

Installing Software for Geospatial Scripting

Introduction

This course provides an overview of scripting concepts and a brief introduction to three scripting languages, R, Python, and Google Earth Engine. The training introduces users how these languages can be applied to geospatial analysis. To complete the exercises in this training, users must choose **ONE** language to use for the course. Please complete before the course.

Objectives

- Choose a language to use for the course
- Set up the environment for your language before the course



USDA Non-Discrimination Statement

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotope, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [How to File a Program Discrimination Complaint](#) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.



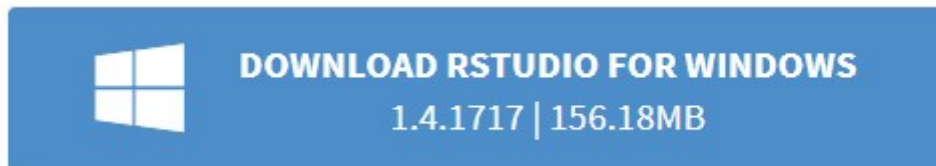
Table of Contents

Part 1: Installing R.....	4
Part 2: Creating an Earth Engine Account	5
Part 3: Python	9

Part 1: Installing R

A. Download and install R and R-Studio (IDE)

1. Install R by following the navigate to the [RStudio CRAN mirror](#) and follow the instructions to download and install R for Windows
2. Navigate to the [R-Studio download page](#) and scroll down to RStudio Desktop 1.4.1717 click the download for Windows button



3. When the download is complete run the executable **RStudio-1.41717.exe** to install **RStudio**. Double click to run the executable and start the install.

Note: if your computer indicates that you need administrator access to install, try right clicking on the executable and select **Run Elevated**. If you can't Run Elevated you will need to contact the help desk

- i. Follow the subsequent prompts to complete this installation. This will give you access to the RStudio IDE and all the statistical and graphical packages that attend it.

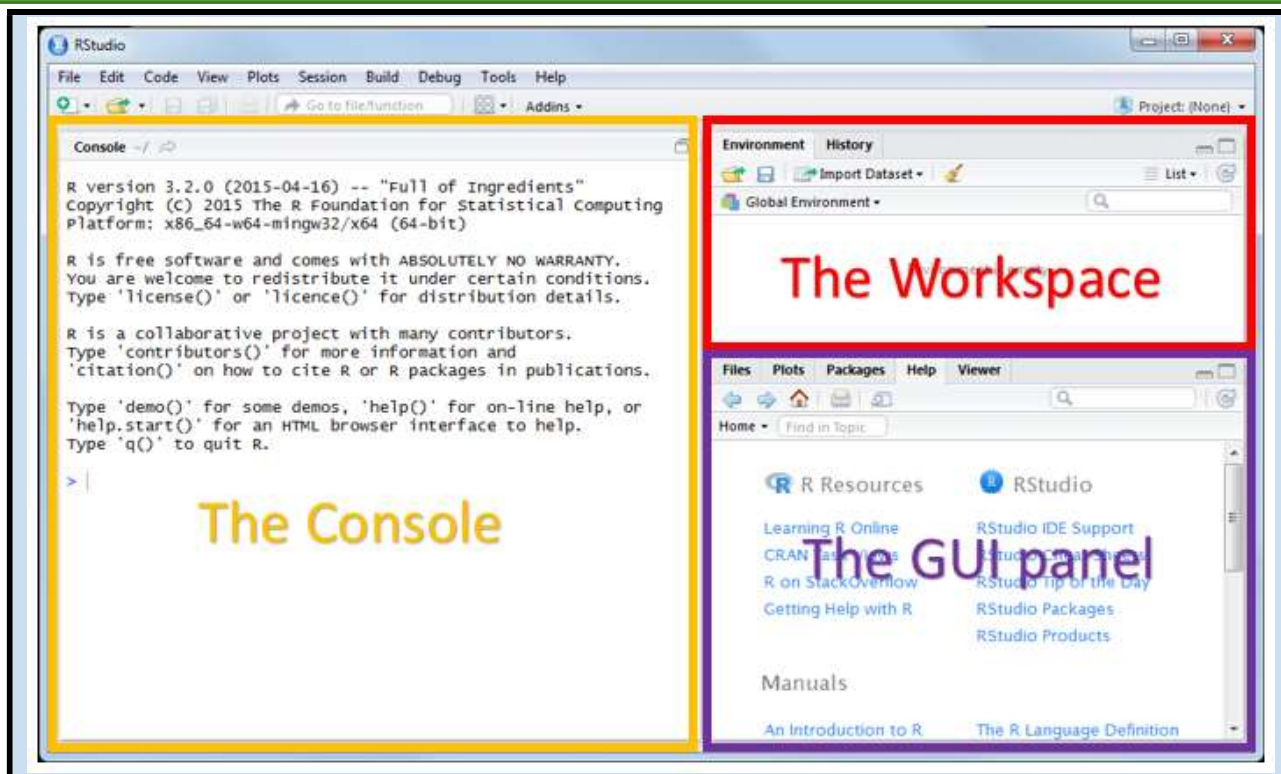
B. Become Familiar with RStudio

1. From the **Start** menu, select **All Programs**. Locate the **RStudio** folder, then select **RStudio**
2. This opens the RStudio Graphical User Interface. Use the graphic below for reference and take a moment to orient yourself.
3. RStudio is a free, open-source integrated development environment (IDE) for R. R comes with its own text editor and RStudio is not required to work in R. However, RStudio offers several convenient features for managing the R environment, making it easier to use R interactively.

The Console: the command prompt within R Studio. This is where you execute your script.

The Workspace: displays and catalogs the elements in your workspace. This helps us remember the 'what' and 'how' of our code in our scripts.

The lower right hand GUI panel: access files, plot graphics, R package, and R help. In addition, it allows you to export your graphics to the clipboard.

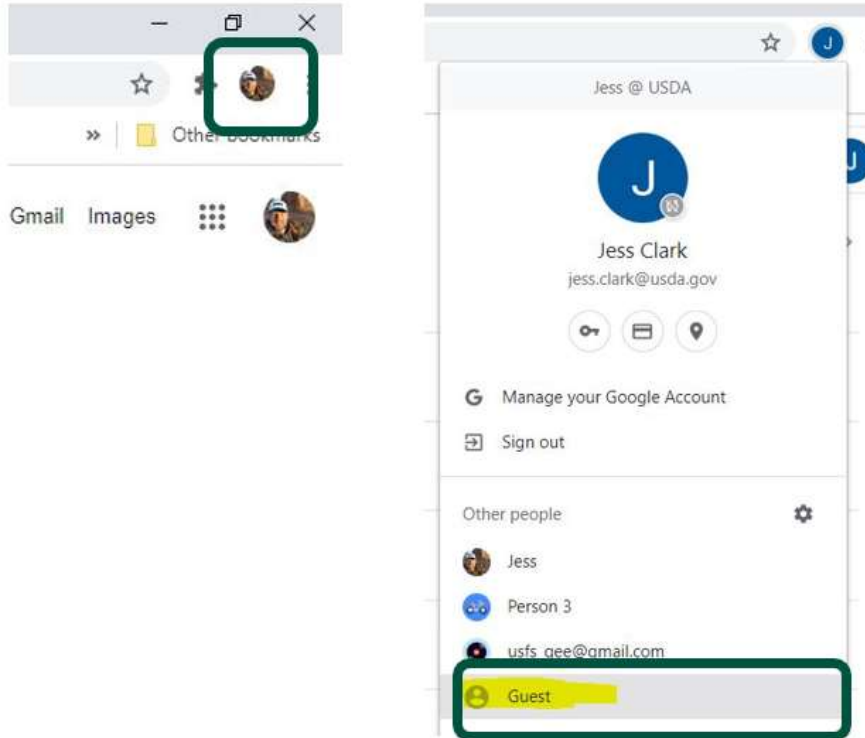


4. Take a moment to go to the [RStudio website](#), and browse through the available resources from the drop-down menu in the upper right hand corner, such as the compilation of available Cheat Sheets!

Part 2: Creating an Earth Engine Account

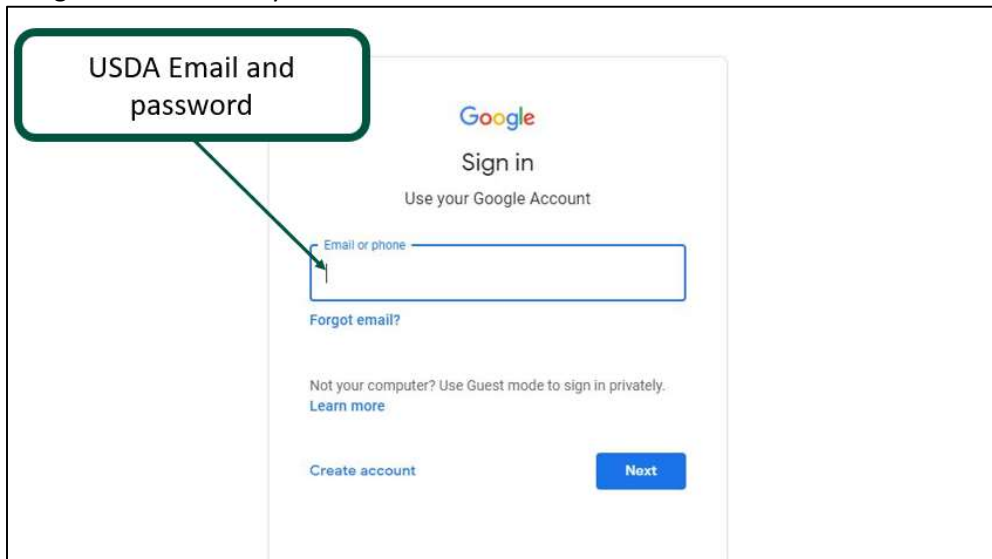
This training uses Google Earth Engine to teach JavaScript. Google Earth Engine (GEE) is cloud based and uses a scripting environment that can be run through an internet browser and does not require you to download any software. You will, however, need to register for an Earth Engine account with your USDA email.

1. Add USDA Account to Google Group
 - i. Email SM.FS.GTAC@usda.gov with your name and USDA email address asking to be added to the Google Earth Engine Google Group
 - ii. Please wait to be notified by GTAC that you've been added to the appropriate groups. This will take 24 hours or longer. Once notified continue to number 2
2. Login to Google Earth Engine with USFS
 - i. Open Google Chrome
 - ii. Click on the circle in the upper right-hand corner of the page, select **Guest** from the dropdown menu

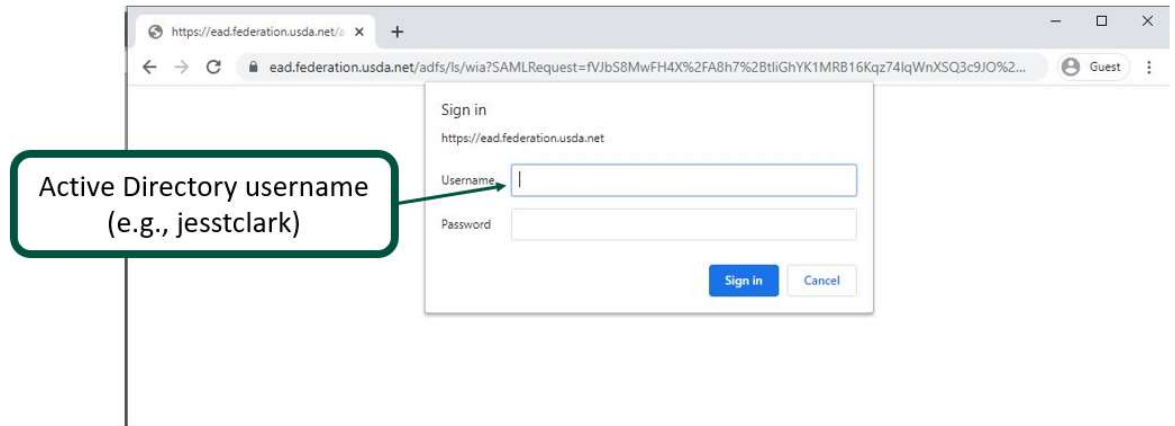


A new page will come up that indicates you're browsing as a Guest

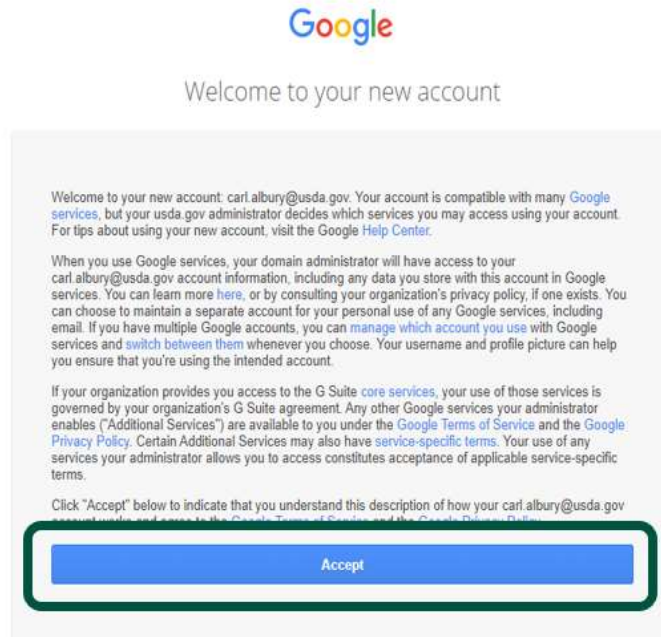
- iii. Navigate to the [Google Earth Engine Code Editor](#), when prompted to Sign in using your Google Account enter your USDA email account credentials



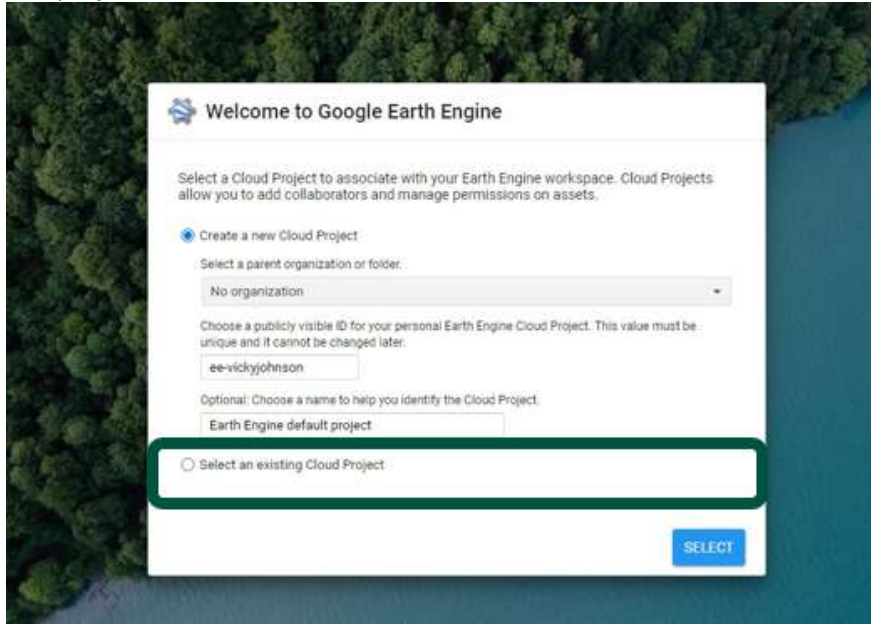
- iv. You will next be prompted to enter a username and password. These are your **Windows Active Directory credentials**, typically your first initial then last name, not your USDA email



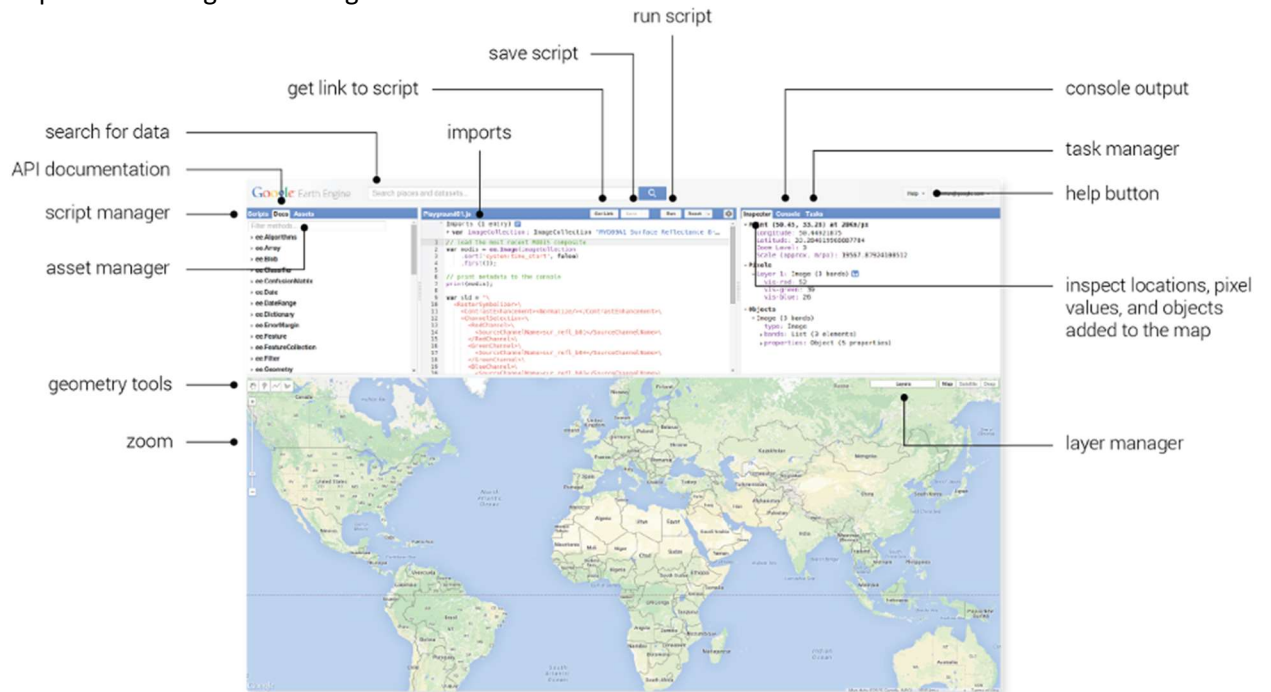
- v. Once logged in, accept the account's terms of service, and continue to the code editor



- vi. When prompted to select a Cloud Project choose **Select an existing Cloud Project** navigate to **GTAC-Training**. You will now have access to the assets currently shared with this project.



3. Explore the Google Earth Engine Code Editor API



4. Use the graphic above to guide you and click through the tabs in the upper left-hand panel, the **Scripts and Documentation Panel**.

- i. Under the **Scripts** tab, note the wide variety of preloaded example scripts that demonstrate capabilities and offer code that you can use for your analyses. You can look

at these to learn about what kinds of things Earth Engine can do. After you create and save a script later in the day, it will be available in your Private repository.

- ii. Under the **Docs** tab, there is a searchable list of documentation for the predefined GEE object types and methods. Note these are grouped and organized by object. Briefly explore what kinds of functions are available in GEE.

Select one of interest and click on it to see the information window with a description of the methods and associated arguments (required and optional). Any optional arguments are listed in italicized print. (The example scripts include examples of many of these methods, try searching for them using the scripts search bar.)

5. Using the graphic above **click through** the tabs in the upper right-hand panel where the Inspector, Console, and Tasks tabs are located.
 - i. We will use the **Inspector** (like the familiar identify tool in ArcMap) to easily get information about layers in the map at specified points in our map (specified by clicking in the Map Panel).
 - ii. The **Console** will be used to return messages as our scripts run and print information about our data, intermediate products, and results. It will also record any diagnostic messages, such as information about runtime errors.
 - iii. The **Tasks** tab is used to manage the exporting of data and results at the end of an analysis.
6. Click on the **Help** button in the upper right and **select Feature Tour** to learn more about each component of the API.
 - i. Click through the options in the Feature tour to become more familiar with each component of the Code Editor.
7. Read more about the Code Editor [here](#)

Part 3: Python

You can choose to use Python2 or Python3, while either will be fine for this course, I would recommend learning Python3 as more programs shift towards Python3 it is starting to become the standard.

A. Python 2 from ArcGIS

1. We will use Python 2 which was installed with your installation of ArcMap version 10.x with Python version 2.x and Spatial Analyst extension. If you have ArcGIS 10.0 or newer installed on your machine, you shouldn't need to take any further steps. If you do not, you can install ArcMap via the software center.

B. Python 3 from [ArcPro](#)

1. Python 3 was installed with your installation of ArcPro. Ensure you have version 2.8 with and the Spatial Analyst extension. To check out the Spatial Analyst check out the [ArcPro License Guide](#) If you do not, you can install ArcPro via the software center.

Congratulations! You have successfully installed R and RStudio, or Python, or signed up for a Google Earth Engine Account. You should be ready for the course!