National Aeronautics and Space Administration

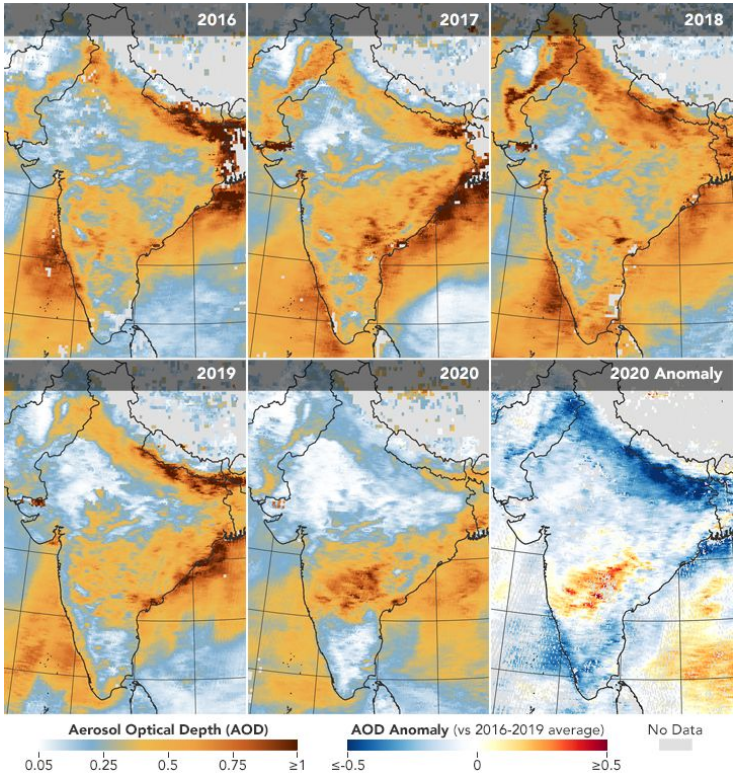


# EXPLORE EARTH

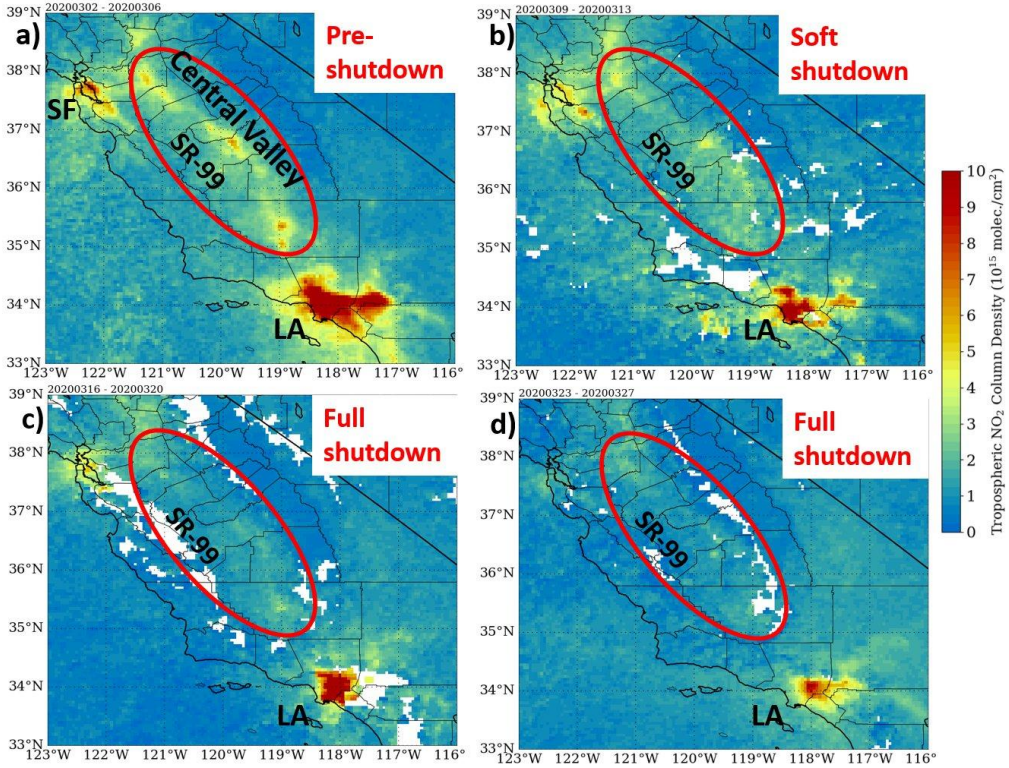
**Betzy Hernandez Sandoval**
**Emil Cherrington**

**October, 2020**

# Using satellite data to evaluate the response to COVID-19

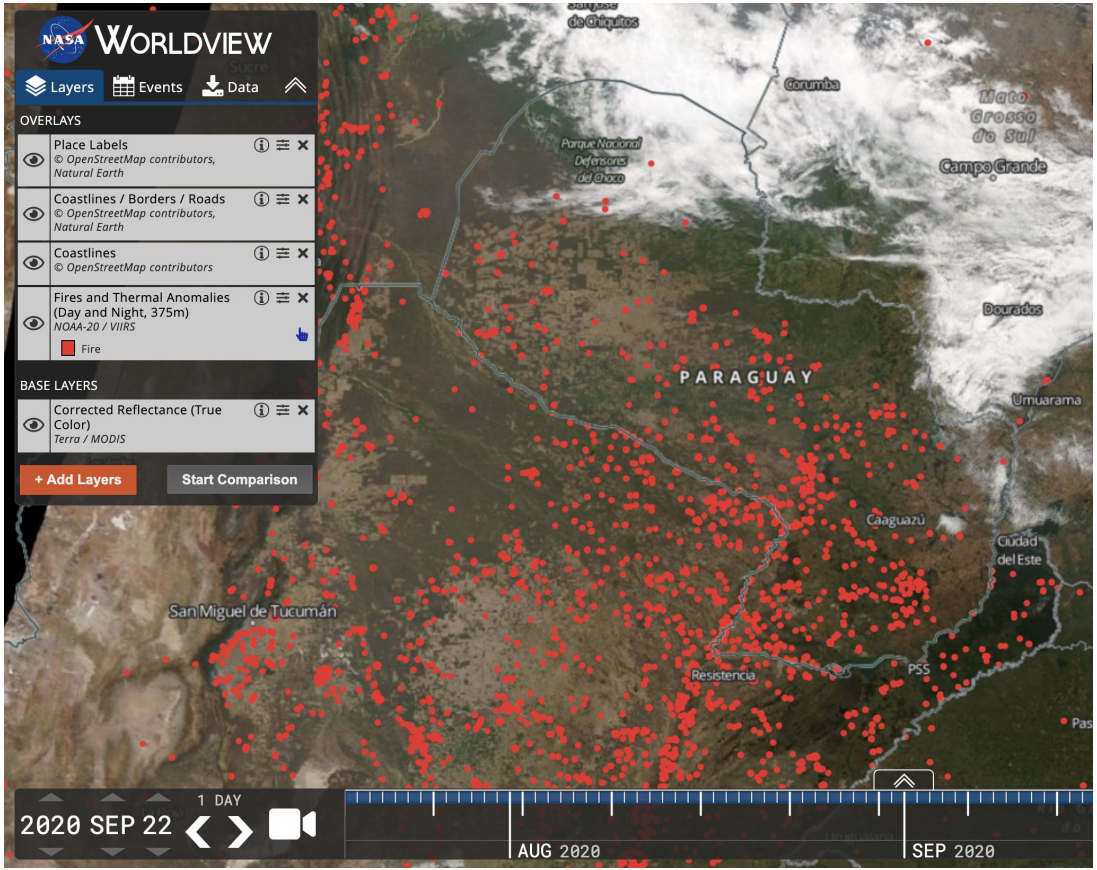



Source: Pawan P. Gupta / NASA




Source: NASA SPoRT

# Paraguay in the time of COVID-19




Source: NASA/EOSDIS

# Satellite images available for the region

# Open access satellite data for urban monitoring

| Satélites | Sensores | Resolution |
|---|---|---|
| Landsat 7 | Enhanced Thematic Mapper+ (ETM+) | swath of 185 km; 15 m, 30 m, 60 m; revisit: 16 days |
| Landsat 8 | Operational Land Imager (OLI) | swath of 185 km; 15 m, 30 m, 60 m; revisit: 16 days |
| Terra & Aqua | MODerate Resolution Imaging Spectroradiometer (MODIS) | swath of 2330 km; 250 m, 500 m, 1 km; revisit: 1-2 days |
| Suomi NPP & JPSS-1 | Visible Infrared Imaging Radiometer Suite (VIIRS) | swath of 3040 km; 375 m – 750 m; revisit: 1-2 days |
| Sentinel 2A & 2B | Multi Spectral Imager (MSI) | swath of 290 km; 10 m, 20 m, 60 m; revisit: 5 days |
| Sentinel 3A & 3B | Ocean and Land Color Instrument (OLCI) | swath of 1270 km; 300 m; revisit: 27 days |

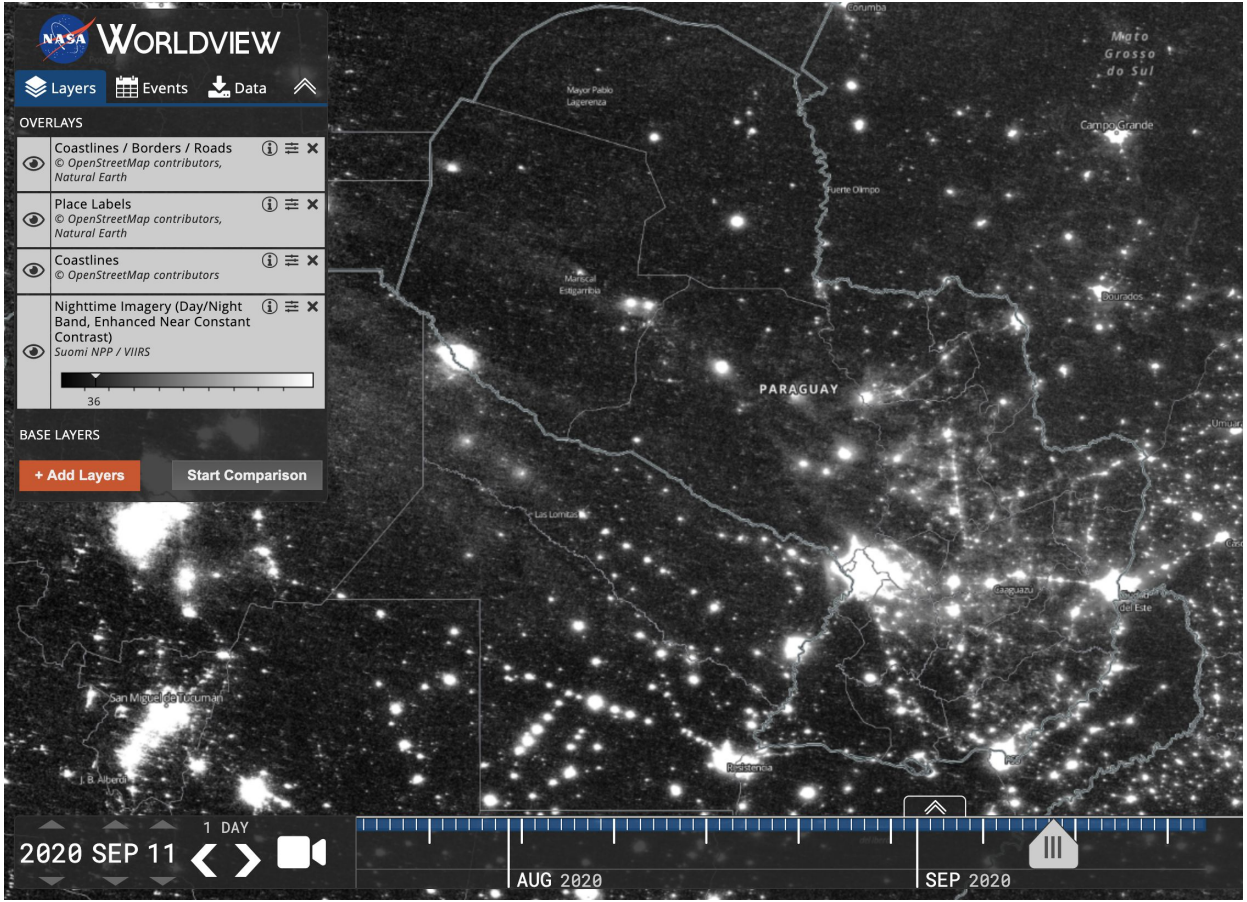
Source: NASA's Applied Remote Sensing Training Program

# https://worldview.earthdata.nasa.gov



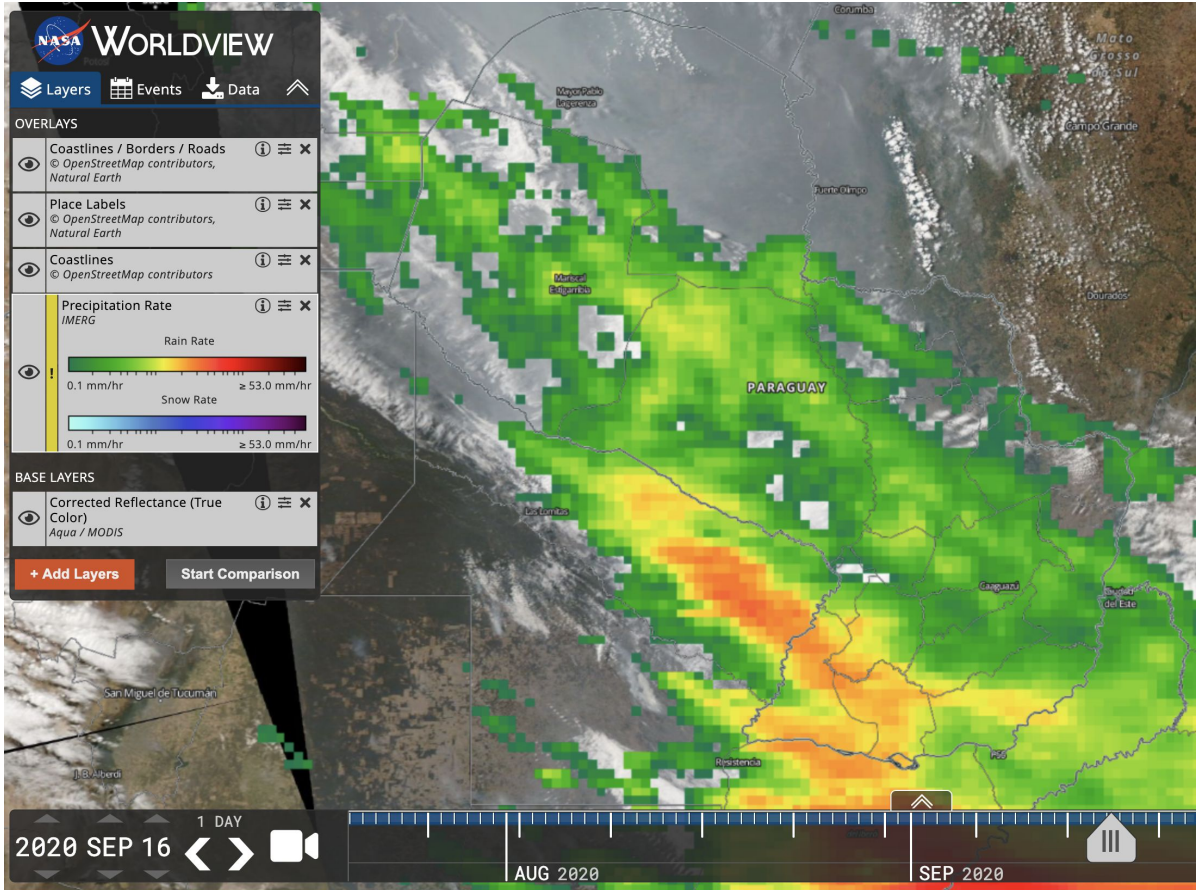

Source: NASA/EOSDIS

# https://worldview.earthdata.nasa.gov



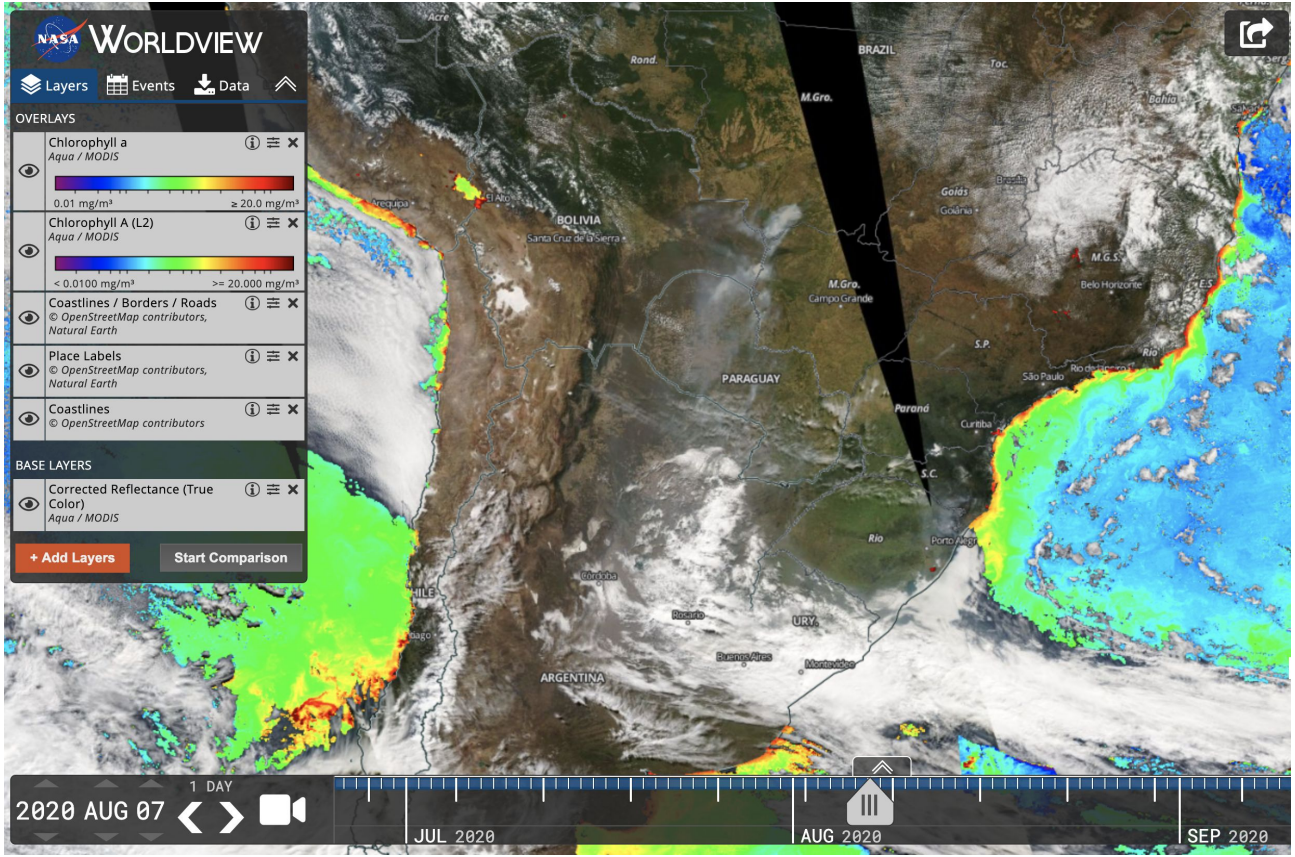

Source: NASA/EOSDIS

# https://worldview.earthdata.nasa.gov



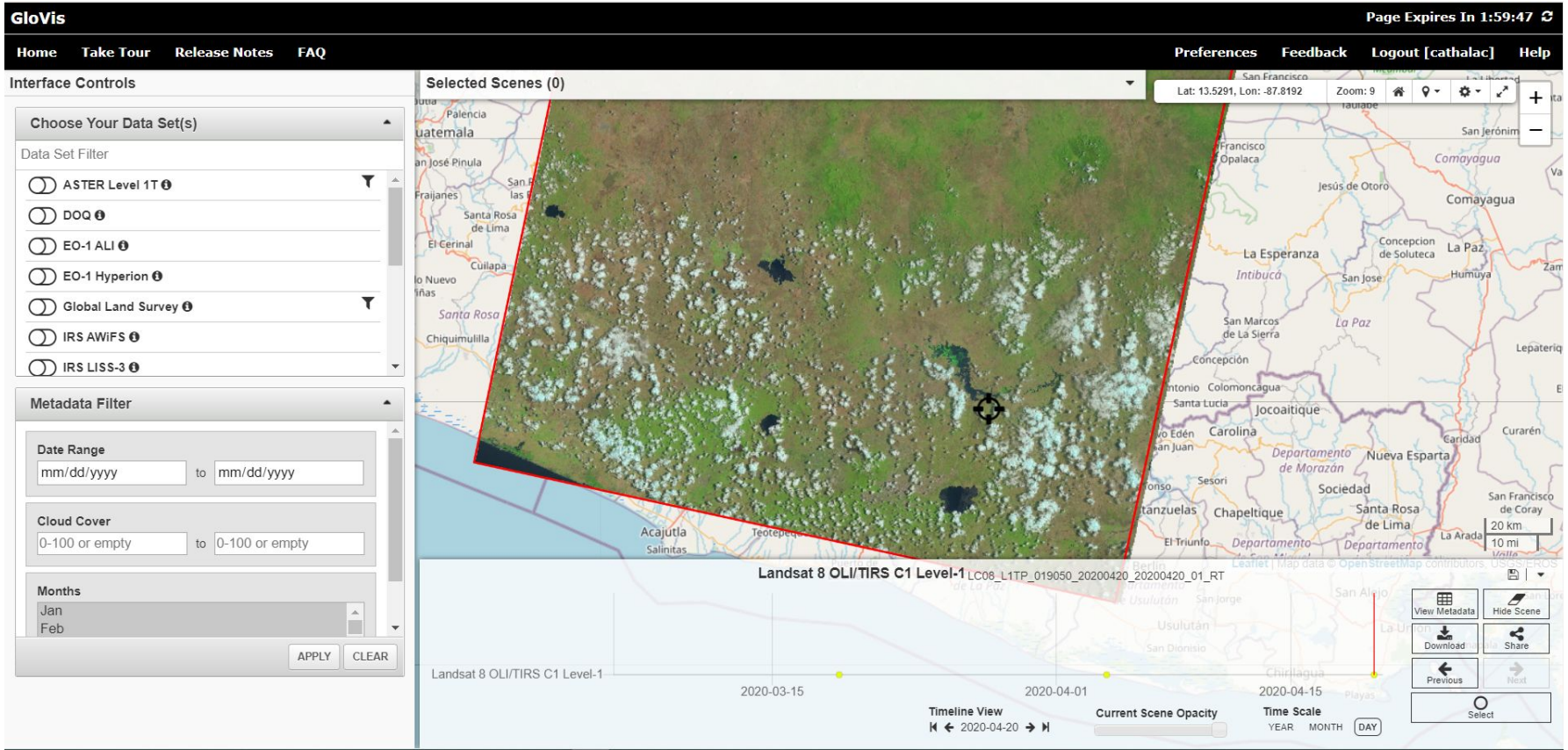

Source NASA/EOSDIS

# https://worldview.earthdata.nasa.gov



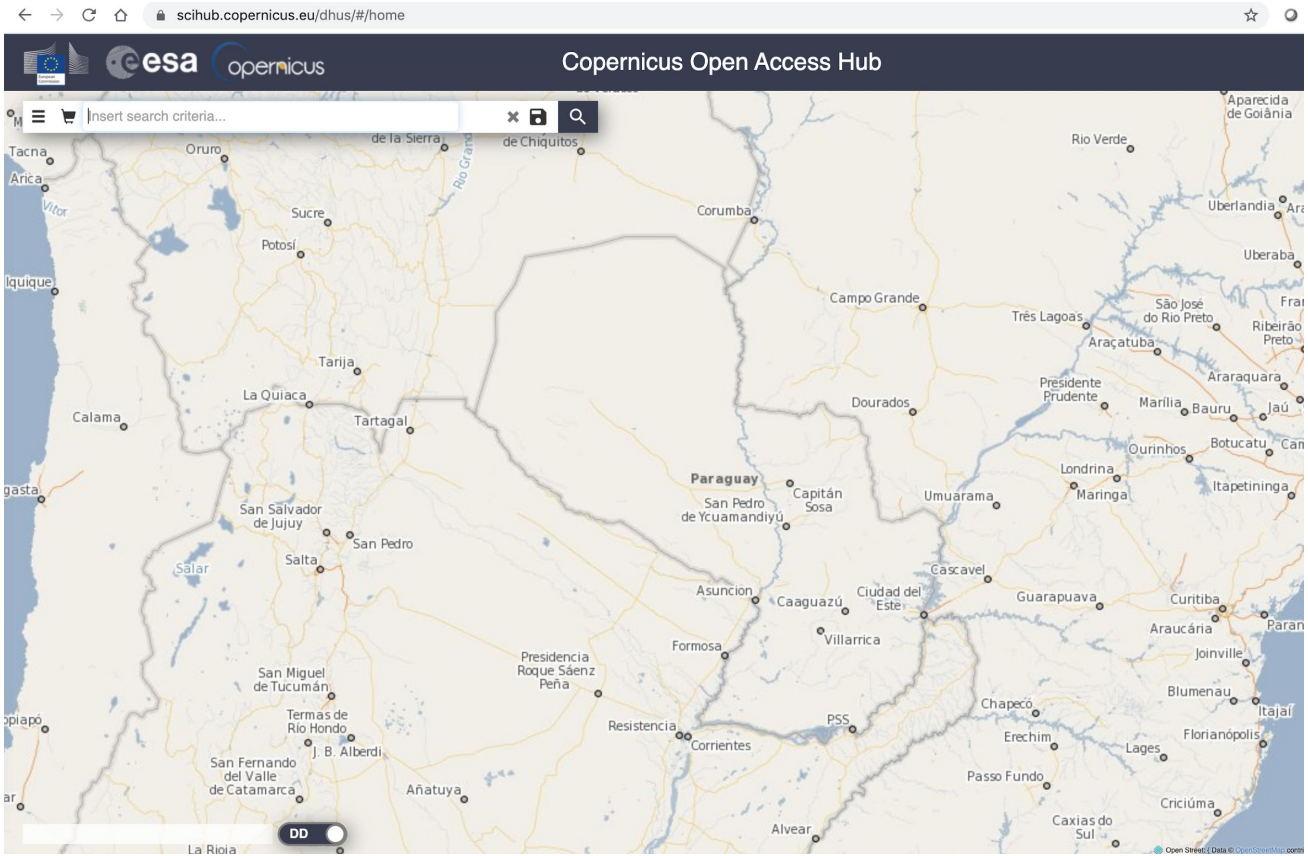

Source: NASA/EOSDIS

# https://glovis.usgs.gov



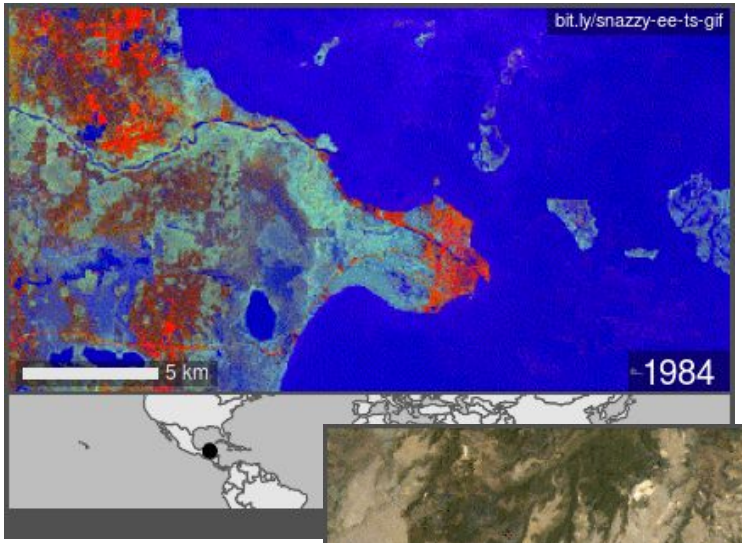

Source: USGS

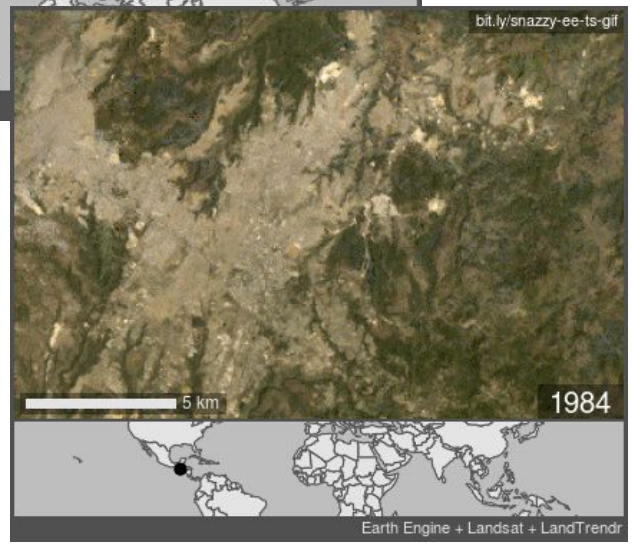
# https://scihub.copernicus.eu/dhus/#/home

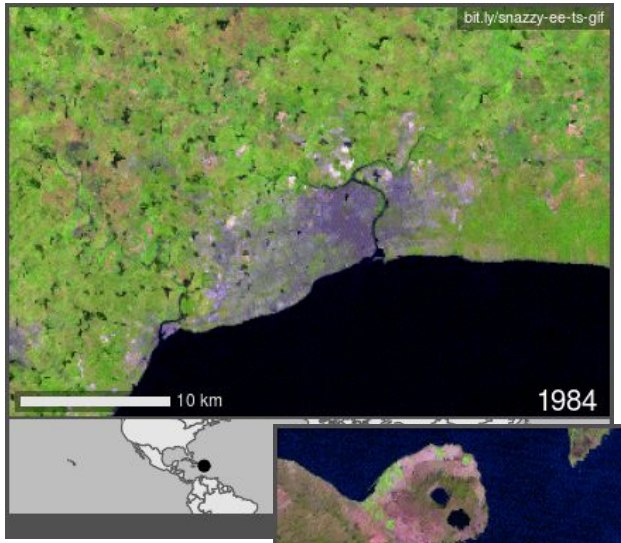


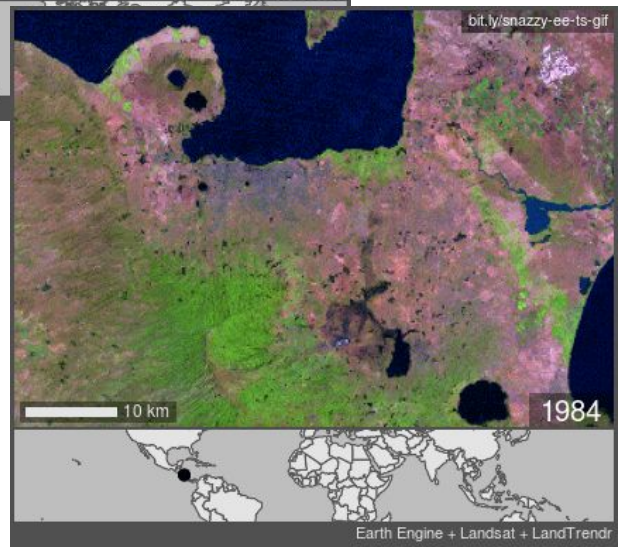

Source: Copernicus

# Examples of satellite data analyses



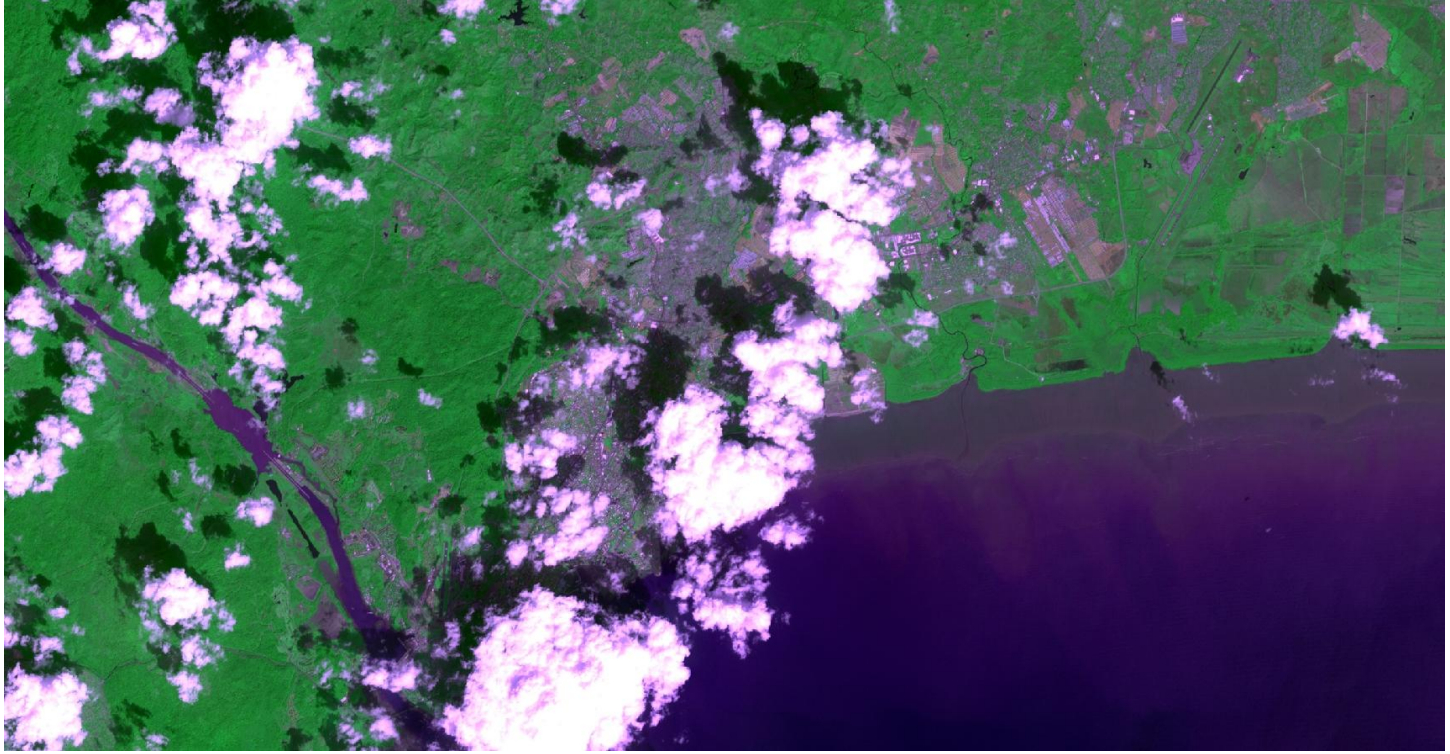




Source: NASA/Landsat

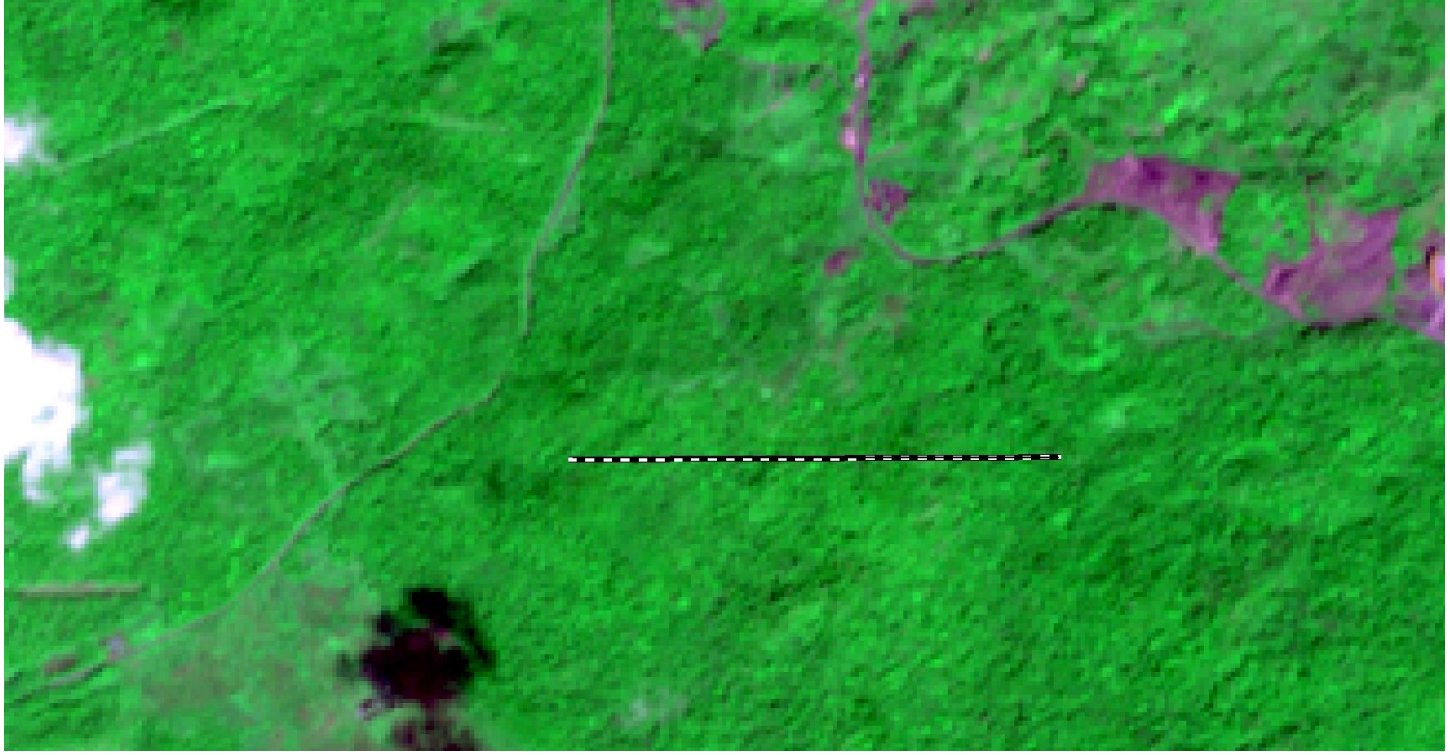
# Characteristics identified via satellite image processing

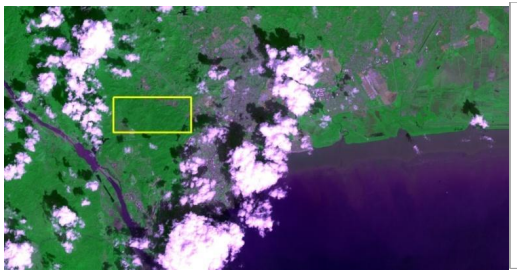
- Road networks (type of asphalt), access roads (emergency response)
- Built-up areas (population density)
- Roof type (census, to identify possible disease-affected areas)
- Green areas (urban heat island effect, higher energy use for air conditioning)
- Water body status (flood exposure areas)

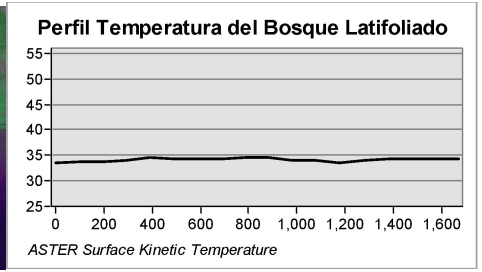



# Surface temperature: Panama City, 2002 (NASA / ASTER)

Source: NASA/ASTER



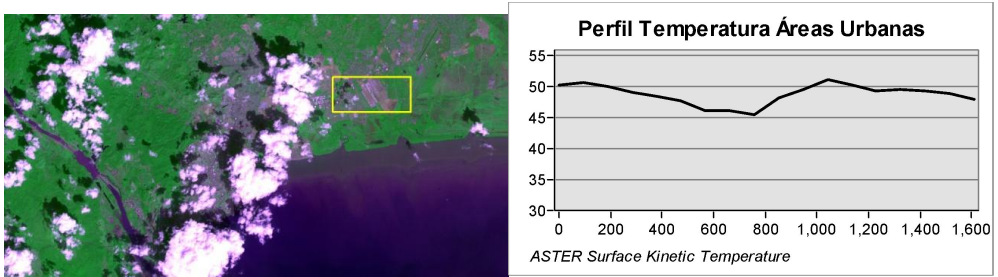





# Surface temperature: Broadleaf forest, 2002 (NASA / ASTER)

Source: NASA/ASTER

- **Urban Heat Island Effect** -higher electricity consumption for cooling




Surface temperature: urban area, 2002 (NASA / ASTER)

Source: NASA/ASTER

# Tools

# Demo

COLLECT EARTH ONLINE

*https://collect.earth*



openforis

Food and Agriculture Organization of the United Nations

Spatial Informatics Group

SERVIR | CIAT | RCMRD | ICIMOD | adpc

# Collect Earth Online (CEO) - to collect baseline Cal / Val data for land cover mapping



CEO interface; available through FAO Open Foris

"This innovation allows the collection of up-to-date data about our environment and its changes in a more efficient and participatory manner, using the local experts that know the landscape and the underlying ecology"

*– Mette Wilki, head of Policy and Resources at FAO's Forestry Division*

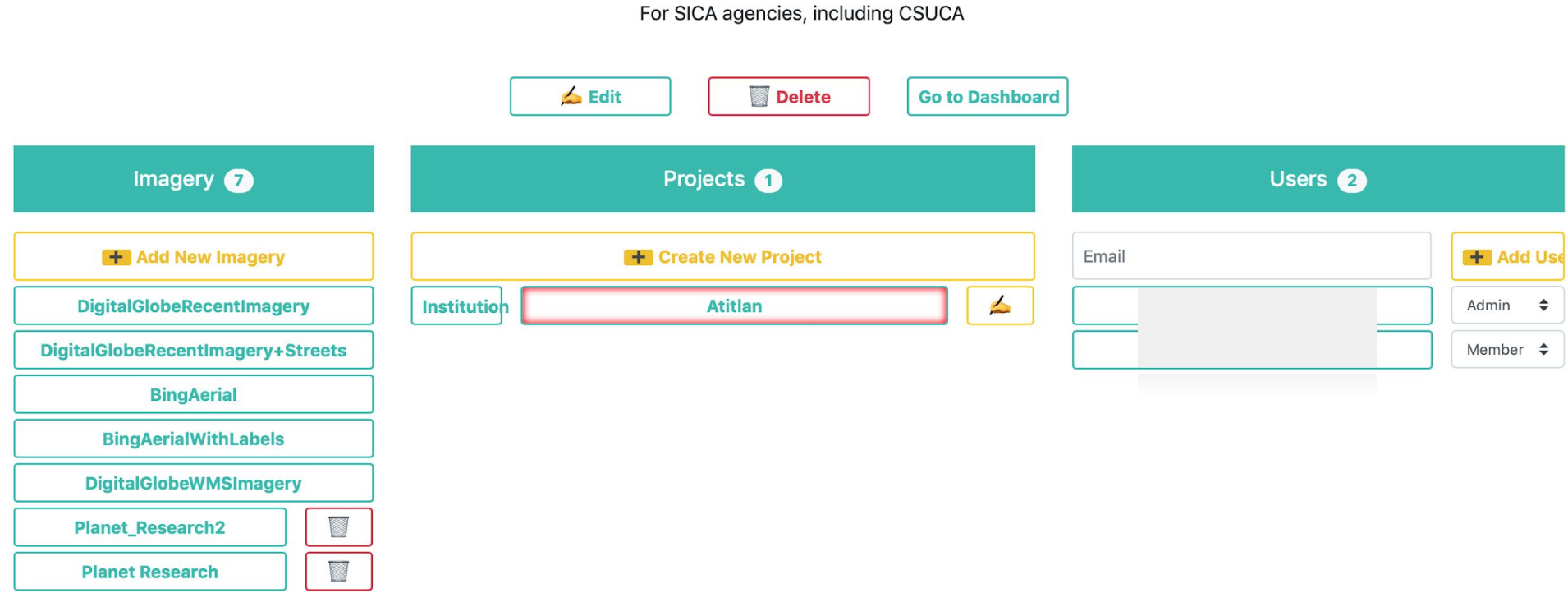
Source: NASA/SERVIR

**https://collect.earth/**

CEO is an open access platform, which uses satellite data to rapidly generate baseline data (in situ) for cal / val of land use / cover analysis.
The Food and Agriculture Organization of the United Nations (FAO) will use CEOs for its 2020 Global Forest Resources Assessment, which will be conducted in 190 countries. The first CEO use will occur in India in March 2019.

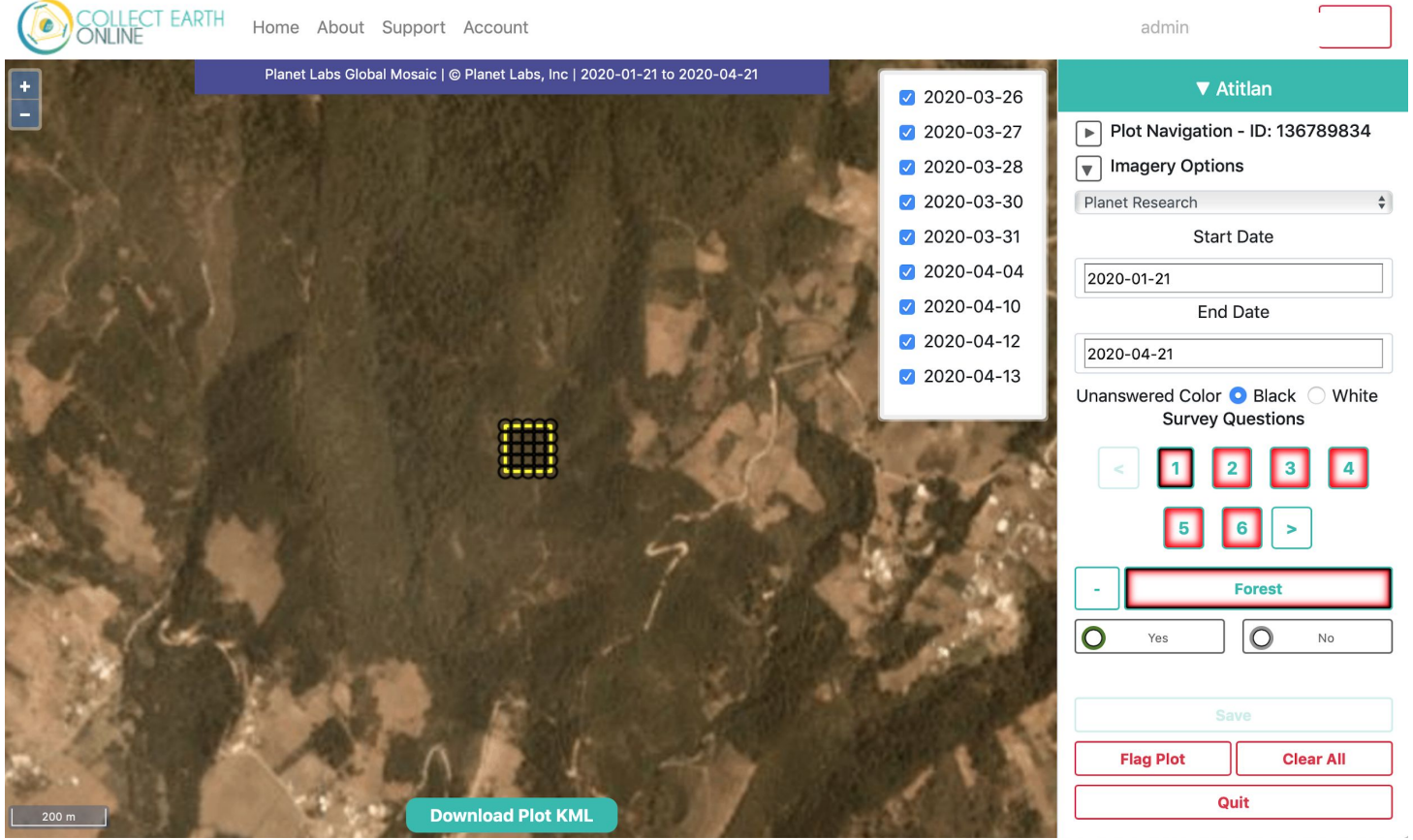
CEO offers a paradigm shift from current methods. Users generate baseline data through online analysis of satellite measurements, significantly reducing the requirement to collect data in the field.
CEO was developed by SERVIR in collaboration with FAO, the Google Earth Engine Team and the SIlvaCarbon program of the US government.

# Using Planet data in CEO




Source: NASA/SERVIR

# Using Planet data in CEO



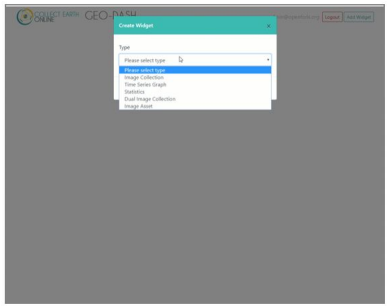

Source: NASA/SERVIR

# 3) Create New Project/Configure Geo-Dash

## Geo-Dash Help Center

- To add an Image Collection Widget: ▼
- To add a Time Series Graph Widget: ▼
- To add a Statistics Widget: ▼
- To add a Dual Image Collection Widget: ▼
- To add a Image Asset Widget: ▲

1. Click Add Widget
2. Select Image Asset in the type drop down
3. Choose Basemap source from dropdown
4. Give widget a title
5. Enter the GEE Image Asset - Example: users/billyz313/carbon_monoxide
6. Enter Image Parameters for asset - Example:

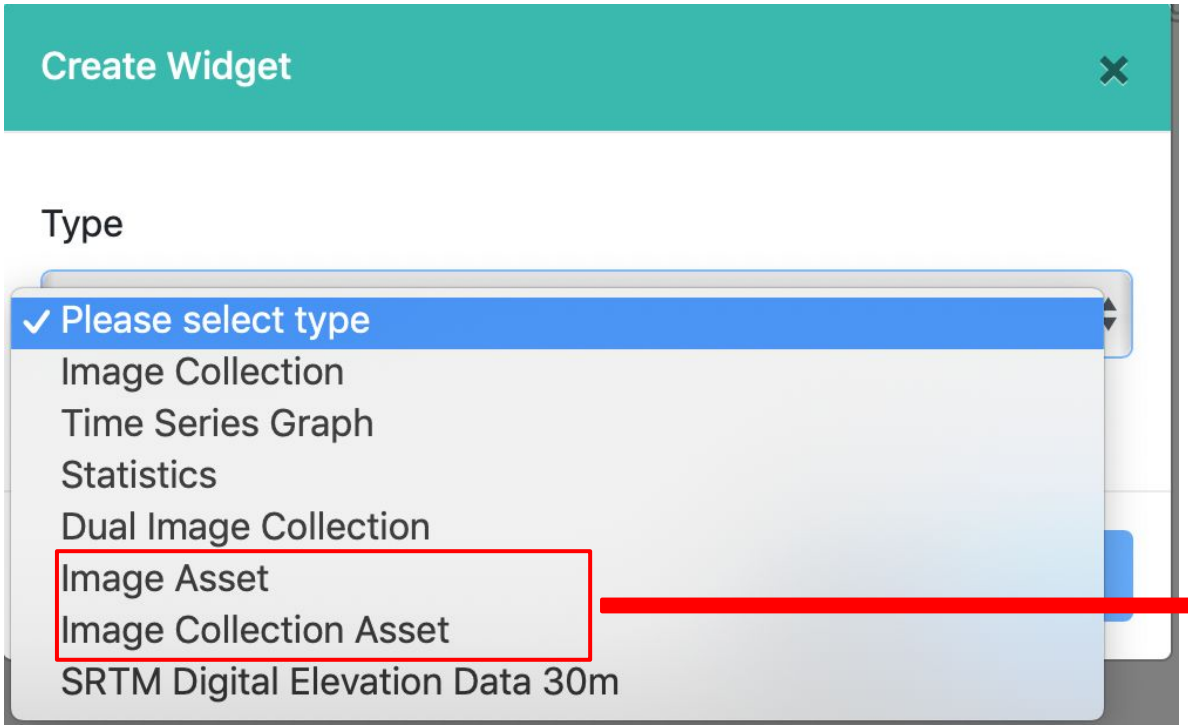


```
{"bands":"CO_column_number_density,H2O_column_number_density,cloud_height","min":"0","max":"0.5"}
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7. Click Create
8. Reposition and resize to your liking

Source: NASA/SERVIR

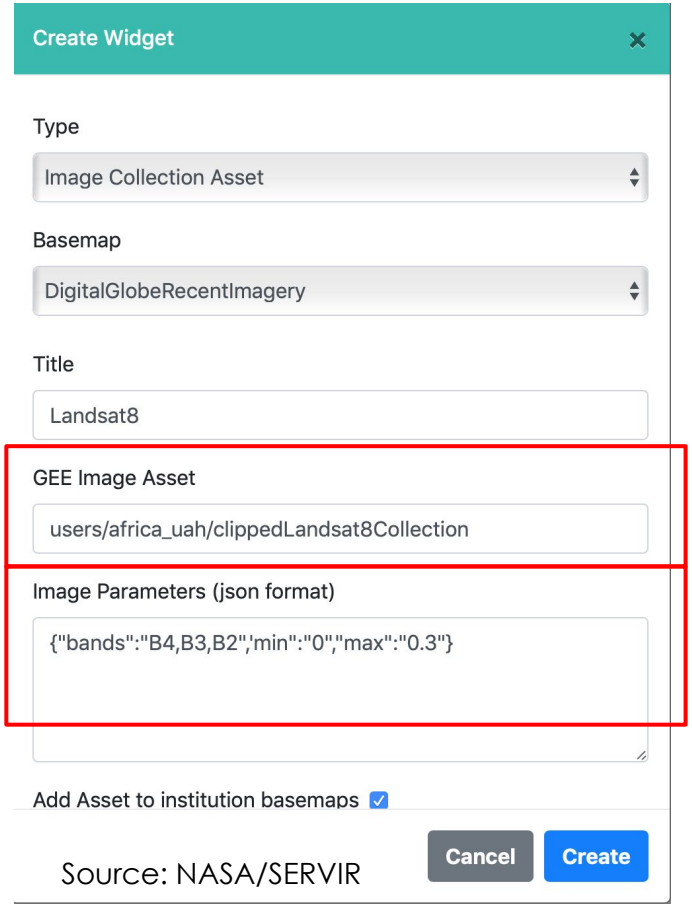
# 3) Create New Project/Configure Geo-Dash




To add data from GEE (also if you want to add it as basemap)

Source: NASA/SERVIR

# 3) Create New Project/Configure Geo-Dash




Source: NASA/SERVIR

**Add your own data as a basemap:**
**You can use this option**
**Use this option to add your own basemap (Landsat, Sentinel-2 (any data in GEE) or from your own acquisition (if not API from commercial provider)**

User defines this

GEE script example to create Image Assets in GEE:

NDVI:
https://github.com/SERVIR/gee-scripts/blob/master/GEE_NDVI_Clip_to_plot_Collection.js#L6

Landsat8:
https://code.earthengine.google.com/10948 5ad0712818dba270b767efbc540

# Additional resources

- NASA EOSDIS WorldView: https://worldview.earthdata.nasa.gov
- USGS Glovis: https://glovis.usgs.gov
- Copernicus hub: https://scihub.copernicus.eu/dhus/#/home
- DigitalGlobe Discover: https://discover.digitalglobe.com
- Planet Explorer: https://www.planet.com/explorer/
- Planet educational grants : http://go.planet.com/research