

Case Study 3 - County-level Soil Properties

1 Soil properties

1.1 Download

[link](#)

click the link and download these files:

Cation Exchange Capacity (cec): cec.tif

Soil Organic Matter (som): om_kg_sq_m.tif

Avail. Water Holding Capacity (awc): water_storage.tif

Property	Units	Download
Chemical		
Calcium Carbonate	kilograms/meter ²	Download
cec → Cation Exchange Capacity	centimoles/kilogram	Download
Cation Exchange Cap. (0 - 5 cm)	centimoles/kilogram	Download
Cation Exchange Cap. (0 - 25 cm)	centimoles/kilogram	Download
Cation Exchange Cap. (0 - 50 cm)	centimoles/kilogram	Download
Electrical Conductivity	decisiemens/meter	Download
Electrical Conductivity (0 - 5 cm)	decisiemens/meter	Download
Electrical Conductivity (0 - 25 cm)	decisiemens/meter	Download
pH	pH	Download
pH (0 - 5 cm)	pH	Download
pH (0 - 25 cm)	pH	Download
pH (25 - 50 cm)	pH	Download
pH (30 - 60 cm)	pH	Download
Sodium Adsorption Ratio	ratio	Download
som → Soil Organic Matter	kilograms/meter ²	Download
Soil Organic Matter - Max	percent by weight, expressed as a decimal	Download
Physical		
awc → Avail. Water Holding Capacity	centimeters	Download
Avail. Water Holding Cap. (0 - 25 cm)	centimeters	Download
Avail. Water Holding Cap. (0 - 50 cm)	centimeters	Download

Fig. 1

1.2 Upload

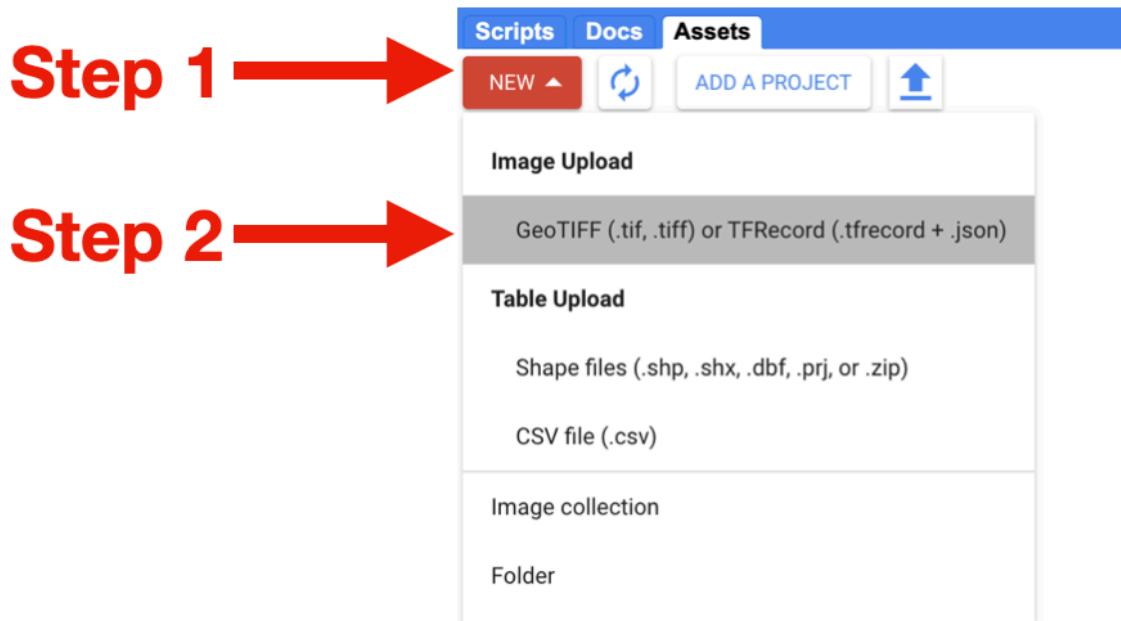


Fig. 2: This is in the top left corner of the code editor

Then the upload process is the same as case study 2.

1.3 Import the soil properties

The import process is the same as case study 2.

2 U.S. county shapefile

The process of downloading and uploading shapefile is the same as case study 2.

The image shows a code editor window titled '405case3'. At the top, there are buttons for 'Get Link', 'Save', 'Run', 'Reset', and 'Apps'. The code area contains the following imports:

```
Imports (2 entries)
var soc: Image projects/ee-xwang2696/assets/mir/som (1 band)
var UScounties: Table projects/ee-xwang2696/assets/mir/cb_2016_us_count...
```

1 /*

Fig. 3

3 Code overview

[link](#)

This is a link to shared code. Once you've uploaded the shapefile and soil properties, you can click on this link, copy the code to your own code editor in browser, and execute the code.

4 Procedures

4.1 Visualize soil properties

```
/**  
 * Extract soil properties for each county  
 */  
  
// weights: soil layers at different depth can be given different weight value. If there is only one soil layer,  
just set the weight as [1].  
var wt_values = [2.5];  
var wt = ee.Image(wt_values);  
  
// get root zone average CEC  
var soc_avg = soc.multiply(wt).reduce(ee.Reducer.sum())  
    .divide(2.5);  
Map.addLayer(soc_avg, {}, 'soc');
```

4.2 Visualize shapefile

```
// get only counties with corn and soy  
var counties = UScounties.filter(ee.Filter.eq('corn_soy',1));  
print(counties);  
Map.addLayer(counties, {}, 'ctn');
```

4.3 Function: export data

```
// Export  
var exportTable = function(table, prefix) {  
  Export.table.toDrive({  
    collection: table.select(['.*'], null, false),  
    description: prefix,  
    folder: 'SSURGO',  
    fileNamePrefix: prefix  
  });  
};
```

4.4 Download the data

```
// loop through each year  
for(var i = 2001; i < 2020; i++) {  
  
  var year = i.toString();  
  
  // Apply the CDL layer to mask out noisy pixels  
  var cropMask;  
  if(year > 2007) {  
    cropMask = ee.Image('USDA/NASS/CDL/' + year).select('cropland').eq(1);  
  } else {  
    var mcdband = 'MODIS/006/MCD12Q1/' + year + '_01_01';  
    cropMask = ee.Image(mcdband).select('LC_Type1').clip(counties).eq(12);  
  }
```

}

```
// Spatially aggregate data into the county level
var soc_county = soc_avg.updateMask(cropMask)
    .reduceRegions({
        collection:counties,
        reducer:ee.Reducer.mean(),
        scale:250,
        tileScale:16});

exportTable(soc_county, 'soc_mean_'+year);
}
```

5 Result

The screenshot shows the 'Tasks' tab of a software interface. At the top, there are three tabs: 'Inspector' (blue), 'Console' (orange), and 'Tasks' (white). Below the tabs, a search bar contains the placeholder text 'Search or cancel multiple tasks in the Task Manager'. To the right of the search bar is a large blue button labeled 'RUN ALL!'. The main area is titled 'UNSUBMITTED TASKS' and lists 15 tasks, each with a small icon and a 'RUN' button to its right. The tasks are: soc_mean_2001, soc_mean_2002, soc_mean_2003, soc_mean_2004, soc_mean_2005, soc_mean_2006, soc_mean_2007, soc_mean_2008, soc_mean_2009, soc_mean_2010, soc_mean_2011, soc_mean_2012, soc_mean_2013, soc_mean_2014, and soc_mean_2015.

Fig. 4