Last Updated: November 2020

# Agenda: Soil Mapping and Classification in Google Earth Engine

Introduction

**Welcome!** Thank you for your interest in the Soil Mapping and Classification in Earth Engine workshop. This workshop is scheduled for **10 am to 4 pm MST on May 11-13, 2021**.

This is a mixed-format webinar that consists of instructor-led presentations, demonstrations, and discussions that usually last 45 to 90 minutes. After these sessions, participants perform hands-on exercises, which will guide them through basic image preparation and classification workflows and reinforce concepts presented to them in the instructor-led discussion. Participants work through the training materials on their own, but interaction with the instructor is always available via the webinar interface.

Connecting to the Webinar

* [Join Microsoft Teams Meeting](https://teams.microsoft.com/dl/launcher/launcher.html?url=%2F_%23%2Fl%2Fmeetup-join%2F19%3Ameeting_OGZlMDgxNzUtMzA4NC00YWYyLTkzYzktY2NjYTA5YjFlMDI3%40thread.v2%2F0%3Fcontext%3D%257b%2522Tid%2522%3A%2522ed5b36e7-01ee-4ebc-867e-e03cfa0d4697%2522%252c%2522Oid%2522%3A%2522beaa3ffa-0174-449d-89c6-d9a1364311a0%2522%257d%26anon%3Dtrue&type=meetup-join&deeplinkId=9818f53e-0a3e-4a5b-903f-9d148b06408f&directDl=true&msLaunch=true&enableMobilePage=true&suppressPrompt=true)

Learning Objectives

* Participants can import and export data to/from Google Earth Engine
* Provide a foundation in using Google Earth Engine for image acquisition and processing
* Ensure participants have a baseline understanding of remote sensing principles (e.g., bands, band combinations, sensor features)
* Give participants introduction to and experience in supervised and unsupervised classification methods
* Participants gain experience applying techniques to soil mapping examples from their own work
* Exposure to a breadth of example applications of Google Earth Engine and/or classification, via examples
* Participants have a script they can adapt to acquire and process remote sensing imagery
* Participants have a script they can adapt to perform a classification

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1. Prerequisites
   1. Experience

You should have some some basic conceptual knowledge of remote sensing and geospatial scripting. Some familiarity with classification methods (e.g., Random Forests) is encouraged. This course will use geospatial scripting methods to analyze and classify spectral information.

You are encouraged to review the following training on geospatial scripting:

* [Introduction to Geospatial Scripting](https://usdagcc.sharepoint.com/sites/fs-gtac-tus/Lists/Course/Item/displayifs.aspx?ID=238)

The following trainings on remote sensing are also provided to support your familiarity with these topics:

* + - [Lightning Talk: Spectral Signatures & Band Combinations](https://usfs.adobeconnect.com/p7rq7gvknd0/)
    - [Overview of Remote Sensing](https://usfs.adobeconnect.com/pu8onvxioksd/)
  1. Software

You will need a Google Earth Engine account. You can request a Google Earth Engine account here: <https://signup.earthengine.google.com>

If you are a Forest Service employee, you are encouraged to register for an account using your usda.gov email address. You can follow the instructions here to request and account.

If you are an NRCS employee, follow your supervisor’s instructions for requesting an account.

* 1. Training data and exercises

Participants should come prepared with an example study area in mind to produce an example classification in earth engine. Your instructors will be available to help determine if this study area is appropriate, and will provide additional considerations.

All of the coursework can be completed without downloading any data from GTAC. If, however, you were unable to secure a Google Earth Engine developer account in time for use in this webinar (or if you have trouble producing the Earth Engine outputs), you can find the necessary imagery below along with the exercises.

* + 1. Change Detection exercises
       1. [Exercise 1](https://fsapps.nwcg.gov/gtac/CourseDownloads/Training/Remote_Sensing/ChangeDetection_Intro/Data_and_Exers/Exercise_1_Introduction_to_GEE.pdf)
       2. [Exercise 2](https://fsapps.nwcg.gov/gtac/CourseDownloads/Training/Remote_Sensing/ChangeDetection_Intro/Data_and_Exers/Exercise_2_Cloud_Free_Composites.pdf)
       3. [Exercise 3](https://fsapps.nwcg.gov/gtac/CourseDownloads/Training/Remote_Sensing/ChangeDetection_Intro/Data_and_Exers/Exercise_3_Image_Enhancements.pdf)
       4. [Exercise 4](https://fsapps.nwcg.gov/gtac/CourseDownloads/Training/Remote_Sensing/ChangeDetection_Intro/Data_and_Exers/Exercise_4_Create_Standardized_Difference.pdf)
       5. [Exercise 5](https://fsapps.nwcg.gov/gtac/CourseDownloads/Training/Remote_Sensing/ChangeDetection_Intro/Data_and_Exers/Exercise_5_Change_Thresholds.pdf)
    2. [Landsat cloud-free composites](https://fsapps.nwcg.gov/gtac/CourseDownloads/Training/Remote_Sensing/ChangeDetection_Intro/Data_and_Exers/Data.zip) (note: these files are large – only download if you do not have access to Google Earth Engine)

There are also self-paced tutorials associated with this training:

* + 1. [Introduction to Change Detection tutorial](https://usdagcc.sharepoint.com/sites/fs-gtac-tus/Lists/Course/Item/displayifs.aspx?List=57ad9b47%2D523a%2D4857%2Dac3b%2Dff91fdf3b0d7&ID=163&Source=https%3A%2F%2Fusdagcc%2Esharepoint%2Ecom%2Fsites%2Ffs%2Dgtac%2Dtus%2FSitePages%2FSelf%2DPaced%2520Training%2Easpx%23InplviewHash59e37ebc%2Dc137%2D45cc%2Db8be%2Dcf2a9d3fae14%3DWebPartID%253D%257B25626995%2D%2D8421%2D%2D4CAF%2D%2DAAEA%2D%2D2229630D19A3%257D&ContentTypeId=0x010007DDBB3B2FC4FA4BBA55C251A4961026) (note: this tutorial contains identical material to this webinar)
  1. Contact information

The instructors of this course are **Lila Leatherman (they/them pronouns) and Juliette Bateman**.

Email: [lila.leatherman@usda.gov](mailto:lila.leatherman@usda.gov)

1. Agenda

All times are Mountain Standard Time.

* 1. Day 1, morning session
* **10:00-10:45** – Presentation: Course overview and Introduction to Google Earth Engine
* **10:45-11:00** – Demonstration: Overview of Google Earth Engine (GEE)
* **11:00-11:10** – Break
* **11:10-11:30** – Presentation: Remote sensing fundamentals and sensor characteristics
* **11:30-12:00** – Demonstration: (Exercise 1): Creating cloud-free composites in GEE

Tasks to complete before the next session: Exercise 1

* 1. Day 1, afternoon session
* **14:00-14:30** – Presentation: Band ratios and image transformations
* **14:30-15:00** – Demonstration: (Exercise 2) Creating basic vegetation indices
* **15:00-16:00** – Q & A and Exercise Help

Tasks to complete before the next session: Exercise 2

* 1. Day 2, morning session
* **10:00-10:30** – Presentation: Intro to supervised vs. unsupervised classification
* **10:30-11:00** – Demonstration: (Exercise 3) Import and organize tabular data and training points
* **11:00-11:10** – Break
* **11:10-11:30** – Presentation: Intro to Random Forests pt 1: what is
* **11:30-12:00** – Demonstration: (Exercise 4): Collect tabular data as training points

Tasks to complete before the next session: Exercise 3 + Exercise 4

* 1. Day 2, afternoon session
* **14:00-14:30 – Presentation: Intro to Random Forests pt 2: Regression and Classification pros and cons**
* **14:30-15:30 – Demo: (Exercise 5) Run and export a random forests classification**
* **15:30-16:00 – Q & A, help with course-related projects/ideas**
* Tasks to complete before the next session: Exercise 5
  1. Day 3, morning session
* **10:00-10:30** – Presentation: Adapting for your own scripts
* **10:30-11:00** – Demonstration: (Exercise 6a) Updating example scripts with new study area and data
* **11:00-11:10** – Break
* **11:10-11:30** –Q&A; breakout groups for participants to troubleshoot together
* **11:30-12:00** – Presentation: example application 1

Tasks to complete before the next session: Exercise 6a

* 1. Day 3, afternoon session
* **14:00-14:30 – Presentation: Accuracy assessment and validation/repos in GEE/addtl tech topic that won’t get practice**
* **14:30-15:00 – Demo / work time: Run initial classification, participants share out results**
* **15:00-15:30 – Presentation: example application 2**
* **15:30-16:00 – Final Q & A and close**

1. Related Resources

GTAC offers a number of trainings. If you do not have access to any of these resources (some sit behind the USFS firewall), please email the instructor to gain access to them.

* [Obtaining Remotely Sensed Imagery](https://fsapps.nwcg.gov/gtac/CourseDownloads/Obtaining_Remotely_Sensed_Imagery/story.html) (self-paced tutorial)
* [Introduction to Geospatial Scripting](https://fsapps.nwcg.gov/gtac/CourseDownloads/GoogleEarthEngine/Intro_to_Scripting/Storyline/story_html5.html) (self-paced tutorial)
* [Geospatial Scripting in JavaScript](https://fsapps.nwcg.gov/gtac/CourseDownloads/GoogleEarthEngine/GeospatialScripting_Javascript/Storyline/story_html5.html)  (self-paced tutorial)
* [Overview of Google Earth Engine](https://usfs.adobeconnect.com/p6bz9gk3736/) (recording)
* [Intro to Google Earth Engine Explorer](https://usfs.adobeconnect.com/p86yz1a6bno/) (recording)
* [Intro to Earth Engine Code Editor and JavaScript](https://usfs.adobeconnect.com/p6de7ge2dz0/) (recording)
* [Introduction to Random Forests](https://fsapps.nwcg.gov/gtac/CourseDownloads/RandomForests/Storyline/story.html) (self-paced tutorial)