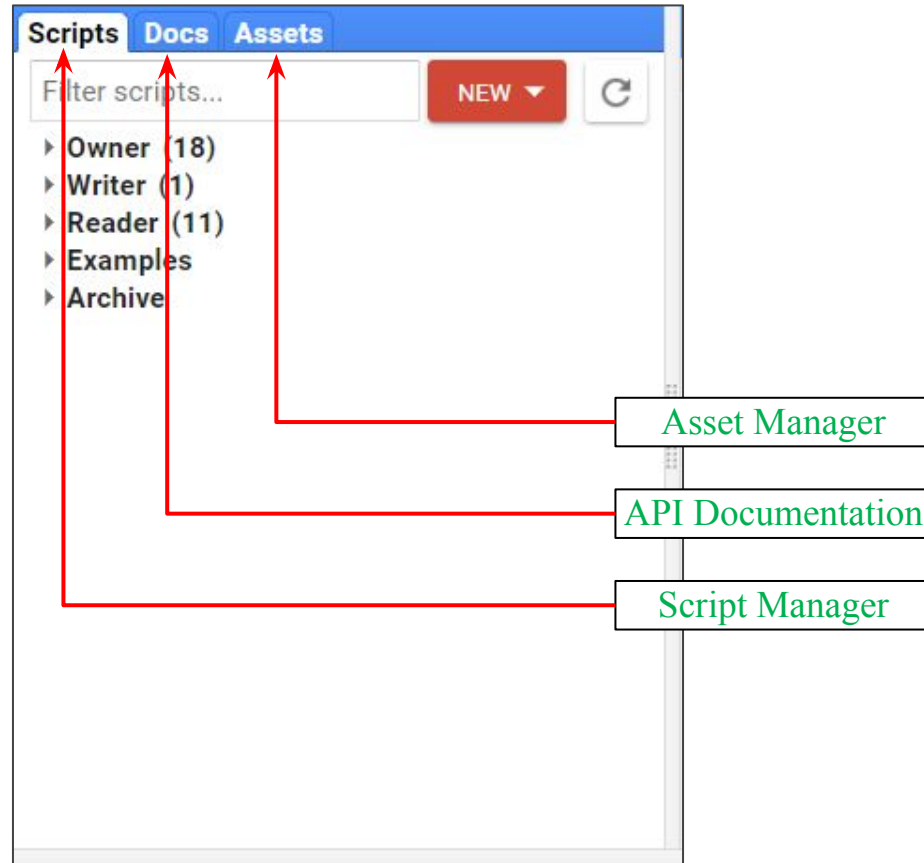
After logging in the interface will look like this.



# GEE Interface

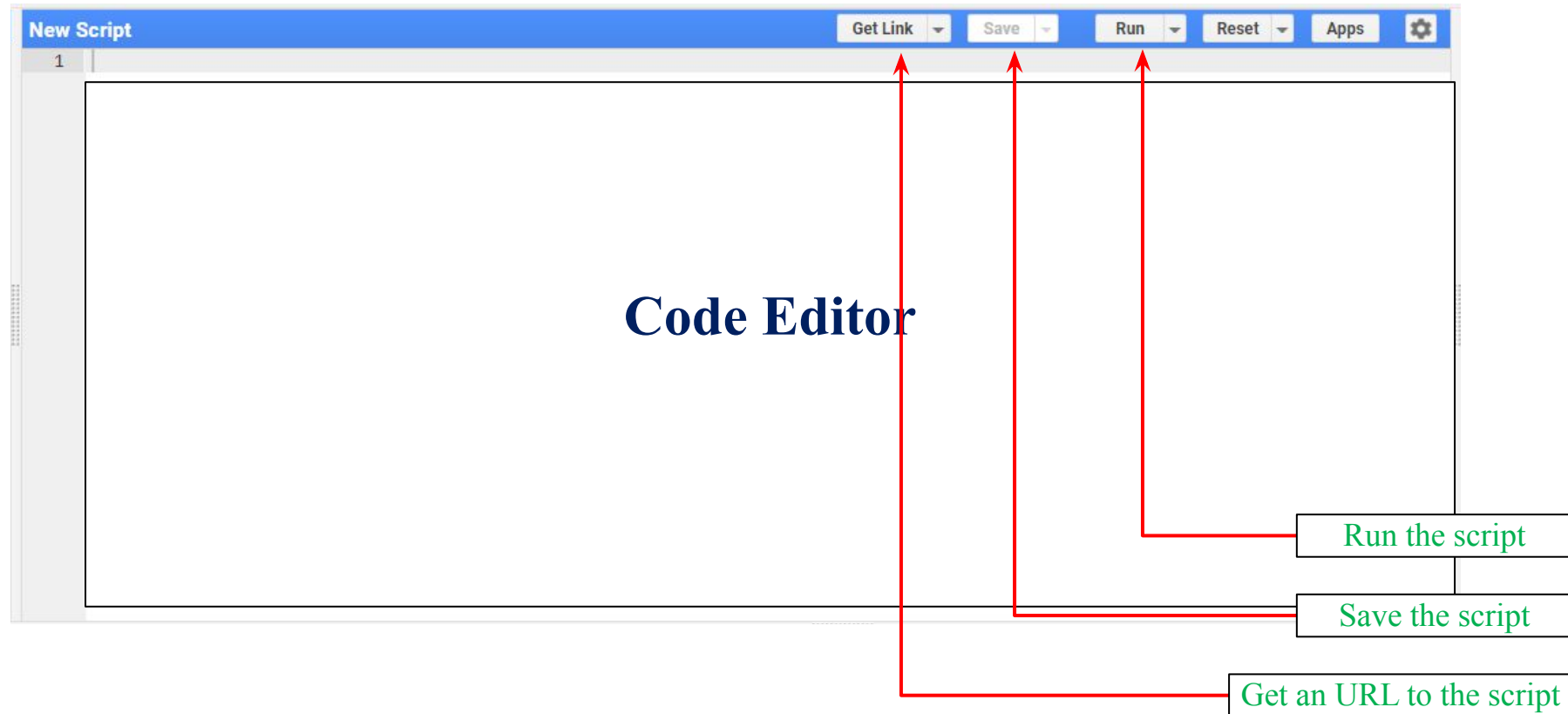


# GEE Interface

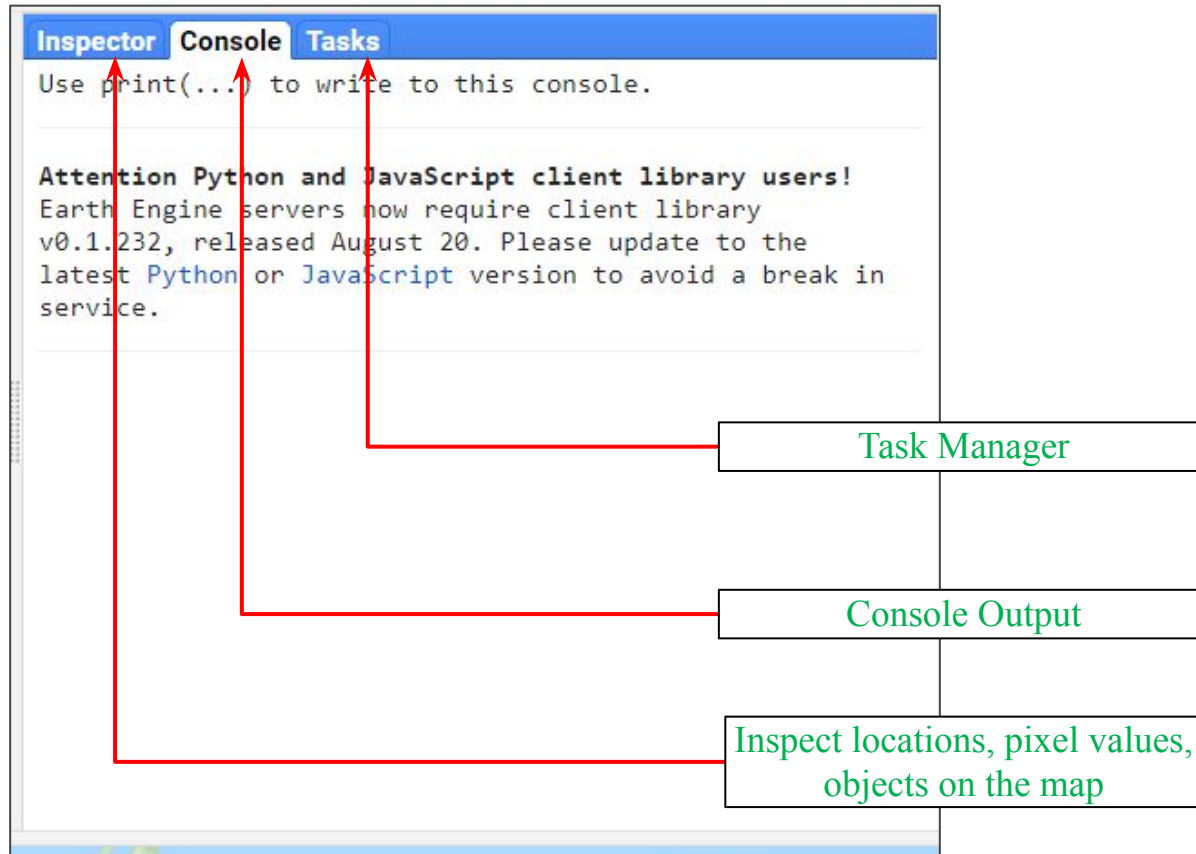




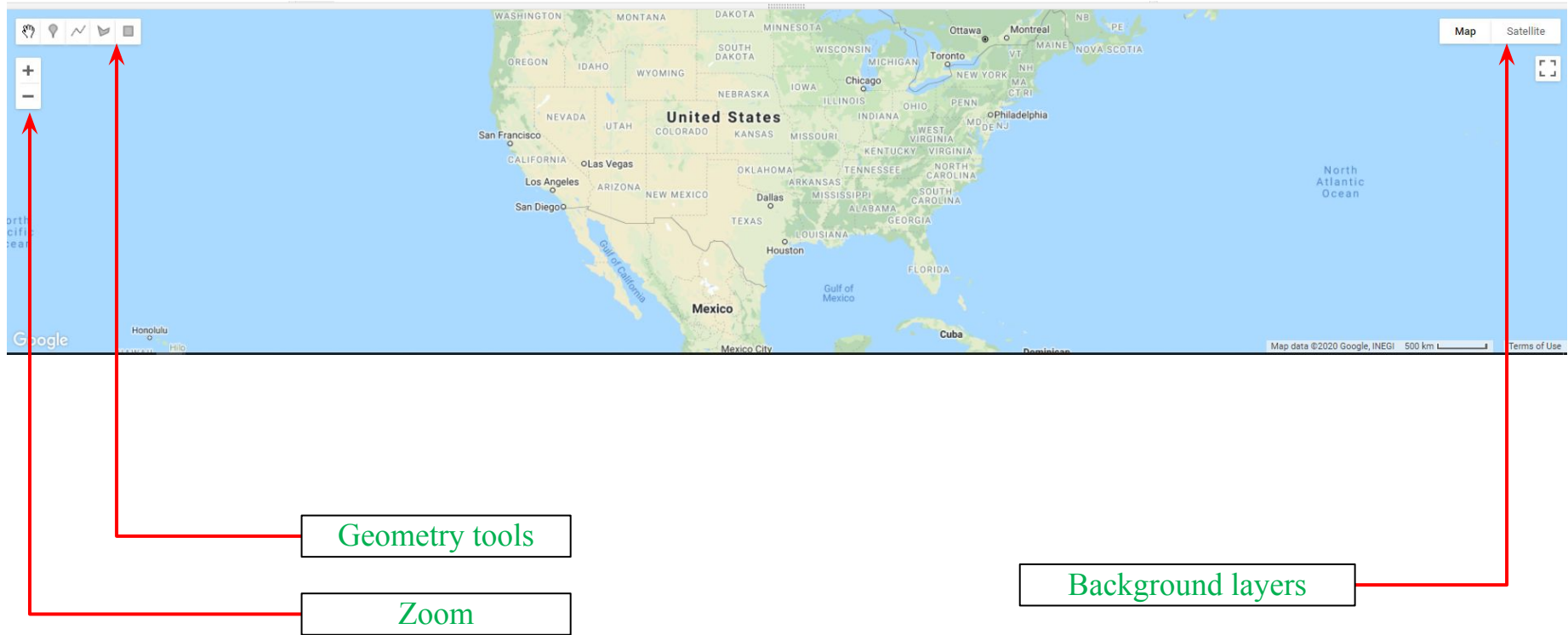
# GEE Interface



# GEE Interface



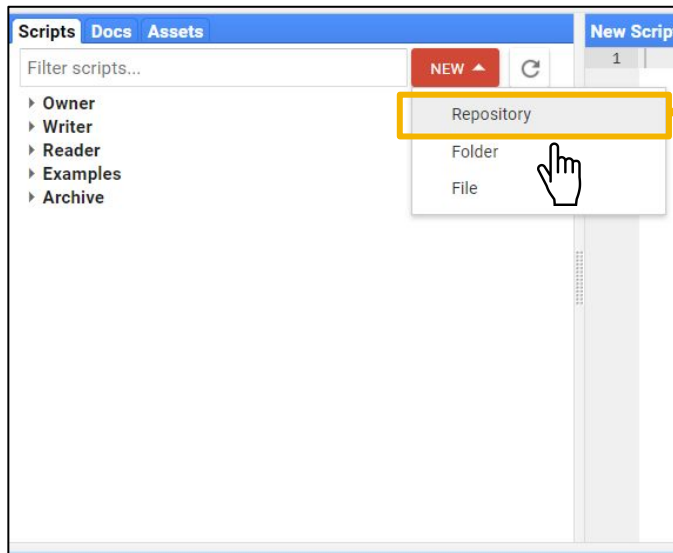
# GEE Interface



# GEE Username Creation

## 4. Create your GEE user name

- When clicking on the repository, a pop-message will show up to create **GEE Username** (home folder).



### Create your home folder

Note that when you share your work, the name of your home folder will be visible to other users and you **cannot change** the name of your home folder after it's created, or add further home folders.

Home folders' names must be shorter than 100 characters and may only include letters, numbers, hyphens, and underscores.

Your home folder will be linked to your signed-in account permanently. We recommend that you set it to an online name that you want to be known by in the Earth Engine community, such as your email username or social media handle.

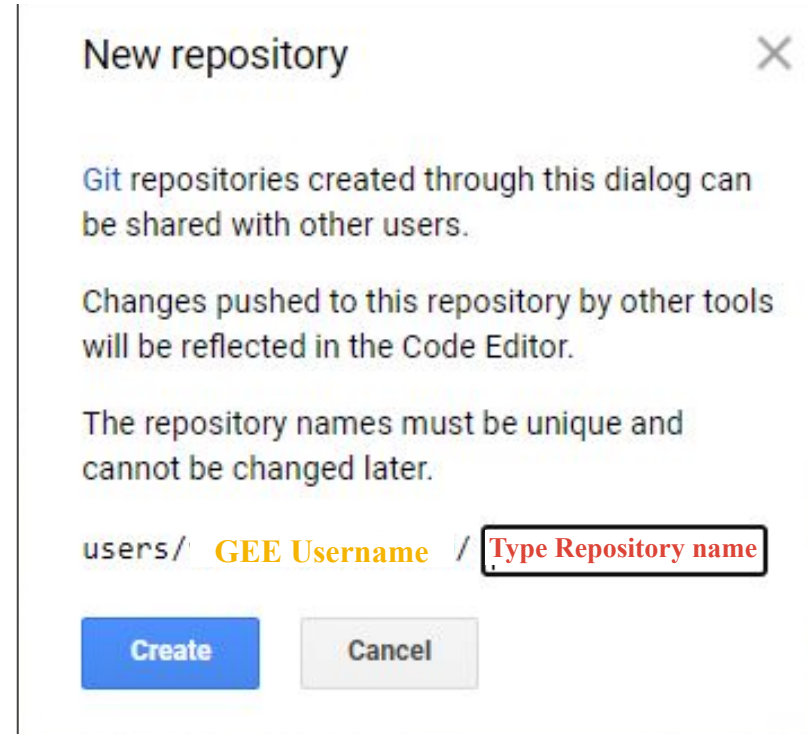
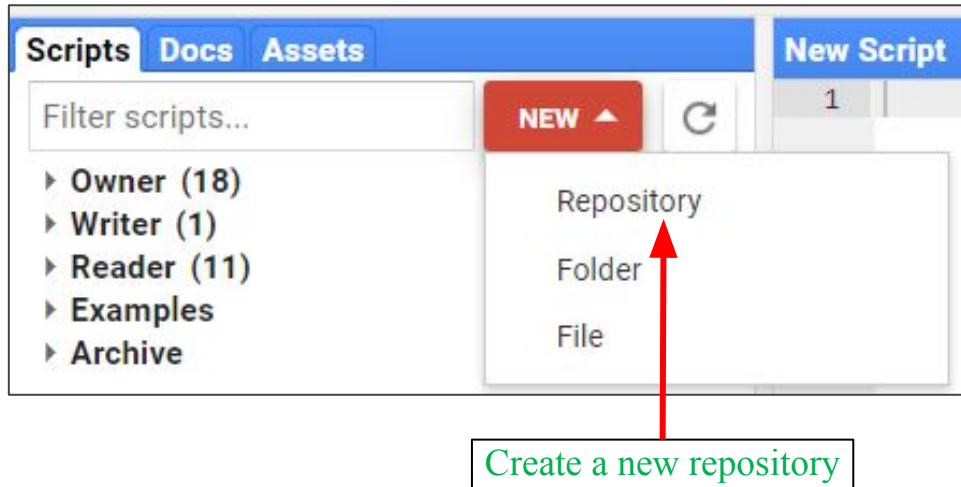
users/

Type your GEE Username

Continue

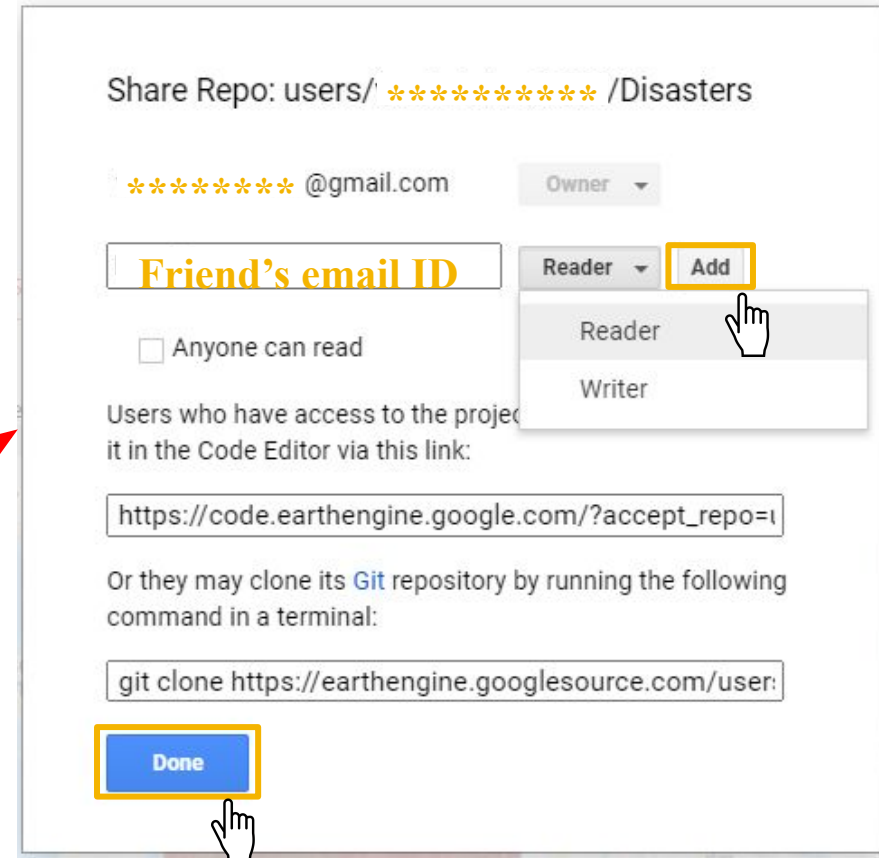
# Repository Creation

- After creating the GEE username, click on the repository and create a one.
- Once created the repository name can't be changed.
- To collaborate with your peers,  
keep the files in repository and share it.



# Repository Sharing

- **Reader** can't edit the code, can be used as it is. Generally, the functions are written and shared universally.
- **Writer** can edit, modify and change your code. So, be careful while giving access to your peers.



Share Repo: users/ \*\*\*\*\* /Disasters

\*\*\*\*\*@gmail.com Owner

**Friend's email ID** Reader **Add**

☐ Anyone can read

Reader

Writer

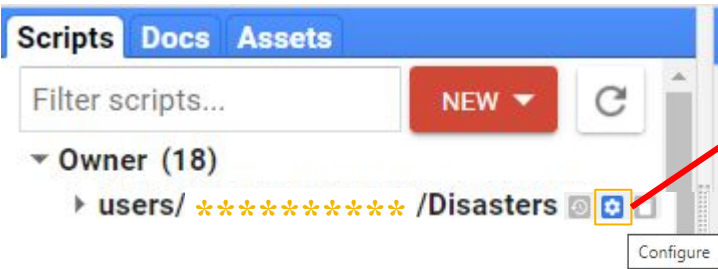
Users who have access to the project in the Code Editor via this link:

[https://code.earthengine.google.com/?accept\\_repo=users/\\*\\*\\*\\*\\*/Disasters](https://code.earthengine.google.com/?accept_repo=users/*****/Disasters)

Or they may clone its [Git](#) repository by running the following command in a terminal:

```
git clone https://earthengine.google.com/user:*****/Disasters
```

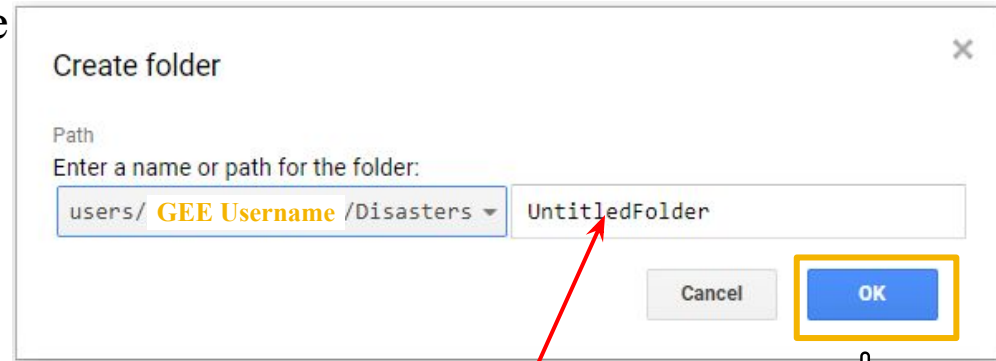
**Done**



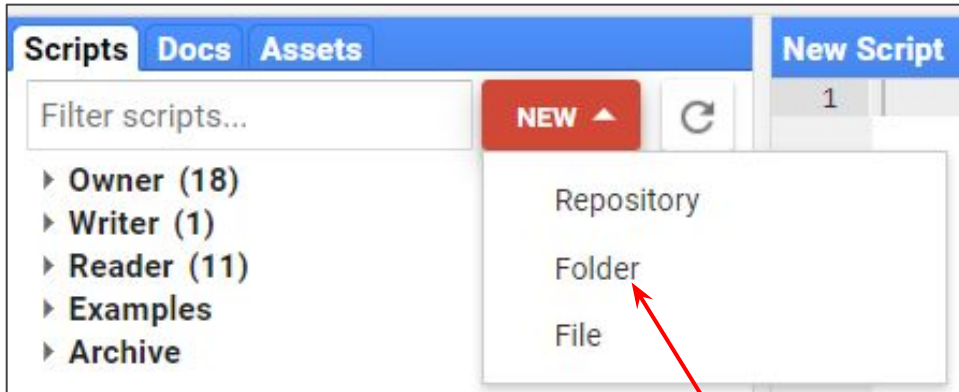


# Folder Creation

After creating a repository, a folder can be created inside it.



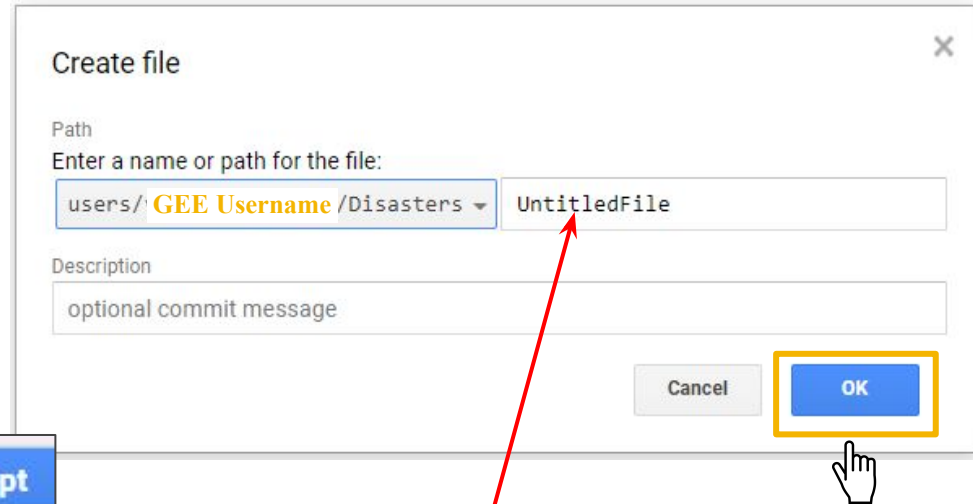
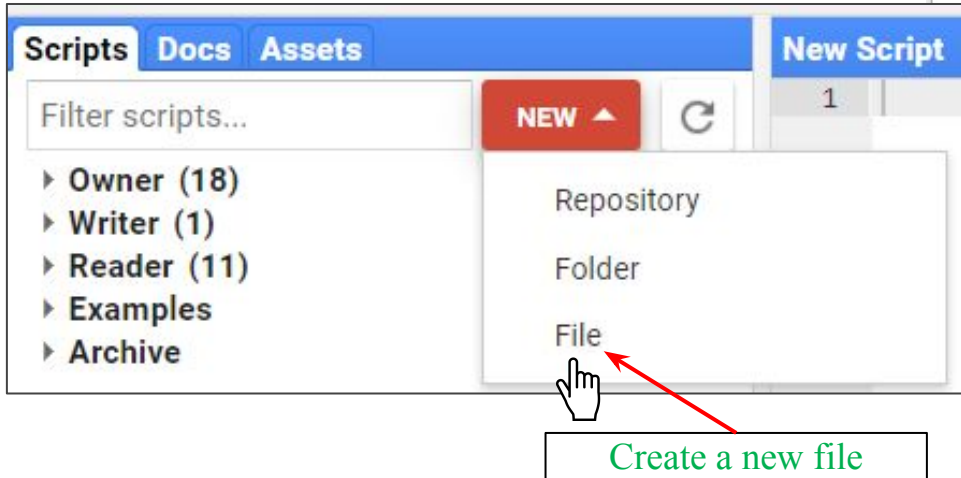
Type folder name



Create a new folder

# File Creation

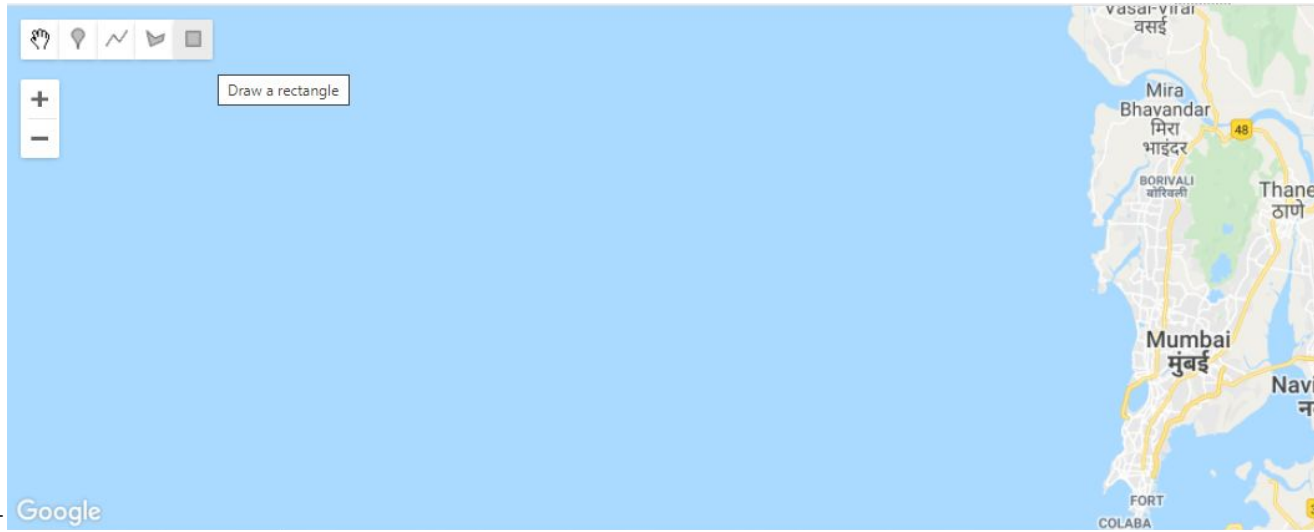
- After creating a repository and a folder, a file can be created inside it.
- Javascript code has to be written on the file.
- The file can be organized (inside repository / folder) as per users requirements.



Type file name

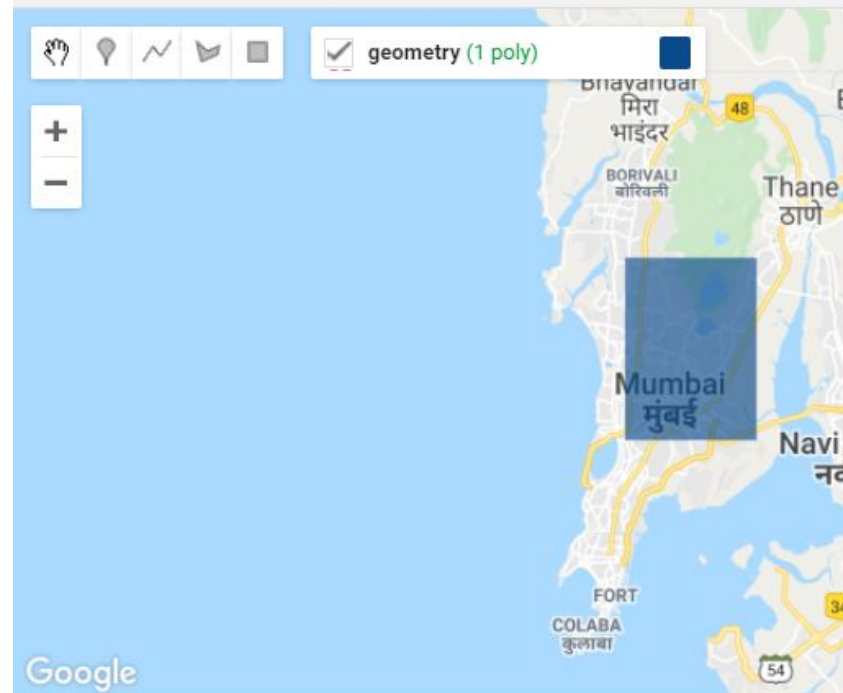
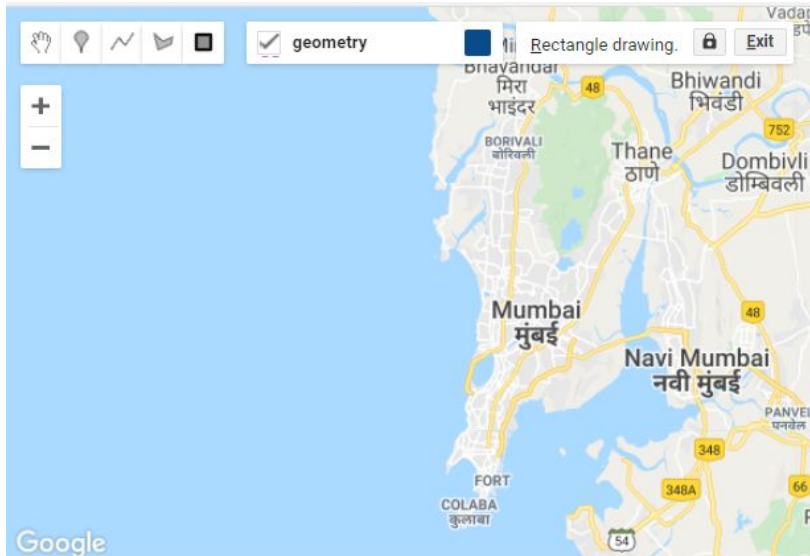
# Region of Interest (ROI) creation

- Create a file
- Zoom to the area of interest on the map
- Click on draw rectangle
- Left click the mouse to start, move the mouse cursor towards bottom right and release the left click button to complete the rectangle.

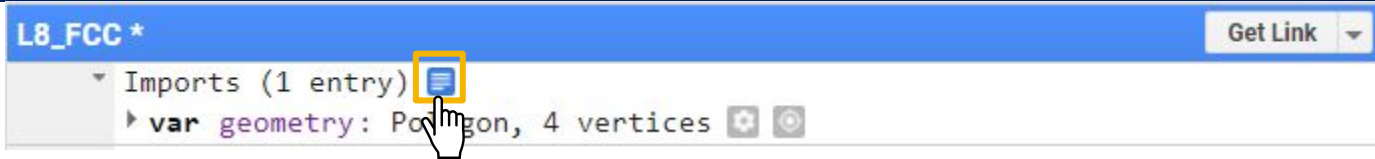


# Region of Interest (ROI) creation

```
L8_FCC *  
Get Link  
Imports (1 entry)  
var geometry: Polygon, 4 vertices
```



# Region of Interest (ROI) creation



Below is the JavaScript code representing the current imports. To transfer them to another script, paste this code into the editor and click "Convert" in the suggestion tooltip.

```
var geometry =  
  /* color: #0b4a8b */  
  /* displayProperties: [  
    {  
      "type": "rectangle"  
    }  
  ] */  
  ee.Geometry.Polygon(  
    [[[72.84384407584409, 19.177784553110932],  
      [72.84384407584409, 19.046727625019944],  
      [72.94409431998471, 19.046727625019944],  
      [72.94409431998471, 19.177784553110932]]], null, false);
```

# Functions and Visualization parameters

```
function maskL8sr(image) {  
  var cloudShadowBitMask = (1 << 3);  
  var cloudsBitMask = (1 << 5);  
  var qa = image.select('pixel_qa');  
  var mask = qa.bitwiseAnd(cloudShadowBitMask).eq(0)  
    .and(qa.bitwiseAnd(cloudsBitMask).eq(0));  
  return image.updateMask(mask);  
}  
  
var vizParams = {  
  bands: ['B5', 'B4', 'B3'],  
  min: 0,  
  max: 3000,  
  gamma: 1  
};
```



# Satellite Data fetching:- Landsat-8 Surface Reflectance

```
var L8_Coll = ee.ImageCollection('LANDSAT/LC08/C01/T1_SR')  
    .filterDate('2019-01-01', '2019-12-31')  
    .map(maskL8sr)  
    .filterBounds(geometry);  
var L8_Image = L8_Coll.median().clip(geometry);
```

**Specify the dates as per the user requirements**

# Visualize Landsat-8 FCC

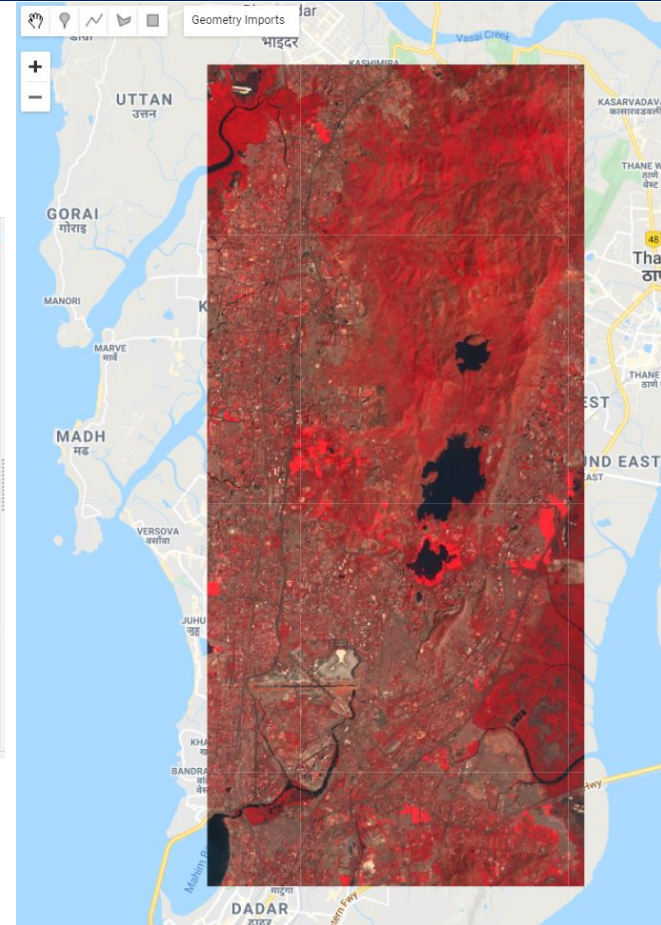
```
Map.centerObject(geometry, 10);  
Map.addLayer(L8_Image, vizParams, 'FCC');
```

[Link to the complete code](#)

# Landsat - 8 FCC visualization

After running the code the output will look like this.

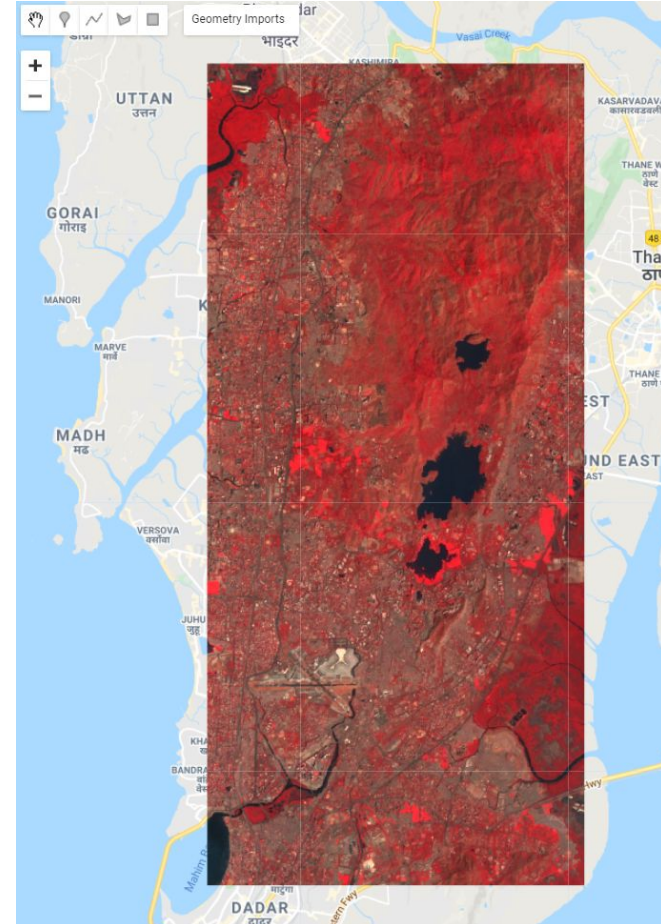
```
L8_FCC
1 var geometry =
2   /* color: #d63000 */
14 function maskL8sr(image) {
15   var cloudShadowBitMask = (1 << 3);
16   var cloudsBitMask = (1 << 5);
17   var qa = image.select('pixel_qa');
18   var mask = qa.bitwiseAnd(cloudShadowBitMask).eq(0)
19             .and(qa.bitwiseAnd(cloudsBitMask).eq(0));
20   return image.updateMask(mask);
21 }
22 var vizParams = {
23   bands: ['B5', 'B4', 'B3'],
24   min: 0,
25   max: 3000,
26   gamma: 1,
27 };
28
29 var L8_Coll = ee.ImageCollection('LANDSAT/LC08/C01/T1_SR')
30   .filterDate('2019-01-01', '2019-12-31')
31   .map(maskL8sr)
32   .filterBounds(geometry);
33 var L8_Image = L8_Coll.median().clip(geometry);
34
35 Map.centerObject(geometry, 10);
36 Map.addLayer(L8_Image, vizParams, 'FCC');
```



# Landsat - 8 FCC visualization

Interpretation of this image:

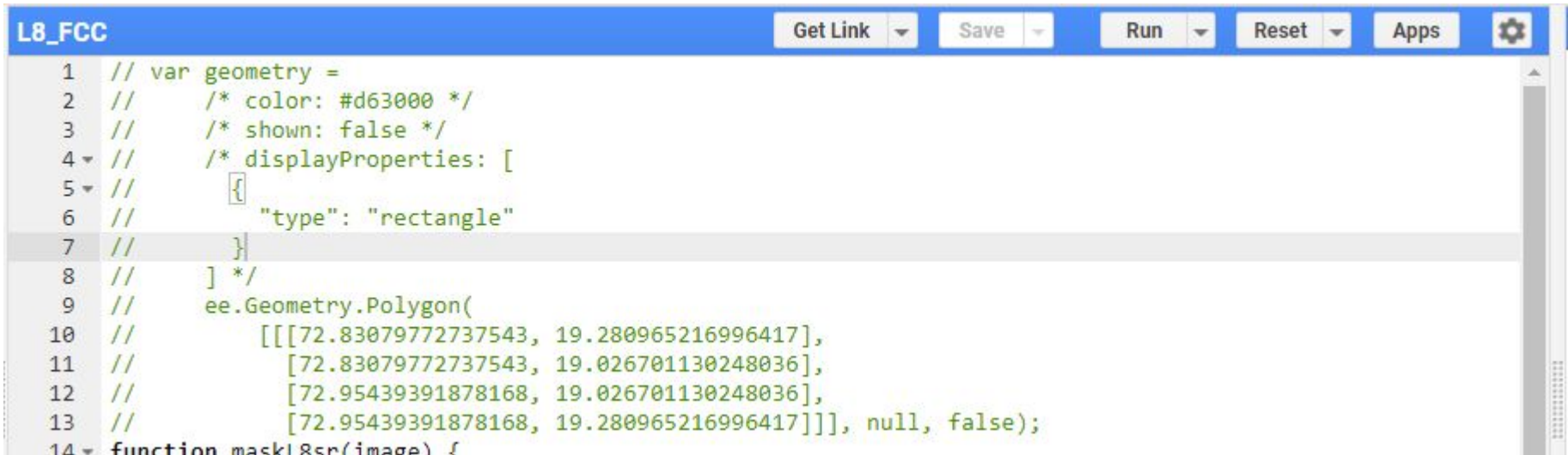
- As the vegetated area give high reflectance values in NIR band, the forest area is seen in red color.
- The water bodies is seen in dark black color.



# Changing the study area / ROI

If the user want to draw an ROI of any location of his interest,

- Comment the variable “var geometry”
  - Select required lines and press Ctrl + / to comment.
  - Commented lines will not considered while running the code.
- Create an ROI as per the requirement as mentioned in previous slides.



```
L8_FCC
Get Link Save Run Reset Apps
1 // var geometry =
2 //     /* color: #d63000 */
3 //     /* shown: false */
4 //     /* displayProperties: [
5 //         {
6 //             "type": "rectangle"
7 //         }
8 //     ] */
9 ee.Geometry.Polygon(
10 [[ [72.83079772737543, 19.280965216996417],
11      [72.83079772737543, 19.026701130248036],
12      [72.95439391878168, 19.026701130248036],
13      [72.95439391878168, 19.280965216996417]] ], null, false);
14 function mask18sr(image) {
```

# Useful resources

- <https://developers.google.com/earth-engine/>
- <https://developers.google.com/earth-engine/guides>
- [https://developers.google.com/earth-engine/guides/image\\_visualization](https://developers.google.com/earth-engine/guides/image_visualization)

## RGB composites

The following illustrates the use of parameters to style a Landsat 8 image as a false-color composite:

```
// Load an image.
var image = ee.Image('LANDSAT/LC08/C01/T1_TOA/LC08_044034_20140318');

// Define the visualization parameters.
var vizParams = {
  bands: ['B5', 'B4', 'B3'],
  min: 0,
  max: 0.5,
  gamma: [0.95, 1.1, 1]
};

// Center the map and display the image.
Map.setCenter(-122.1899, 37.5010, 10); // San Francisco Bay
Map.addLayer(image, vizParams, 'false color composite');
```

In this example, band 'B5' is assigned to red, 'B4' is assigned to green, and 'B3' is assigned to blue. The result should look something like Figure 1.





End of module 1

Thanking you

