

University of Oregon - GEOG 485/585 – Remote Sensing 1 – Fall 2021

Lab Assignment #7: Google Earth Engine

Objectives: We will work through an introductory tutorial for the Google Earth Engine JavaScript API.

Logistics:

Date assigned: Week 7
Date due: Before the beginning of Week 8 labs
Points: 100 points
Deliverables: Post a PDF document on Canvas with all answers and necessary graphics using the answer sheet given to you. Your responses are expected to be in complete, grammatically correct sentences based on knowledge gained from lecture, reading, and lab exercises. Remember that some of the questions have multiple parts so make sure you answer all parts of the questions.

Preface:

The lab instructions will be available on Canvas (canvas.uoregon.edu) and the class network drive (details below). Data used in labs are not posted on canvas and should be accessed through the SSIL network (you can also remotely connect to this network from off campus, following these [instructions](#)).

There is no class data for this lab.

Lab overview

This tutorial provides examples of how to use Earth Engine to analyze geospatial raster and vector data. The tutorials assume no programming background, although they do assume a willingness to learn some JavaScript. By the end of the tutorial, you will have seen most of the basic functionality of the Earth Engine API.

1. Code Editor

Navigate to the Google Earth Engine Code Editor (<https://code.earthengine.google.com/>) and sign in. Take a minute or two to get familiar with the various panels of the Code Editor using the following as a guide: <https://developers.google.com/earth-engine/guides/playground>.

2. Javascript

The Code Editor uses a *javascript client API* to make requests to Google Servers. If you wish, you can work through the javascript tutorial but this is not compulsory: https://developers.google.com/earth-engine/tutorials/tutorial_js_01.

3. Earth Engine Tutorial

3.1. Page 1

We will work through an Earth Engine tutorial which can found here: https://developers.google.com/earth-engine/tutorials/tutorial_api_01. But refer to this document to complete the lab assignment.

3.2. Page 2 https://developers.google.com/earth-engine/tutorials/tutorial_api_02

We will first change the `Map.setCenter` to somewhere we are interested in. For example, in the below code we would change the **bold** coordinates (but do not change the Zoom level which can be left as 9).

```
// Zoom to a location.  
Map.setCenter(-112.8598, 36.2841, 9); // Center on the Grand  
Canyon.
```

Since we are looking at a new area of the world, also change the `min` and `max` values so the SRTM image is stretched appropriately.

```
Map.addLayer(image, {min: 0, max: 3000}, 'custom  
visualization');
```

Finally, we will set the color palette to two or three colors of our choice.

```
Map.addLayer(image, {min: 0, max: 3000, palette: ['blue',  
'green', 'red']}, 'custom palette');
```

Click **Next Page** to progress through the tutorial.

3.3. Page 3 https://developers.google.com/earth-engine/tutorials/tutorial_api_03

Work through the next page of the tutorial, remembering to change the `Map.setCenter` to your area of interest.

Question 1 (30 points):

- a) Copy and paste a screenshot showing the **elevation** of your customized SRTM image with your drawn polygon overlaid. Add a caption describing where your image is and the mean elevation within the polygon.
- b) Copy and paste a screenshot showing the **slope** of your customized SRTM image
- c) Copy and paste a screenshot showing the **aspect** of your customized SRTM image

3.4. Page 4 https://developers.google.com/earth-engine/tutorials/tutorial_api_04

On the next page, use the **point drawing tool** to add a point somewhere in your area of interest. Rename this point by clicking **Configure** and changing the name to **point**.

Also change the dates of your **ImageCollection** to a **one year** period of your choice (preferably in the last five years).

```
var temporalFiltered = spatialFiltered.filterDate('2015-01-01',  
  '2015-12-31');
```

Question 2 (10 points):

Copy and paste a screenshot showing the “least cloudy” **ImageCollection** surrounding your point of interest

3.5. Page 5 https://developers.google.com/earth-engine/tutorials/tutorial_api_05

Again change the dates of your **ImageCollection**:

```
var median = l8.filterDate('2016-01-01', '2016-12-31').median();
```

Question 3 (20 points):

Zoom out a bit and copy and paste a screenshot showing your cloud-free, water masked image composite.

3.6. Page 6 https://developers.google.com/earth-engine/tutorials/tutorial_api_06

Change `point` and `filterDate` to your point and period of interest.

```
var point = ee.Geometry.Point([-122.292, 37.9018]);

var image = ee.Image(l8.filterBounds(point).filterDate('2015-01-01', '2015-12-31').sort('CLOUD_COVER').first())
```

Question 4 (20 points):

Zoom out a bit and copy and paste a screenshot showing your “greenest pixel” image composite.

3.7. Page 7 https://developers.google.com/earth-engine/tutorials/tutorial_api_07

Question 5 (20 points):

- a) Copy and paste a chart showing Landsat NDVI over time at a point geometry
- b) Copy and paste a chart showing **cloud-masked** Landsat NDVI over time at a point geometry

Google Earth Engine is an incredibly powerful (and perhaps the only) tool for analyzing large quantities of remote sensing data over large scales. There are now some great resources to learn more: <https://developers.google.com/earth-engine/tutorials/videos>.

This concludes Lab 7! Remember to type up all answers on your word document, convert file to PDF and upload it to Canvas by the deadline.