Case Study 3 - County-level Soil Properties

1 Soil properties

1.1 Download

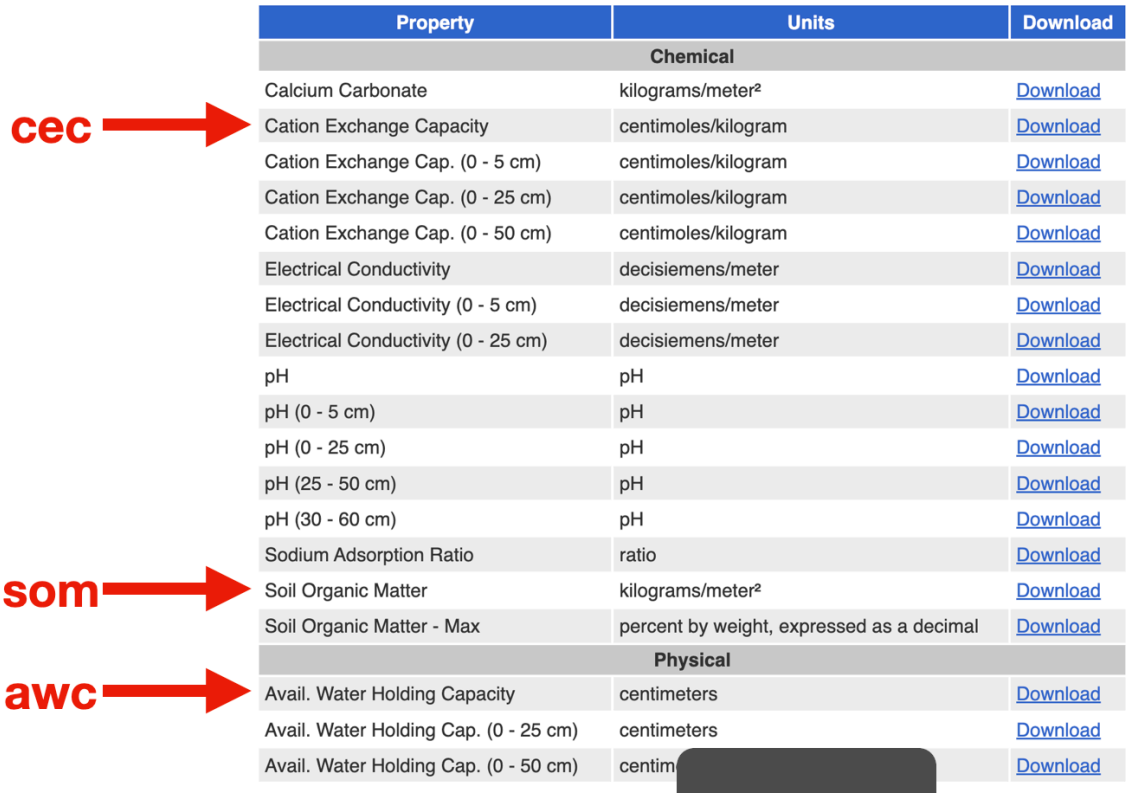
link

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/meter²	Download
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
Soil Organic Matter	kilograms/meter²	Download
Soil Organic Matter - Max	percent by weight, expressed as a decimal	Download
Physical		
Avail. Water Holding Capacity	centimeters	Download
Avail. Water Holding Cap. (0 - 25 cm)	centimeters	Download
Avail. Water Holding Cap. (0 - 50 cm)	centim	Download

Fig. 1

1.2 Upload

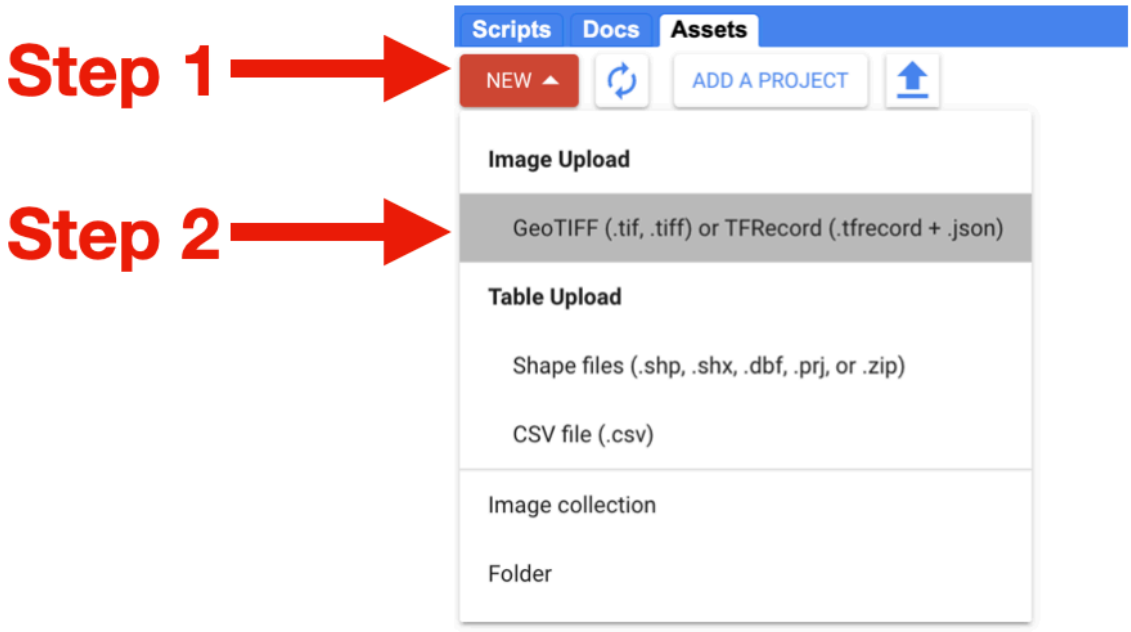


Fig. 2: This is in the top left corner of the code editor

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.

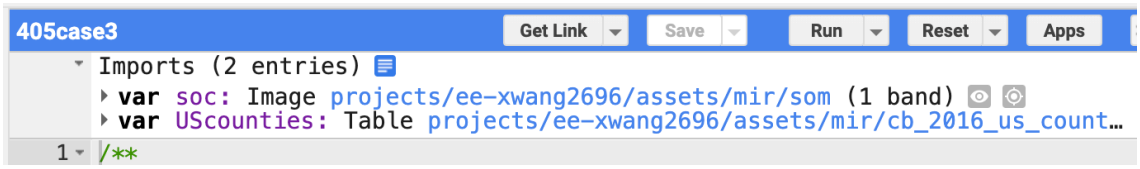


Fig. 3

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

Fig. 4