

Using Google Earth Engine to Create Multi-Band Sentinel-1 and 2 Composite

Google Earth Engine is a free web service which can easily create and combine data from a multitude of satellites and other data sources. The satellite data available includes Landsat, Modis and Sentinel data.

Main website: <https://earthengine.google.com/>

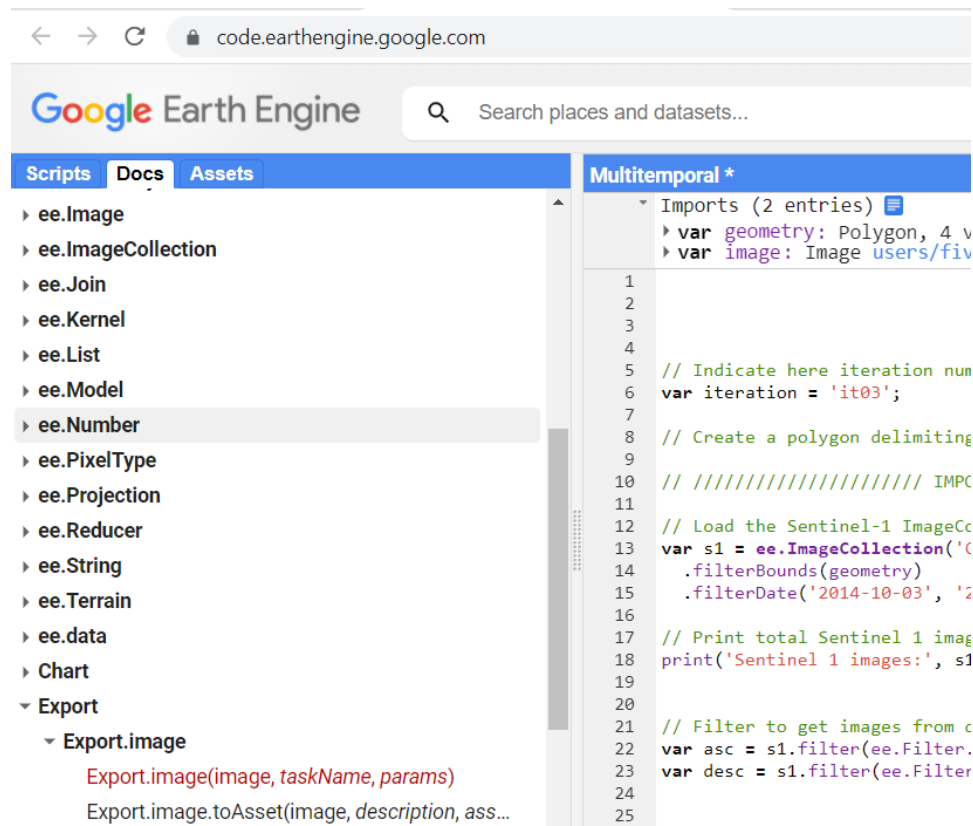
Datasets: <https://developers.google.com/earth-engine/datasets/catalog>

Once signed up, data can easily be created using the Google Earth Engine Code Editor.

The code editor is available from the Platform drop-down main on the main webpage.

The code editor left pane has Scripts, Docs and Assets tabs. You can load data into your assets, with a limitation of 10 GB size for each file. If larger, they must be loaded to either Google Drive or Google Cloud Storage.

The Script tab is where any scripts you store are held, while the Docs tab contains the documentation for the different API's that can be used. See Export, for examples of how to export any data gathered and calculated from scripts to either Assets, Drive or Cloud Storage.

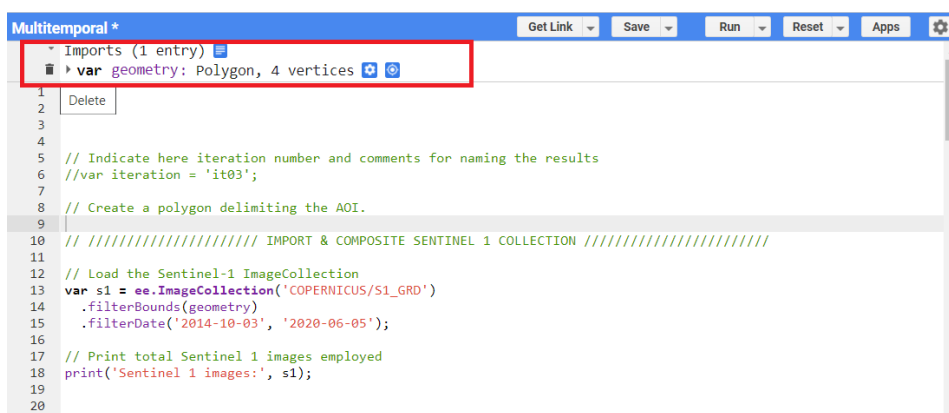


Google Earth Engine accepts both Java and Python scripts.

Using GEE to create multitemporal Sentinel-1 and 2 composite 14-band Tiff file:

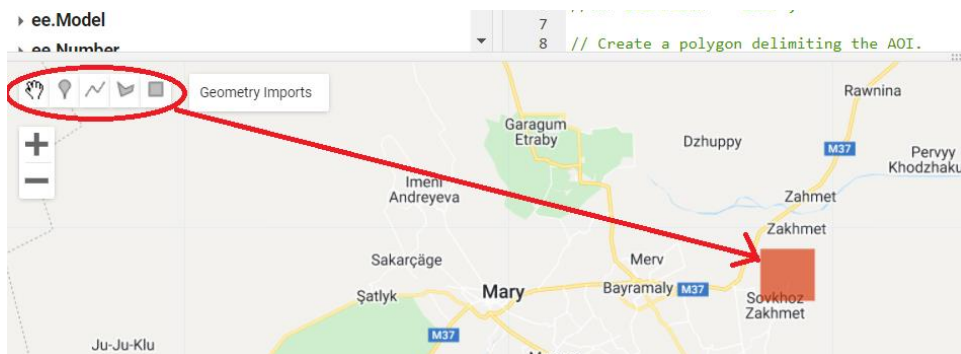
The java script for creating the multitemporal Sentinel composite image is in the Multitemporal_14band_Sentinel_Composite_Javascript_for_GEE.txt file. Copy this code into the editor window.

If the geometry is set from a previous session, then delete this at the top of the window. This is the defined area to create the composite.



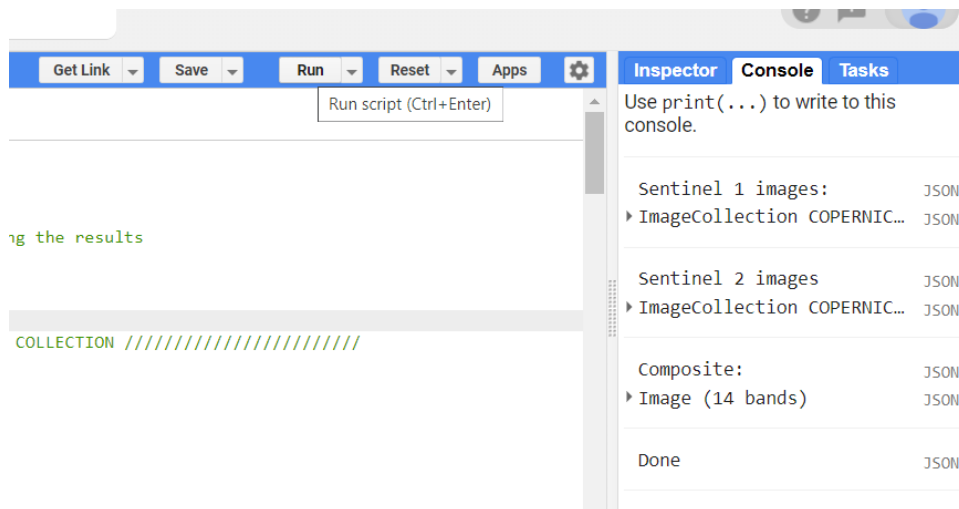
```
1 Delete
2
3
4
5 // Indicate here iteration number and comments for naming the results
6 //var iteration = 'it03';
7
8 // Create a polygon delimiting the AOI.
9
10 // ////////////////////////////////// IMPORT & COMPOSITE SENTINEL 1 COLLECTION //////////////////////////////////
11
12 // Load the Sentinel-1 ImageCollection
13 var s1 = ee.ImageCollection('COPERNICUS/S1_GRD')
14   .filterBounds(geometry)
15   .filterDate('2014-10-03', '2020-06-05');
16
17 // Print total Sentinel 1 images employed
18 print('Sentinel 1 images:', s1);
19
20
```

Define a new geometry for the area of interest on the map.

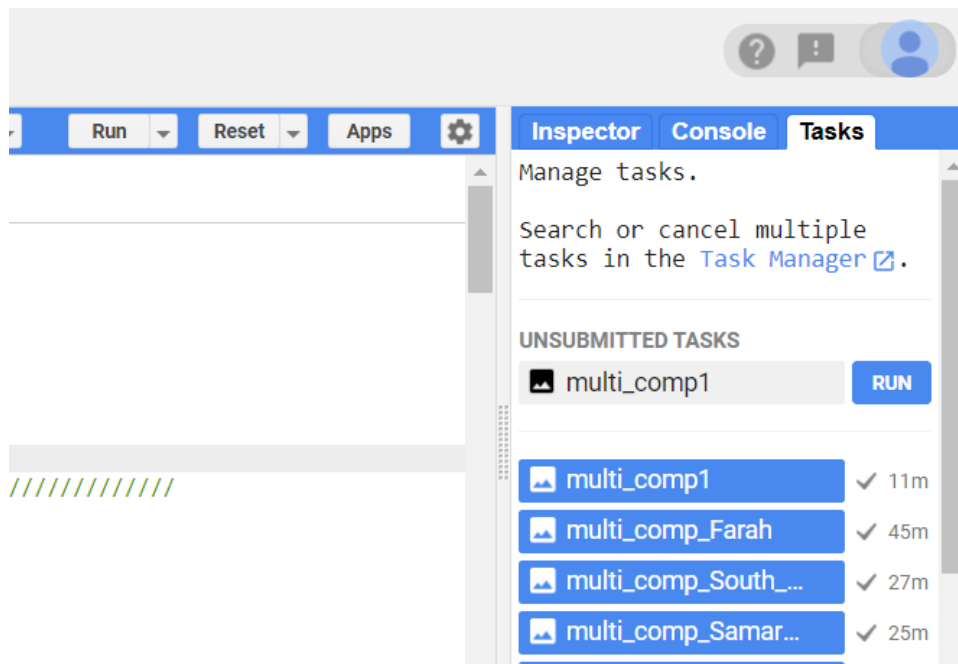


The last lines of code in the script is setup to export the data to Google Drive and defines the name of the file to be exported. Make any changes necessary.

Run the script and wait for the steps in the console to be finished.



In the Tasks menu, a new task will be ready to run. Click on the Run button to export the Tiff file with the composite to Google Drive, or the export destination that has been chosen.



If a large area has been chosen for export, Google Earth Engine will split the composite into multiple parts which would need to be combined in GIS software.

The exported Tiff will contain 14 bands, composited over the period defined in the script. The first four bands are Sentinel-1 SAR bands. VV polarization in ascending mode, VH polarization in ascending mode, VV polarization in descending mode and VH polarization in descending mode.

The next 10 bands are Sentinel-2 multispectral bands. These are B2, B3, B4, B5, B6, B7, B8, B8A, B11 and B12. The following webpage describes the bands and some common display methods for the bands, and their use.

<https://gisgeography.com/sentinel-2-bands-combinations/>