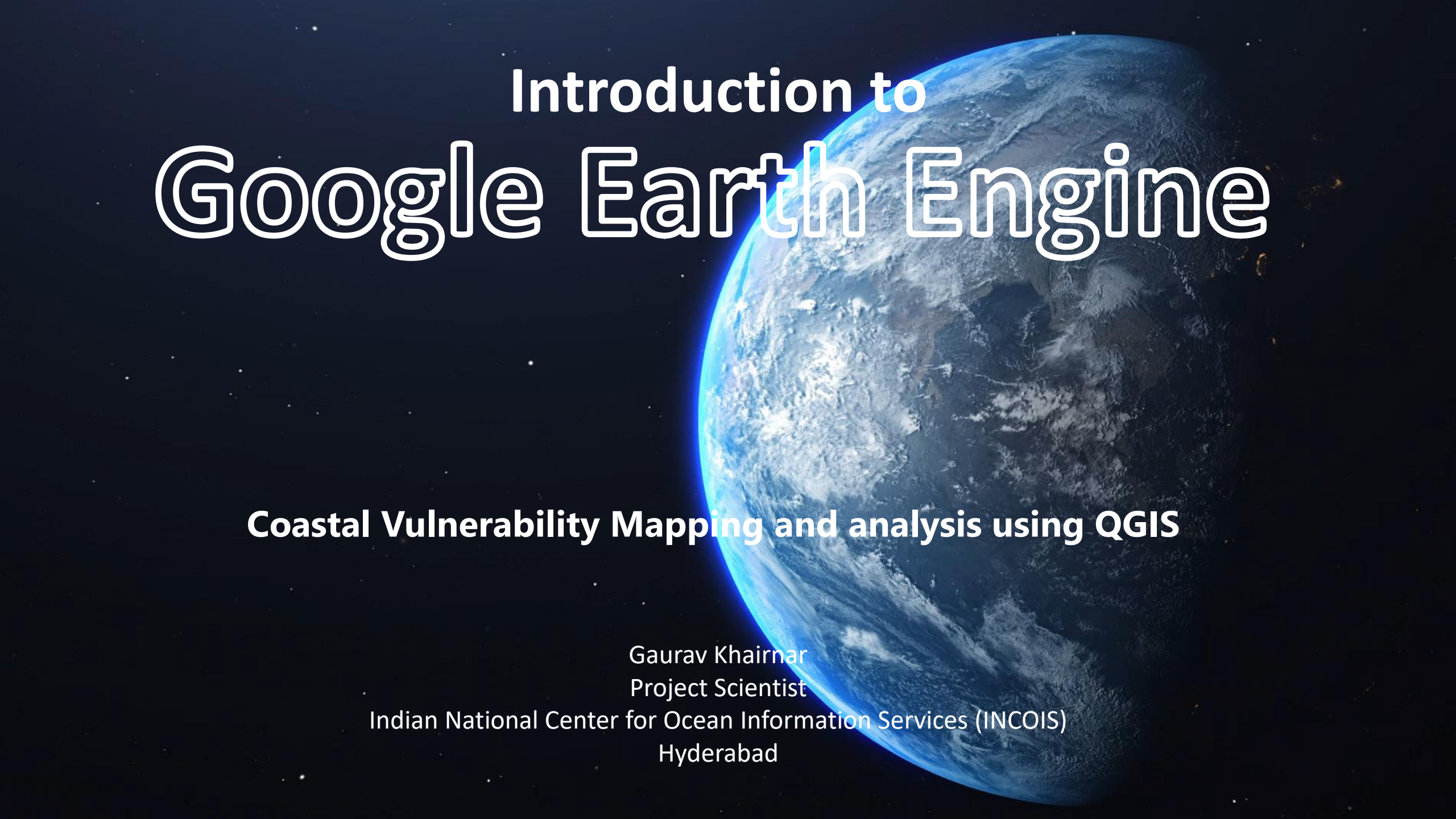




Introduction to Google Earth Engine

Coastal Vulnerability Mapping and analysis using QGIS

Gaurav Khairnar
Project Scientist
Indian National Center for Ocean Information Services (INCOIS)
Hyderabad

Outline

- Introduction
- Datasets and ImageCollections
- Working with Google Earth Engine
- Data management and analysis
- Importing and exporting data
- Python api
- QGIS

Introduction

- Google Earth Engine Cloud-based platform combines multi-petabyte catalog of satellite imagery and geospatial datasets with large-scale geospatial analysis
- Access over 40 plus years of data
- The Earth Engine API is available in Python and JavaScript, making it easy to harness the power of Google's cloud for your own geospatial analysis.
- No need of satellite data downloading, processing, storage...

Datasets on Google Earth Engine

Climate and Weather

- Surface Temperature
- Climate
- Atmospheric
- Weather

Imagery

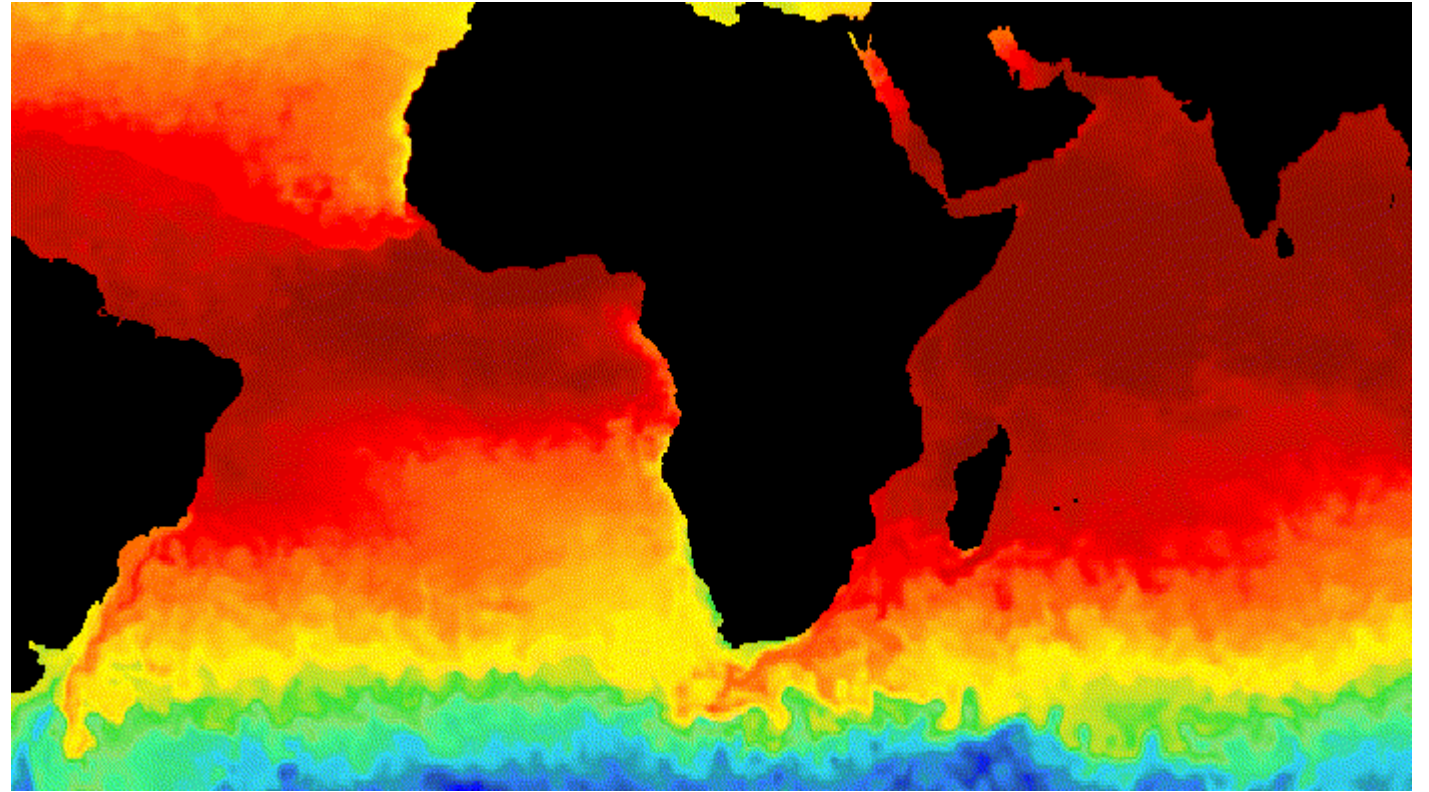
- Landsat
- Sentinel
- MODIS
- High Resolution Imagery

Geophysical

- Terrain
- Land Cover
- Cropland

Climate and Weather

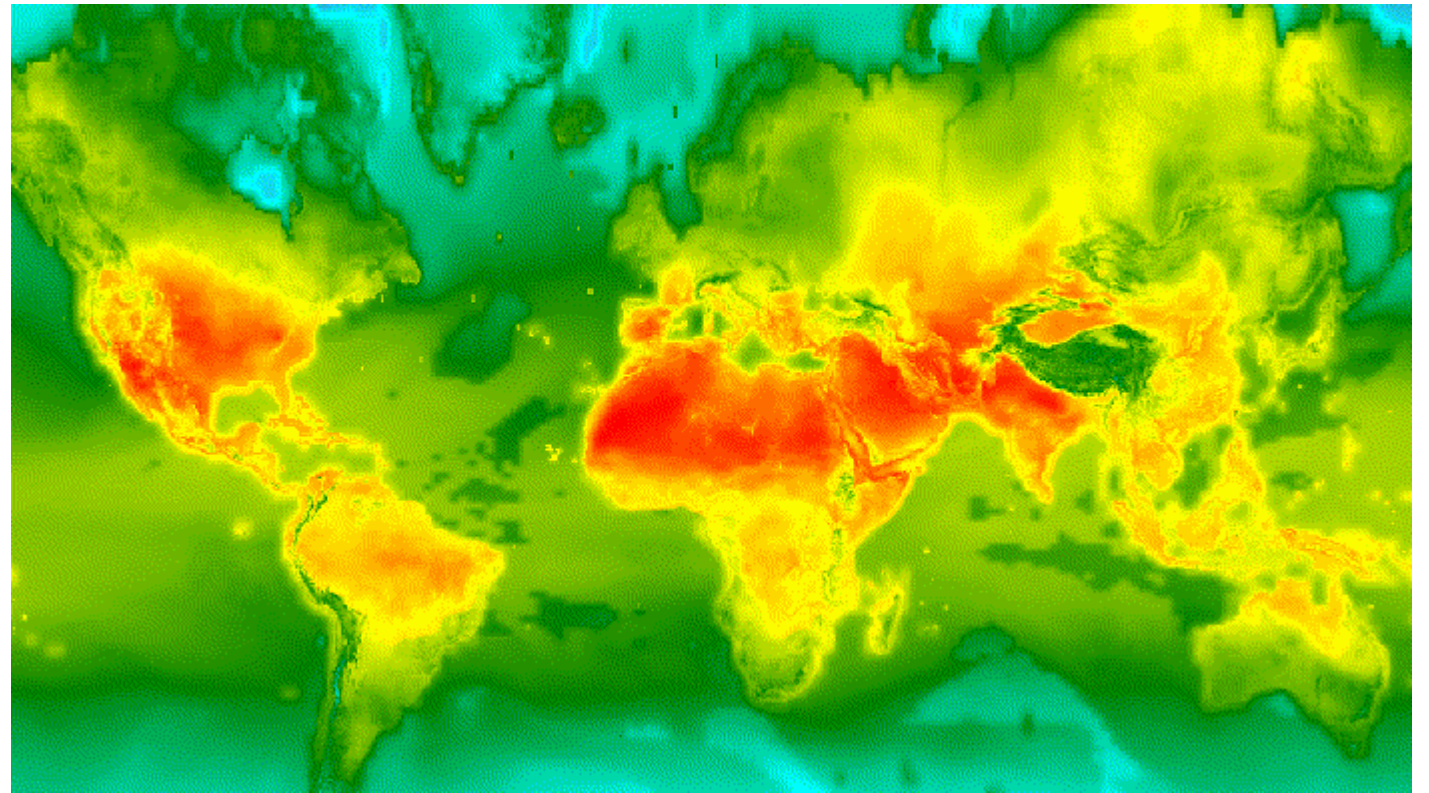
- Surface Temperature



- Standardised Precipitation-Evapotranspiration Index database
- Ocean Color SMI: Standard Mapped Image MODIS Aqua Data
- NOAA AVHRR Pathfinder Version 5.3 Collated Global 4km Sea Surface Temperature
- Day/Night Land Surface Temperature and Emissivity Daily 1km

Climate and Weather

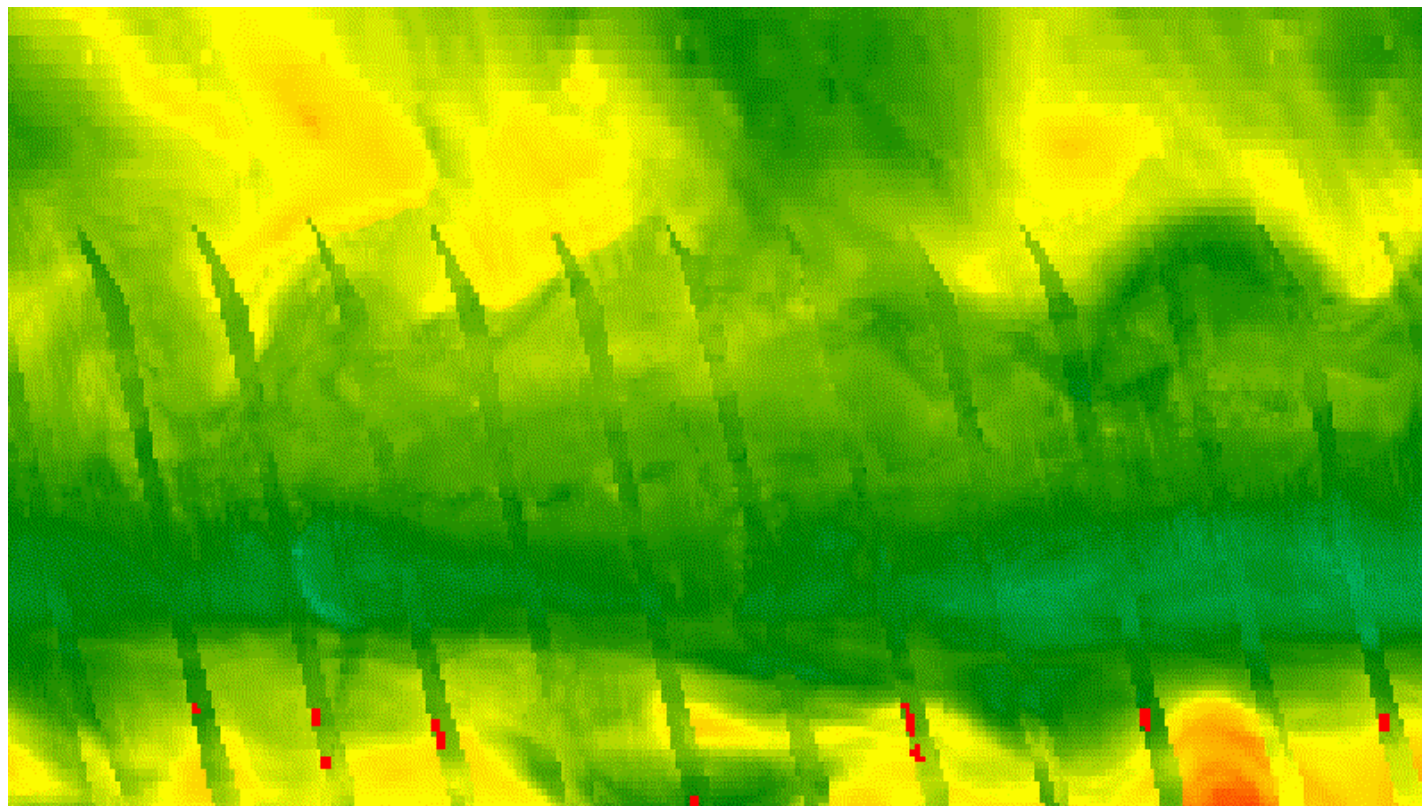
- Climate



- Sentinel5P : CH₄, NO₂, Cloud,
- SPEIbase: Standardised Precipitation-Evapotranspiration Index database
- Global Change Observation Mission's L3 Leaf Area Index (V1)

Climate and Weather

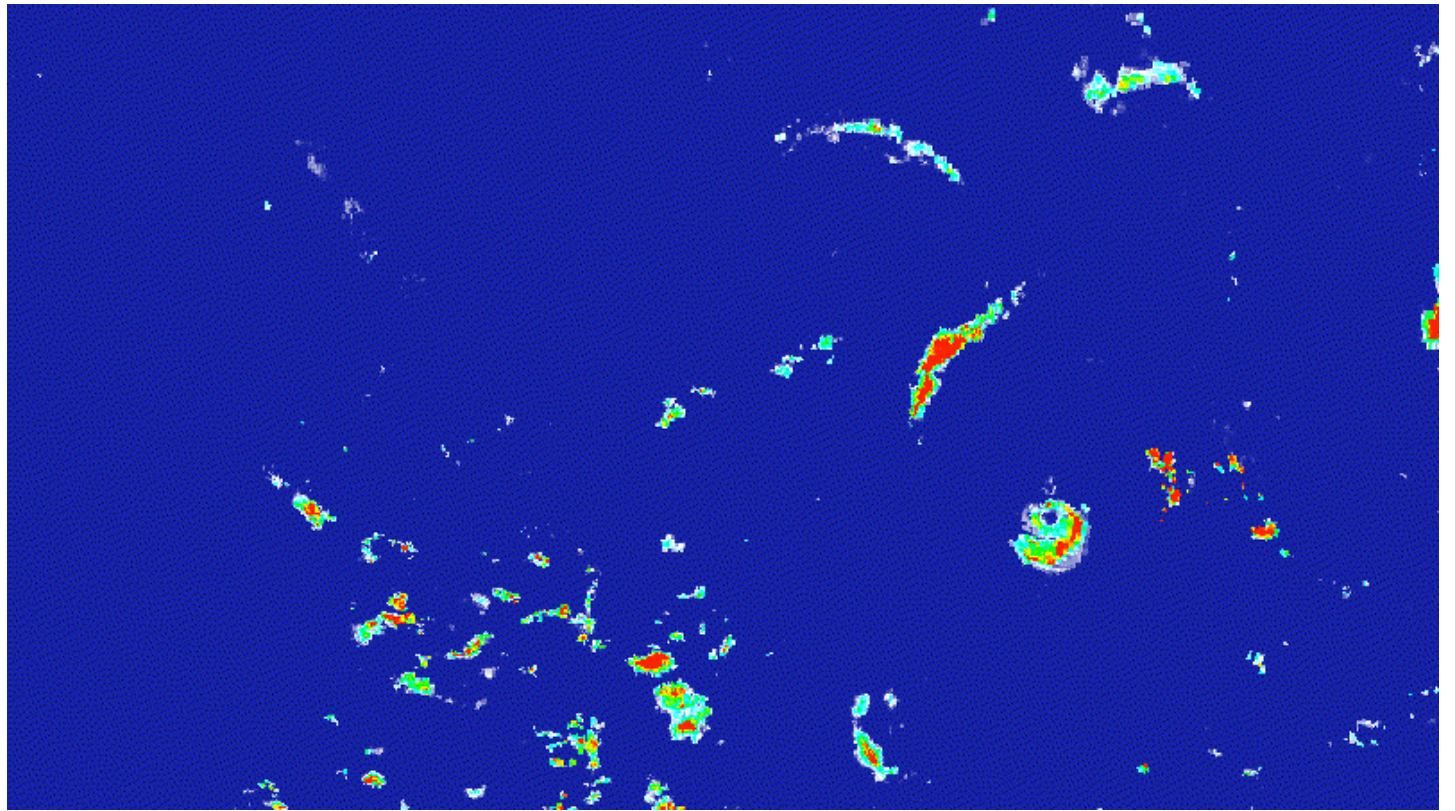
- Atmospheric



- Copernicus Atmosphere Monitoring Service (CAMS) Global Near-Real-Time
- TOMS and OMI Merged Ozone Data
- National Center for Atmospheric Research's Reanalysis Data, Water Vapor

Climate and Weather

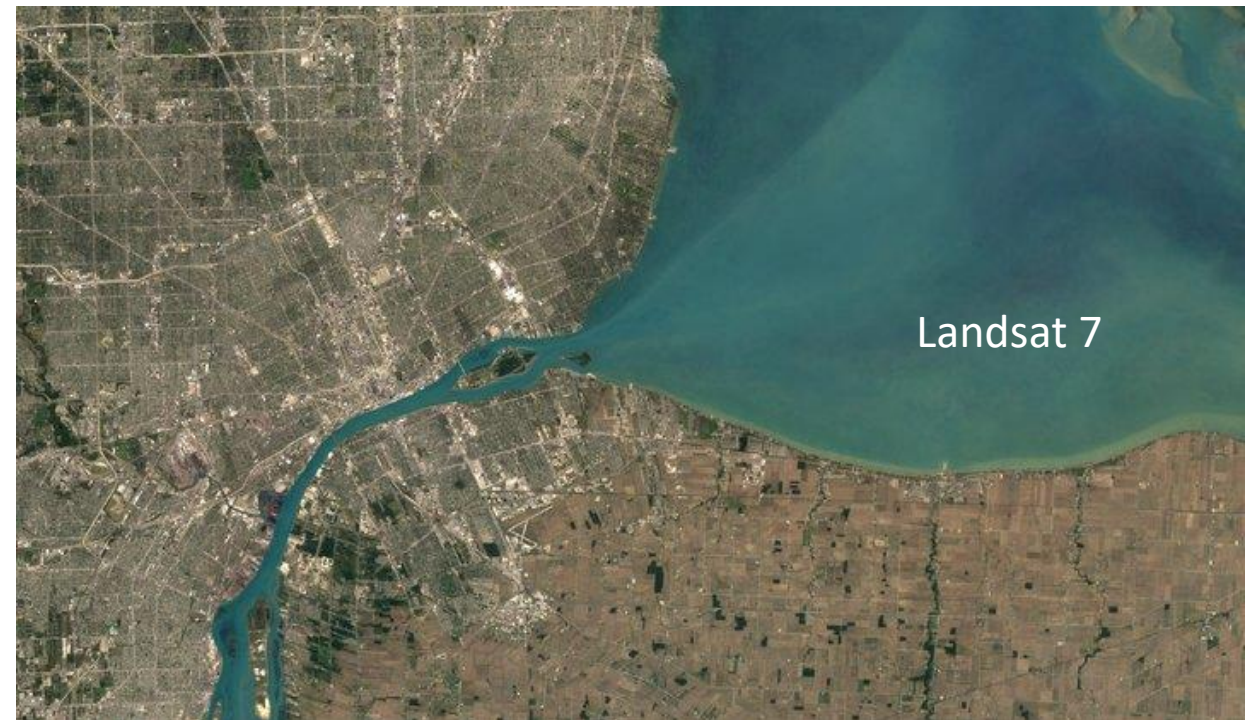
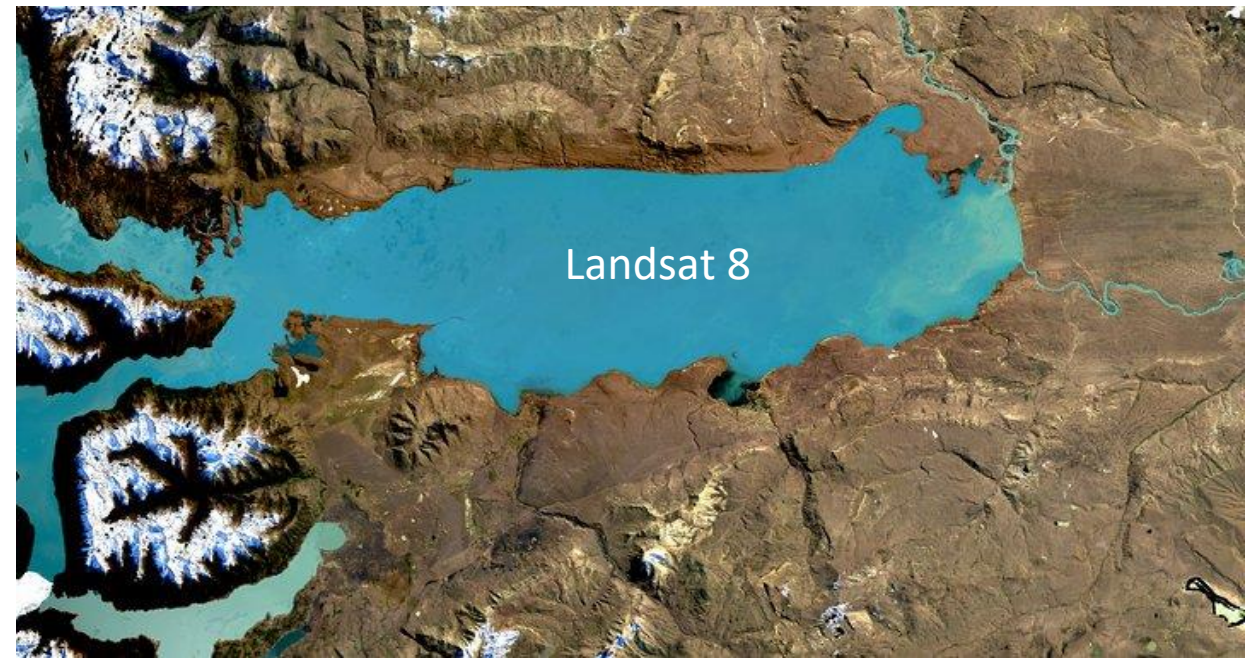
- Weather



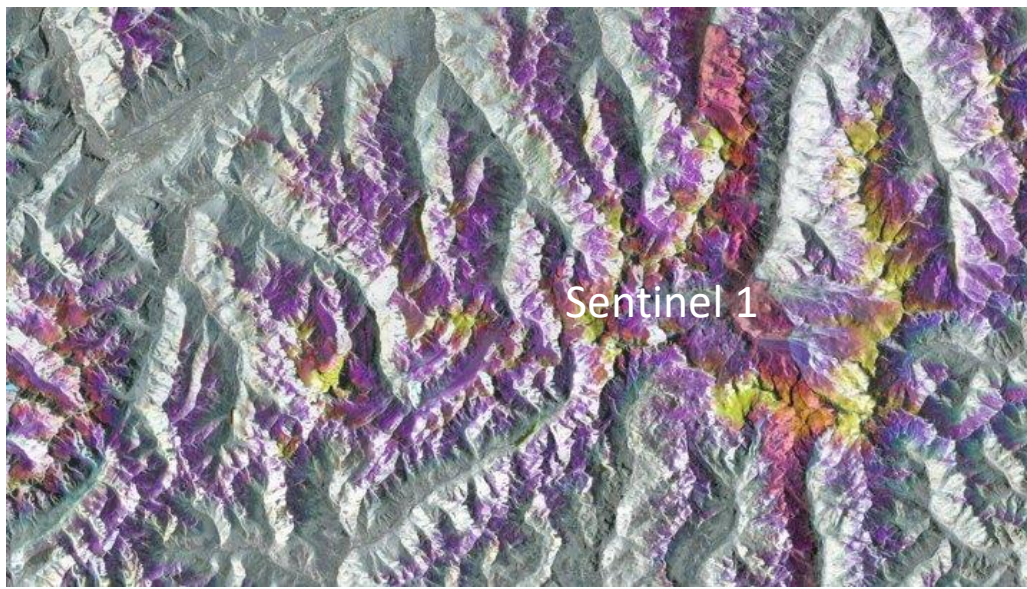
- SPL4SMGP.007 SMAP L4 Global 3-hourly 9-km Surface and Root Zone Soil Moisture

Imagery

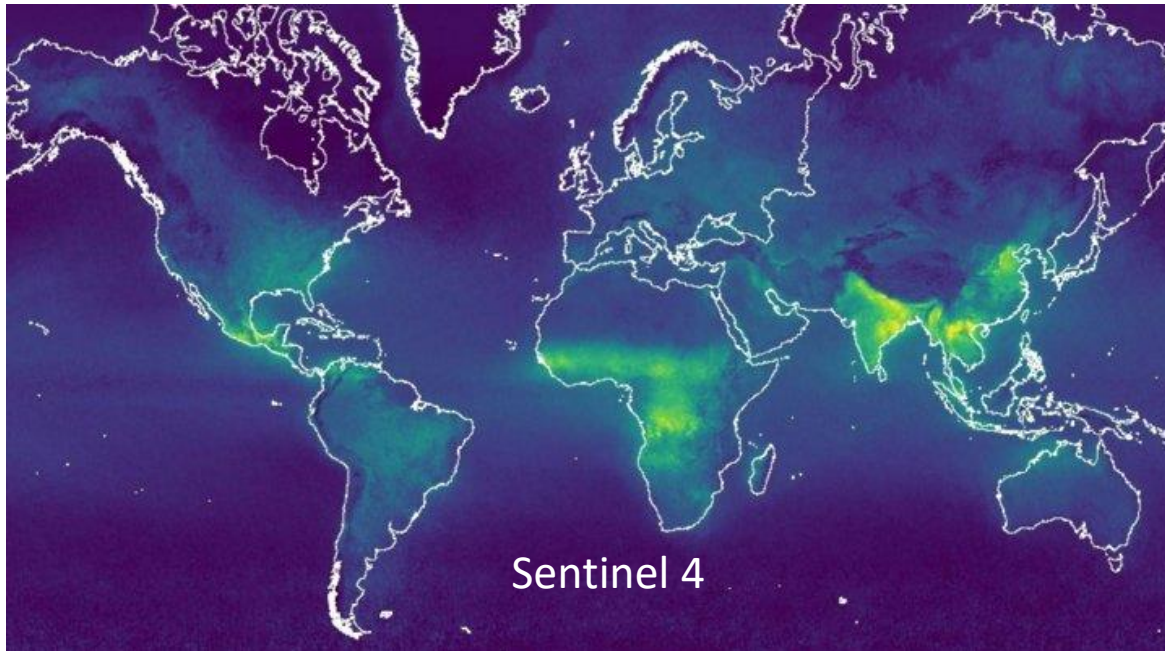
- Landsat



Imagery

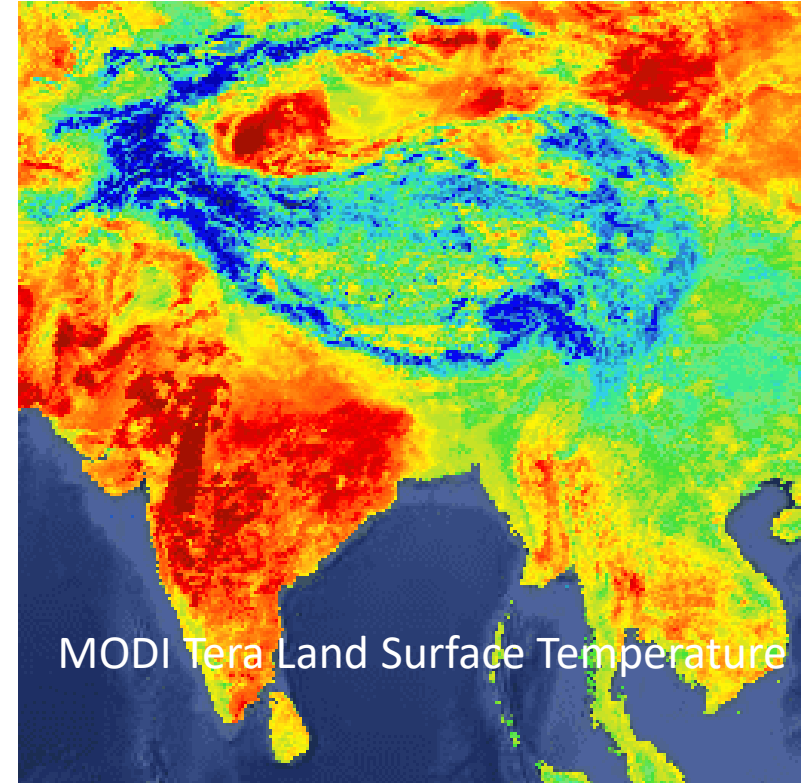
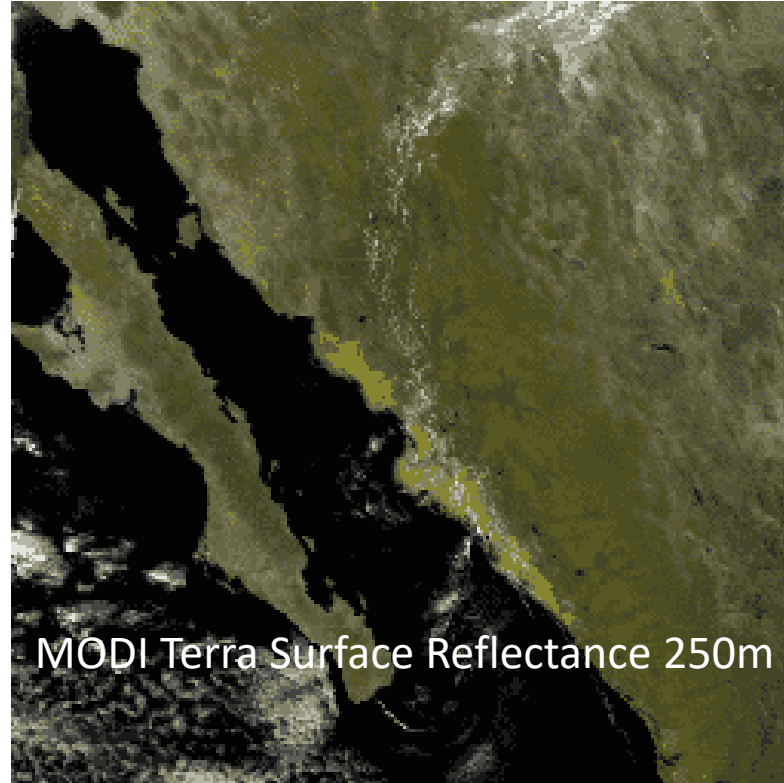
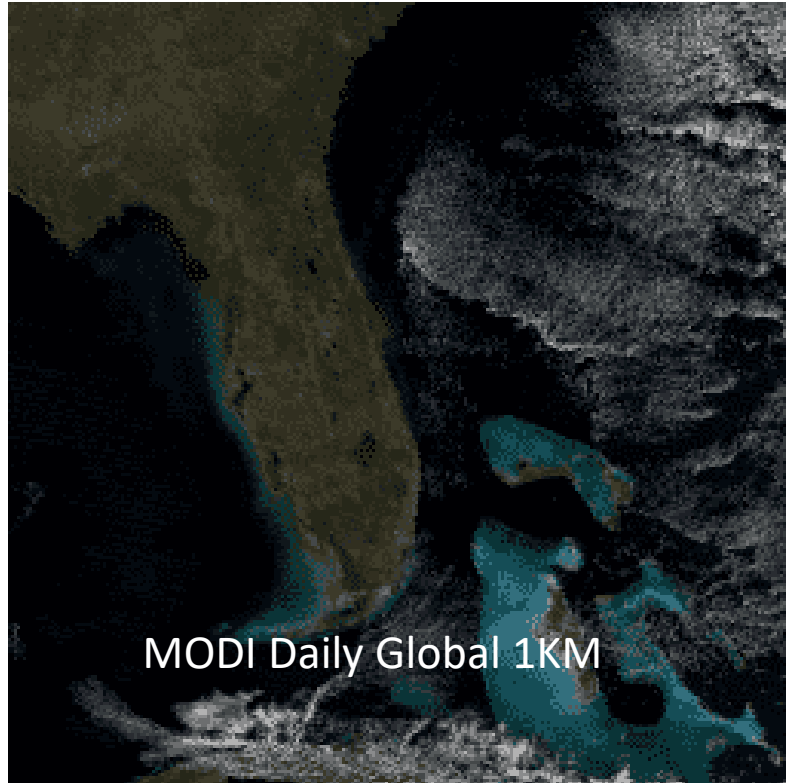


- Sentinel



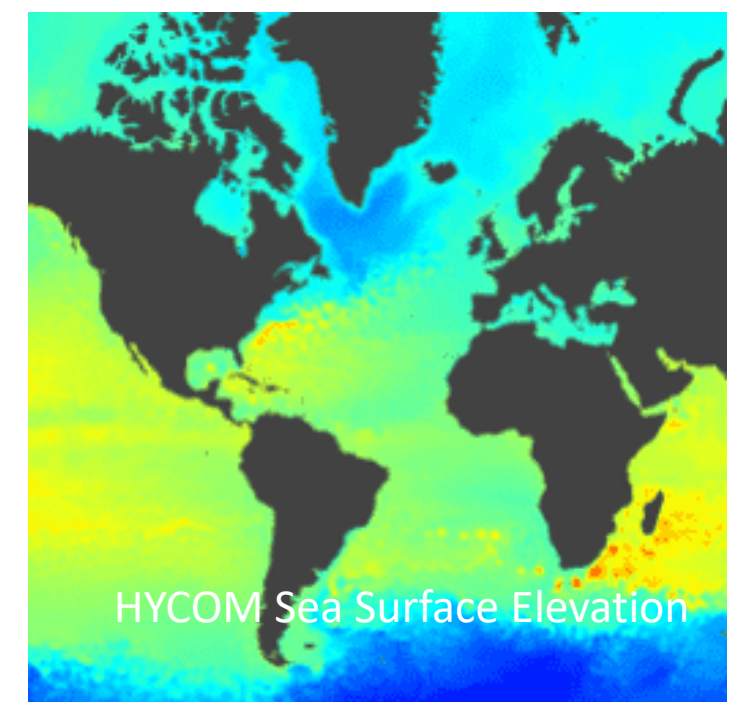
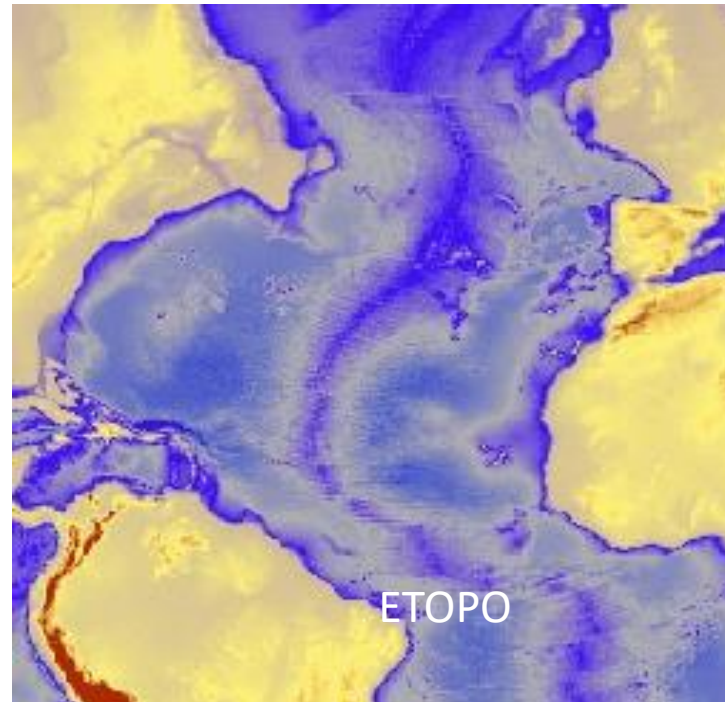
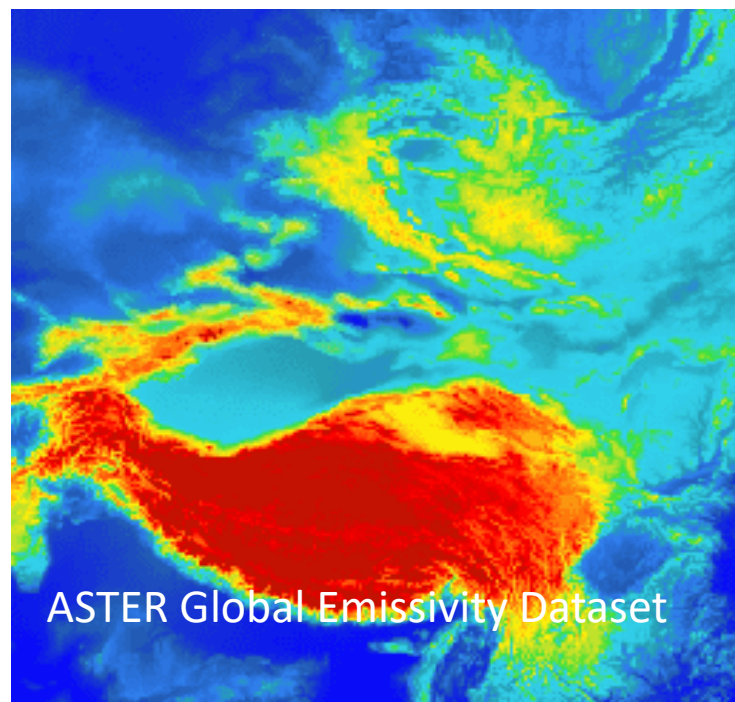
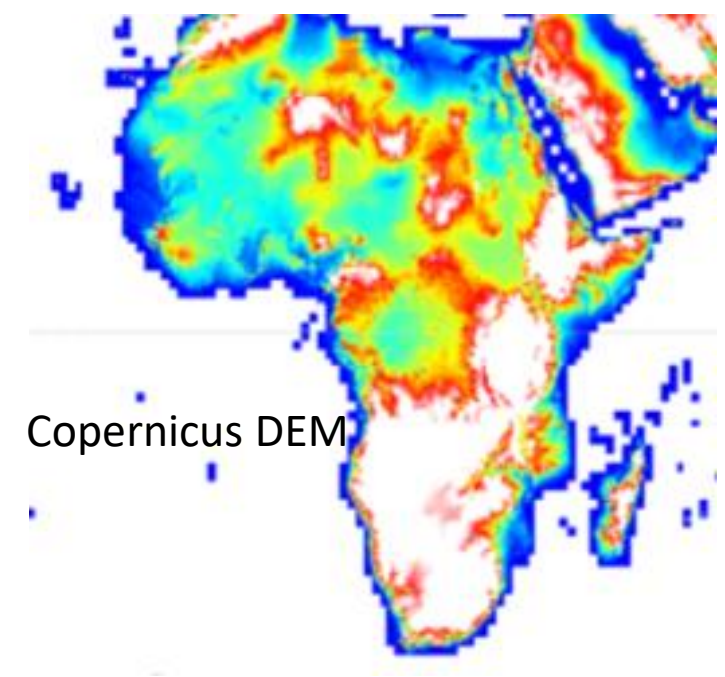
Imagery

- MODIS



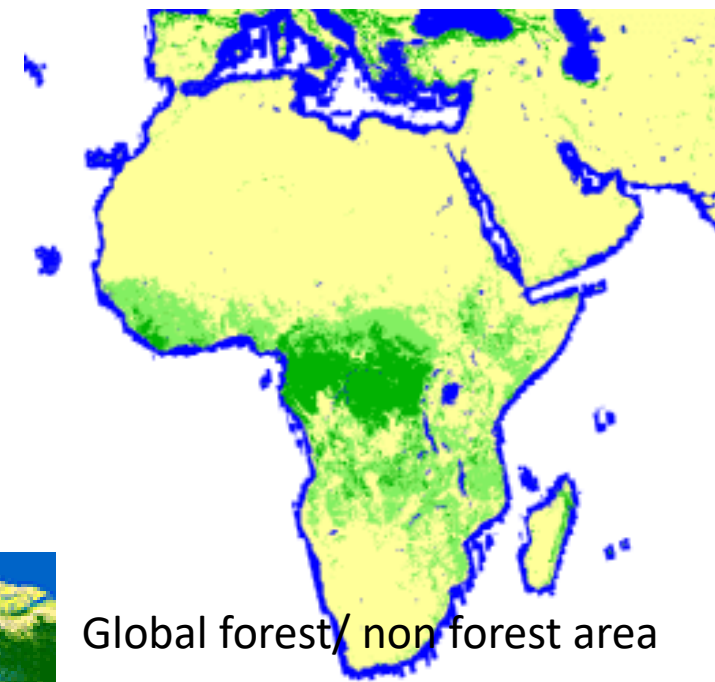
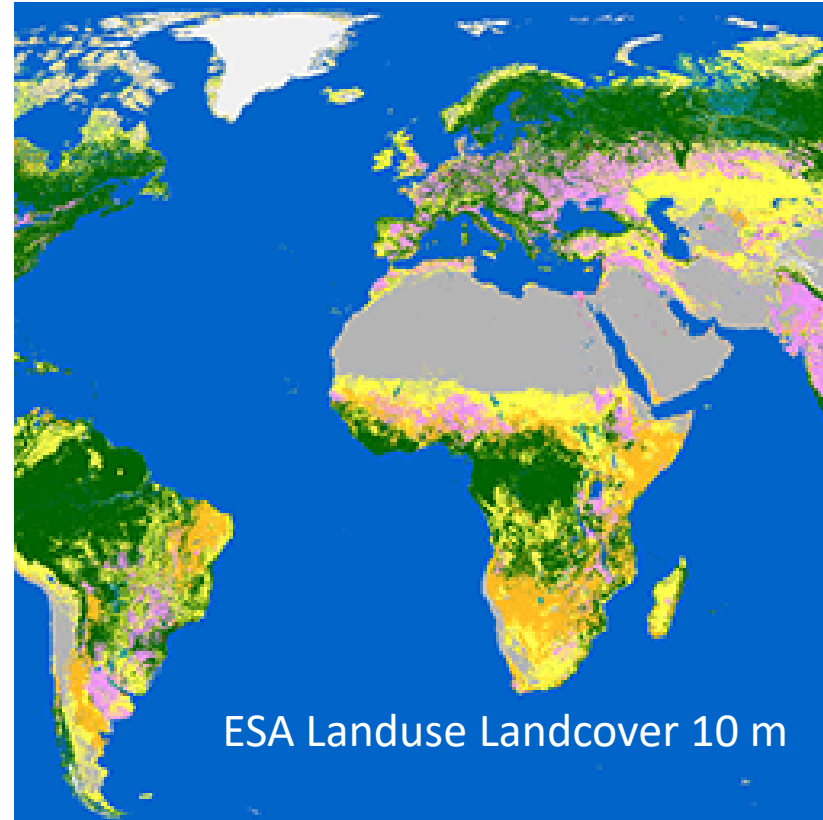
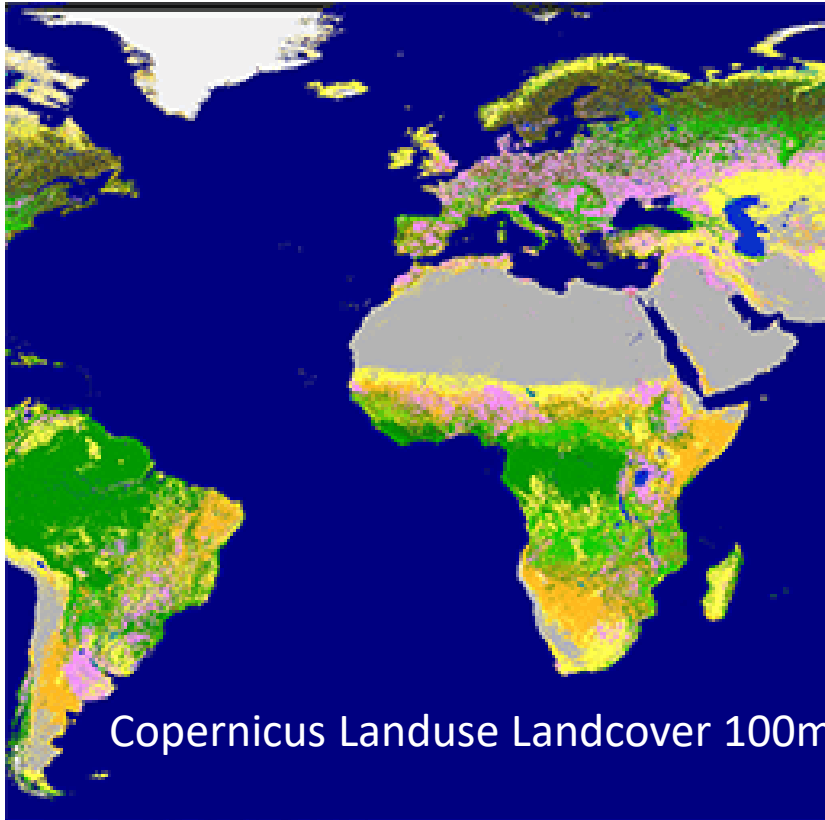
Geophysical

- Terrain



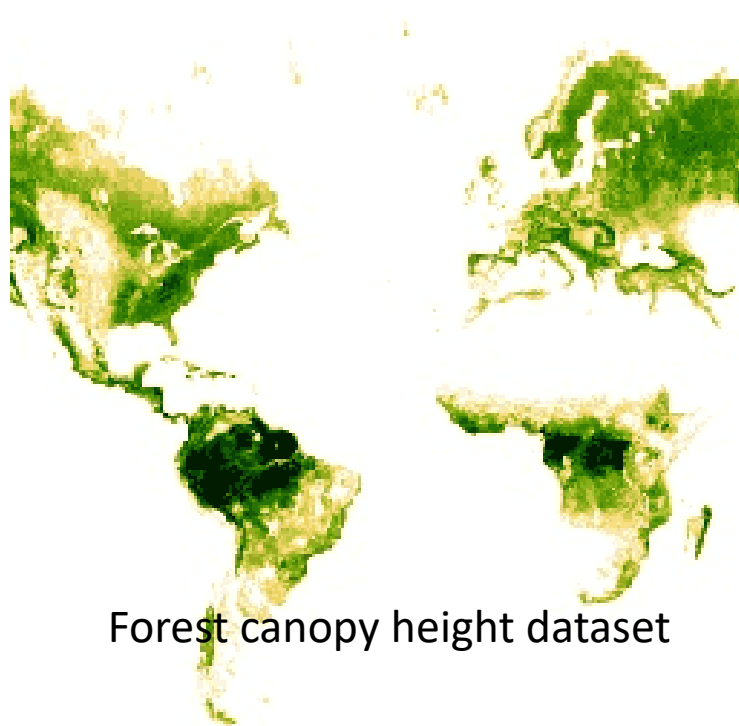
Geophysical

- Land Cover

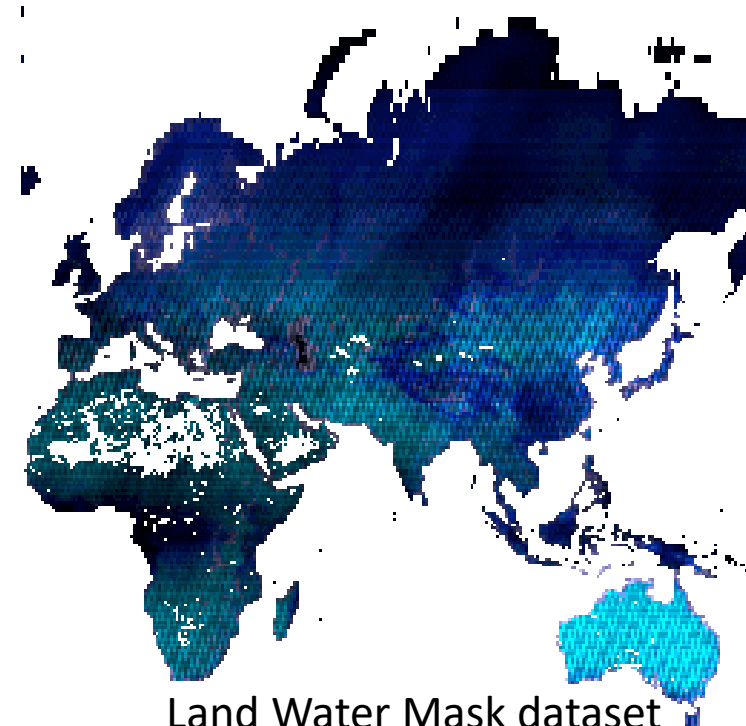


Geophysical

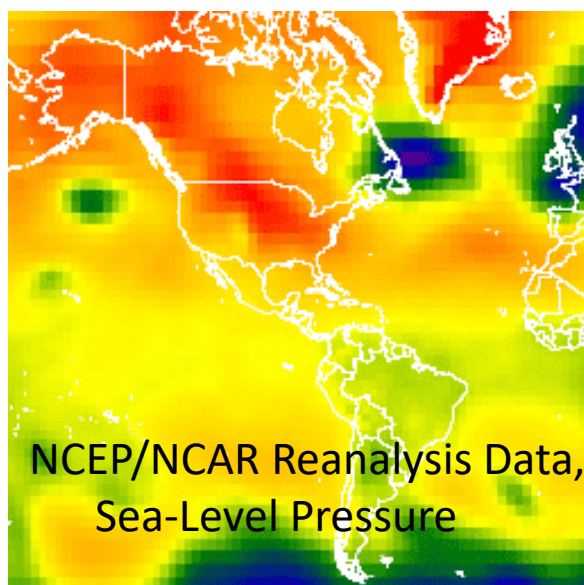
- Other



Forest canopy height dataset



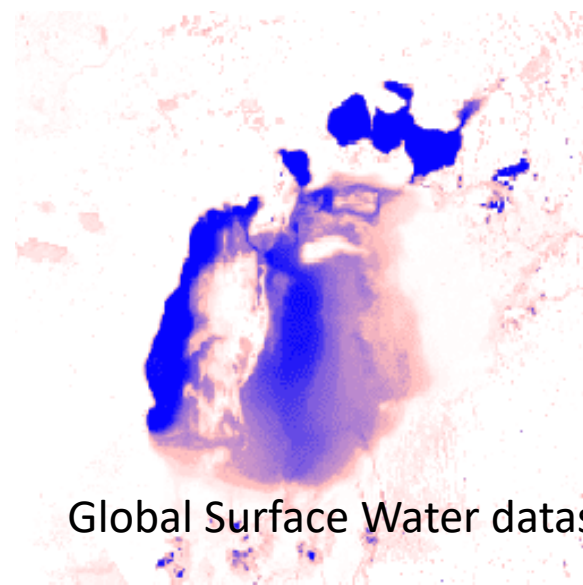
Land Water Mask dataset



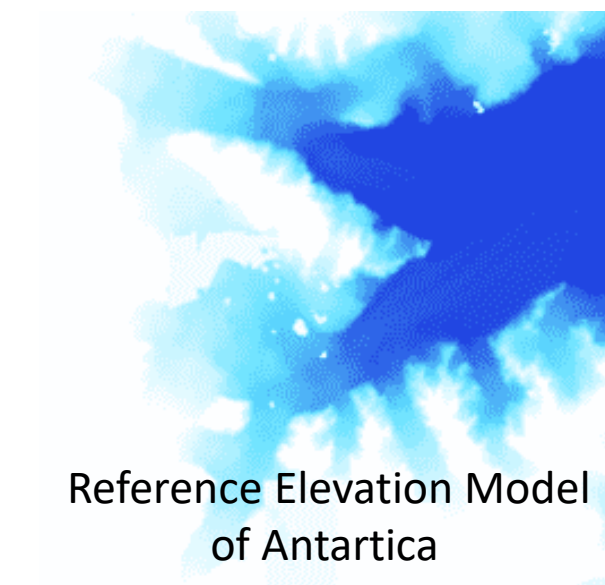
NCEP/NCAR Reanalysis Data,
Sea-Level Pressure



MODIS's Terra
Vegetation Continuous Fields



Global Surface Water dataset



Reference Elevation Model
of Antarctica

Working with Google Earth Engine

The screenshot displays the Google Earth Engine web application interface. At the top, a browser tab is labeled "New Script - Earth Engine Code". The address bar shows the URL "code.earthengine.google.com". The main header features the "Google Earth Engine" logo and a search bar with the placeholder text "Search places and datasets...". On the right side of the header, there are icons for a menu, download, print, and a user profile labeled "ee-incois" with a "Relaunch to update" button.

The interface is divided into several sections:

- Left Sidebar:** Contains navigation tabs for "Scripts", "Docs", and "Assets". Below these is a "Filter scripts..." input field and a "NEW" button. A tree view shows the "Owner (1)" as "users/incoisgee/GEE_Introduction", with sub-items: "Composit_and_Mosaic", "Data Management", "Spectral Signatures", and "Working_with_image_collection". Below this, sections for "Writer", "Reader", and "Archive" all state "No accessible repositories. Click Refresh to check again." An "Examples" link is at the bottom.
- Top Bar:** Includes buttons for "Get Link", "Save", "Run", "Reset", and "Apps".
- Main Content Area:** Titled "New Script", it shows a code editor with a single line of text "1" on the first line.
- Right Sidebar:** Contains tabs for "Inspector", "Console", and "Tasks". The "Console" tab is active, displaying the instruction "Use print(...) to write to this console." and a large empty text area for output.
- Bottom Panel:** A world map showing the current view. The map includes labels for various countries and regions, such as "United States", "Mexico", "Guatemala", "Nicaragua", "Venezuela", "Guyana", "Suriname", "Colombia", "Ecuador", "France", "Spain", "Portugal", "Morocco", "Algeria", "Libya", "Egypt", "Sudan", "Yemen", "Saudi Arabia", "Iraq", "Syria", "Türkiye", "Greece", "Italy", "Romania", "Bulgaria", "Mongolia", "China", "Kyrgyzstan", "Turkmenistan", "Afghanistan", "Pakistan", "India", "Nepal", "Myanmar (Burma)", "Thailand", "Vietnam", "Philippines", "Malaysia", "Somalia", "Kenya", "Ghana", "Nigeria", "Chad", "Mali", "Niger", "Guinea", "Burkina Faso", "Western Sahara", "Mauritania", and "South Africa". The map also shows major bodies of water like the "North Atlantic Ocean", "Gulf of Mexico", "Caribbean Sea", "Gulf of Guinea", "Gulf of Aden", "Arabian Sea", "Bay of Bengal", and "Laccadive Sea". Map controls on the left include a hand icon, a location pin, a line tool, a rectangle tool, and a square tool. A zoom in (+) and zoom out (-) button are also present. The bottom right corner of the map shows "Map" and "Satellite" view toggles, a scale bar for "1000 km", and a "Terms of Use" link.