Committee on Earth Observation Satellites

Using Satellite Data in the Cloud with the Open Data Cube

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Eyes on Nature Workshop
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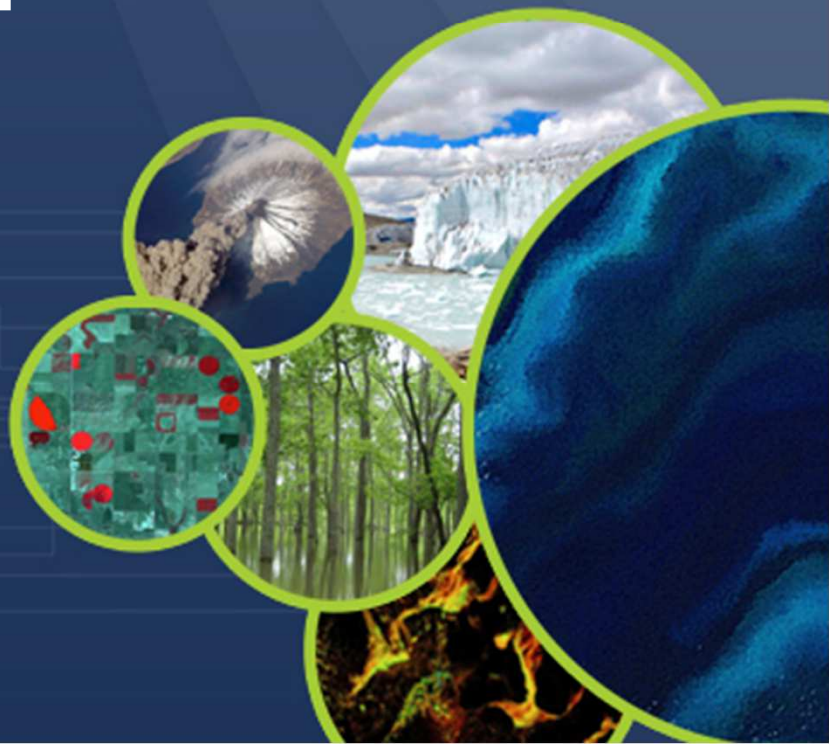
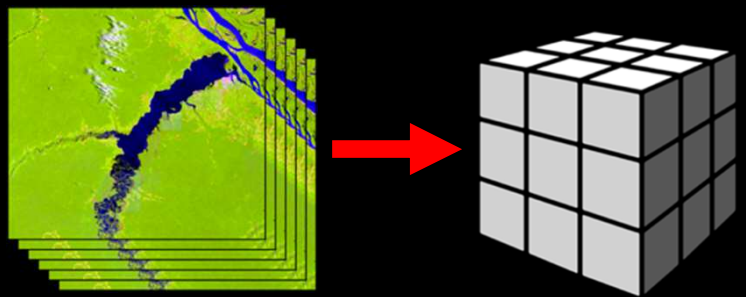
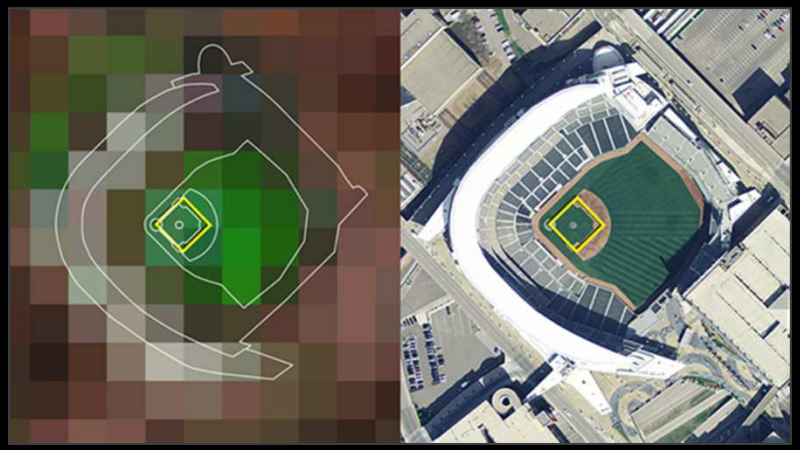


The Trends in Space Data

- Growing free/open satellite data available in the cloud ... no need to download large volumes of data
- Increasing cloud vendor options ... Google, Amazon, Microsoft
- Satellite data being pre-processed into analysis-ready formats
- New open sources tools (e.g. Open Data Cube) for using data and promoting open science
- Jupyter notebook programming environments using Python
- Increasing international collaboration and regional initiatives (e.g. Digital Earth Africa / Pacific / Americas)

What is a Data Cube?

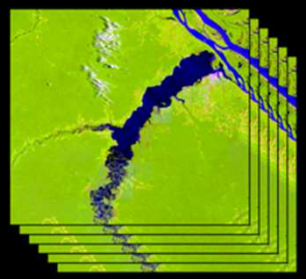




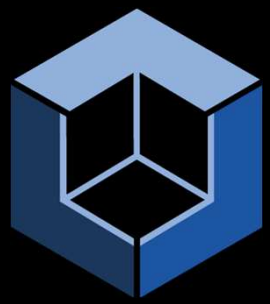
- Satellite data from many days and years are organized into a cube of space (latitude and longitude) and time.
- These cubes are made of small "pixels" that give us data at a scale of 30-meters (Landsat) ... about the size of a baseball diamond.
- When organized in a data cube, it is much easier to analyze the data and create valuable products

What is the Open Data Cube?

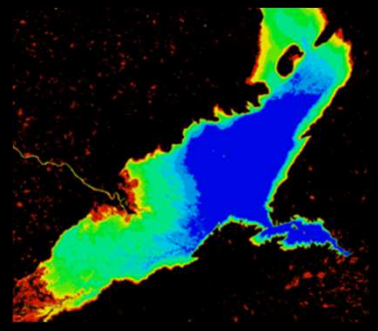
Open Data Cube (ODC) ***... an open source geospatial data management and analysis framework for decision-making***



Satellite
Analysis-Ready Data



Open Data Cube
Core Code + Utilities,
API and Database



Applications and Tools

Past, Present, Future

- Past … Initiated and proven in Australia as the Australian Geoscience Data Cube. The Open Data Cube (ODC) concept and brand was born within the Committee on Earth Observation Satellites (CEOS).
- Present … Digital Earth Africa (operational) + Digital Earth Pacific (early planning) + Digital Earth Americas (early planning) + over 100 local or country-level data cubes. Improvements in core ODC code, application algorithms, and cloud computing methods.
- Future … The goal is to achieve a global network of connected regional data cubes using ODC algorithms. We hope to grow the user community and share/test algorithms and methods to support SDGs and user needs.

Digital Earth AFRICA

DIGITAL EARTH AMERICAS

Digital Earth PACIFIC

SUSTAINABLE DEVELOPMENT GOALS

Open Data Cube Sandbox

- The Committee on Earth Observation Satellites (CEOS) has developed a new Open Data Cube (ODC) Sandbox that runs on Google Colab. http://openearthalliance.org/sandbox
- This tool is a free/open Jupyter notebook interface connected to Google Earth Engine datasets that can create sample application products anywhere in the world.
- Sample applications include: Landsat and Sentinel-2 cloud statistics, spectral products, cloud-filtered mosaics, vegetation change, water extent, vegetation phenology, VIIRS nighttime lights, mission coincidences, and radar products.

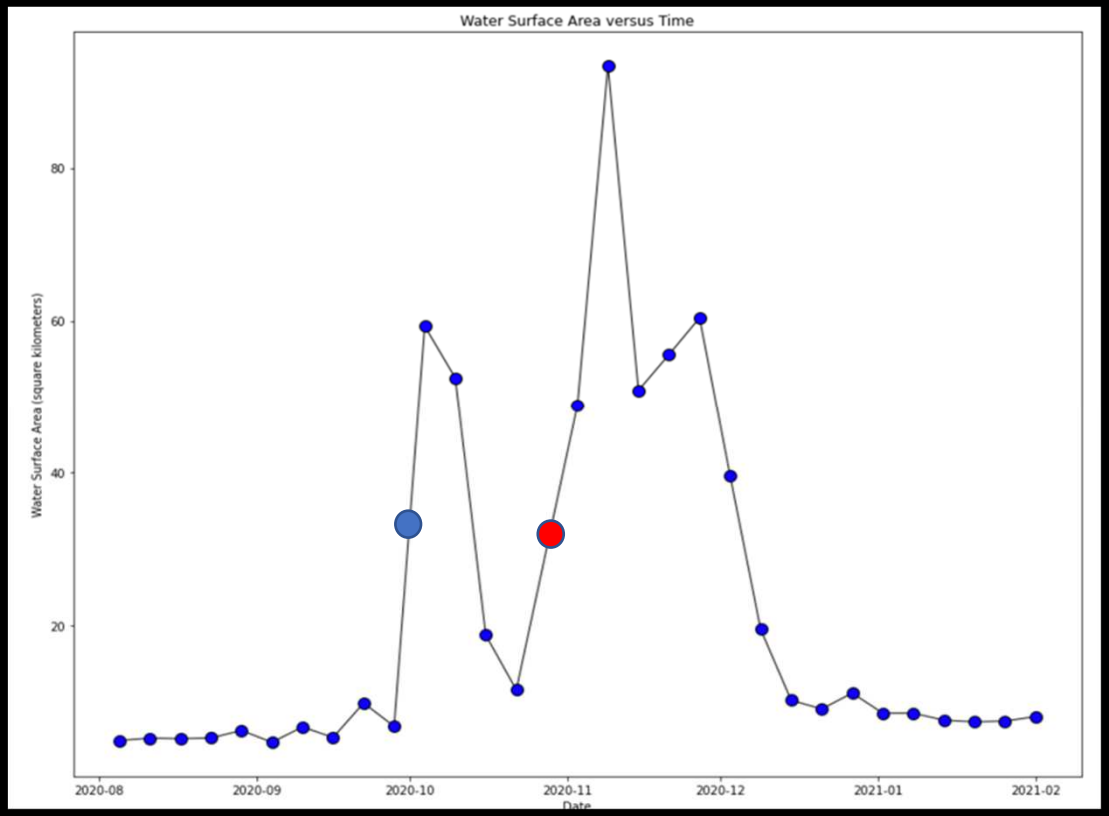
Tabasco, Mexico – November 2020

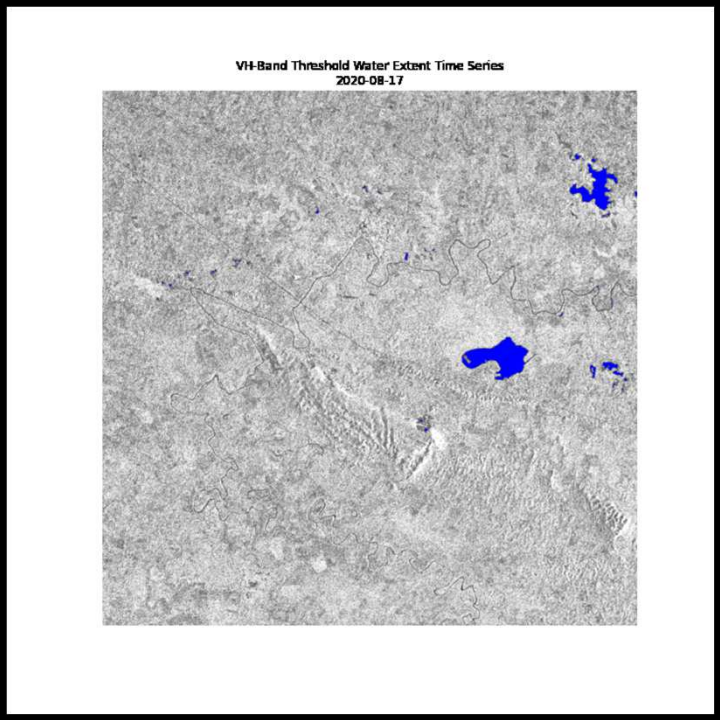
- The International Charter was activated on November 6, 2020 for Tabasco, Mexico due to flooding from Tropical Storm Eta.
- Heavy rainfall across south and southeast Mexico affecting over 100,000 people. At least 21 people have been killed and thousands of homes destroyed.
- The worst affected areas of Tabasco, Chiapas and Veracruz, received torrential rain trigggering landslides which claimed 2000 homes.
- At least 10 rivers have burst their banks in the Gulf coast state, causing widespread flooding.

Macuspana, Tabasco, Mexico on Nov 9, 2020 after Tropical Storm Eta
Reference: atalayar.com

Flooding in Macuspana, Tabasco, Mexico

- Tropical Storm Gamma – October 2-3, 2020
- Tropical Storm Eta – November 1-6, 2020





Time Series Animation of Flooding Extent

What do we see for the future?

- More satellite data available in more clouds
- More regional and local data cubes around the world ... broad adoption by governments, academia and industry
- Faster and more efficient ODC applications using parallel processing, and Machine Learning.
- More Python proficiency across the globe
- Combining satellite data with diverse datasets .... Drones, Internet of Things (IoT)

python

THANK YOU

ODC Sandbox: openearthalliance.org/sandbox

ODC website: opendatacube.org

Twitter: @opendatacube