



Climate Engine Virtual Workshop #4

July 12, 2023

Supporting South Florida Water Management District

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Agenda

Time (ET)	Description	Section Lead
Introduction (1:00-1:05)	Workshop Introduction + Agenda	Caleb White
Section 1 (1:05-1:30)	1(a): API Access Recap 1(b): Python Script Quick Reference Guides	Ankur Shah
Section 2a (1:30-2:30)	API Calls Live Coding	Ankur Shah
Break (2:30-2:40)	Break	n/a
Section 2b (2:40-3:40)	API Calls Live Coding	Ankur Shah
Section 3 (3:40-3:55)	Questions & Answers, Troubleshooting	Ankur Shah
Wrap Up (3:55-4:00)	Wrap Up	Caleb White

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Workshop Notes

- Workshop is meant to showcase live examples of how to access the APIs, make various API calls, and ways in which to work with the data.
- Virtual 'Paired programming': A 'quick start' notebook was provided, we **highly encourage** participants to follow along within their own notebooks.
- Please interrupt/raise hand if anything is not working for you, this is intended to be a **participant hands-on** session, screen sharing is encouraged!!
- Note: Authentication in the Colab notebook is owned by SFWMD IT, questions on that front can be directed to (Steve/Kurt).

1a: API Access Recap

Recap: High-level process for accessing the Climate Engine API



Technical Support (API)
support-sfwmd@climateengine.com

Popular Geospatial Python Packages

- **Numpy** - helps users work with numbers, arrays (including images), and do math more easily
- **Geopandas** - facilitates work with maps and geographical data
- **Matplotlib** - helps users make graphs, charts, and maps
- **Seaborn** - helps users create more advance and fancy-looking graphs and charts
- **Folium** - helps create interactive maps inside Jupyter notebook or Colab
- **Gdal** - extremely useful for working with different types of geospatial data
- **Rasterio** - helps people work with raster data creation and processing

Making API requests through Python Scripts

Utilizing python scripts to execute Climate Engine API requests allows you to customize your analysis workflow and automate analyses. Interaction with the API will be via Python in Colab.

Setting up a python script for requests can be broken down into a few steps:

1. Identify an endpoint of interest and define it as a variable in your script
2. Look up the parameter requirements and options on the docs page (ensure you use proper parameter names for datasets and variables)
3. Input the path for your google cloud storage bucket to store exports

Note: Some endpoints don't export to a bucket, but are returned as json and can be exported utilizing functions in script

4. Send request to the API
5. Track status updates as request is processed

1b: Python Script Quick Reference Guides

Making Raster Requests & Exporting to Google Cloud Storage

Import Packages

- Import packages for
 - Making HTTP requests
 - Working with raster data
 - Making Maps

Prep for API Call

- Select an endpoint
- Define parameters
- Define output path to google cloud storage

Make API Request

- Send request to the API
- Print response to see task status

Copying Raster to Notebook & Generating Maps

Pull Geotiff from Google Cloud Storage

- Authenticate access to google cloud
- Copy file from google cloud storage bucket to local content bucket

Perform Raster Processing

- Open geotiff with raster package such as gdal or rasterio

Utilize Mapping Package to Generate a Map

- Create a figure to add the raster to
- Add a color bar, set color ramp, and set min/max
- Add title
- Add option to export as png
- Show map to see resulting map

Making Time Series Requests

Import Packages

- Import packages for
 - Making HTTP requests
 - Working with tabular data
 - Making Charts

Prep + Make API Call

- Select endpoint of interest
- Define parameters
- Make request

Turn Response into Dataframe

- Select data dictionary from unpacked response
- Use `pd.DataFrame.from_dict` to convert dictionary into pandas dataframe

Creating Graphs in Notebooks

Process Results for Plotting

- Get rid of non-valid values
- Format date for plotting
- Set x values to date variable
- Set y values to value variable

Create Plot

- Create Figure
- Plot date and value
- Add labels and title
- Show plot to check results

Export PNGs

- Export png + download

Section 2a: API Calls Live Coding

Raster Exports and Analysis

[Live Demo]

Time Series Analysis

[Live Demo]

Break: 10 minutes

Section 2b: API Calls Live Coding

Forecast Time Series Analysis

[Live Demo]

Vector Data Analysis

[Live Demo]

Section 3: Questions & Answers, Troubleshooting

Thank you!

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