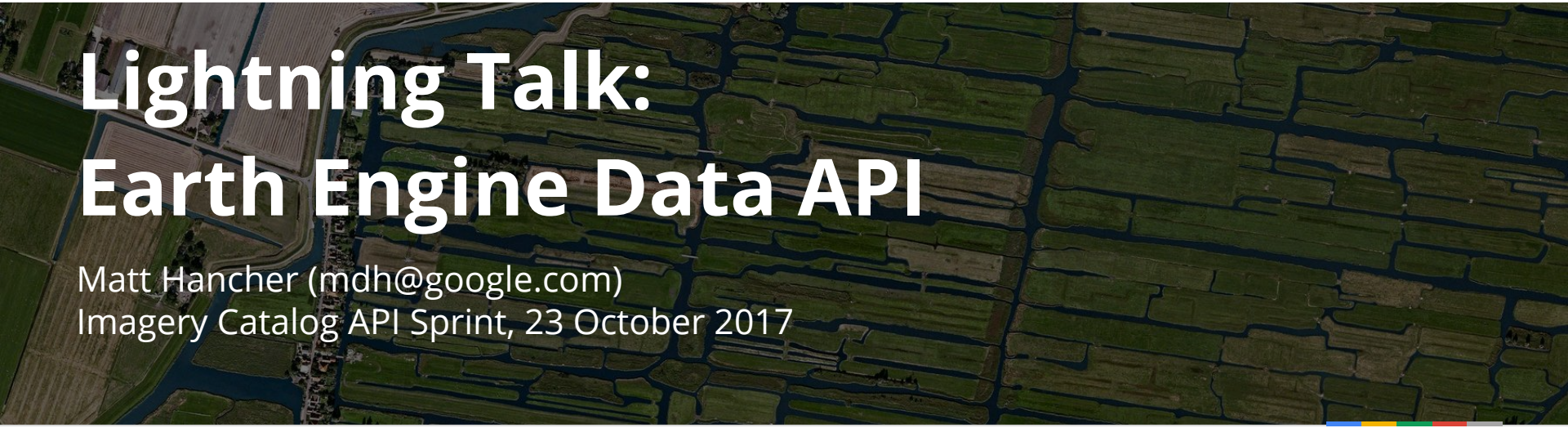
Google Earth Engine



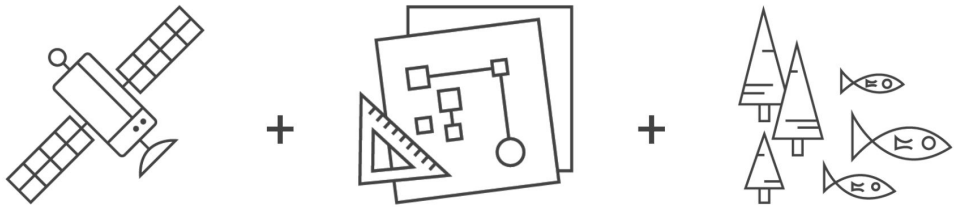
Lightning Talk: Earth Engine Data API

Matt Hancher (mdh@google.com)
Imagery Catalog API Sprint, 23 October 2017

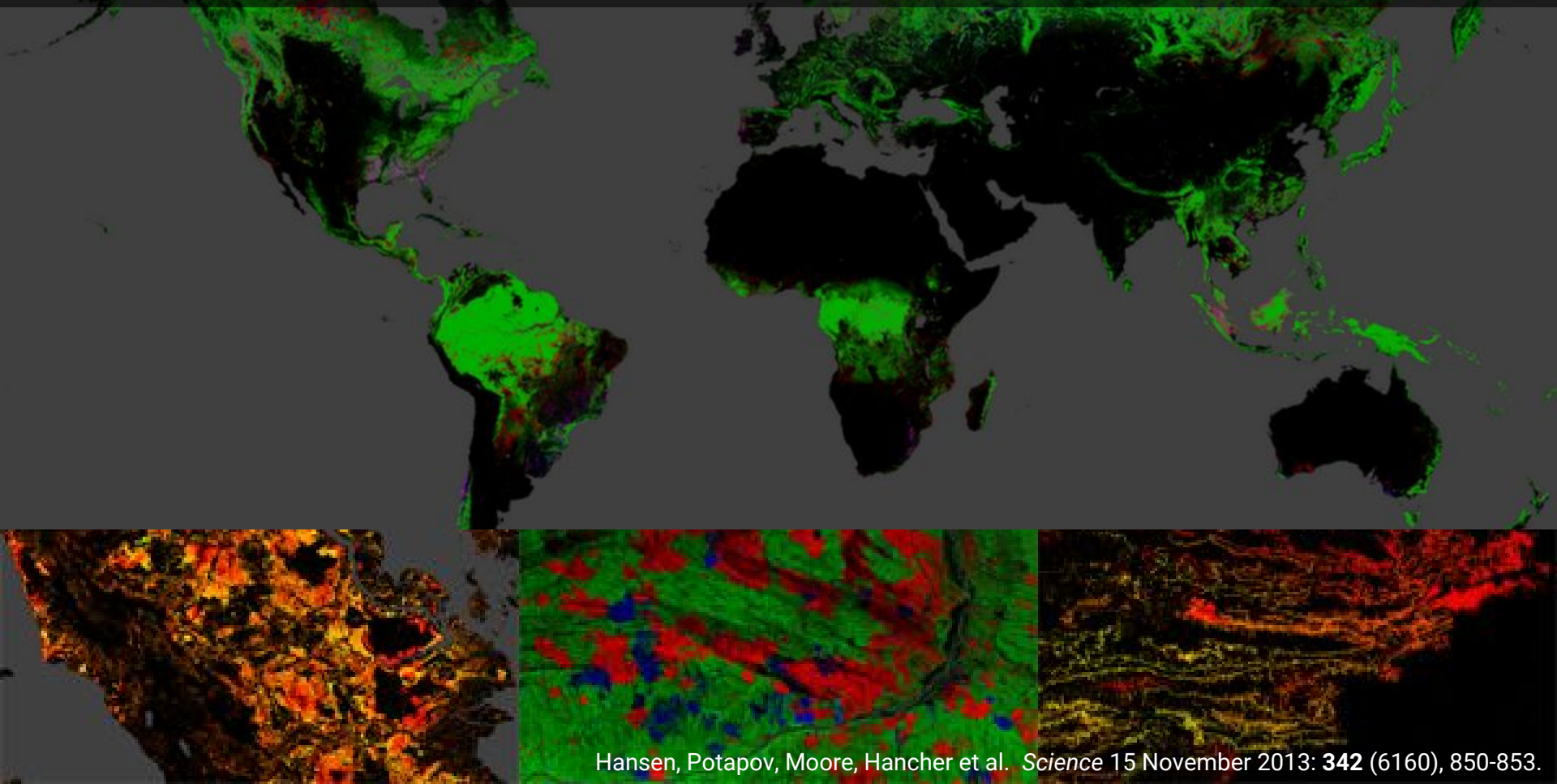
Google Earth Engine

Google's **cloud platform** for easy **petabyte-scale analysis**

of **satellite imagery** and other **geospatial data**.

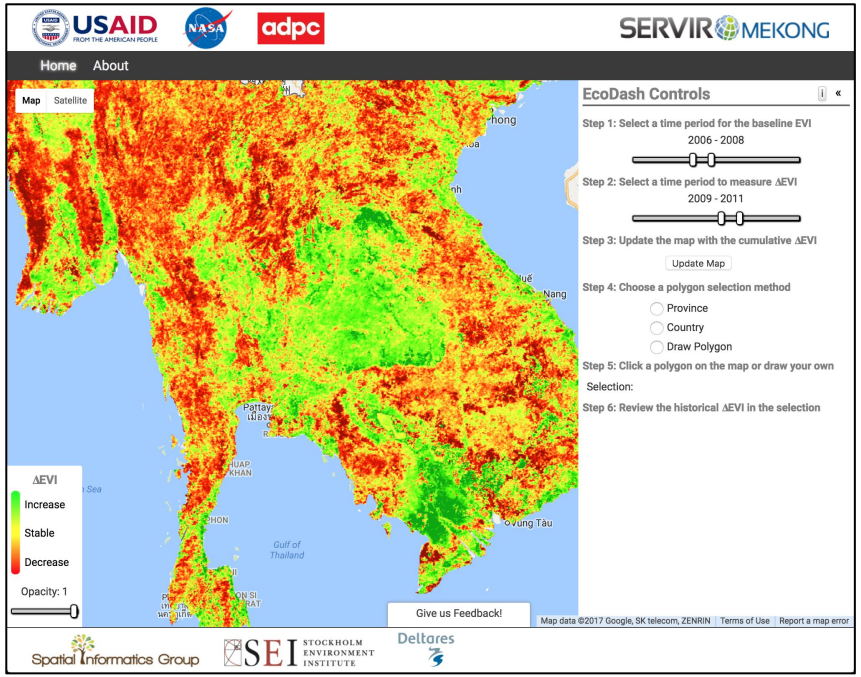


Example: Global 21st-Century Forest Extent and Change

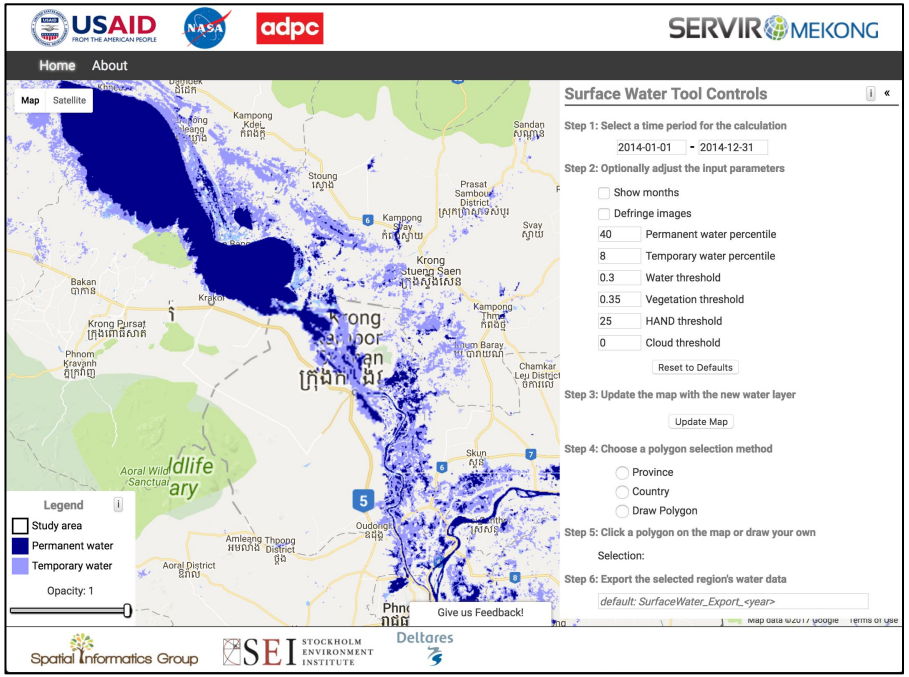


Hansen, Potapov, Moore, Hancher et al. *Science* 15 November 2013: **342** (6160), 850-853.

Example: SERVIR Mekong Decision Support Tools



Eco-Dash



Surface Water Mapping Tool

The Earth Engine Public Data Catalog

Our (long-term) mission: Organize **all the world's Earth science data** and make it universally accessible and useful, with computation on top.

Today:

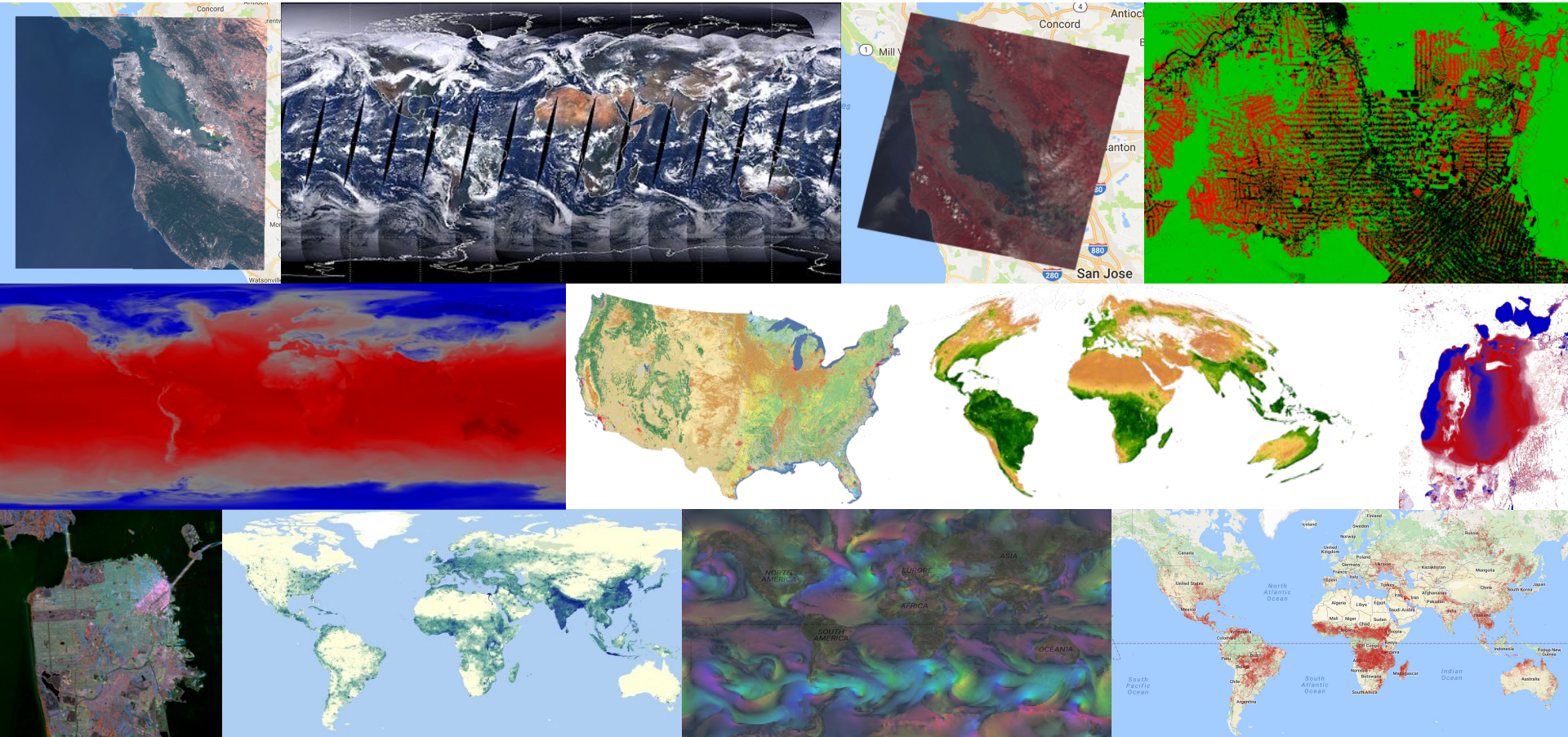
> 200 public datasets

> 11 million images

> 6000 new images every day

> 8 petabytes of data

The Earth Engine Public Data Catalog



Accessing Earth Engine from Google Cloud Platform
Step 1: The Data Catalog


GDAL


TensorFlow

Key API Concepts

Earth Engine data is organized into a hierarchical system of **Assets**.

- **Folder**: A listable container for other assets.
- **Image**: A single gridded raster, with arbitrary data bands and key/value metadata.
- **Image Collection**: A container of related images, indexed by their metadata.

All details subject to change!

List a Folder or Collection

Get all assets in the folder for the Center for International Earth Science Information Network (CIESIN).

```
GET /v1/assets?parent=CIESIN
{
  "assets": [{
    "kind": "earthengine#folder",
    "path": "CIESIN/GPWv4"
  }]
}
```

In this case there is only one child folder, containing the Gridded Population of the World v4 (GPWv4).

All details subject to change!

Get Information About an Asset

For images, this includes information about all the bands, projection, and properties.

```
GET /v1/assets/CIESIN/GPWv4/population-density/2000
{
  "kind": "earthengine#image",
  "path": "CIESIN/GPWv4/population-density/2000",
  "updateTime": "2016-12-16T19:51:16.107Z",
  "timestamp": "2000-01-01T00:00:00Z",
  "bands": [
    {
      "name": "population-density",
      "dataType": {
        "precision": "FLOAT32"
      },
  ...
  "sizeBytes": "198246654"
}
```


All details subject to change!

Filter an Image Collection

Apply a spatial and temporal filter to Landsat 8.

```
GET /v1/images?parent=LANDSAT/LC8 \
  &start_time=2016-08-01T00:00:00.000Z \
  &end_time=2016-09-01T00:00:00.000Z \
  &region={"type":"Point","coordinates":[-122.085,37.422]}
{
  "assets": [{
    "kind": "earthengine#image",
    "path": "LANDSAT/LC8/LC80440342016227LGN00",
    "updateTime": "2016-08-30T00:54:56.281Z",
    "properties": {
      "CLOUD_COVER": 33.7400016784668,
      // ...other properties...
    },
    "timestamp": "2016-08-14T18:46:08.306Z",
  ...
}
```


All details subject to change!

Fetch Pixels

Raw or visualized image data in your chosen projection.

```
POST /v1/images:getPixels
{
  "asset_path": "LANDSAT/LC8/LC80440342017037LGN00",
  "pixel_grid": {
    "origin": {"x": 580635, "y": 4147365},
    "dimensions": {"x": 256, "y": 256},
  },
  "image_bands": ["B5", "B4", "B3"],
  "visualization": {
    "ranges": [{"min": 0, "max": 25000}]
  },
  "encoding": "JPEG"
}
```

All details subject to change!

Early Lessons

- Keep it simple.
- Plan for more than just satellite imagery.
- Filter by space, time, and properties.

But…

- How best to search what data is available in your catalog?

Google Search I'm Feeling Lucky

Integrate with Search

Make your archive crawler-friendly

Embrace and extend schema.org

W3C Data Catalog Vocabulary (DCAT)

Google Research Blog

The latest news from Research at Google

Facilitating the discovery of public datasets

Tuesday, January 24, 2017

Posted by Natasha Noy, Google Research and Dan Brickley, Open Source Programs Office

There are many hundreds of data repositories on the Web, providing access to tens of thousands—or millions—of datasets. National and regional governments, scientific publishers and consortia, commercial data providers, and others publish data for fields ranging from social science to life science to high-energy physics to climate science and more. Access to this data is critical to facilitating reproducibility of research results, enabling scientists to build on others' work, and providing data journalists easier access to information and its provenance. For these reasons, many publishers and funding agencies now require that scientists make their research data available publicly.

However, due to the volume of data repositories available on the Web, it can be extremely difficult to determine not only where is the dataset that has the information that you are looking for, but also the veracity or provenance of that information. Yet, there is no reason why searching for datasets shouldn't be as easy as searching for recipes, or jobs, or movies. These types of searches are often open-ended ones, where some structure over the search space makes the exploration and serendipitous discovery possible.

To provide better discovery and rich content for books, movies, events, recipes, reviews and a number of other content categories with Google Search, we rely on structured data that content

goo.gl/iuHBey