Dubai Coastal Expansion, 1984-2012

Las Vegas Urban Growth, 1986-2012

Brazilian Amazon Deforestation, 1984-2012

Columbia Glacier Retreat, 1984-2011

Usefulness of Google Earth Engine in Geoscience Studies

The 143th GIS Seminar
GONG Hao
2016.07.14

Acknowledgement

Some of contents, pictures or resources are borrowed from the Google Earth Engine official website.

Usefulness of Google Earth Engine in Geoscience Studies

01 INTRODUCTION

✔ What is Google Earth Engine?
✔ How is Earth Engine different from Google Earth?
✔ Objective

02 TOPICS

✔ Datasets (public data catalog)
✔ Platform (cloud-based)
✔ Analysis (code editor and explorer)

03 FINAL

✔ Get started
✔ Case studies

Google Earth Engine

What is Google Earth Engine?

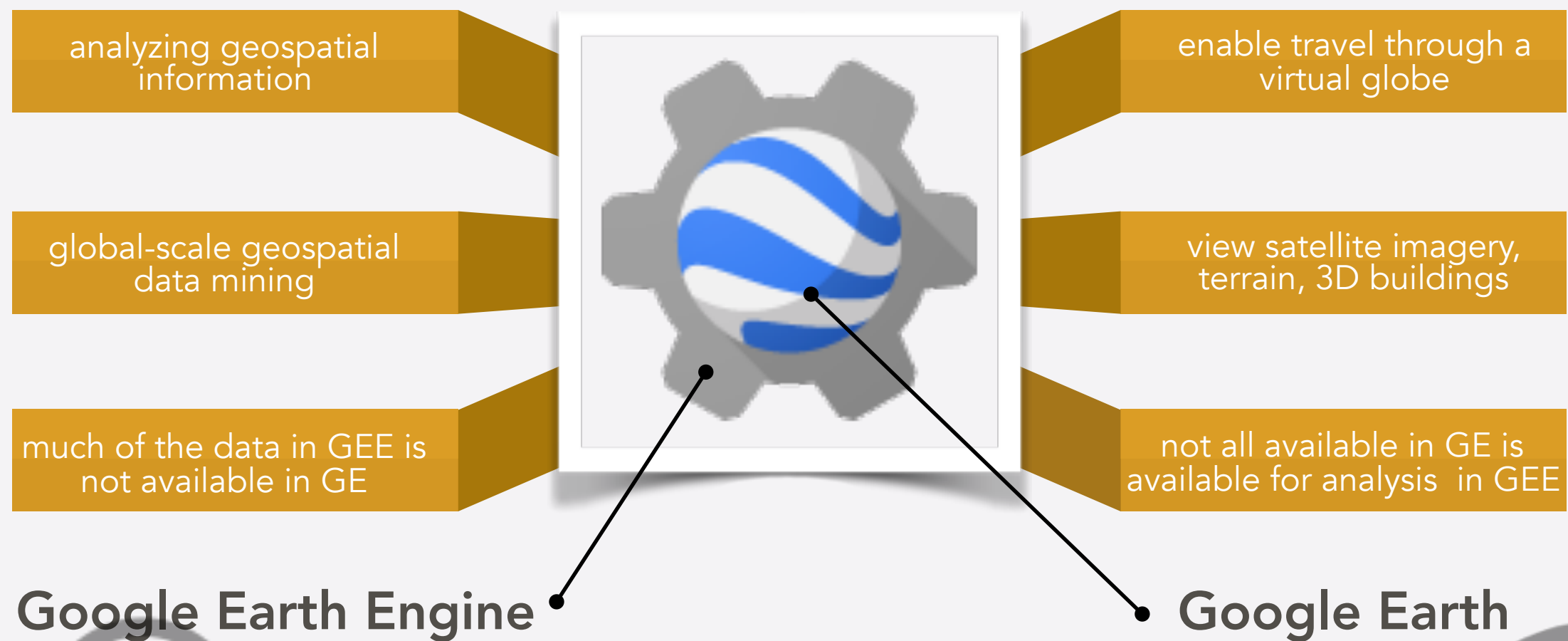a cloud-based computing platform that allows users to run geospatial analysis

a platform for petabyte-scale scientific analysis and visualization of geospatial datasets, and makes it available for global-scale data mining

a tool provides simple and powerful APIs in JavaScript and Python, to enable the analysis of large datasets

Google Earth Engine combines a multi-petabyte catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities and makes it available for scientists, researchers, and developers to detect changes, map trends, and quantify differences on the Earth's surface.

Google Earth Engine

How is Earth Engine different from Google Earth?

analyzing geospatial information

enable travel through a virtual globe

global-scale geospatial data mining

view satellite imagery, terrain, 3D buildings

much of the data in GEE is not available in GE

not all available in GE is available for analysis in GEE

Google Earth Engine

Google Earth

UNDERSTANDING
GOOGLE EARTH ENGINE

a cloud-based computing platform that allows users to run geospatial analysis

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✓ Geospatial analysis (code editor and explorer)

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D A T A S E T S
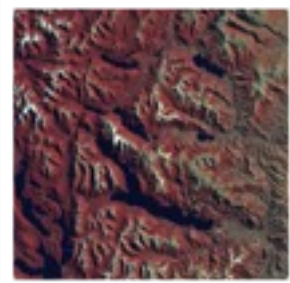
IMAGERY

Landsat
MODIS
High-Resolution
Sentinel
Other (nightlight)
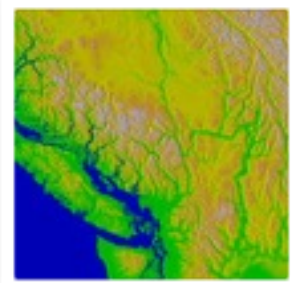
GEOPHYSICAL

Terrain
Land Cover
Cropland
Surface Temperature
Other (FIRMS)
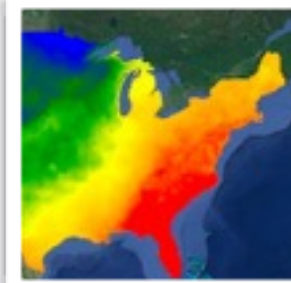
CLIMATE

Atmospheric data
Weather
Climate
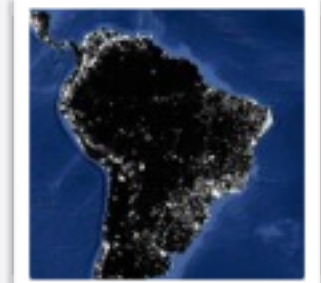
DEMOGRAPHIC

World Pop
Malaria data

...

You can also upload your own raster data or vector data.

DATASETS

LANDSAT

1972 ~ now
30m resolution
once every 2 weeks
NDVI, EVI...
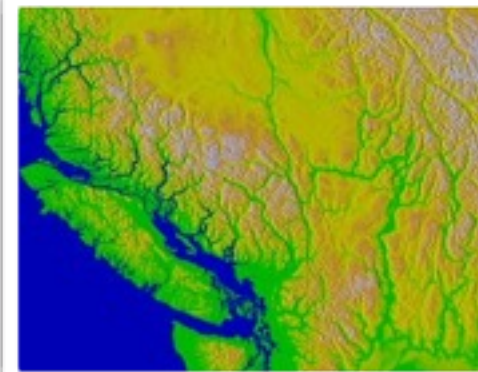
TERRAIN

SRTM 30m
ASTER 100m
WWF's HydroSHEDS
hydrology database
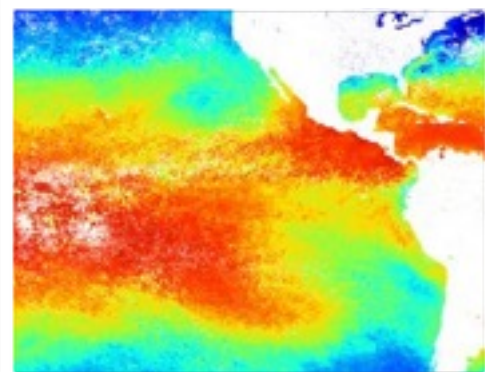
SURFACE TEMP

MODIS, ASTER, and
AVHRR
Landsat thermal data

NIGHT LIGHT

DMSP-OLS

https://code.earthengine.google.com/datasets

PLATFORM

CODE EDITOR

a web-based IDE for the Earth Engine JavaScript API
https://code.earthengine.google.com/
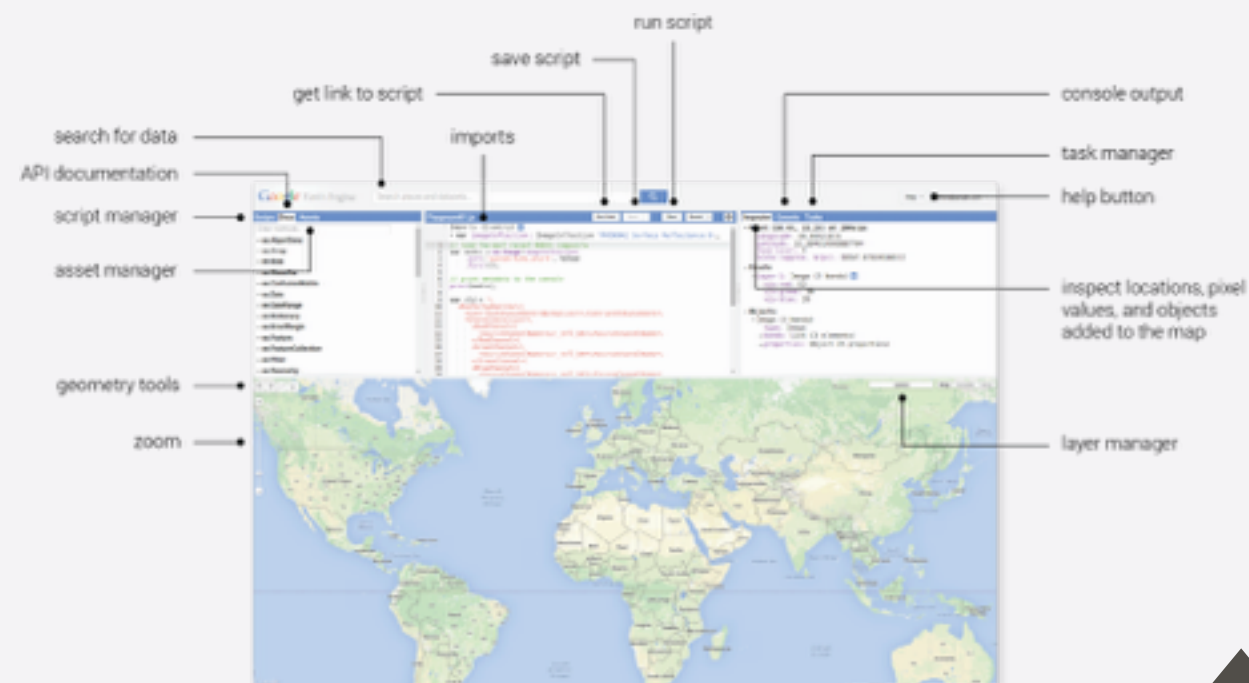
EXPLORER

a simple web interface to the Earth Engine API
https://explorer.earthengine.google.com/#workspace

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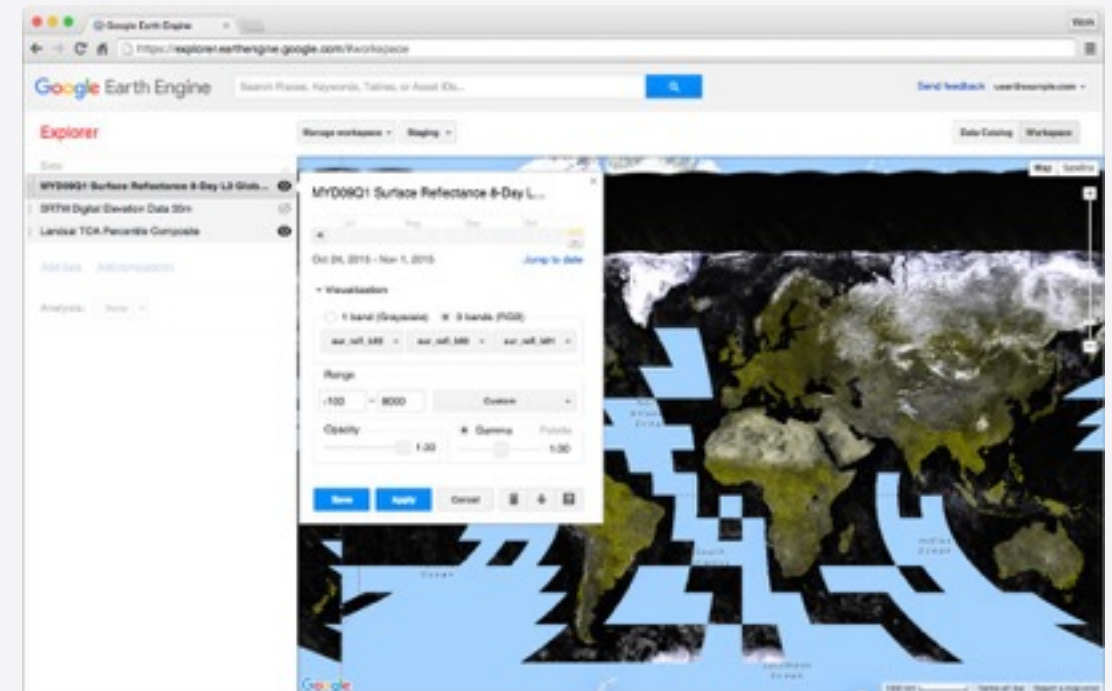
CODE EDITOR

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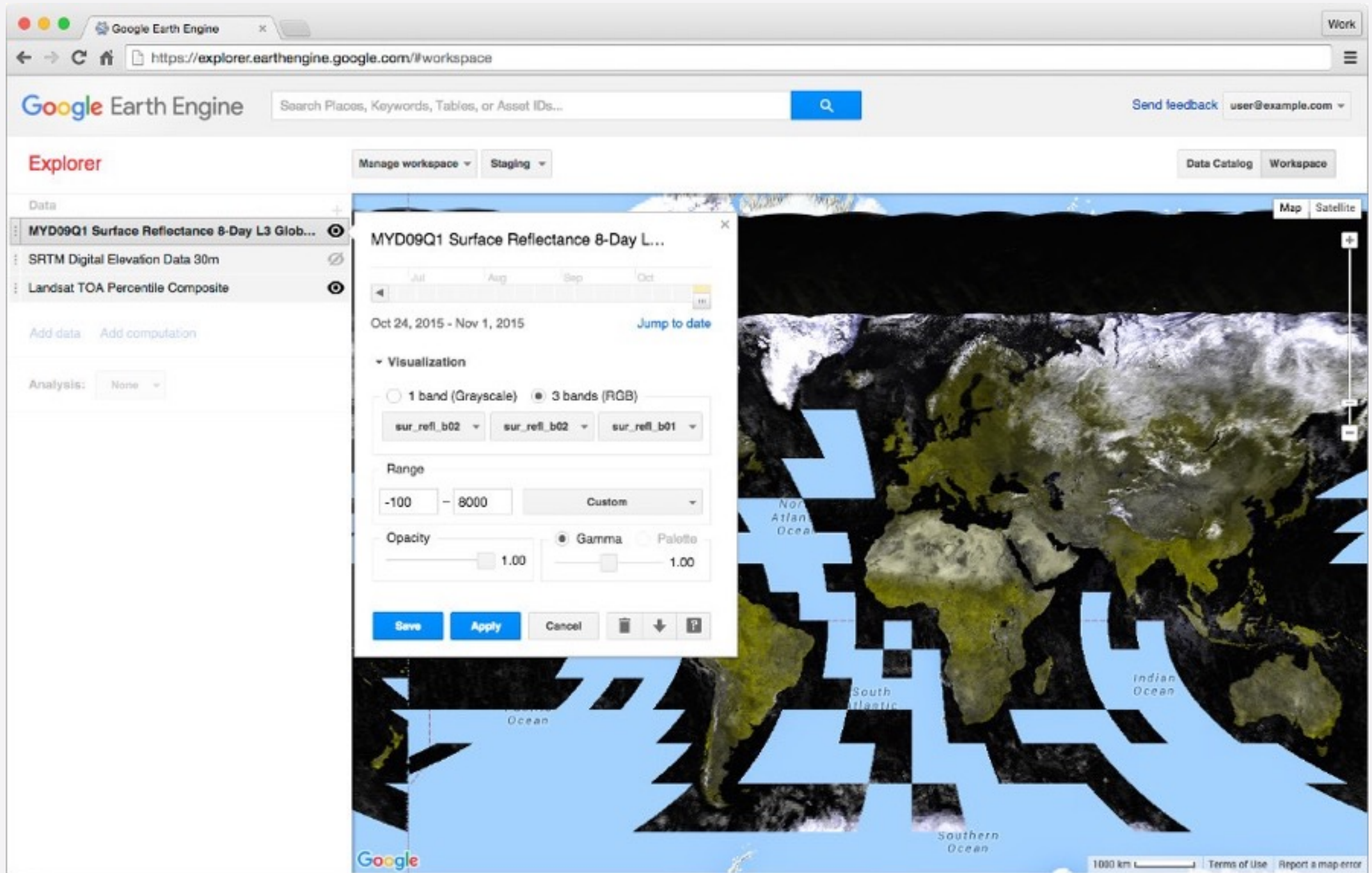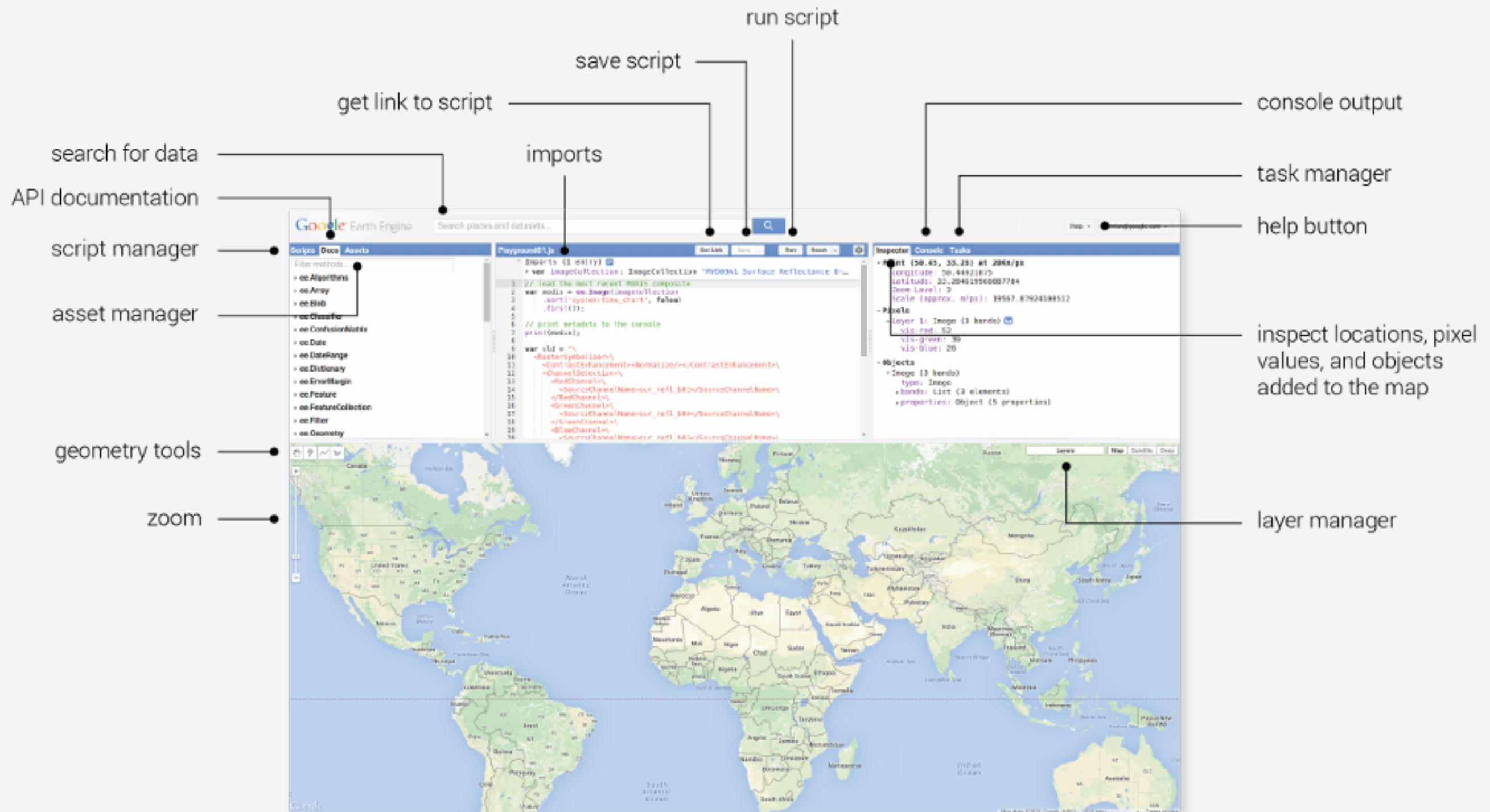
GEOSPATIAL ANALYSIS

Case 1 | Visualizing Images and Image Bands
(image regions charts, cloud mask)

Case 2 | Statistics of Image Neighborhoods

Case 3 | Vector to Raster Interpolation (Kriging)

Case 4 | Raster to Vector Conversion

Case 5 | Supervised Classification

Case 6 | Importing Raster/Vector Data, Exporting Data

Case 1 | Visualizing Images and Image Bands (Explorer)
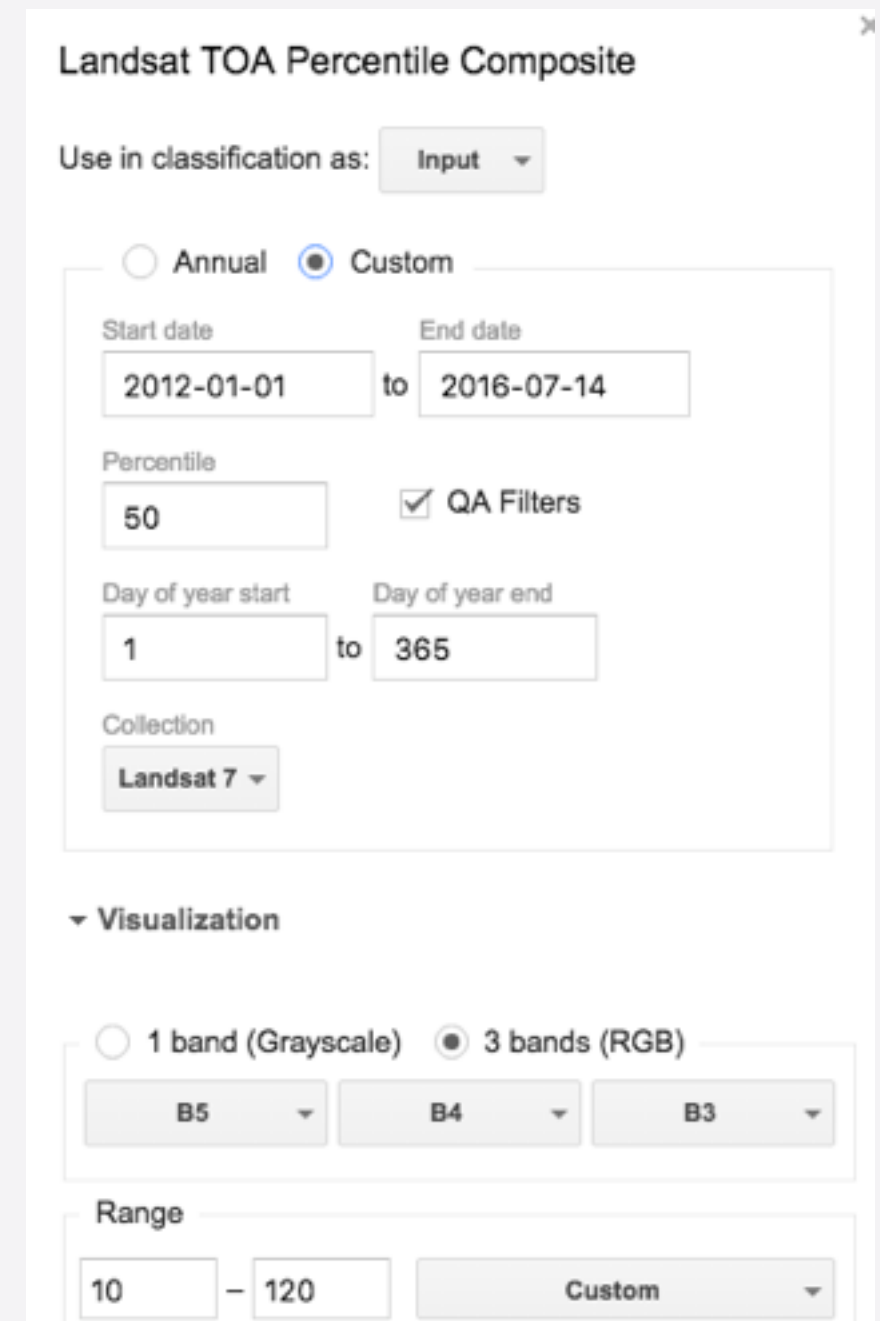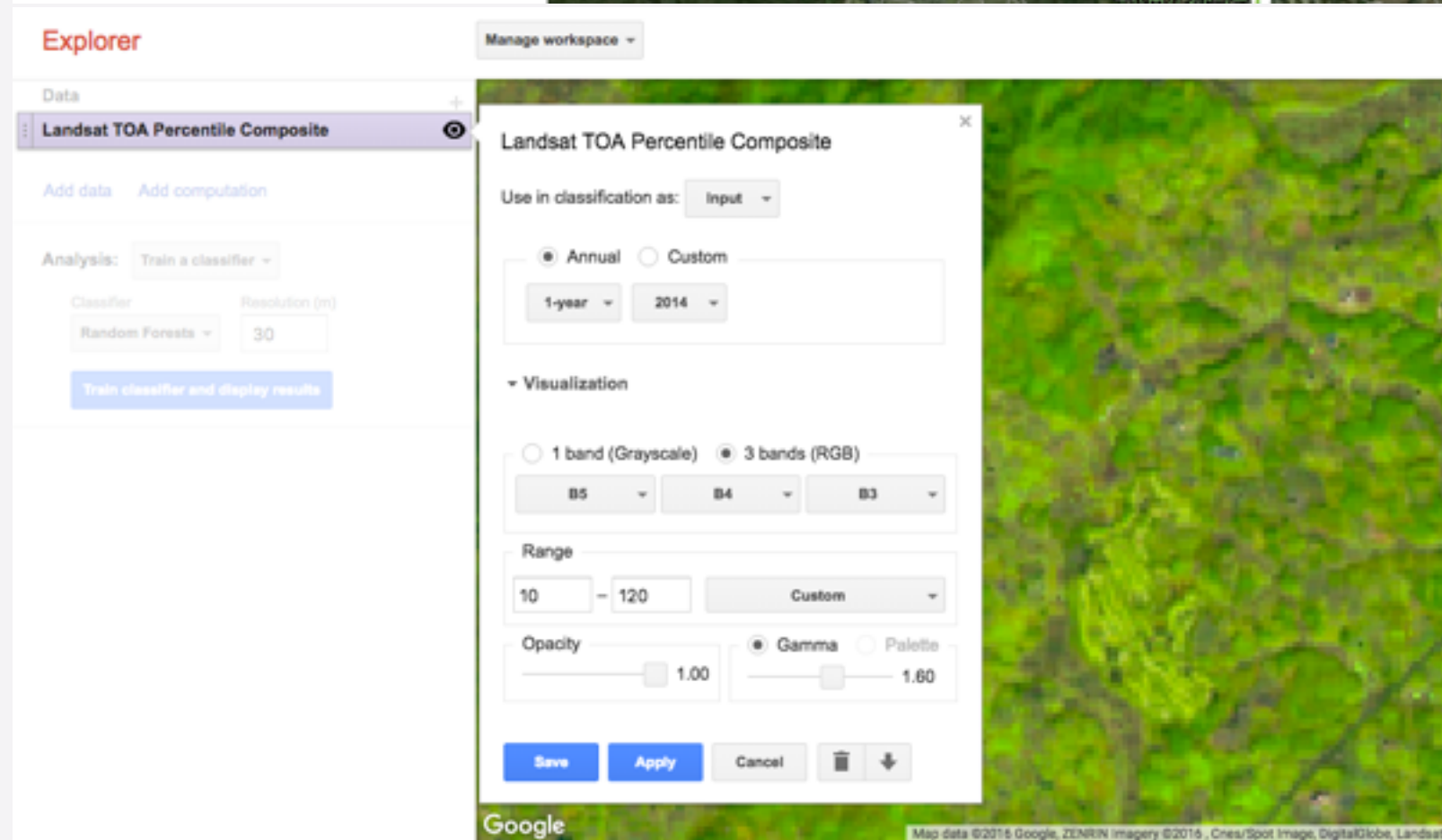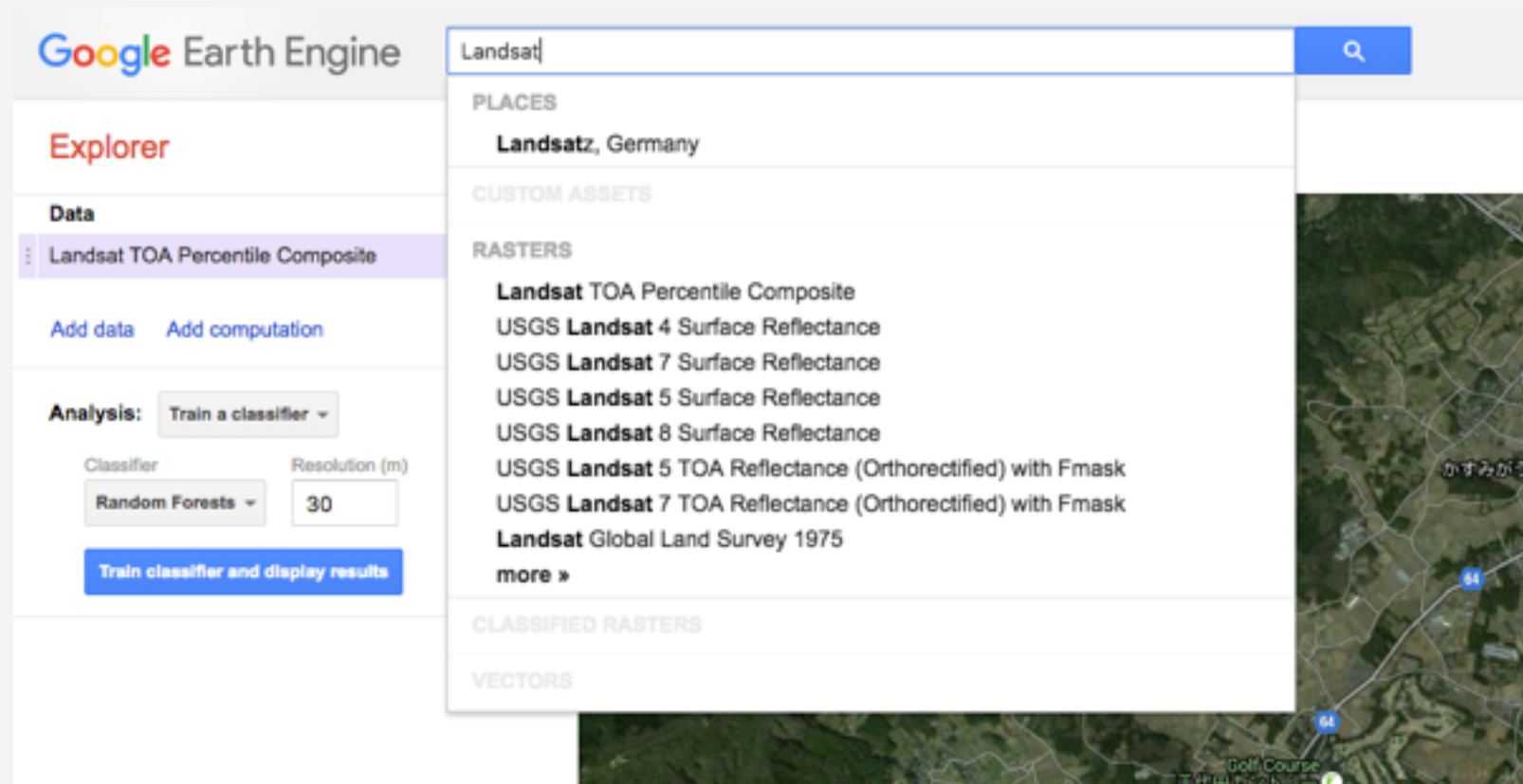
Before

After

https://developers.google.com/earth-engine/landsat
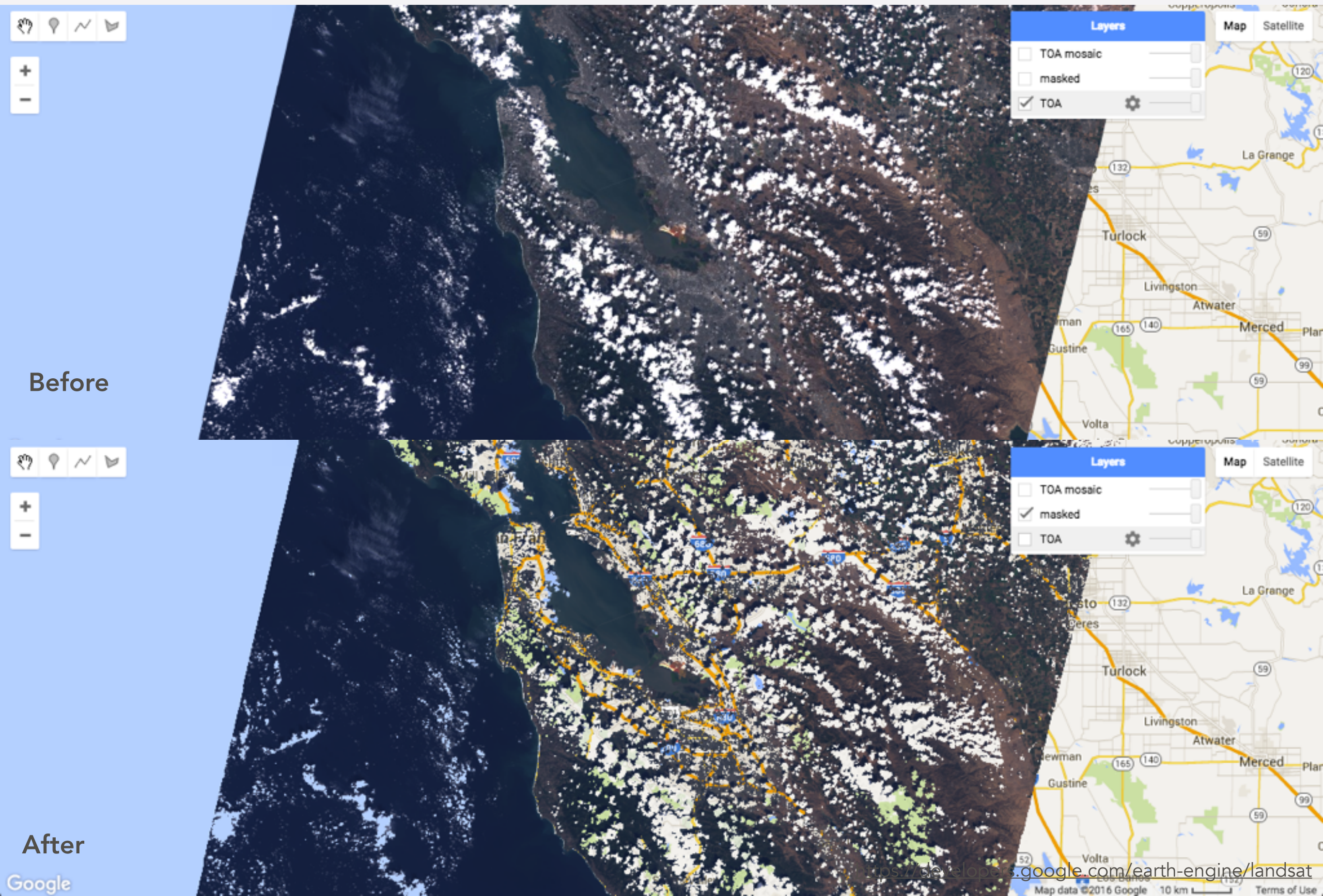
Case 1 | Visualizing Images and Image Bands
(image regions charts)

The following example illustrates this method by getting image spectra from three land cover types at locations in Mexico
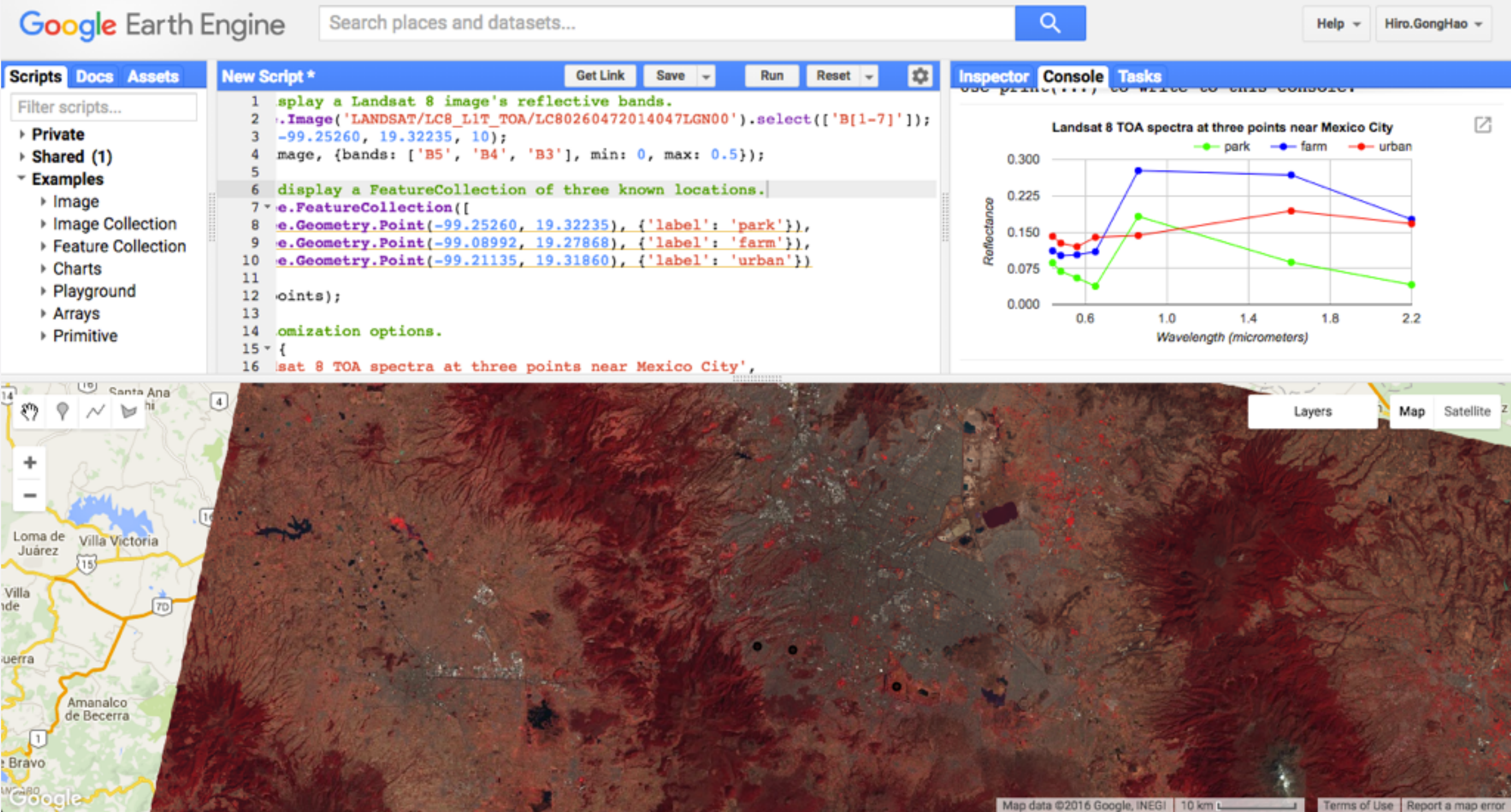
Case 2 | Statistics of Image Neighborhoods (Code Editor)

Using National Agriculture Imagery Program (NAIP) imagery to quantify landscape differences resulting from logging in the California redwood forests.
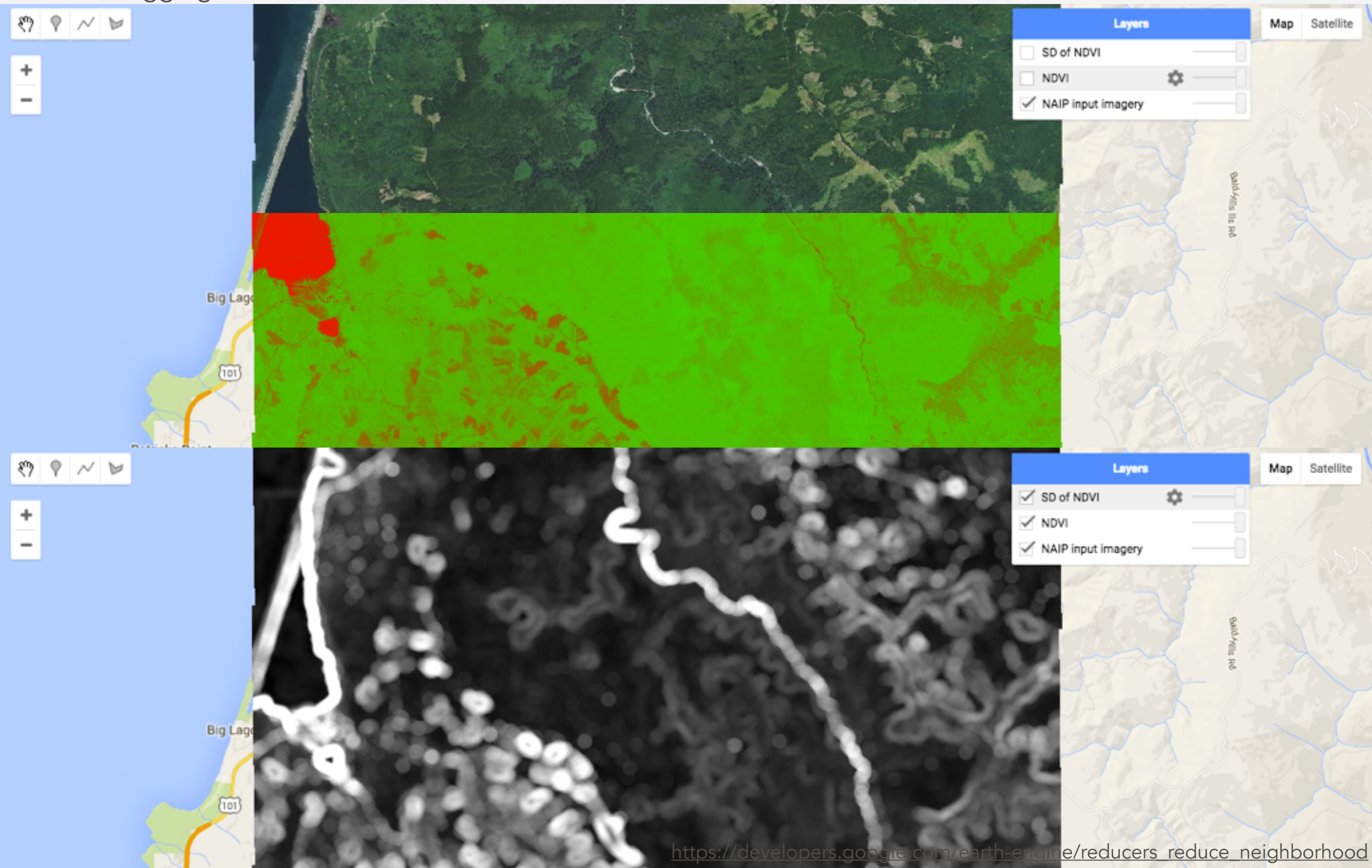
Case 3 | Vector to Raster Interpolation (Kriging)

The following example samples a sea surface temperature (SST) image at random locations, then interpolates SST from the sample using Kriging.
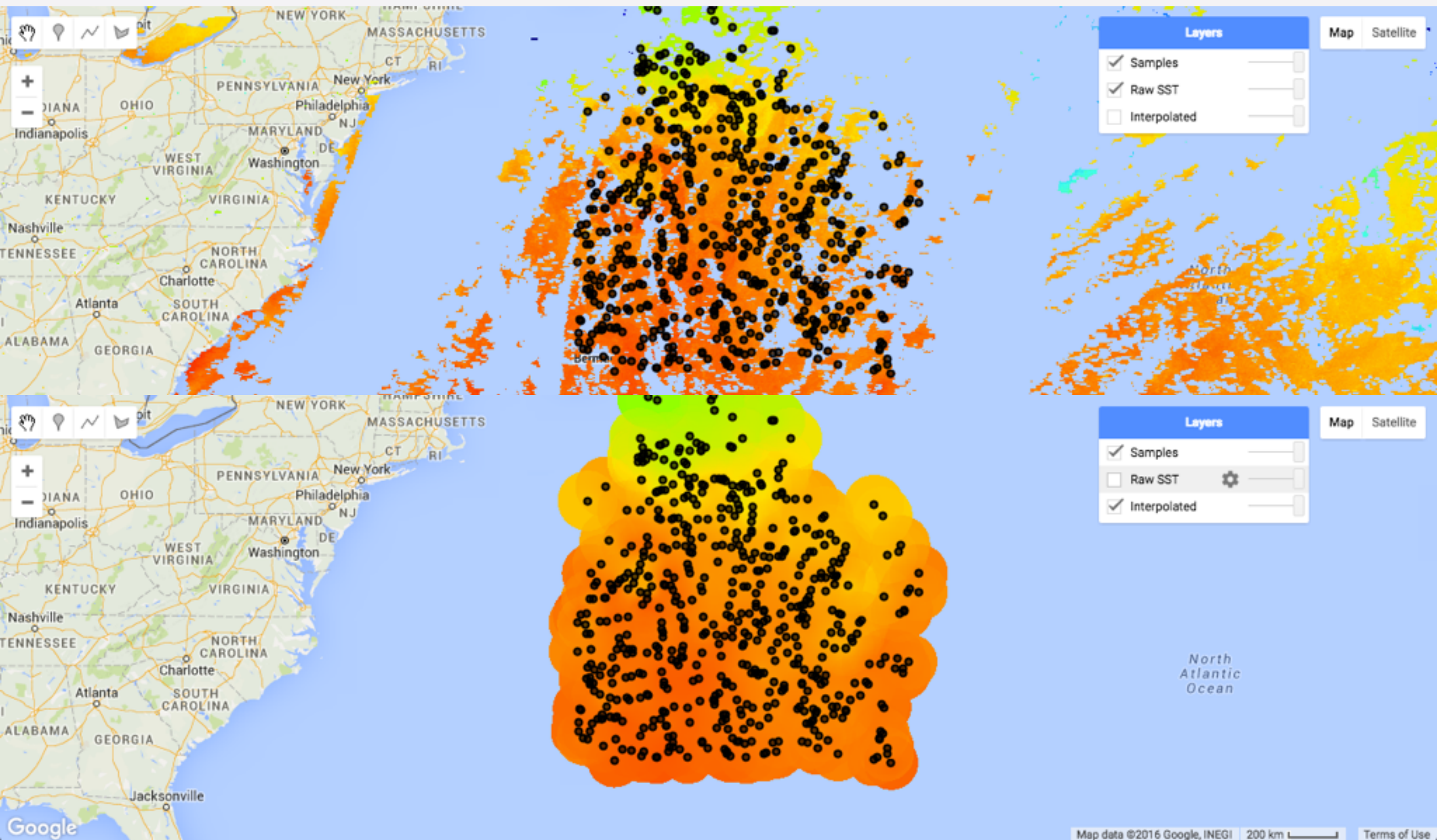
Case 4 | Raster to Vector Conversion (Code Editor)

Night-lights digital number serve as a proxy for development intensity of Japan, 2012

Case 5 | Supervised Classification (Explorer)

Case 5 | Supervised Classification (Code Editor)

Case 6 | Importing Raster/Vector Data, Exporting Data

Importing raster data (<10 GB)
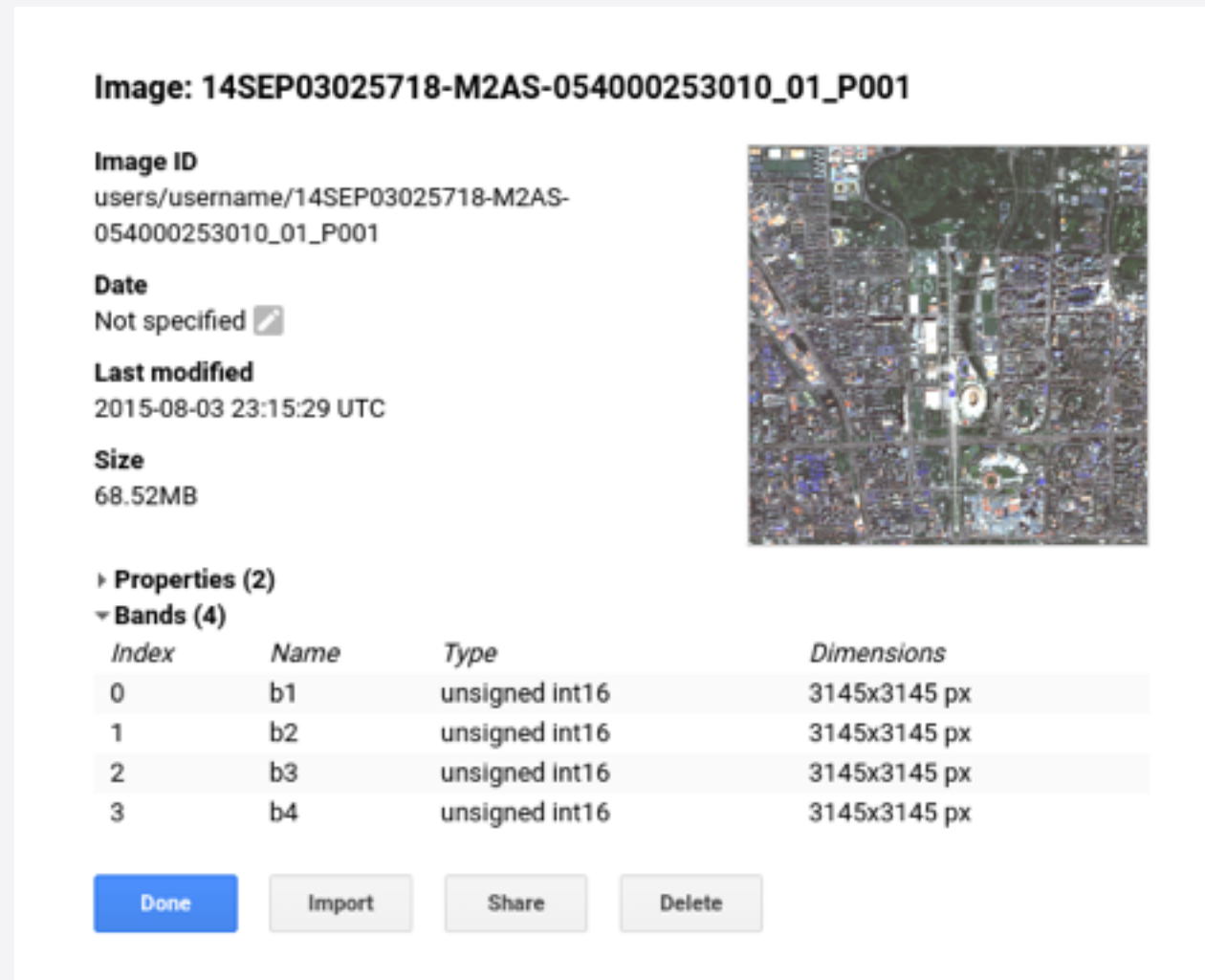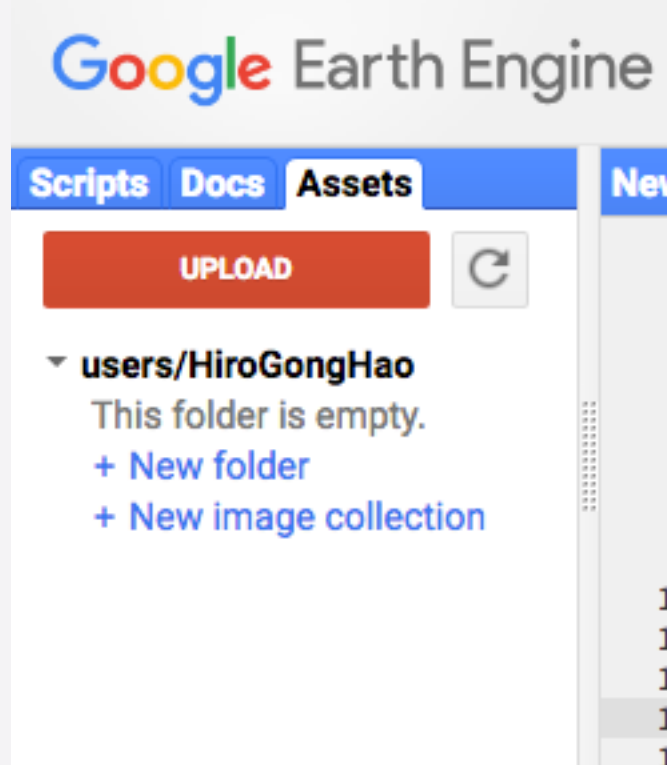
Importing vector data

Google Fusion Tables

```
// Load a Fusion Table from the ID using the FeatureCollection constructor.
var fc = ee.FeatureCollection('ft:11SfWB6oBS1iWGiQxEOqF_wUgBJL7Bux-pWU-mqd5');
```

Exporting data

The exports can be sent to your Google Drive account or to Google Cloud Storage.

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A planetary-scale platform
for Earth science data &
analysis
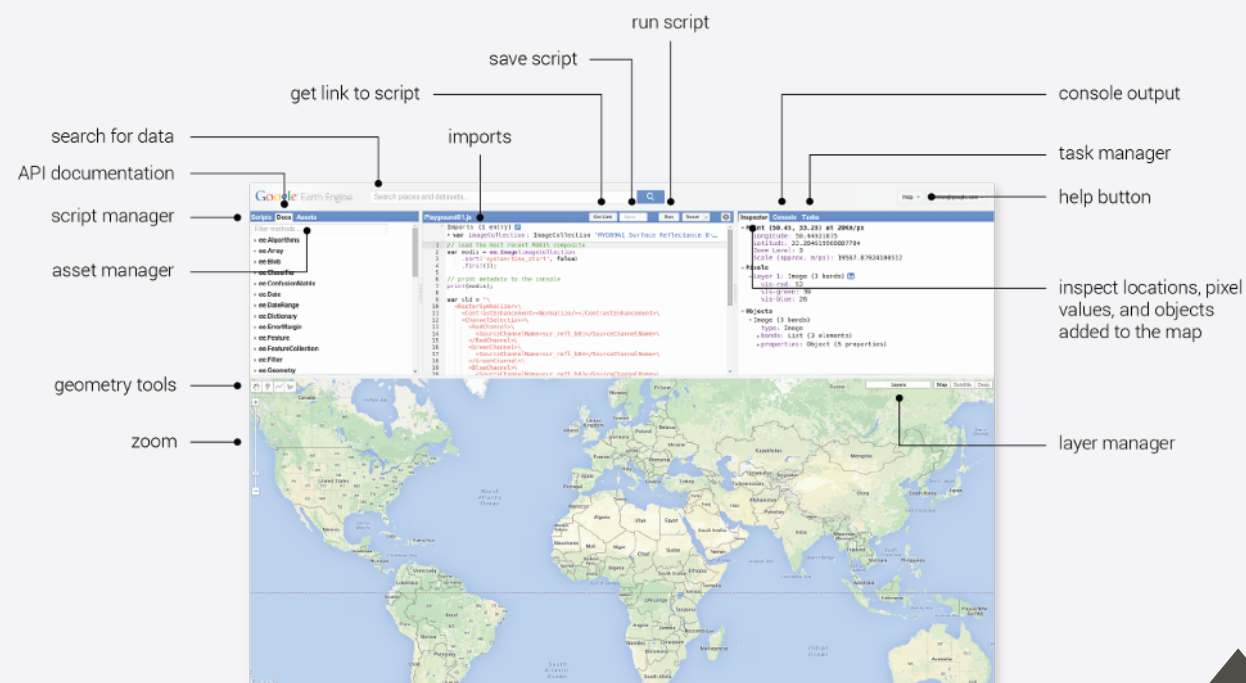
Powered by Google's cloud infrastructure

▶ WATCH VIDEO

GET STARTED
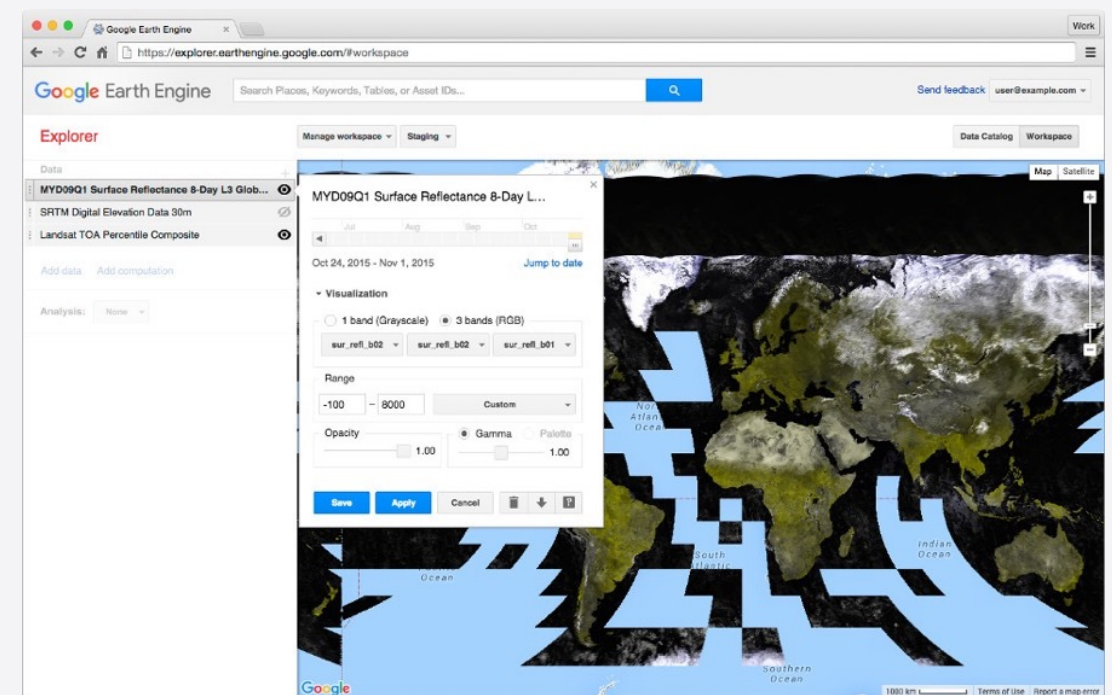
https://earthengine.google.com/

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EXPLORER

a simple web interface to the Earth Engine API
https://explorer.earthengine.google.com/#workspace

CASE STUDIES

Case 1 | Global Forest Cover Change

Case 2 | Map Of Life
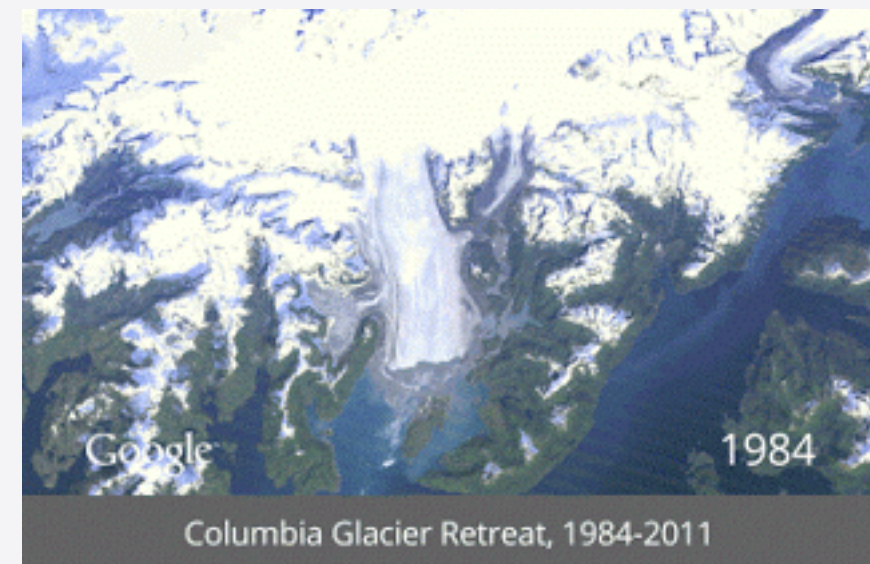
Case 3 | Global Forest Watch

Case 4 | Tiger Habitat Monitoring

Case 5 | Malaria Risk Mapping

Case 6 | Global Surface Water

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Las Vegas Urban Growth, 1986-2012

Brazilian Amazon Deforestation, 1984-2012

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Google Earth Engine