EVENT

Fundamentals to Use Hyperspectral and Thermal NASA Earth Observations

Join us for a two-day webinar covering the fundamentals necessary to work with NASA's high-spectral resolution land-based Earth observation data from NASA's EMIT, ECOSTRESS, and PACE missions.

Overview of Google Earth Engine (GEE)

NASA EarthData webinar: Hyperspectral & Thermal Fundamentals

07.2025

credits: some slides modified from Google, SERVIR Science Coordination Office

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Disclaimer

Overall purpose

- Understand / explore the basics of Google Earth Engine

Specific objectives

- Explore the GEE Code Editor for basic data visualization
- Examine the datasets in GEE's public catalog
- Learn about other resources
- Set stage for rest of training

credits: modified from H. Parache, SERVIR Science Coordination Office

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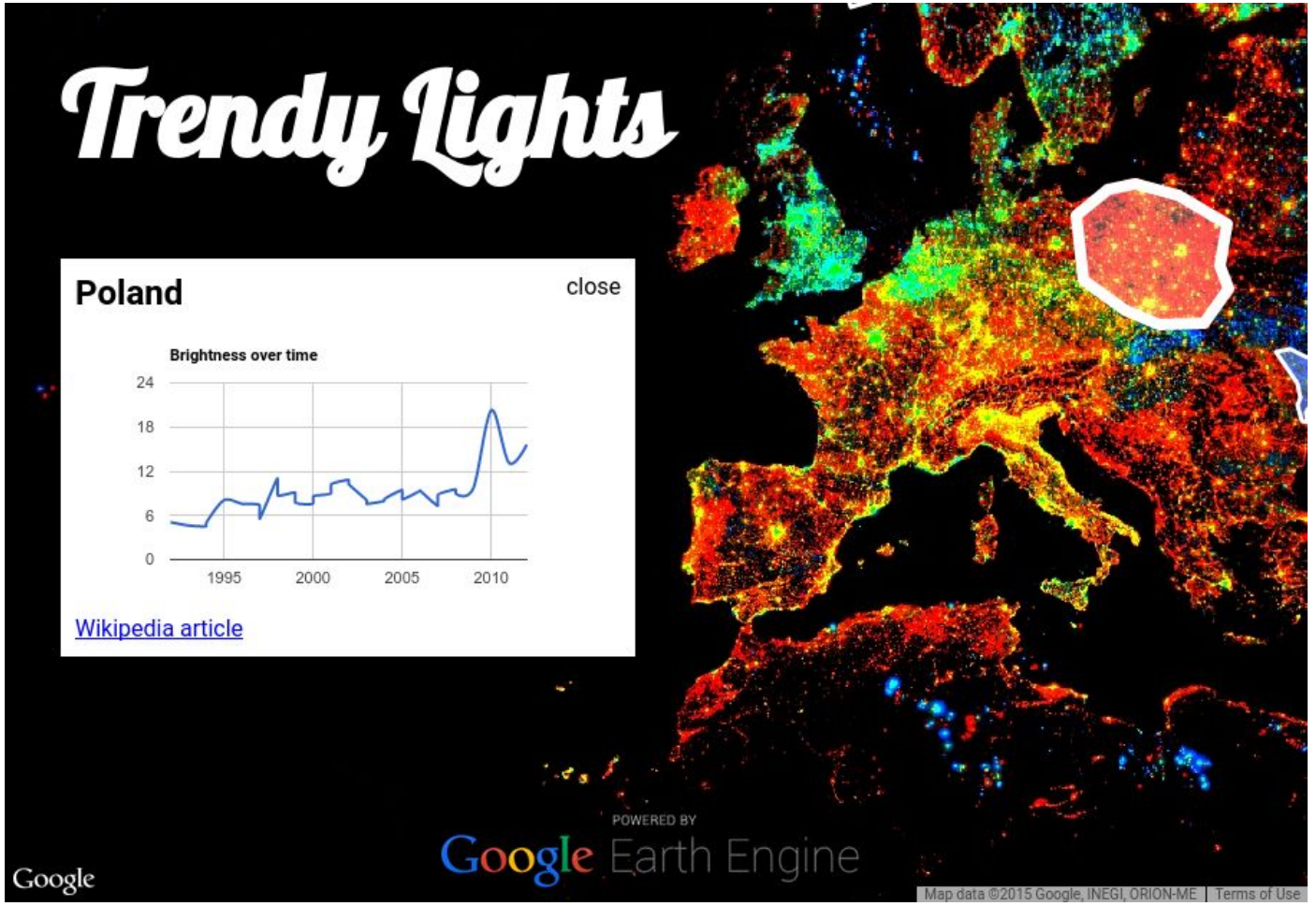
Overview of GEE

What is Google Earth Engine (GEE)?

A free, web based, image analysis tool that facilitates scalable and shareable image analysis through an interactive development platform



slide modified from K. Markert, SERVIR Science Coordination Office

What is Google Earth Engine (GEE)?

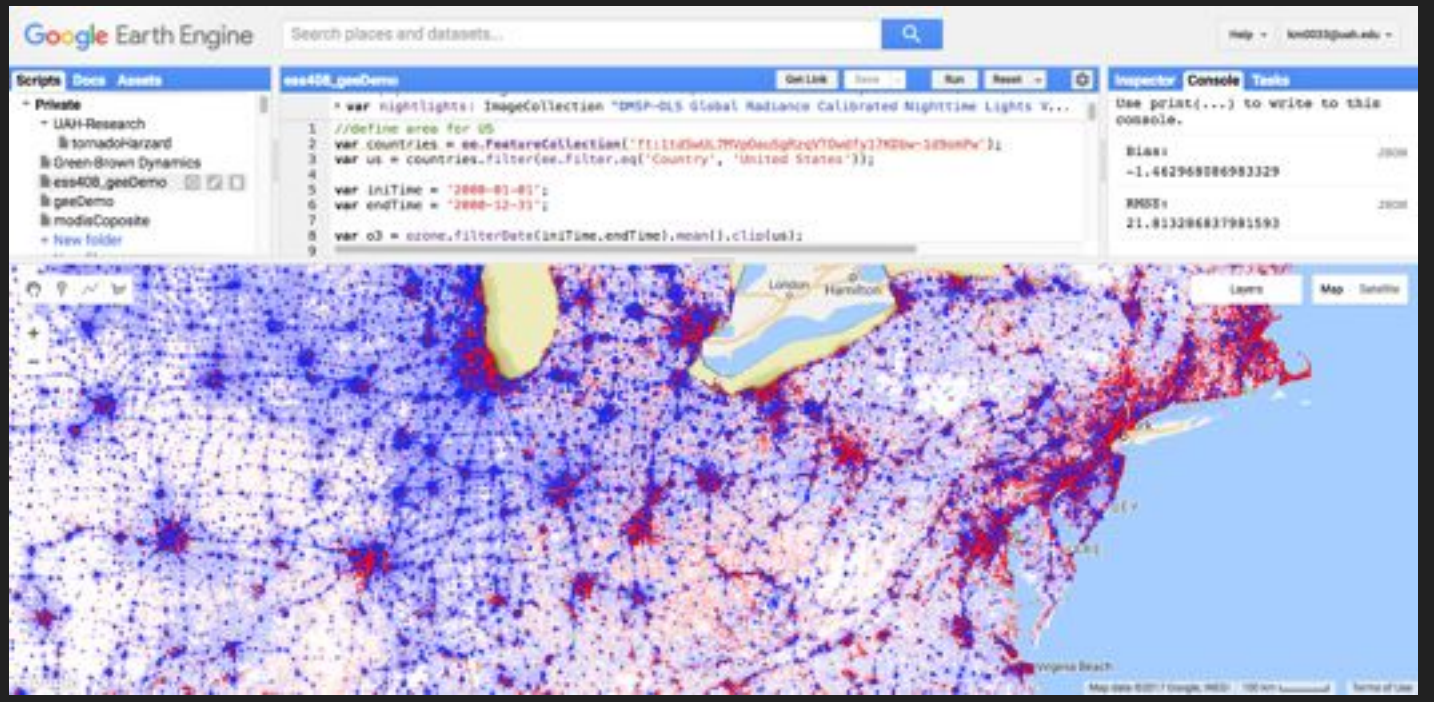
"Big Data" analysis and visualization platform

-Designed *for scientists*, not software engineers

-Goals: *make it easy, enable non-traditional users*

Focused on society's biggest challenges

-Reduce the time needed on analysis to spend more time on impact



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What data does GEE have?

~90 PB Public Data Catalog (updated daily)

Imagery

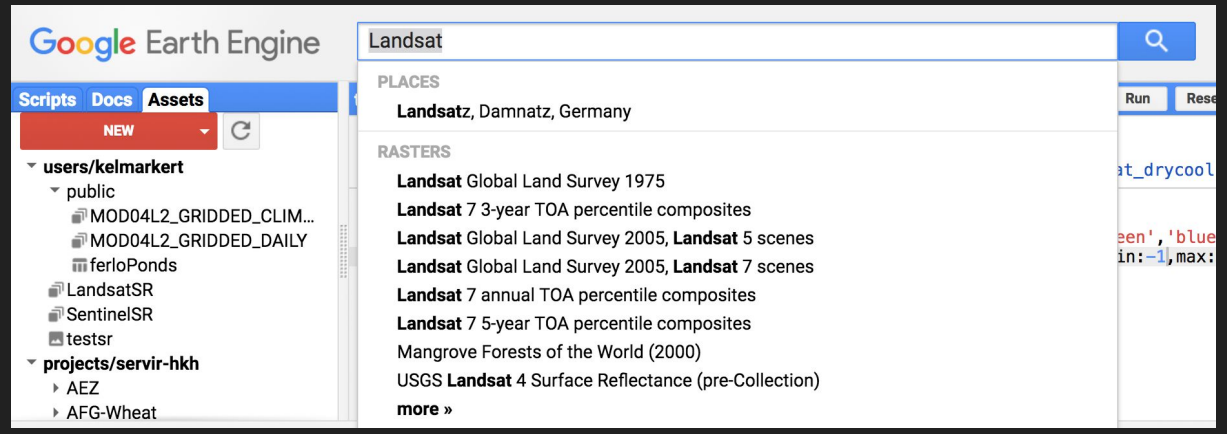
Landsat 4-9	7 bands, 30m
MODIS	250m Daily Global
Sentinel-1	10m SAR
Sentinel-2	12 bands, 10/20/60m

Geophysical

- Digital Elevation
- Land Cover
- Surface Temperature, etc.

Weather Forecasts, Climate Models
+300 more analysis ready datasets

Custom user assets



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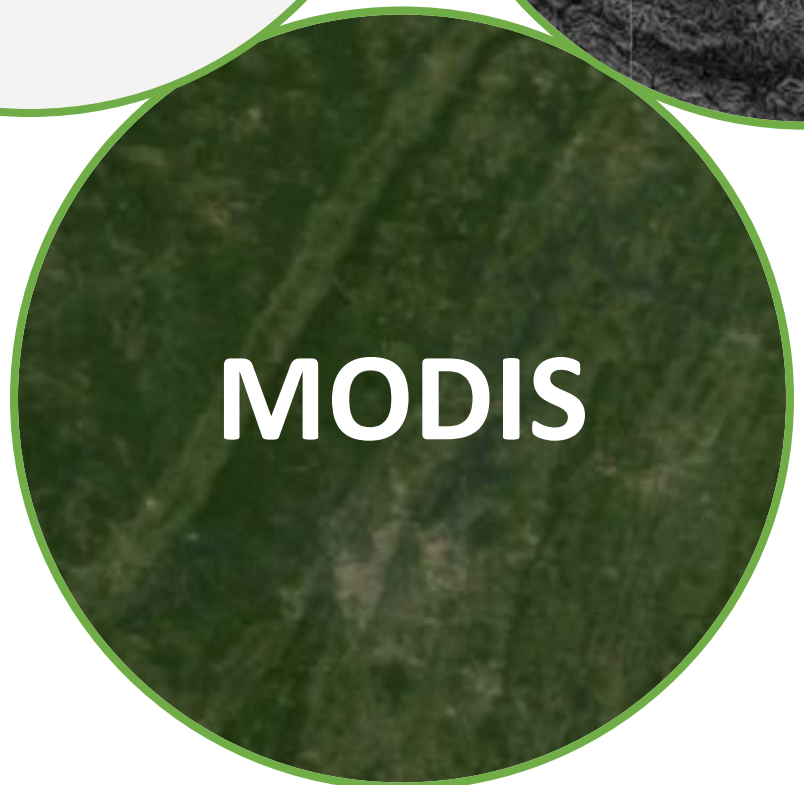
Data Availability

~50 years historical coverage

20+ petabytes of data



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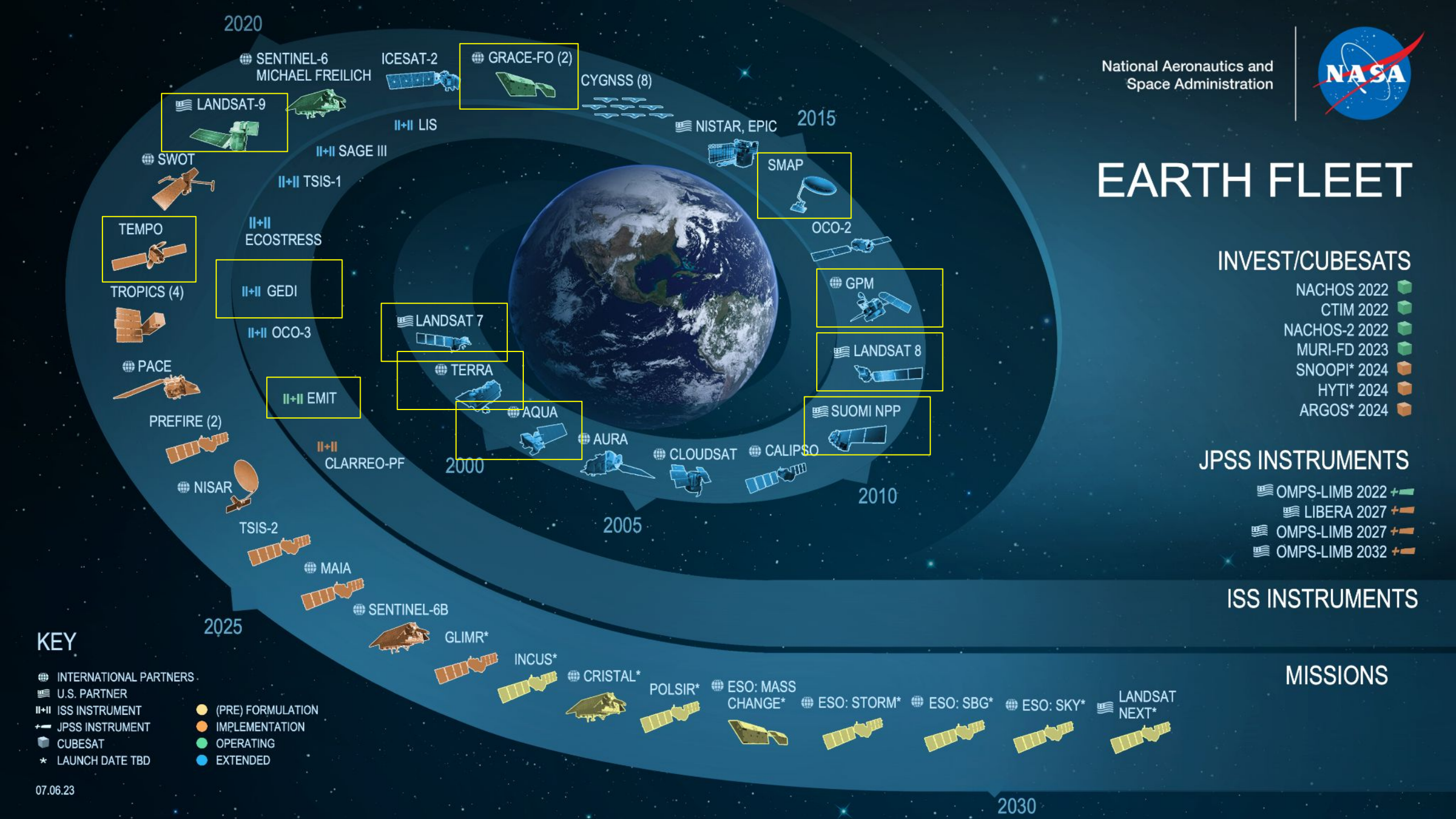
National Aeronautics and Space Administration
NASA
EARTH FLEET
2020
SENTINEL-6 MICHAEL FREILICH
ICESAT-2
GRACE-FO (2)
CYGNSS (8)
LANDSAT-9
LIS
NISTAR, EPIC
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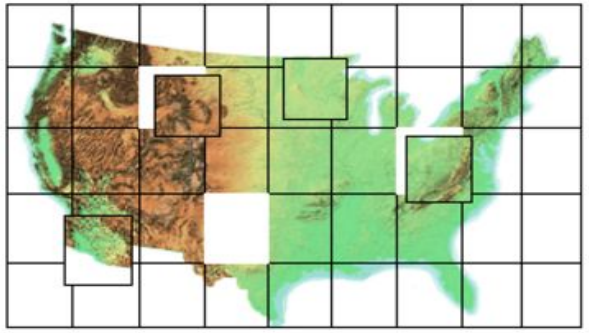
SAGE III
SWOT
TSIS-1
SMAP
TEMPO
ECOSTRESS
OCO-2
TROPICS (4)
GEDI
GPM
LANDSAT 7
OCO-3
LANDSAT 8
PACE
TERRA
EMIT
SUOMI NPP
AQUA
PREFIRE (2)
AURA
CLOUDSAT
CALIPSO
CLARREO-PF
2000
2010
NISAR
2005
TSIS-2
MAIA
SENTINEL-6B
2025
GLIMR*
INCUS*
CRISTAL*
POLSIR*
ESO: MASS CHANGE*
ESO: STORM*
ESO: SBG*
ESO: SKY*
LANDSAT NEXT*
2030
INVEST/CUBESATS
NACHOS 2022
CTIM 2022
NACHOS-2 2022
MURI-FD 2023
SNOOPI* 2024
HYTI* 2024
ARGOS* 2024
JPSS INSTRUMENTS
OMPS-LIMB 2022
LIBERA 2027
OMPS-LIMB 2027
OMPS-LIMB 2032
ISS INSTRUMENTS
MISSIONS
KEY
INTERNATIONAL PARTNERS
U.S. PARTNER
ISS INSTRUMENT
JPSS INSTRUMENT
CUBESAT
* LAUNCH DATE TBD
(PRE) FORMULATION
IMPLEMENTATION
OPERATING
EXTENDED
07.06.23

GEE facilitates scalable and shareable image analysis

- Leverages the GEE image collections and Google's super computers
  - Cloud processing, distributed computation
  - Ability to perform analysis on large scale datasets
- Collaboratively share data, algorithms, and visualizations using URLs

Divides data into independent grids



Storage Clusters (petabytes of data)
Computing clusters (1,000's of CPUs)

Merges all grid calculations

slide modified from K. Tenneson, SIG

GEE is an Interactive development platform

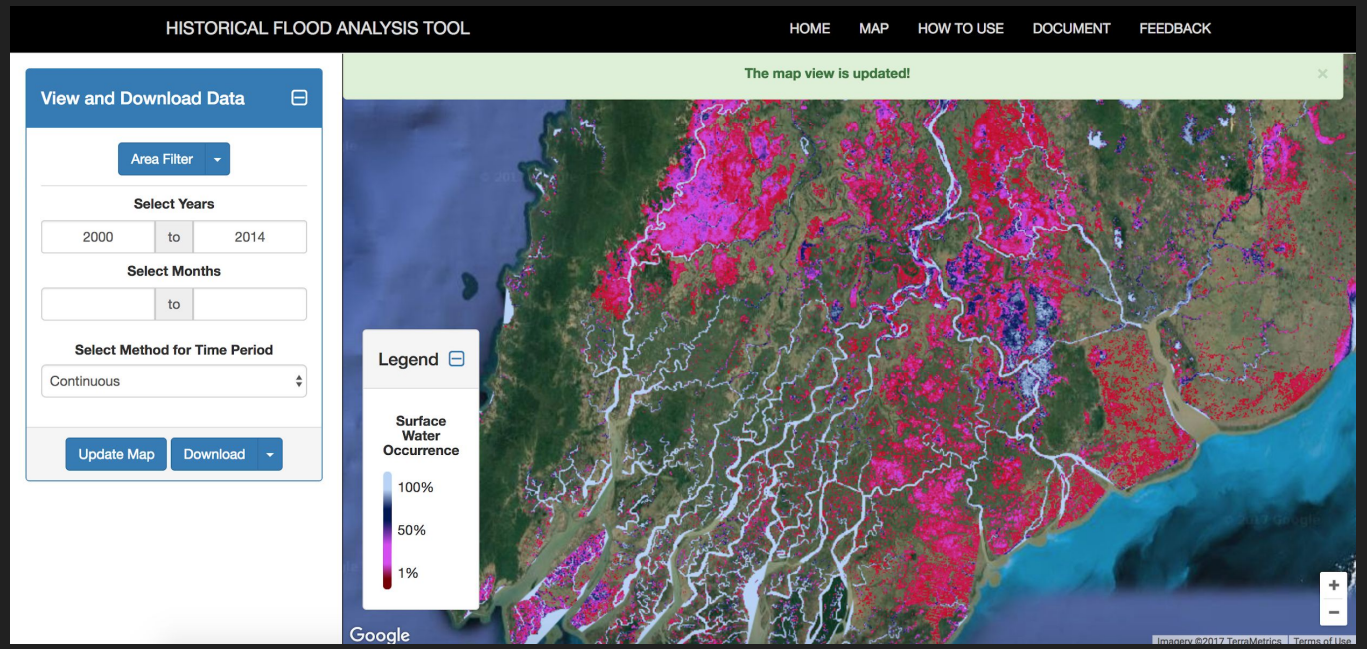
- Mapping, plotting and printing interface
- Comprehensive toolset to analyze data
  - Library of scientific algorithms ready to use
  - Building blocks to create your own workflow
- Save and share work routines
    - Example scripts
    - Consult the GEE Developers' forum
    - Share your own repository
- GEE Developers Forum

slide modified from K. Markert, SERVIR Science Coordination Office

How do you use it?

JavaScript API
- -interactive Code Editor
- -easy to use and instant results
- -easy to implement web apps

Python API
- Python module
- -Web Apps with App Engine
- -Jupyter Notebooks



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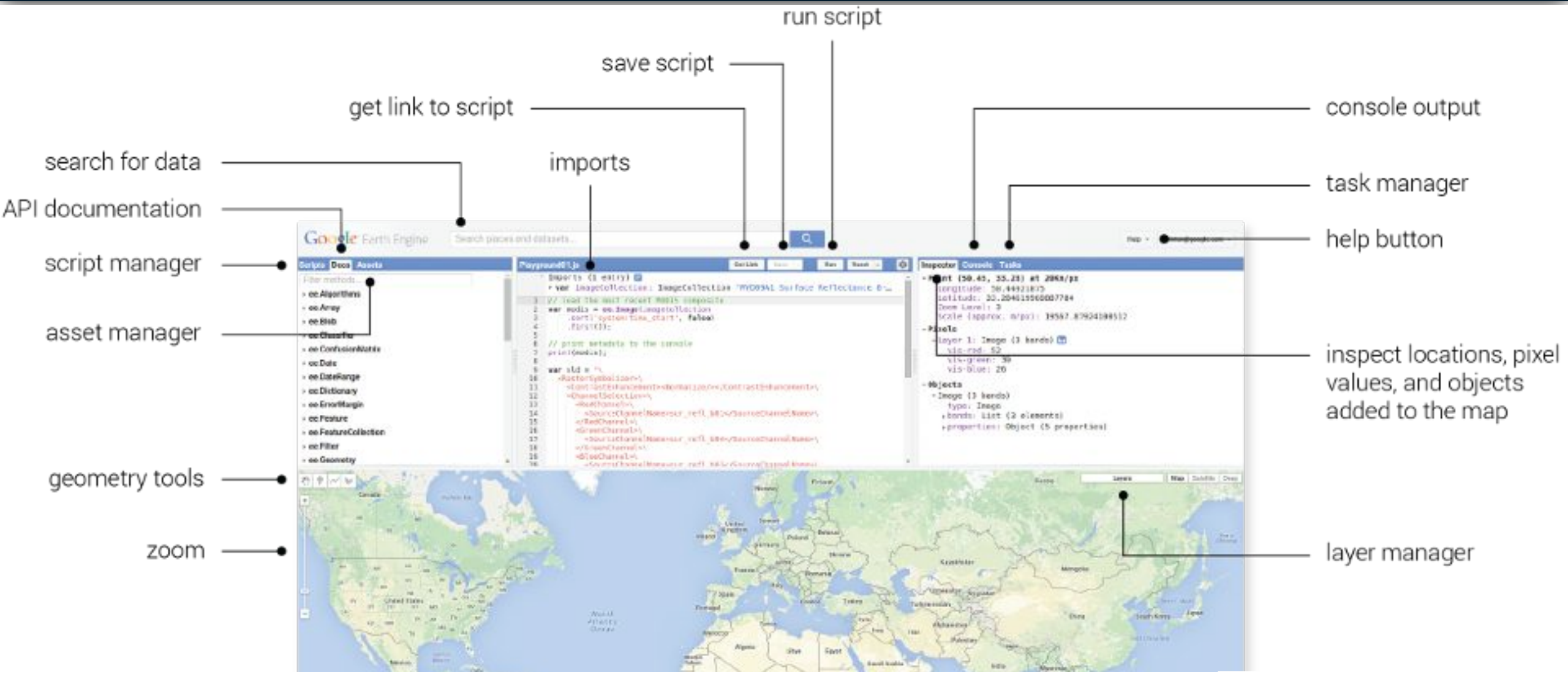
GEE Code Editor: https://code.earthengine.google.com



credits: modified from Google

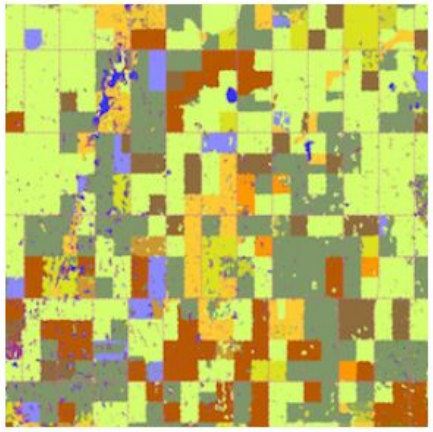
Earth Engine Data Catalog

Earth Engine's public data catalog includes a variety of standard Earth science raster datasets. You can import these datasets into your script environment with a single click. You can also upload your own raster data or vector data for private use or sharing in your scripts.

Looking for another dataset not in Earth Engine yet? Let us know by suggesting a dataset.

Filter list of datasets

Canada AAFC Annual Crop Inventory

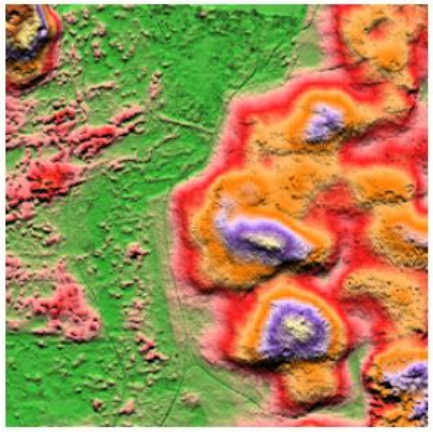


Starting in 2009, the Earth Observation Team of the Science and Technology Branch (STB) at Agriculture and Agri-Food

Allen Coral Atlas (ACA) - Geomorphic Zonation and Benthic Habitat - v1.0

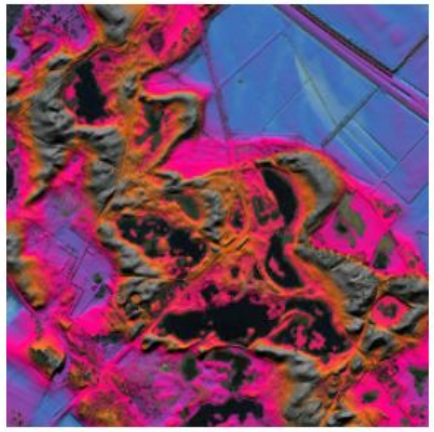
The Allen Coral Atlas dataset maps the geomorphic zonation and benthic habitat for the world's shallow coral reefs at 5m

AHN Netherlands 0.5m DEM, Interpolated



The AHN DEM is a 0.5m DEM covering the Netherlands. It was generated from LIDAR data taken in the spring between 2007 and

AHN Netherlands 0.5m DEM, Non-Interpolated

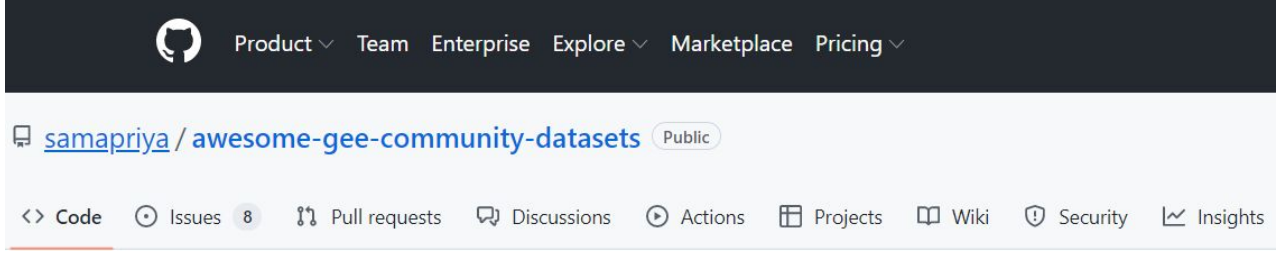


The AHN DEM is a 0.5m DEM covering the Netherlands. It was generated from LIDAR data taken in the spring between 2007 and

AHN Netherlands 0.5m DEM, Raw Samples

The AHN DEM is a 0.5m DEM covering the Netherlands. It was generated from LIDAR data taken in the spring between 2007 and

https://developers.google.com/earth-engine/datasets



README.md

awesome-gee-community-datasets

Follow @samapriyaroy 2k awesome Community Datasets 909 SupportedBy: JetStream

The awesome-gee-community-datasets are community sourced geospatial datasets made available for use by the larger Google Earth Engine community and shared publicly as Earth Engine assets. The project was started with the idea that a lot of research datasets are often unavailable for direct use and require preprocessing before use. This catalog lives and serves alongside the Google Earth Engine data catalog and also houses datasets that are often requested by the community and under a variety of open license.

You can read about the history and more in the Medium Post article here

Copy this badge as you contribute datasets: gee-awesome-datasets data commons contributor

Use this in your Readme.md file

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![contributor](https://img.shields.io/badge/gee--awesome--datasets-data%20commons%20contributor-green)
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Community Catalog Site

Online Awesome Google Earth Engine Community Catalog:

Community Datasets added by users and made available for use at large

Submit your Datasets to be included in the list: Using the template Link here

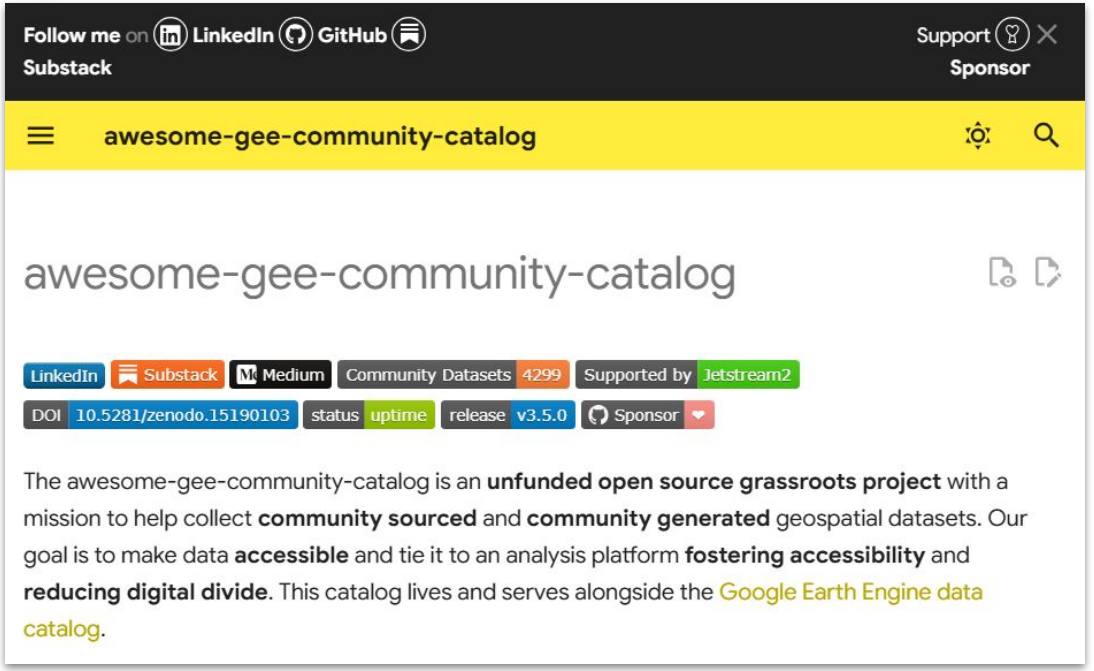
No releases published

Packages

No packages published

Contributors 3

samapriya Samapriya Roy



https://gee-community-catalog.org