HYDRAFloods Module 1

Getting Started with HYDRAFloods

SERVIR Science Coordination Office
Curriculum Development Team
Micky Maganini
Contact: mrm0065@uah.edu

Prepared for “Observing and Modelling Surface Water in a Changing World” at ITC
Quartile 3 2022-2023

Table of Contents

Prerequisites & Requirements

For this module you will need...

- A computer
- Access to the internet
- A Google account

Learning Objectives

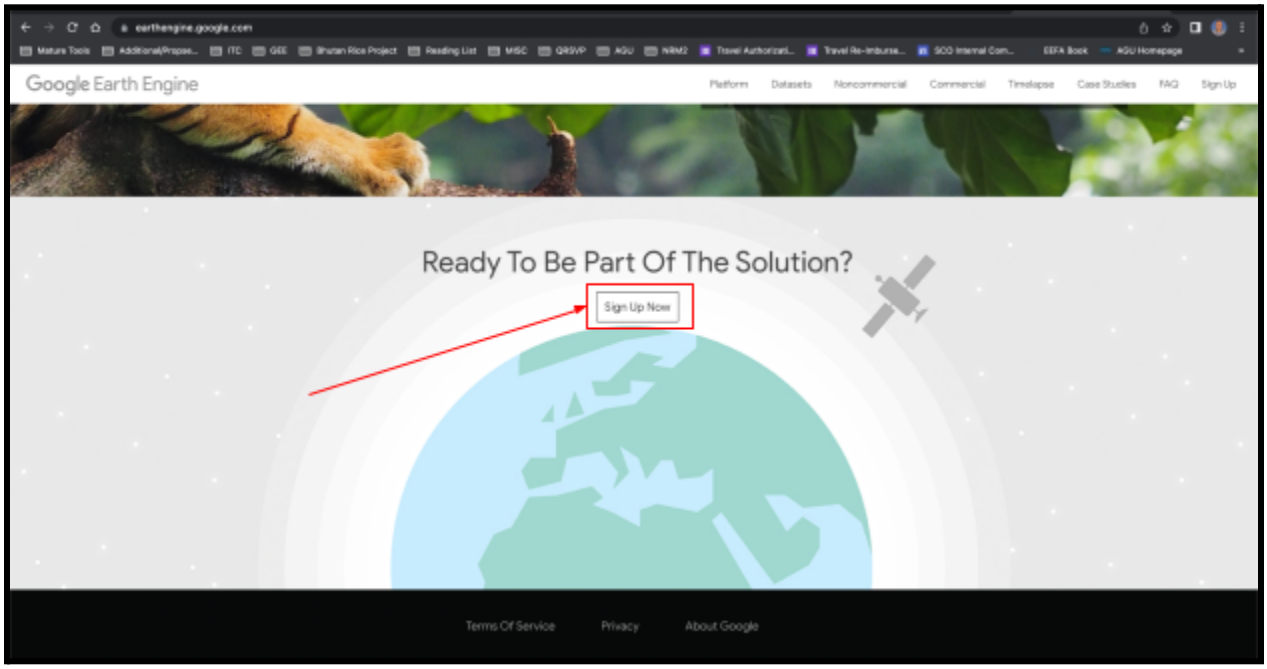
By the end of this module you will...

- Have a Google Earth Engine Account
- Be a member of the “hydrafloods-for-itc” Google Cloud Project
- Be able to open a “Google Colab” Notebook

Creating a Google Earth Engine Account

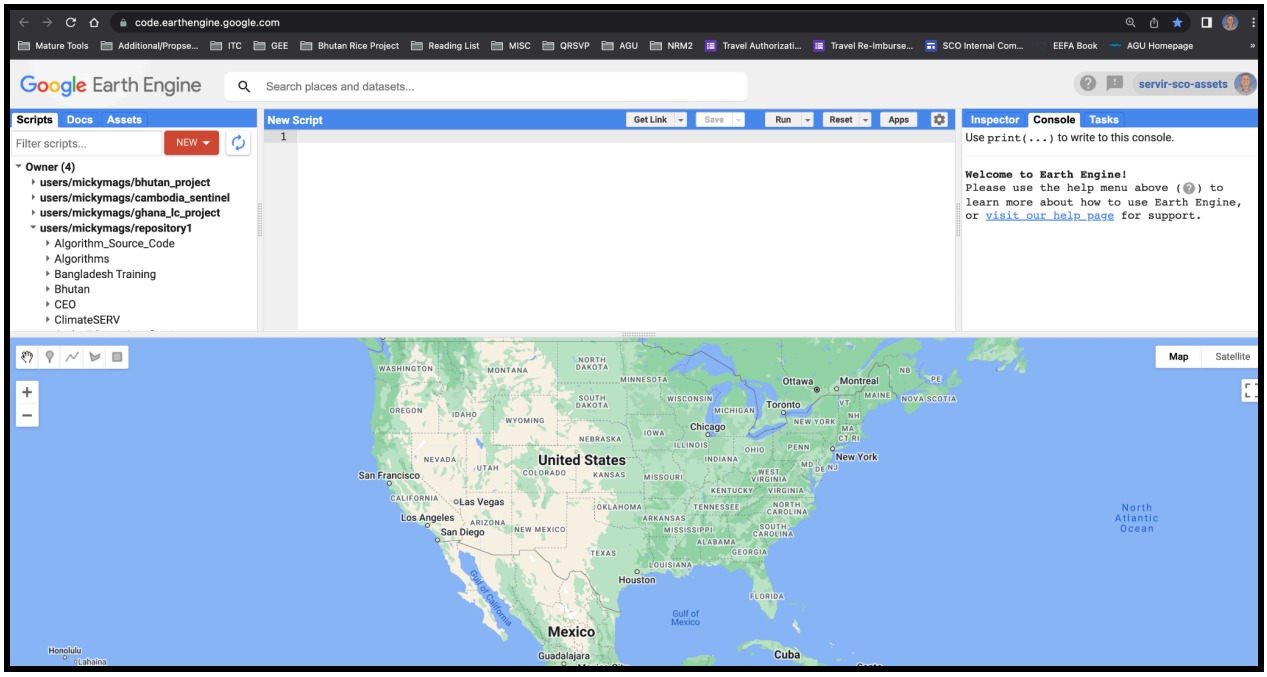
Google Earth Engine is a geospatial platform that hosts many remote sensing datasets and allows for their computation using coding. HYDRAFloods, which is an application using the Python programming language, is built using Google Earth Engine and Google Cloud Platform to leverage cloud computing for geospatial data. Thus, you will need to create a Google Earth Engine account in order to use HYDRAFloods. You will need a Google account in order to register an account in Google Earth Engine

To register for a Google Earth Engine account, open your browser and navigate to earthengine.google.com. Scroll down to the bottom of the page, and click the **"Sign up now"** button, as shown by the red arrow in the image below.



Follow the instructions provided after clicking this button to create a Google Earth Engine account. Please note that it may take several days until your account is approved and registered. Once your account is approved, you will get an email saying that your account has been created.

Now that you have a Google Earth Engine account, let's look at the Code Editor in Google Earth Engine by navigating to code.earthengine.google.com. Your screen will now appear similar to the screenshot below.



You are now ready to request membership to the hydrafloods Google Cloud Project. This cloud project will allow us to authenticate the use of Google Earth Engine for HYDRAFloods!

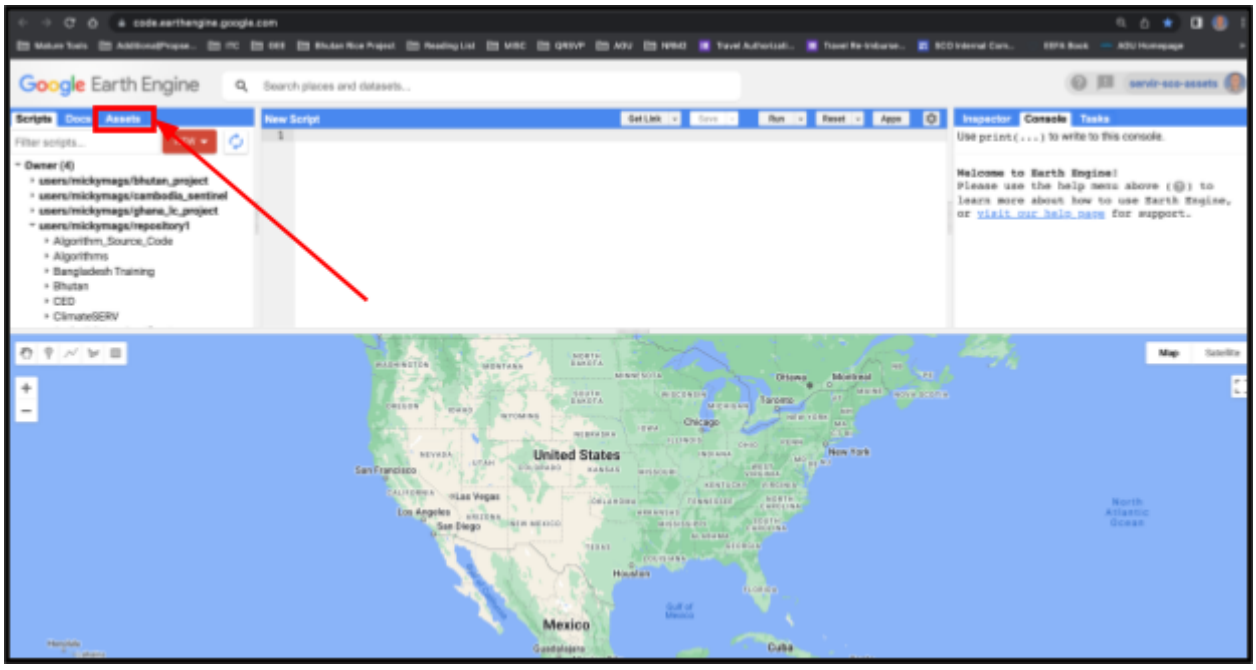
Requesting Membership to the “hydrafloods-for-itc” Google Cloud Project

---

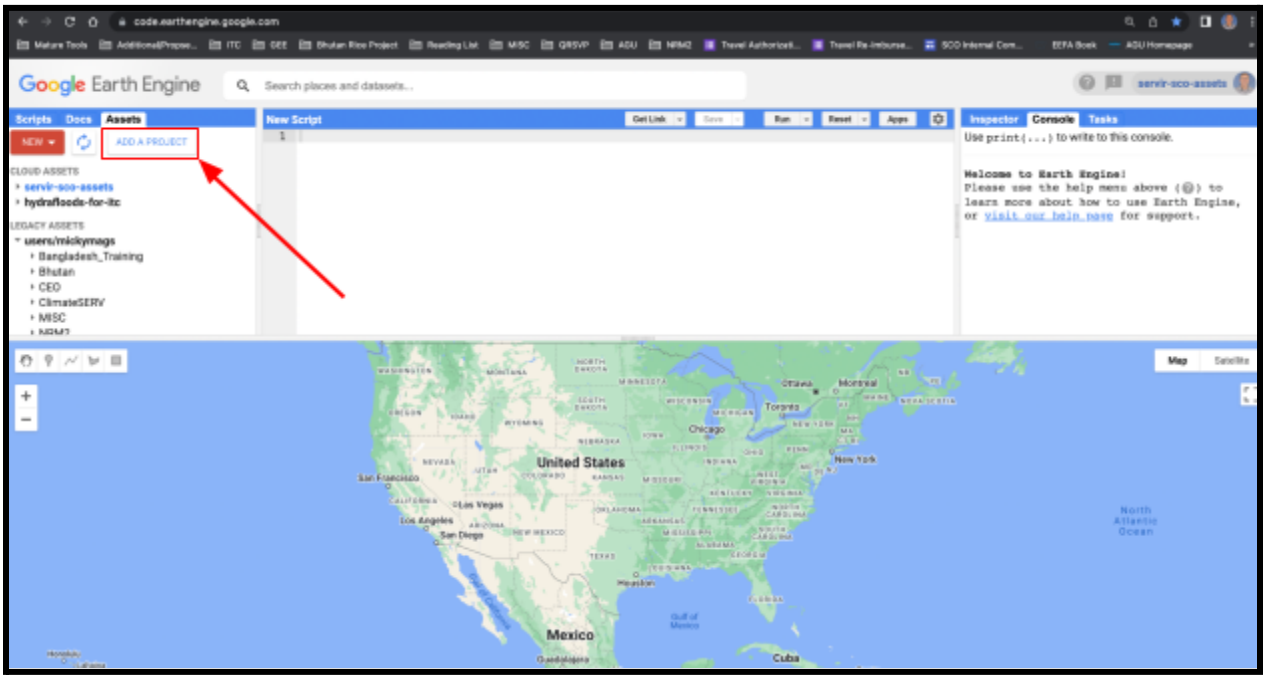
Because HYDRAFloods is built on the Google Earth Engine API, we need to authenticate our Google Earth Engine in the Google Colab instance through the use of a Google Cloud Project.

To be added to the “hydrafloods-for-itc” Google Cloud Project, email Micky Maganini mrm0065@uah.edu with the same email address associated with your Google Earth Engine account (also add Roelof Rietbroek r.rietbroek@utwente.nl in cc please). Micky will add you to the Google Cloud Project and reply to your email.

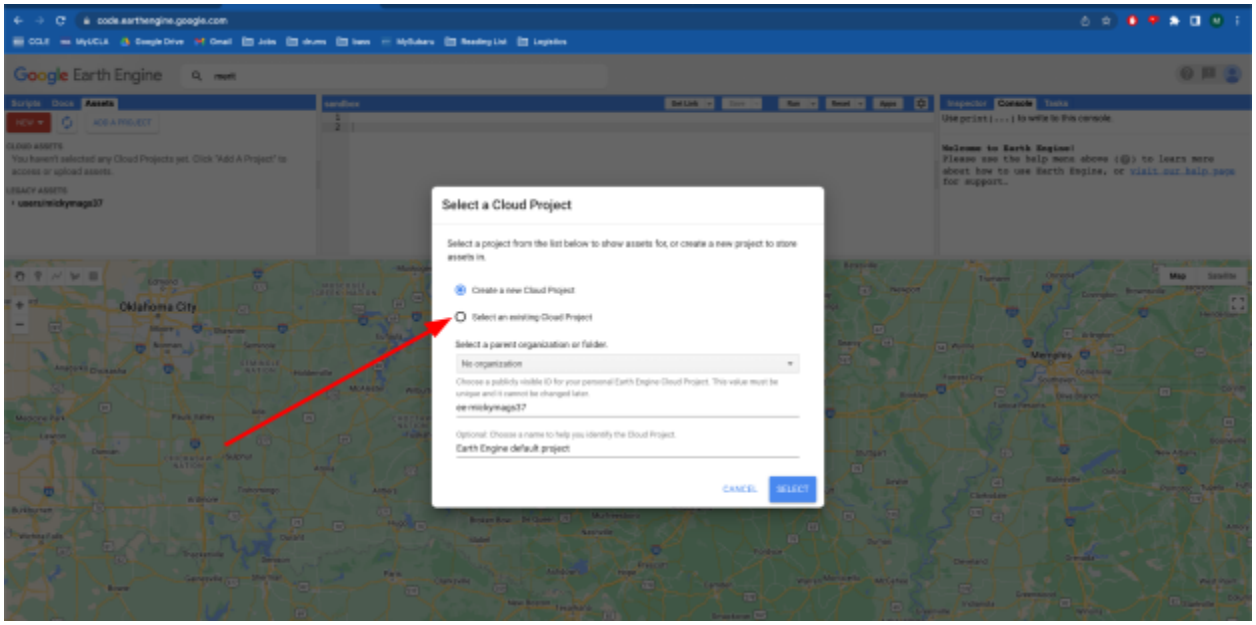
Once you get a reply from Micky saying that you have been added to our Google Cloud Project, navigate to the Google Earth Engine Code Editor (by going to code.earthengine.google.com). Click the **“Assets”** button towards the top left corner, as shown by the red arrow in the image below.



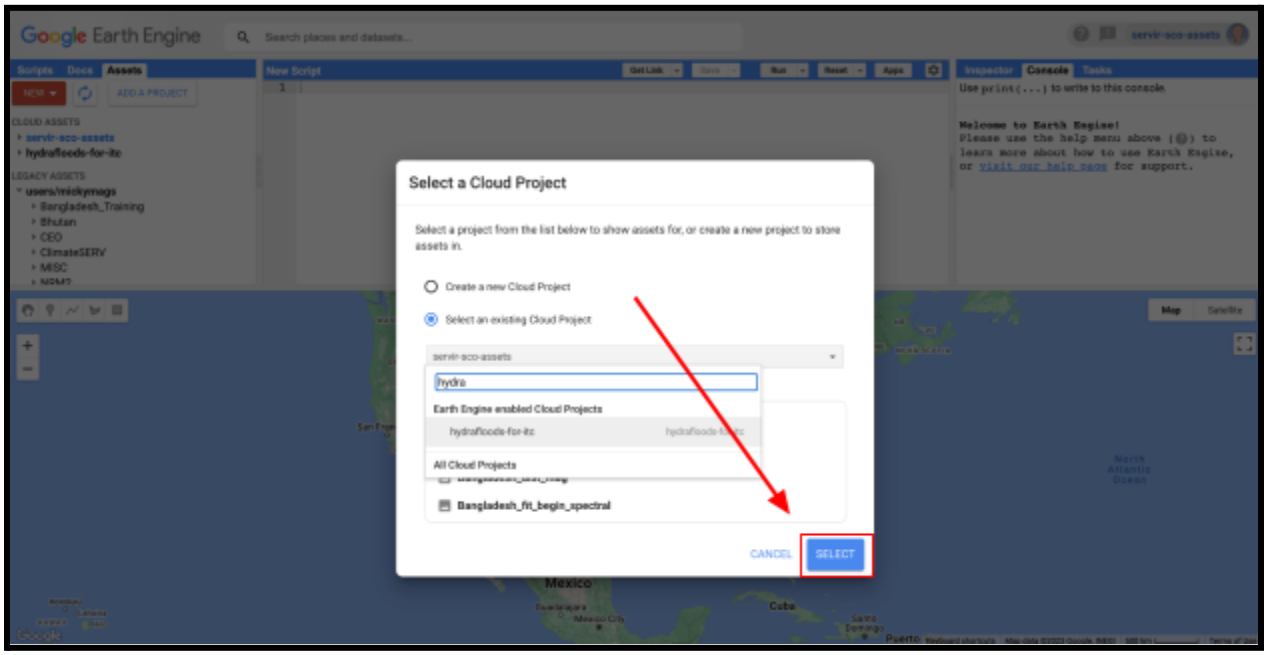
Next, click the **“Add a Project”** button towards the top left of the page, as shown by the red arrow in the image below.



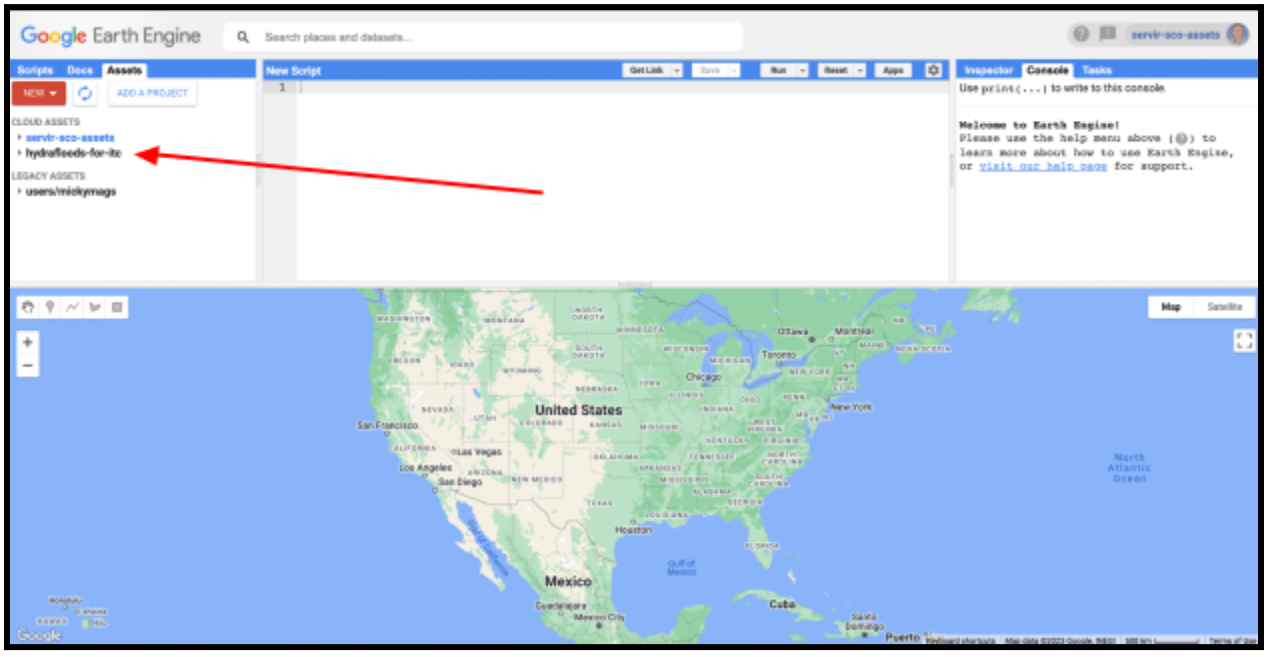
This will bring up a window like the one shown below. Click the circle next to the text that says **“Select an existing Cloud Project”,** as shown by the red arrow below.



Next, click the text that says “**Select a Cloud Project"**, and type in “hydra”, then click “hydrafloods-for-itc”. Finally, click the blue **“Select”** button as shown by the image below.



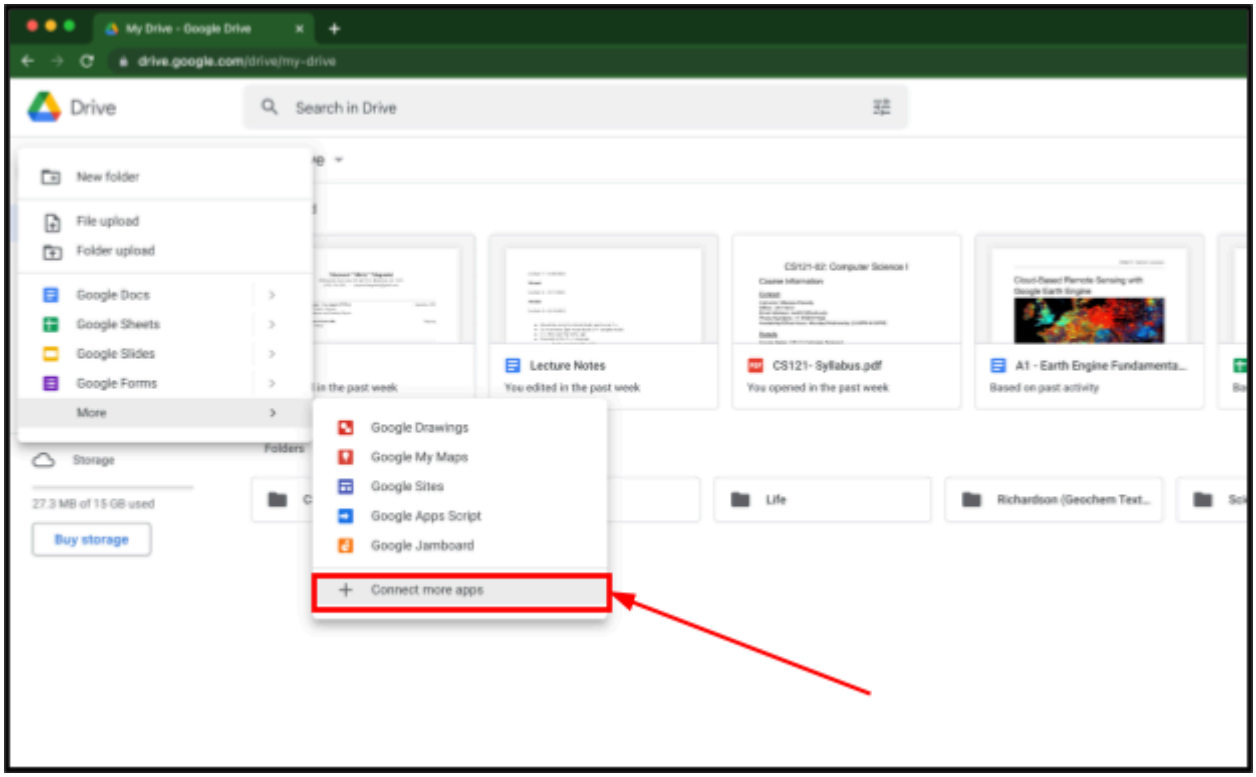
Now, navigate back to your “assets” page in Google Earth Engine. If you followed the above steps correctly, you should now see text that says **“hydrafloods-for-itc”** on the left side of your screen under the text that says **“Cloud Assets”**, as shown by the image below**.**



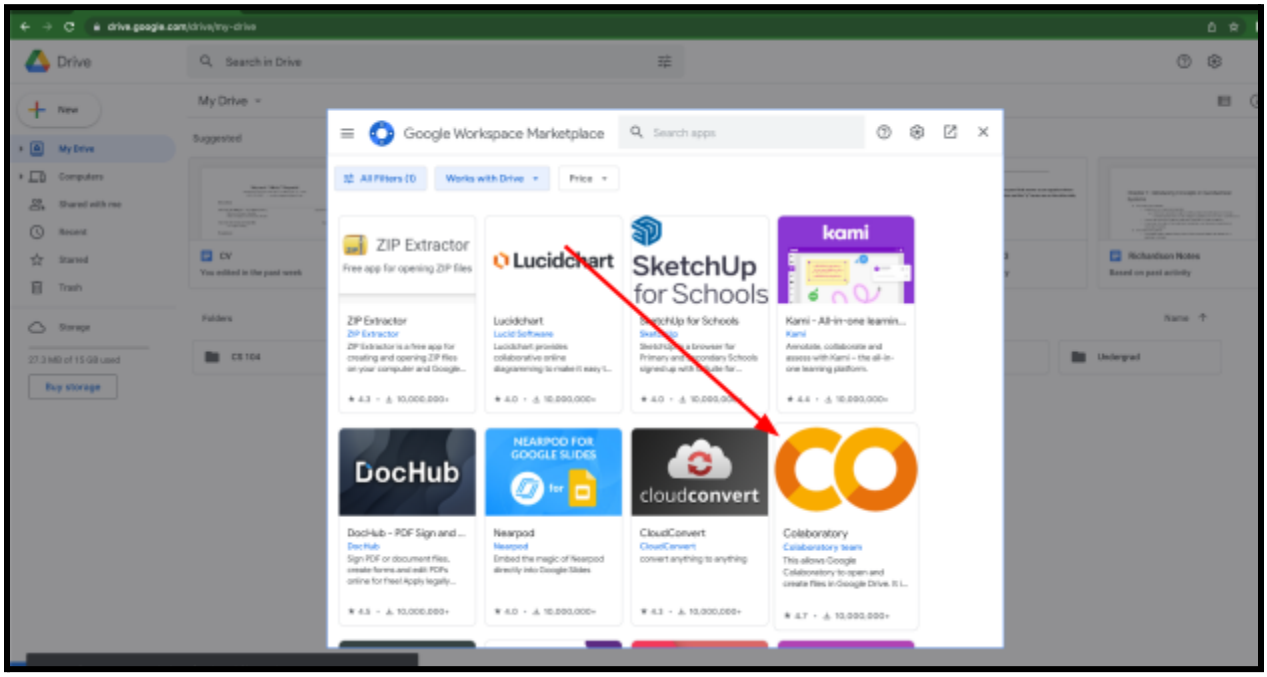
Installing Google Colaboratory

We will use HYDRAFloods via Google Colaboratory notebooks. Google Colaboratory (often called Google Colab) allows you to write and execute Python (a programming language) code in your browser with access to free GPUs and the ability to share your notebooks (documents where you can run and comment on code) with others. You can find more information about Google Colab [by clicking here.]

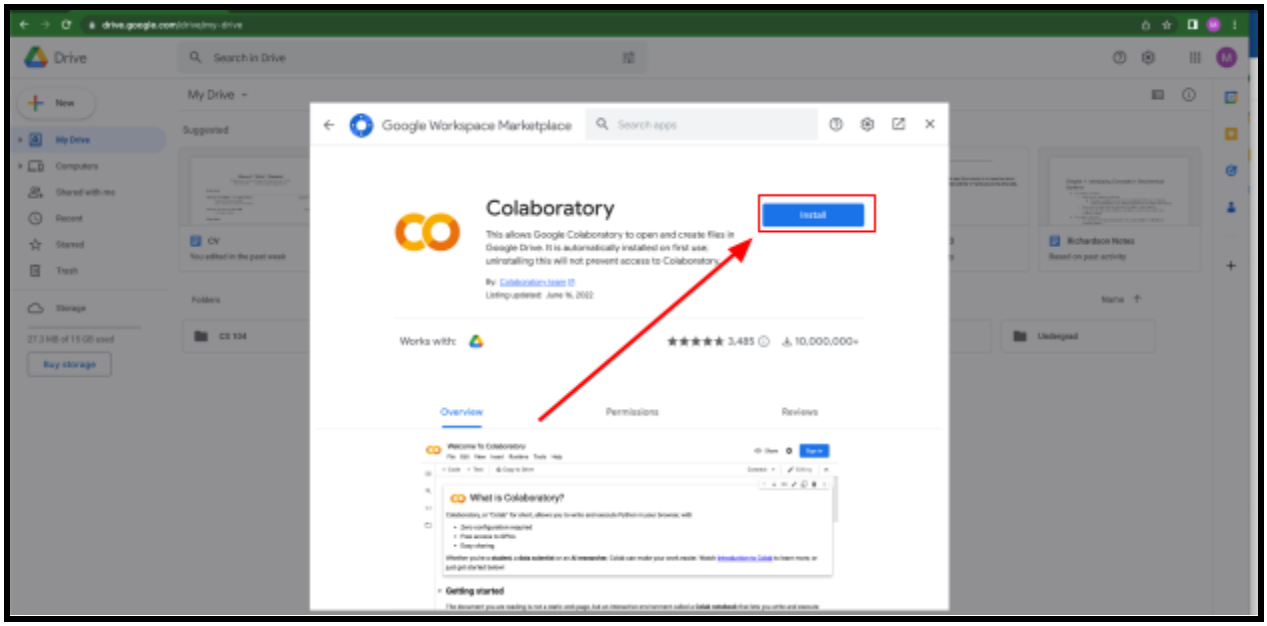
To install Google Colab, navigate to [drive.google.com] and log into your account. Note that this must be the same email associated with your Google Earth Engine account.



Click Google Colaboratory (should be on the bottom right, but if not you can search for it using the search bar in the upper right).



This will bring up the screen shown below. Click the blue **“Install”** button to install Google Colaboratory to your Google Drive account. Follow the prompts to complete the installation process.

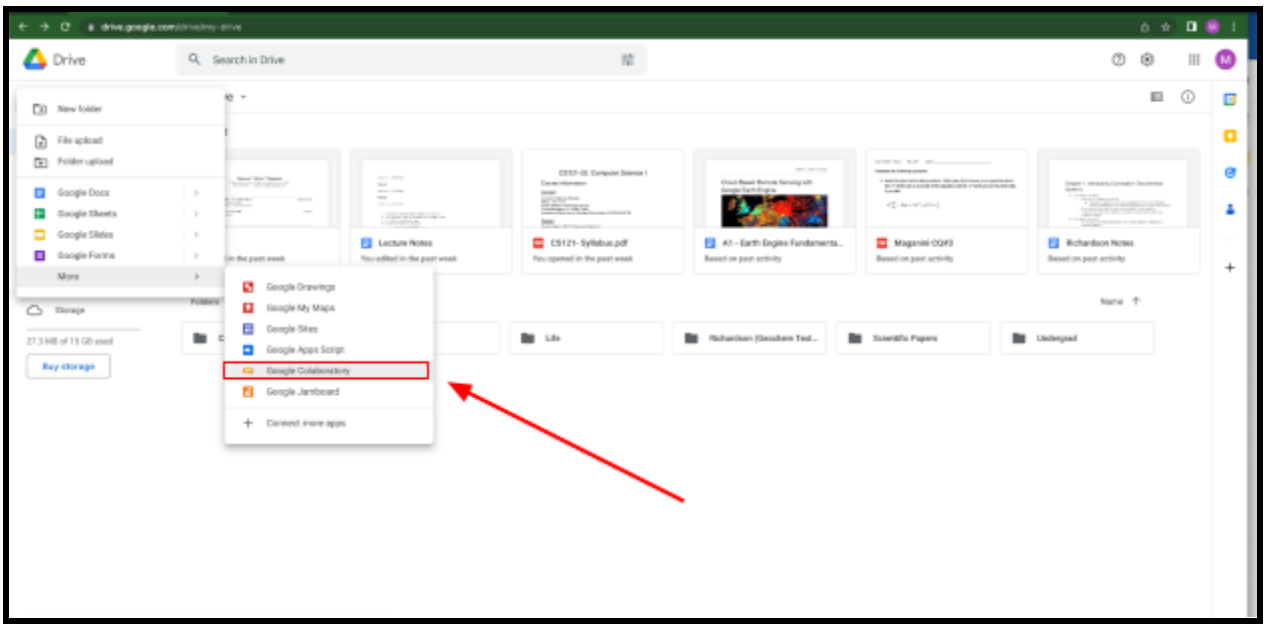


Introduction to Google Colab

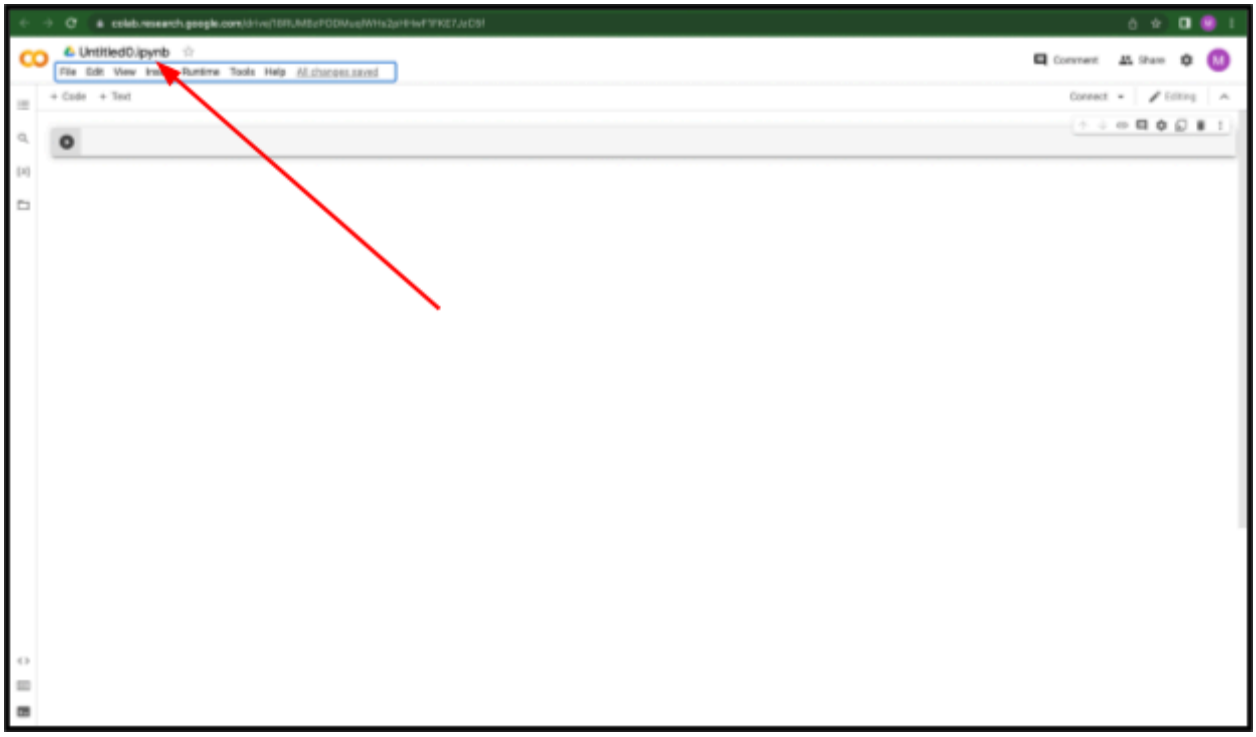
Let's get familiar with how Colab works.

Opening a Google Colaboratory File

To open a Google Colaboratory file, click the **"New"** button in the upper left, then click **"More"** from the dropdown menu. This will bring up a separate dropdown menu. Click **"Google Colaboratory"**, as shown by the red arrow below. This will open a Google Colaboratory File.

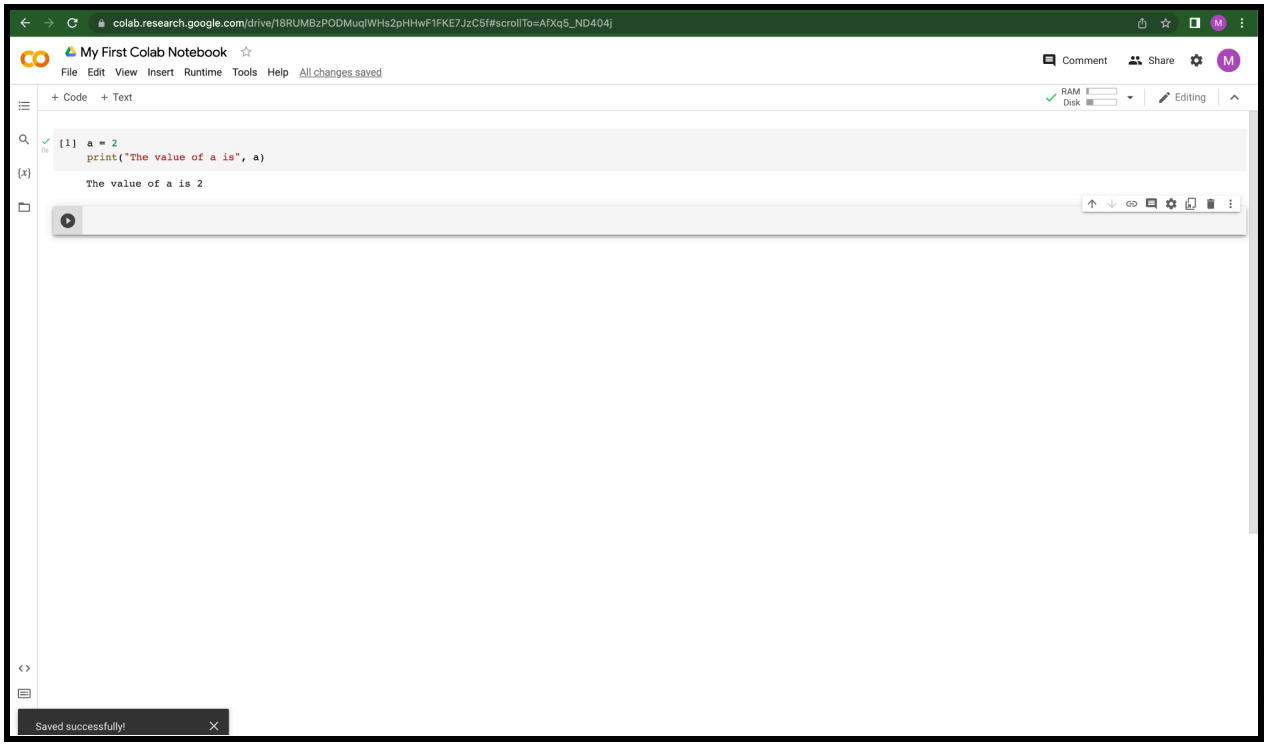


Give your Colab file a title by clicking in the top left corner, and typing in a new name, as shown by the image below.

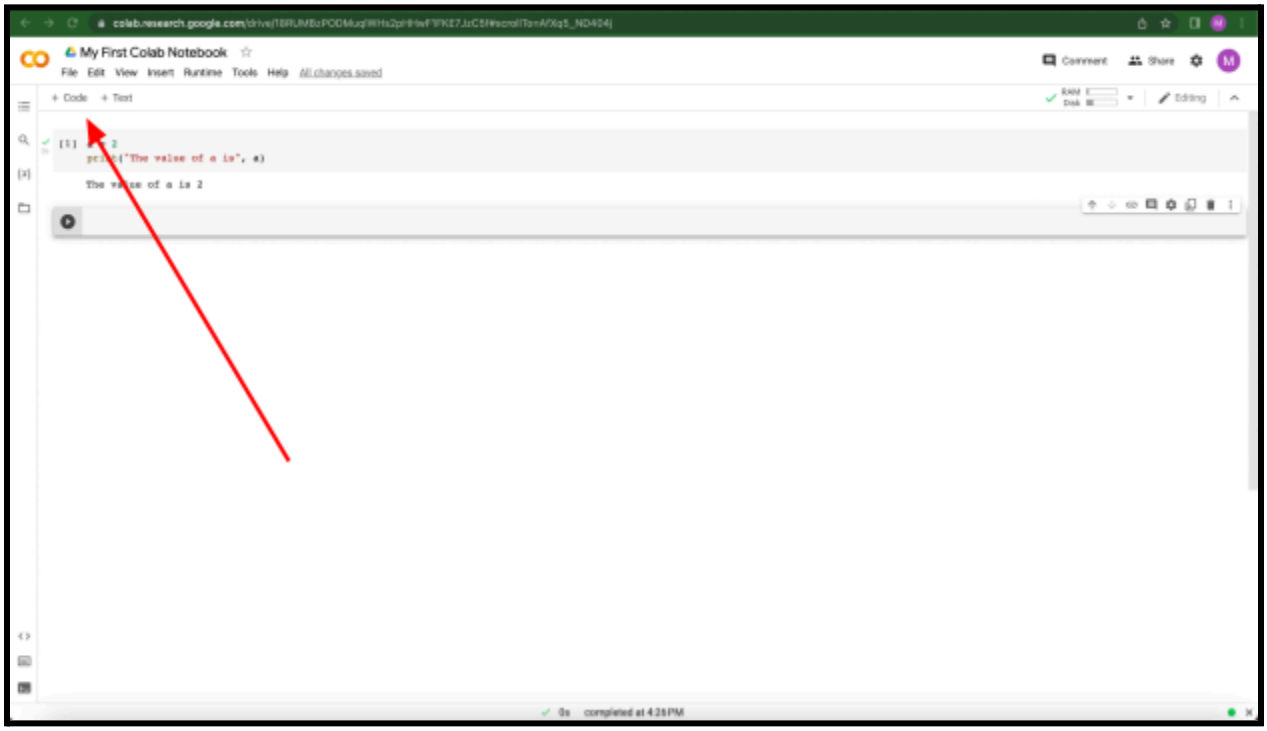


There are two types of cells in Google Colab, code cells and text cells. Code cells are cells where we can type and run Python code, where text cells are where we can type descriptive information about our code.

Google Colab will open with a code cell already present, so let's type in and run some code using Shift + Enter (or clicking the play button to the left of the cell). We can see that running the cell will return an output (if our code tells it to), as shown by the image below.



We can add more code cells to our notebook by clicking the **"+Code"** button (shown by the arrow in the image below).



To add a text cell, click the button just to the right of the **“+Code”** button, that says **“+Text”.** This will add a text cell below where we can write some simple text to describe what our code does.

Congrats! You know the basics of Google Colaboratory and are ready to start working with HYDRAFloods! For a more in-depth introduction to Google Colab, click here.

Acknowledgements

HYDRAFloods was developed by SERVIR-Southeast Asia (formerly known as SERVIR-Mekong). The development team includes Kel Markert, Amanda Markert, Ate Poortinga, Nyein Soe Thwal, Arjen Haag, Farrukh Christie, Tim Mayer, Khun San Aung, Peeranan Towashiraporn, David Saah, Chinaporn Meechaiya, Biplov Bhandari, and Kamal Hosen.

The HYDRAFloods Curriculum was organized by SERVIR's Science Coordination Office. The modules were influenced by a training developed by Kel Markert, Tim Mayer, Biplov Bhandari, and Lauren Carey and the HYDRAFloods Documentation authored by Kel Markert. Review of the curriculum was conducted by Roelof Rietbroek, Kelsey Herndon, Emil Cherrington, Diana West, Katie Walker, Lauren Carey, Jacob Abramowitz, Jake Ramthun, Natalia Bermudez, Stefanie Mehlich, Emily Adams, Stephanie Jimenez, Vanesa Martin, Alex Goberna, Francisco Delgado, Biplov Bhandari, and Amanda Markert.

Sources:

SERVIR Application Management System – HYDRAFloods Entry: https://sams.servirglobal.net/detail/19

HYDRAFloods Documentation: https://servir-mekong.github.io/hydra-floods/