Monitoring Land Cover Changes in Jambi Province, Sumatra using Sentinel-1 and Google Earth Engine

15th of November 2016

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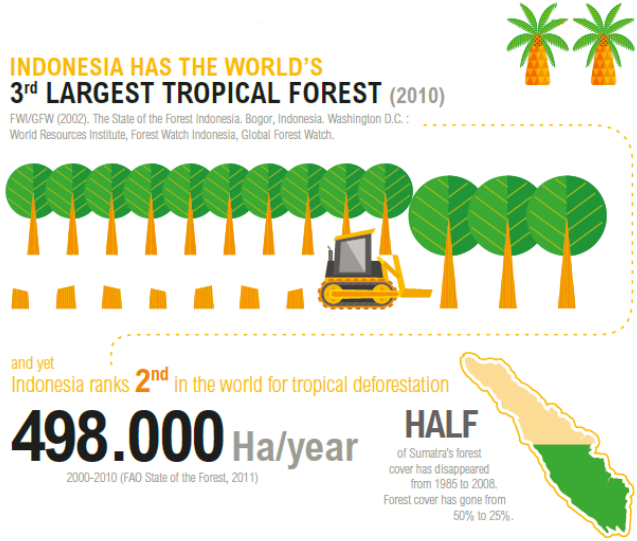
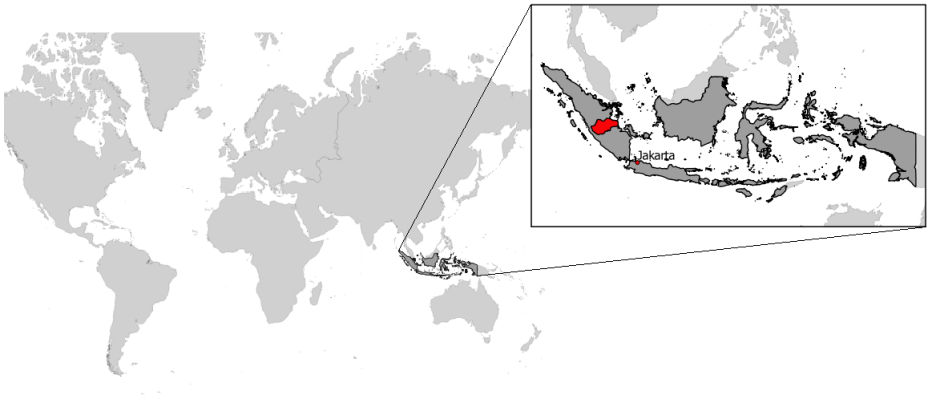


- Near real-time detection
- Land cover change detection $\rightarrow$ Burned area
- Area calculation
- Evaluation of suitability of Sentinel-1



- Hosted by the European Space Ageny (ESA)
- C-SAR
- Two-satellite constellation
- Spatial resolution: up to 5 x 5 m
- Temporal resolution: 6 days
  (up to 3 days over Europe and Canada)

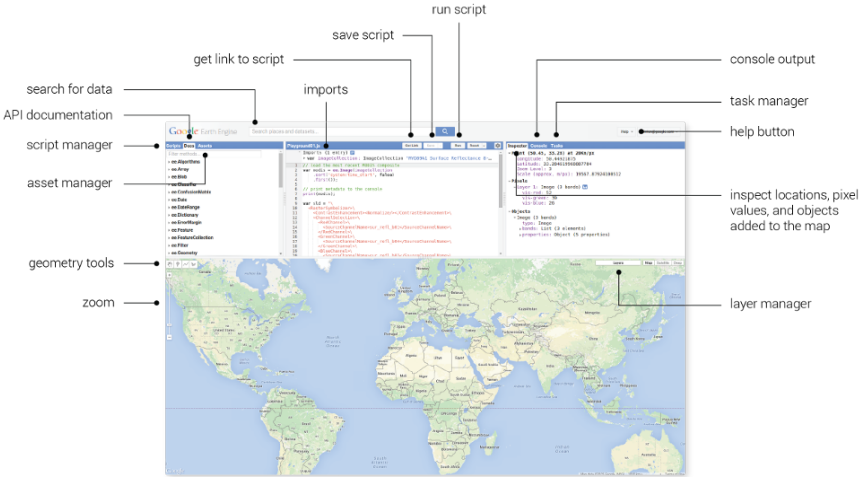
esa
European Space Agency

opernicus
Europe's eyes on Earth

Google Earth Engine

- Data download not necessary
- Huge computational power
- Platform for the scientific analysis of high-resolution imagery
- Team of > 100 programmers
- Java Script or Python API

Google Earth Engine



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- Clear cut or burned area of a minimum size is required

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- Sentinel-1 Ground Range Detection (GRD) of 2015

```
// Load the Sentinel-1 ImageCollection.
var sentinel1 = ee.ImageCollection('COPERNICUS/S1_GRD')
    .filterDate('2015-'+monthi+'-01', '2015-'+monthi+'-28')
    .filterBounds(geometry);
```

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- Sentinel-1 Ground Range Detection (GRD) of 2015
- Filtering for Interferometric Wide Swath Mode (IW), dual polarization (VH)

```
var vh = sentinel1
    // Filter to get images with VV and VH dual polarization.
    .filter(ee.Filter.listContains('transmitterReceiverPolarisation', 'VH'))
    // Filter to get images collected in interferometric wide swath mode.
    .filter(ee.Filter.eq('instrumentMode', 'IW'));
```

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- Processing monthly mean SAR imagery
- Calculating the differences between two months

```
var tempvh = vh.select('VH').mean().select([0], ['VH_'+month]);
```

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- Sentinel-1 Ground Range Detection (GRD) of 2015
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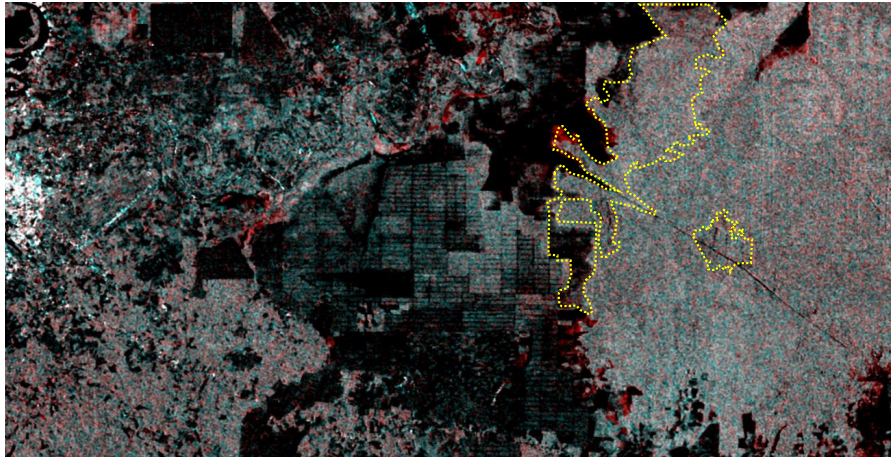
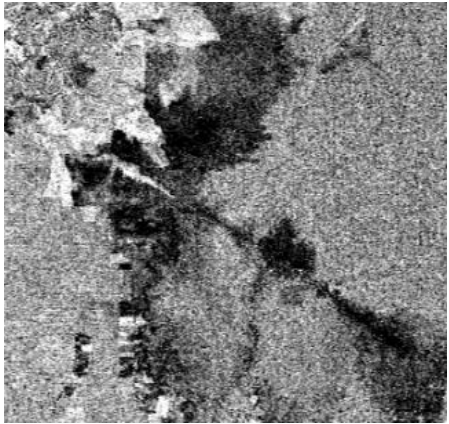
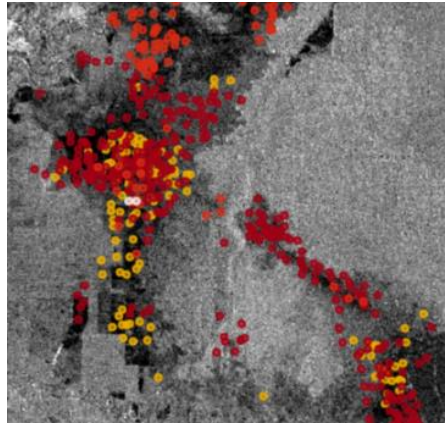
- Processing monthly mean SAR imagery
- Calculating the differences between two months
- Visual interpretation
- Dual temporal composite
- Validation: MODIS



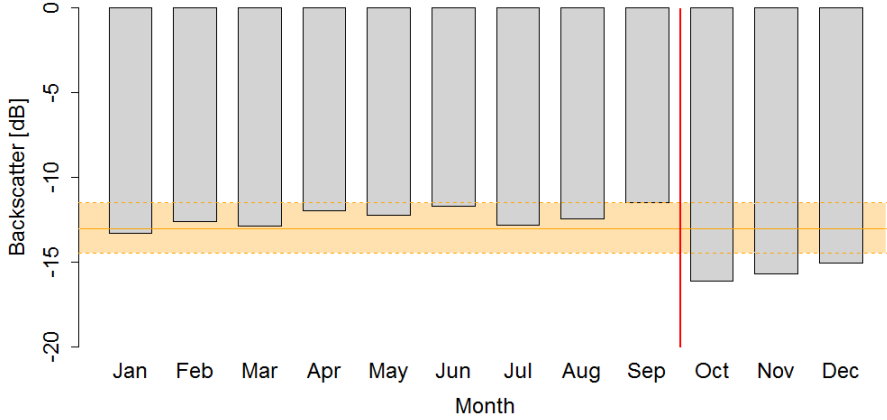
July – August 2015



July - November 2015



August
September
October
November


Backscatter [dB]
0
-5
-10
-15
-20
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

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- Changes in backscatter are caused by many different aspects:
  - Acquisition mode
  - Local topographic aspects like slope or surface roughness
  - Water content

$\Longrightarrow$ complicate the distinction between actual change in land cover caused by fire or anthropogenic disturbances

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  $\Longrightarrow$ complicate the distinction between actual change in land cover caused by fire or anthropogenic disturbances
- Validation data

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- Automatic classification
- Area calculation

Thank you for your attention!

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