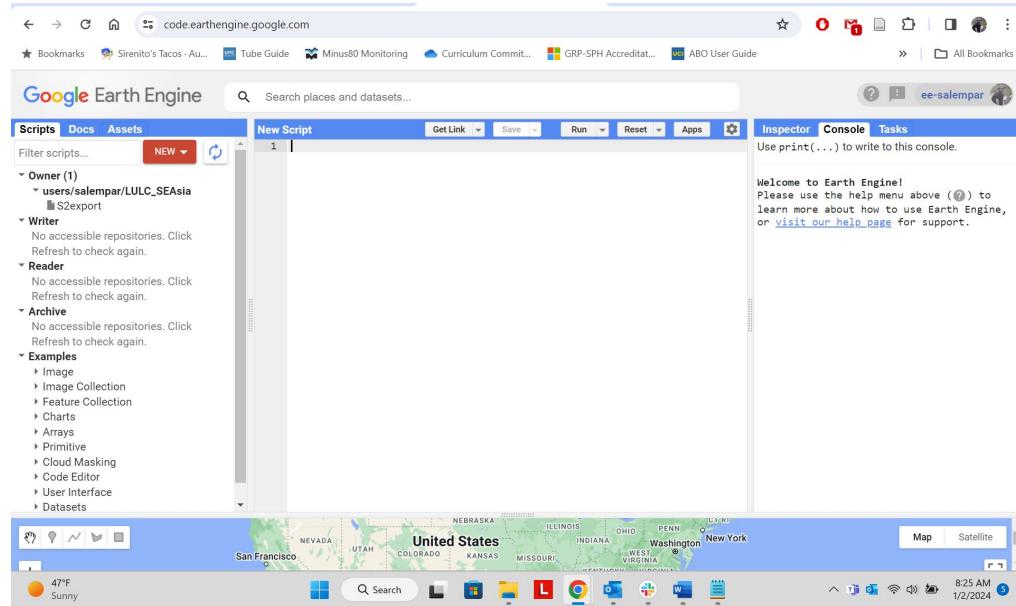


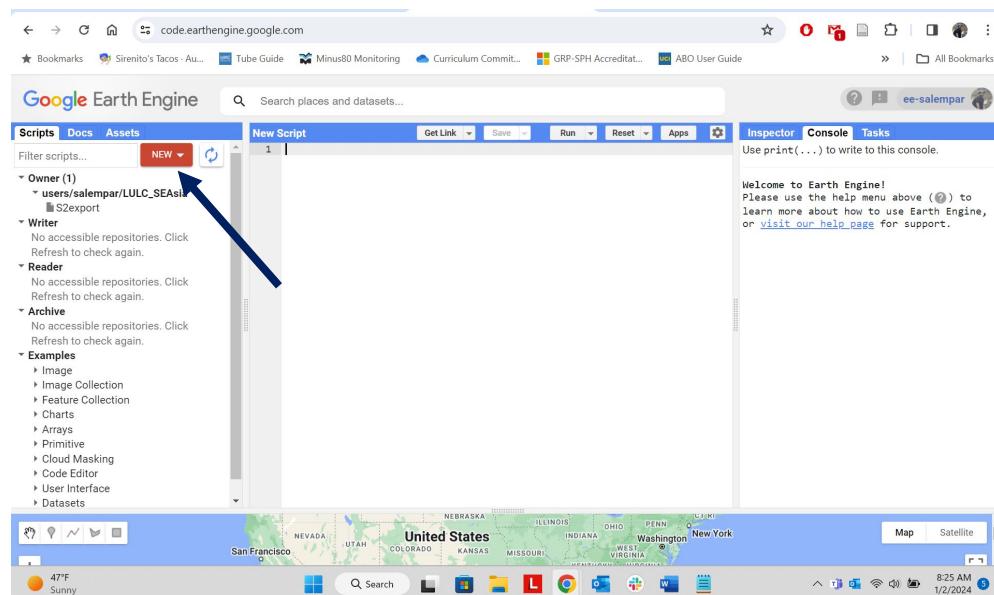
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Using the GEE (Google Earth Engine) to load a shapefile, so that you can extract data (such as DynamicWorld data) based on the shapefile area.

Go to: code.earthengine.google.com
Your screen should look similar to this:

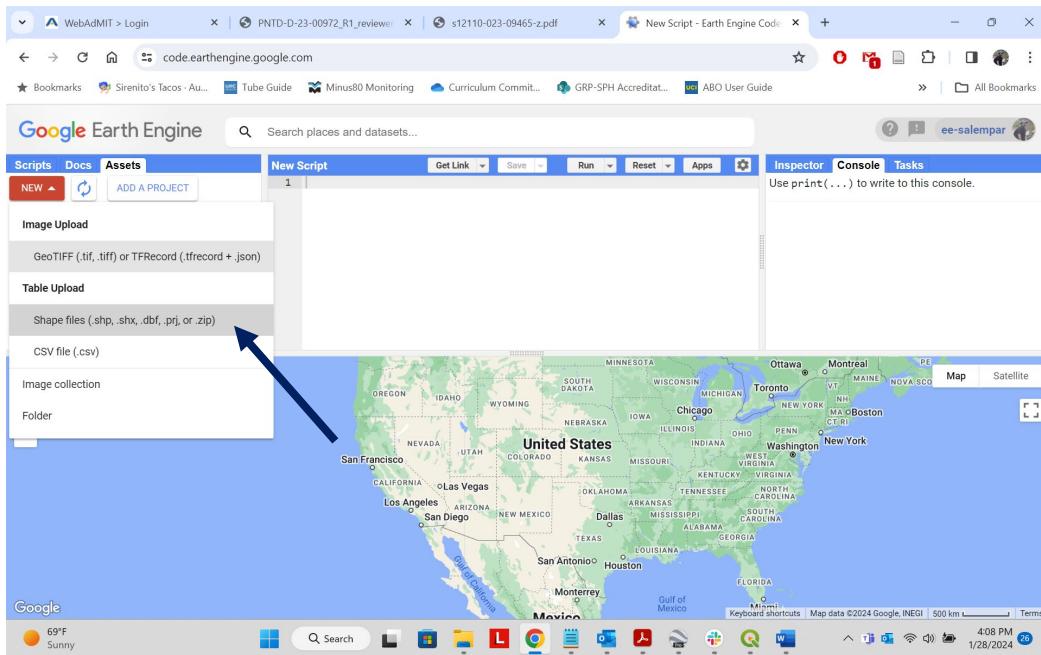


//click on the “NEW” box on the top left

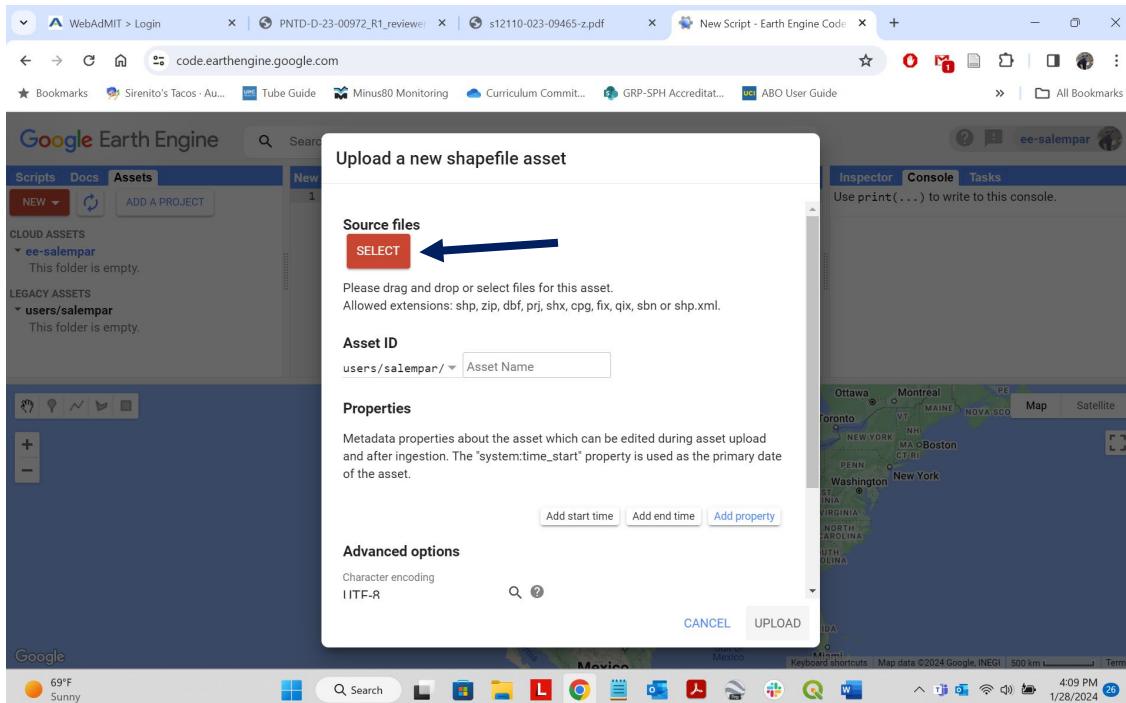


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//you should now see box with several options. For this exercise choose “Shape files”



//a new window/box will open, and you'll need to now select “SELECT” to scroll to where your shapefile is located on your computer

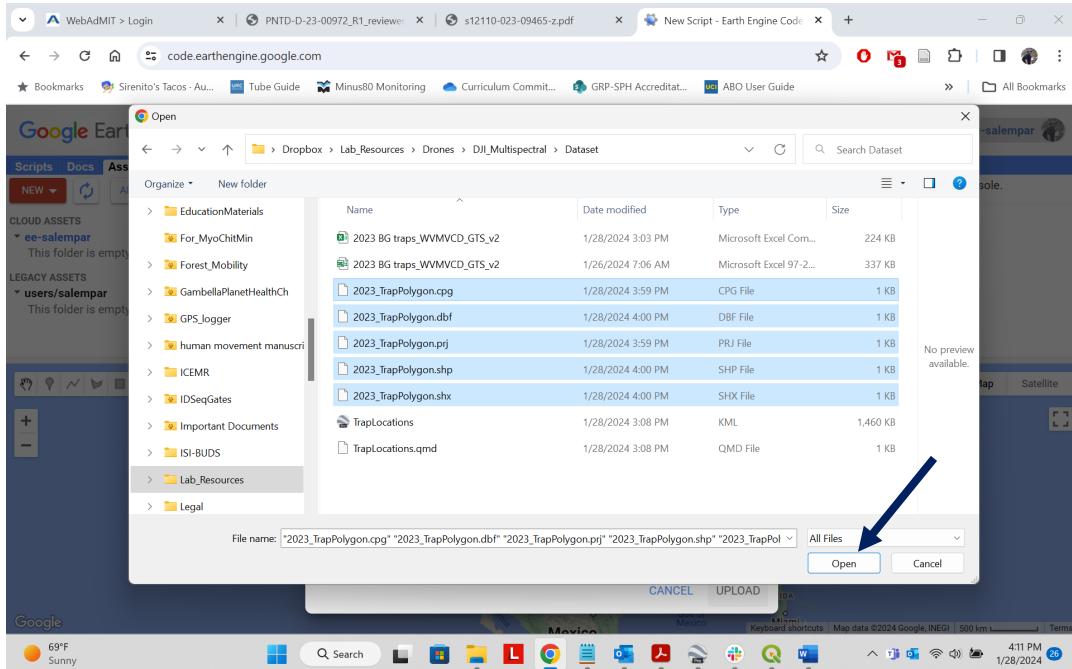


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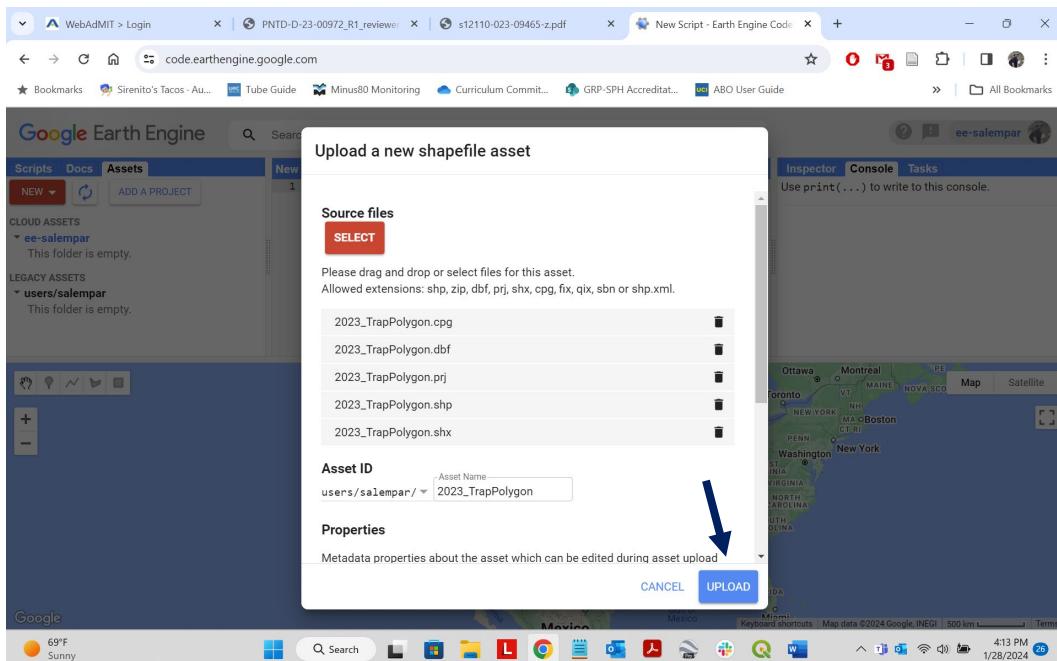
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//you'll need to select all of the files that go along with the shapefile. I've had some trouble with /some special shapefile types at this stage. Keep in mind that only certain types of associated files /will work with GEE. They're listed in the previous step after "Allowed extensions:..."

//Click on "Open" at the bottom right

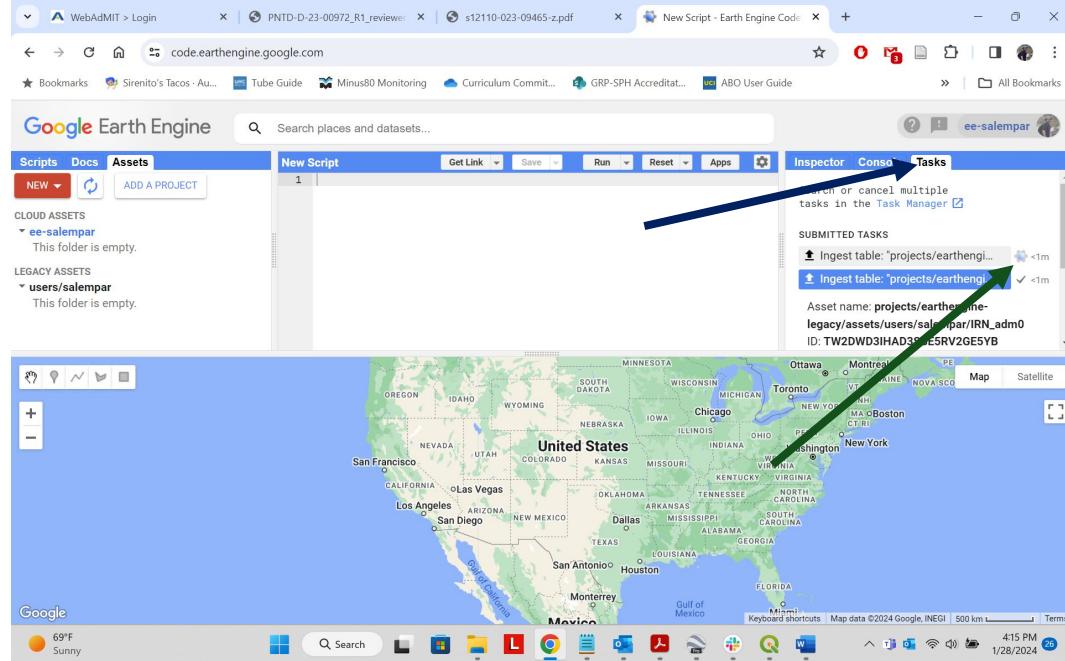


//Now you should be able to click on "UPLOAD" in the bottom right, assuming the shapefile loaded /correctly

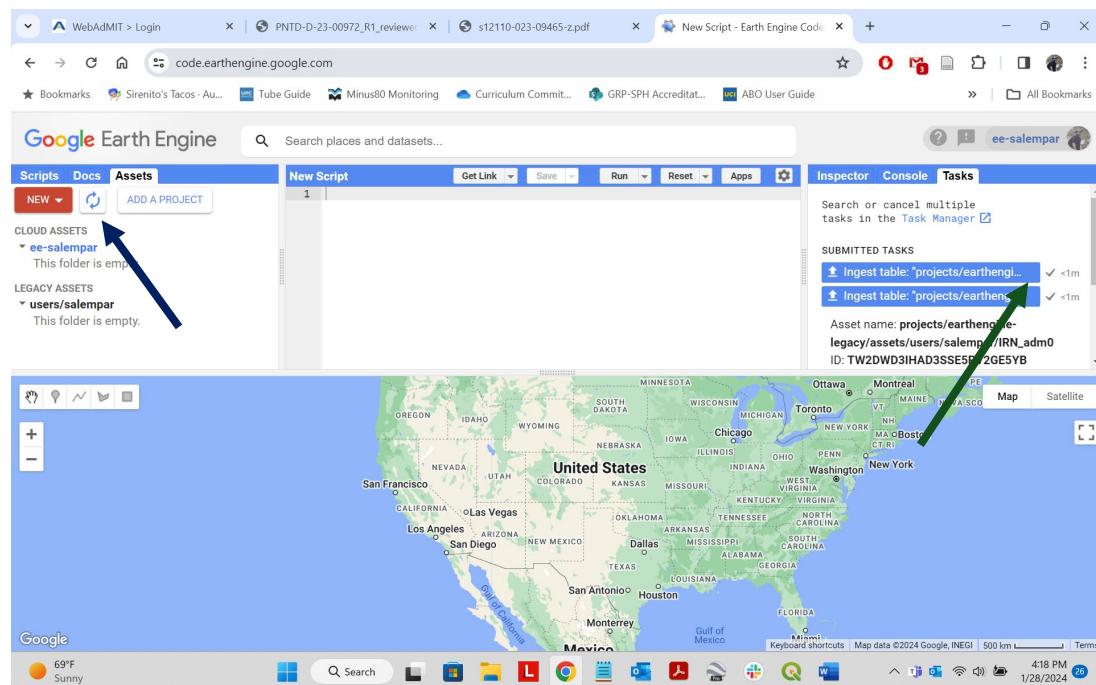


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//Now go to the “Tasks” tab in the top right of the API
//You should see the upload working with a spinning wheel/spokes symbol (green arrow)



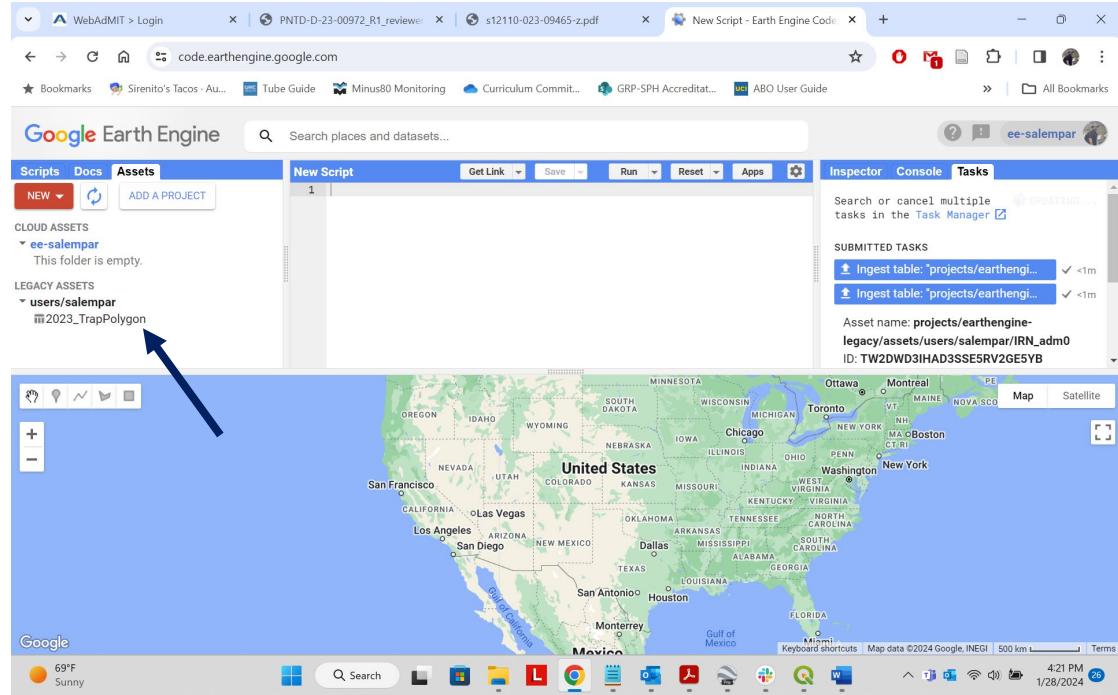
//When it has uploaded, it should look like this (green arrow)
/You can see I've got multiple ‘tasks’ going, you may only have the one for now
// Next, go back to the left hand side and click on the circular arrows under the “Assets” tab (blue /arrow)



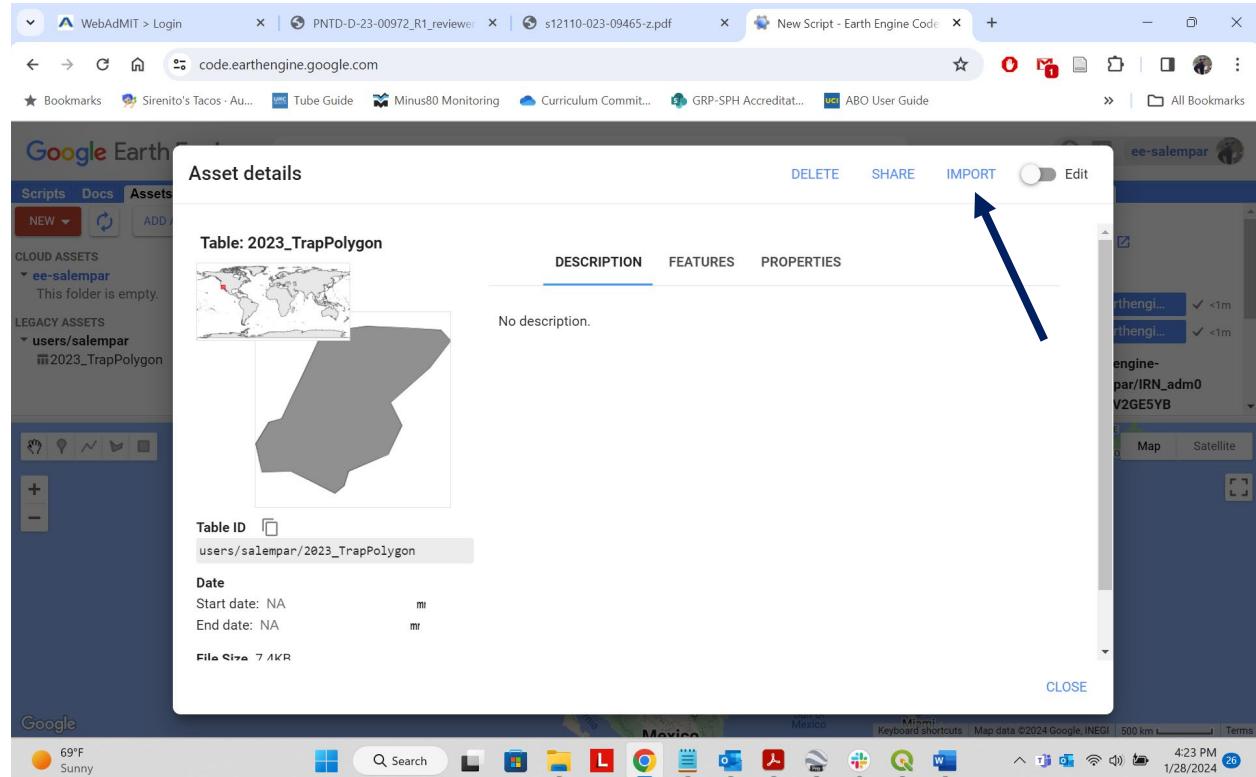
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//When you are ready for the next step, you'll see your shapefile in the Assets part of the API (blue arrow)

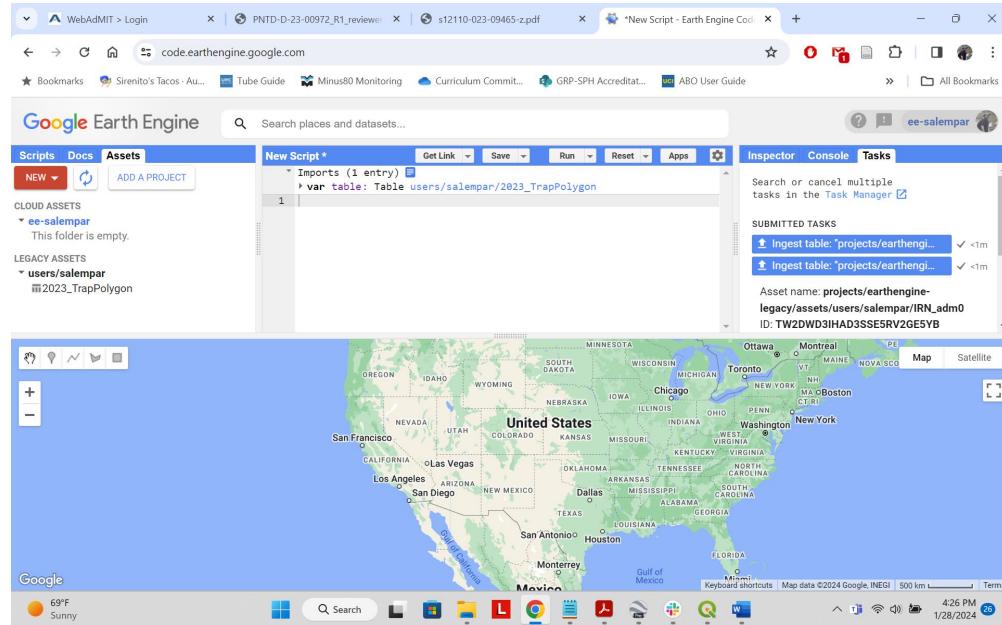


//Double click directly on the name of the shapefile/asset ("2023_TrapPolygon" in my case)
// You should now see a new box open up, as below. Let it load (you should see the polygon in the top left). Then click on "IMPORT" near the top right corner (blue arrow).

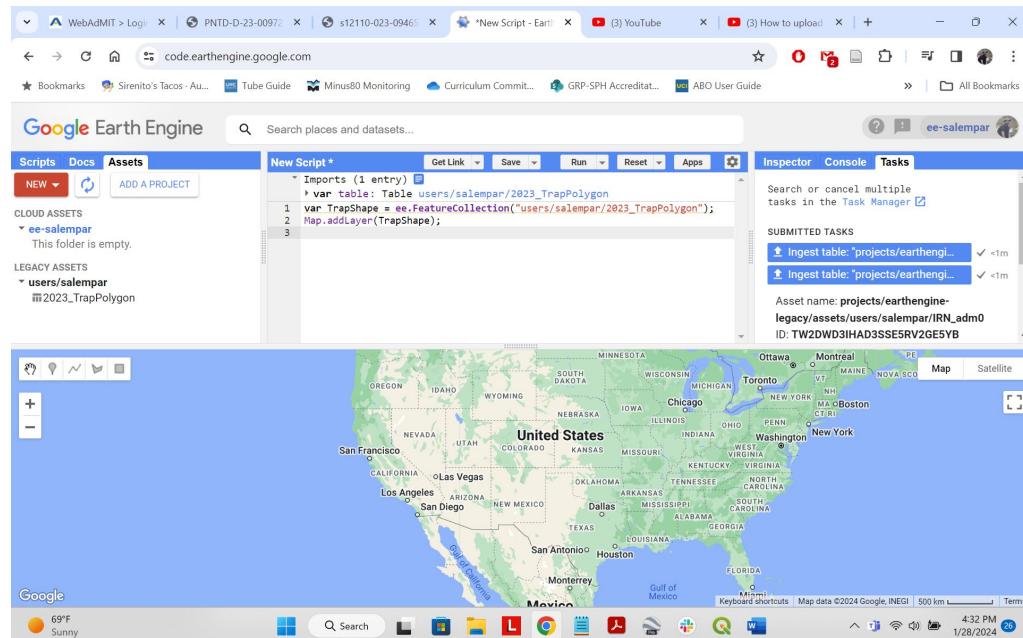


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//That box should then close, and you'll go back to the normal GEE API. One difference you should /now see is in the script box in the middle. Note the difference here, beginning with "var table:..." //This is saying that we are defining a new variable "var" named, "table", which is the new shapefile / that you've now loaded. I suggest changing the var name to something other than "table". I will / choose "TrapShape". I will do this in the next step.



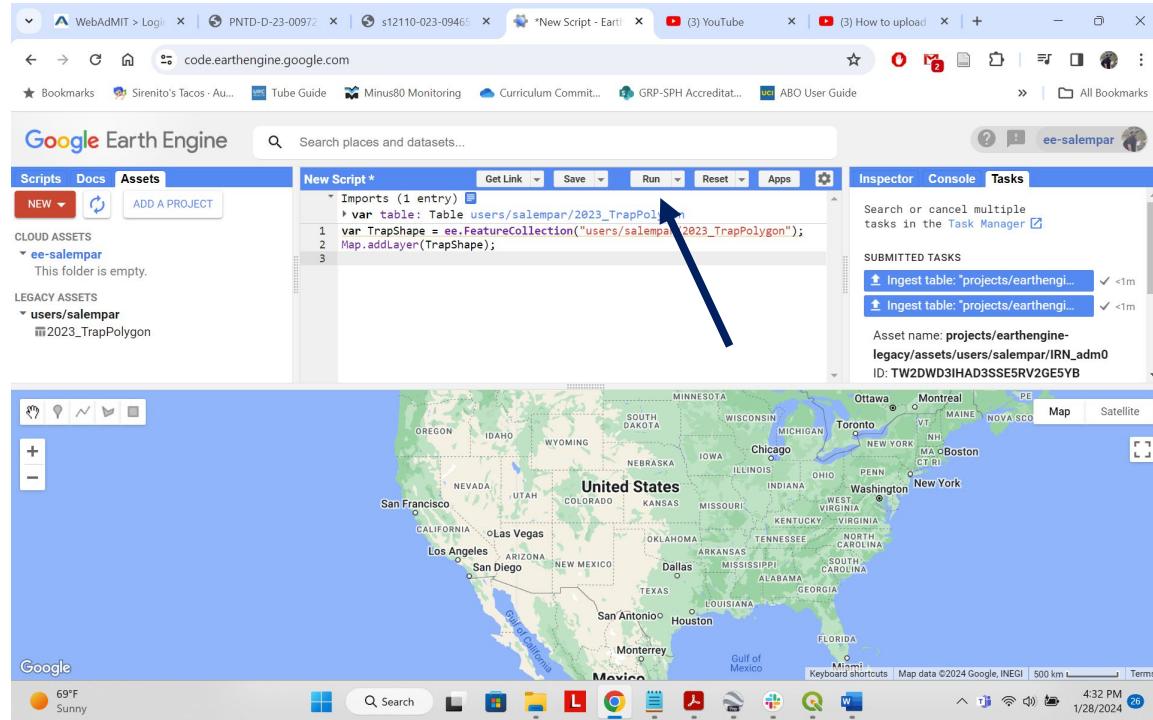
//use the following JavaScript to rename and visualize your shapefile
/// Note that I'm specifying "var TrapShape =" now, this changes the name away from "table"
var TrapShape = ee.FeatureCollection("users/salempar/2023_TrapPolygon");
Map.addLayer(TrapShape);



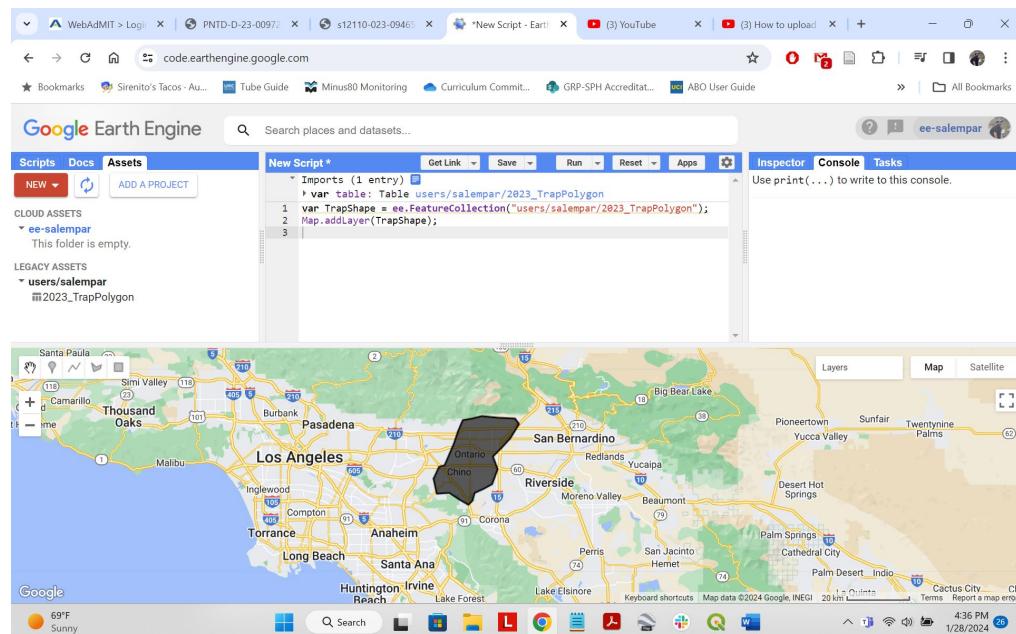
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//Now click “Run” (blue arrow)

// If there is a problem at this point, the “Console” tab to the right (just left of “Tasks”) should turn / orange. The console tab will also give you a line-by-line error message so you can debug



//conversely, if all steps have worked then you should be able to see your shapefile now
// see the dark grey polygon here



```
// Now you can follow this up with the JavaScript from the previous tutorial to download
// DynamicWorld data, or Sentinel-2 data, etc. Or you can search in the data repository (as you did
// earlier to find the DynamicWorld data) for other types of data. There are a lot of options through
// GEE!!! Try DEM, NDVI, surface water, heat, night lights, etc.

// You will need to update the parts of the following script that say "TrapShape" with whatever you've
// named your geographic area of interest. Then you should be able to just copy and paste the
// JavaScript into the API. It will of course be useful for you to go through the script to make sense
// of what it is doing.

/// BEGIN JavaScript
// giving the date range for the Dynamic World LULC (Land Use Land Cover) data that we will pull
var startDate = '2022-01-01';
var endDate = '2022-05-31';
// here we are specifying the data type we want (Dynamic World). There are many, many different
// data types available in GEE.
var dw = ee.ImageCollection('GOOGLE/DYNAMICWORLD/V1')
    .filterDate(startDate, endDate);

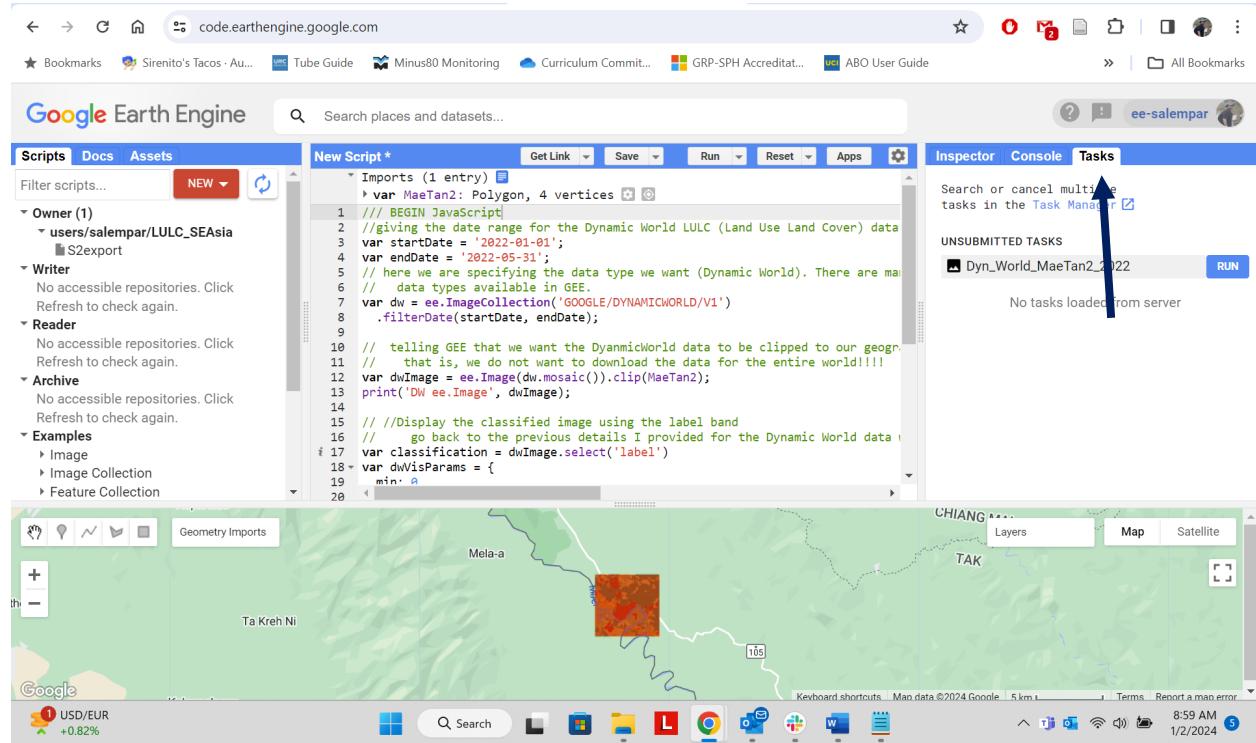
// telling GEE that we want the DynamicWorld data to be clipped to our geographic area of interest
// that is, we do not want to download the data for the entire world!!!!
var dwImage = ee.Image(dw.mosaic()).clip(TrapShape);
print('DW ee.Image', dwImage);

/// //Display the classified image using the label band
// go back to the previous details I provided for the Dynamic World data webpage. That page
// provides the different data bands and what they represent.
var classification = dwImage.select('label')
var dwVisParams = {
  min: 0,
  max: 8,
  palette: ['419bdf', '397d49', '88b053', '7a87c6', 'e49635', 'dfc35a', 'c4281b',
            'a59b8f', 'b39fe1']
};
Map.addLayer(classification, dwVisParams, 'Classified Image');
Map.centerObject(TrapShape);

// We must first export these data to Google Drive
Export.image.toDrive({
  image: classification,
  description: "Dyn_World_SanBernTrapShape _2022",
  scale: 10,
  region: TrapShape,
  maxPixels: 1e13
});
```

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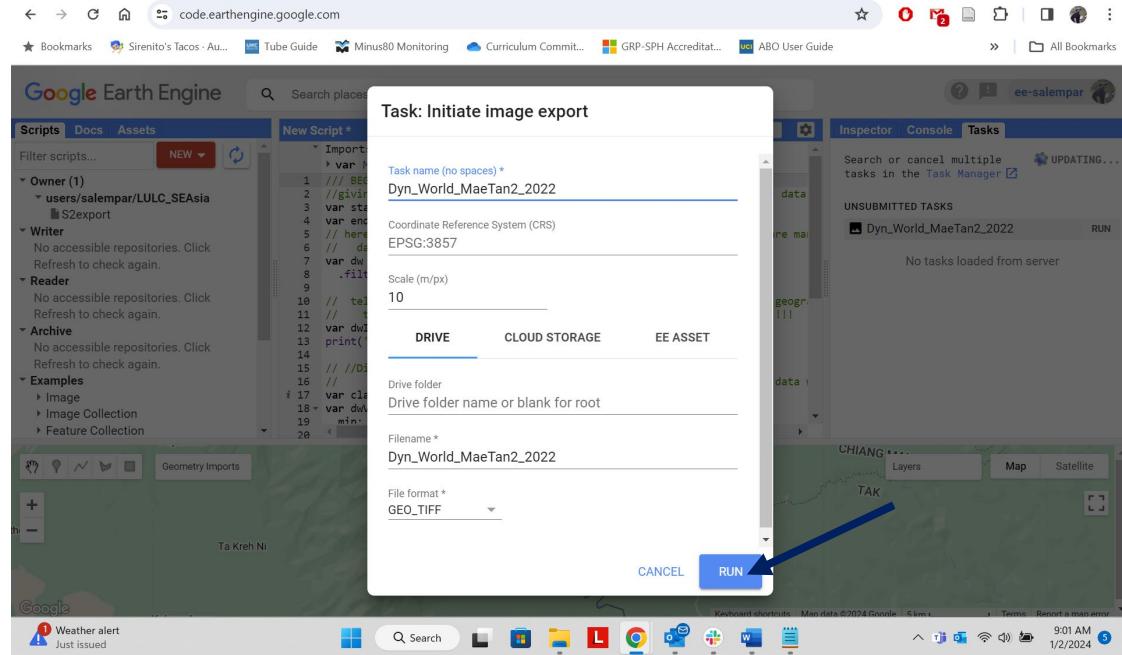
```
//NOW, on the top right hand side of the API, click on the tab labeled "Tasks" (blue arrow)
// you should see any unsubmitted tasks here, with the name you've provided for those tasks
// I suggest a name that will help future you (I'm using the data type, geog location, and year)
// next, click on "RUN" (green arrow)
```



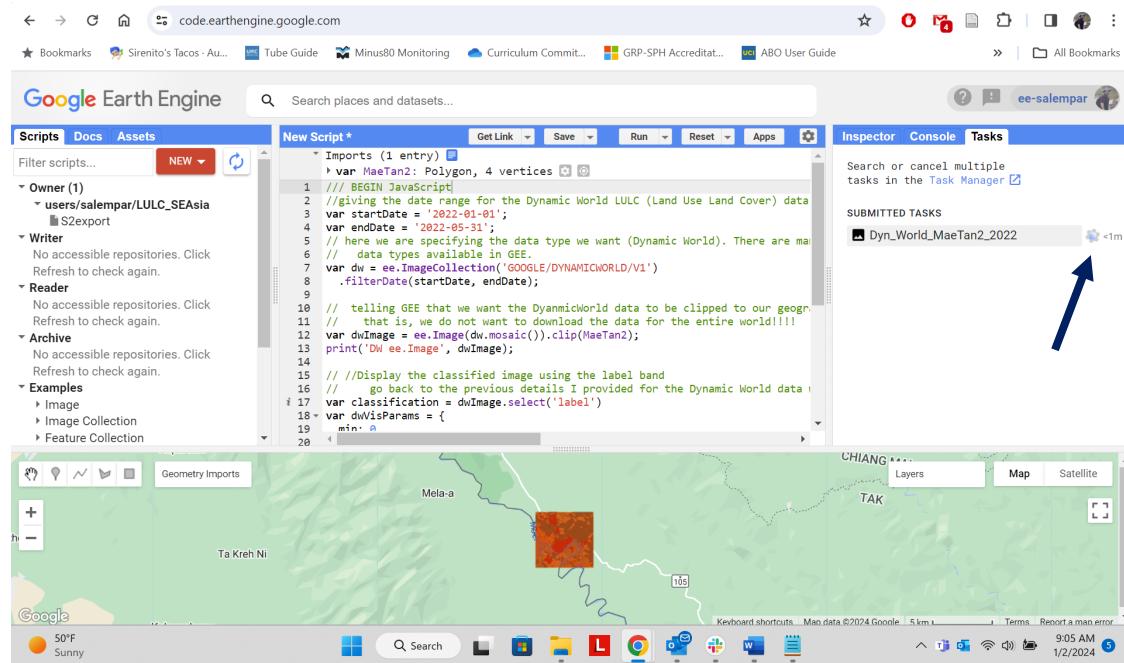
```
// a new box should emerge. You shouldn't need to change anything here, unless you want to  
// change the name for the file you'll be downloading.  
// GEO_TIFF is a good file format, as it is a georeferenced raster that can be viewed in QGIS,  
// ArcGIS, etc. Click the "RUN" button on the bottom right.
```

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//Now you'll see a spinning wheel next to the submitted task (blue arrow), this means the process is
// working.



//When the process is complete, you'll see a checkmark instead of spinning wheel

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The screenshot shows the Google Earth Engine interface. On the left, there's a sidebar with 'Scripts', 'Docs', and 'Assets' tabs, and a search bar at the top. Below it is a tree view of repository contents. The main area has a 'New Script' tab open with some JavaScript code. To the right, there's an 'Inspector', 'Console', and 'Tasks' tab. A 'SUBMITTED TASKS' section shows a task named 'Dyn_World_MaeTan2_2022' with a status of 'UPDATING...'. Below the tasks is a map viewer showing a green landscape with a red polygon selected. The bottom of the screen shows a Windows taskbar with various icons.

// NOW, go into your Google Drive and look for the file you've downloaded

The screenshot shows the Google Drive interface. On the left, there's a sidebar with 'Home', 'My Drive', 'Computers', 'Shared with me', 'Recent', and 'Starred' sections. The main area shows a 'Home' page with a search bar and a list of files. One file, 'Dyn_World_MaeTan2_2022.tif', is visible in the list. On the right, there's a 'Duet AI' sidebar with a message about Duet AI and a 'Hi! Duet AI in Drive is here to help you summarize documents and answer questions about your projects.'

// You can download this to your computer or to a hard drive, and then load it as a raster type file in
// QGIS.
// One interesting thing to do with these types of data is to generate a Zonal Histogram (which is a
// way of summarizing the land types in a defined polygon). You could even do Zonal Histograms
// for different points in time for the same area, for example to show growth of 'built' areas over
// time..

/// Want to do the same with Sentinel 2 data??! Use the following script and go through the same
// process. You don't need to select a new geographic area unless you want to.
// Remember to change your geographic area name in the JavaScript

// This is the Sentinel 2 collection (all the possible available Sentinel-2 imagery)

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```
var S2_collection = ee.ImageCollection("COPERNICUS/S2")
  .filterBounds(MaeTan2)
  .filterDate('2019-01-01', '2019-02-28'); // change date range here

// This tells us what images are inside the collection
print(S2_collection);

// These are the bands that we want to be displayed
var S2_bands = ['B4', 'B3', 'B2'];

// This turns the whole S2 collection into one image, finding the middle value for each pixel
var S2_mosaic = S2_collection.median().select(S2_bands).clip(MaeTan2);

// This controls how we want the S2 image to be displayed
var S2_display = {bands: S2_bands, min: 0, max: 3000};

// This adds the S2_mosaic to the map, using the S2_display visual parameters, and giving it the
// name "S2_Image"
Map.addLayer(S2_mosaic, S2_display, "S2_Image");

// This automatically pans the map to the middle of our area of interest
Map.centerObject(MaeTan2);

// This exports our Sentinel-2 image to Google Drive where we can download it
Export.image.toDrive({
  image: S2_mosaic,
  description: 'Sentinel-2',
  scale: 10,
  maxPixels: 1e13,
  region: MaeTan2
});
```