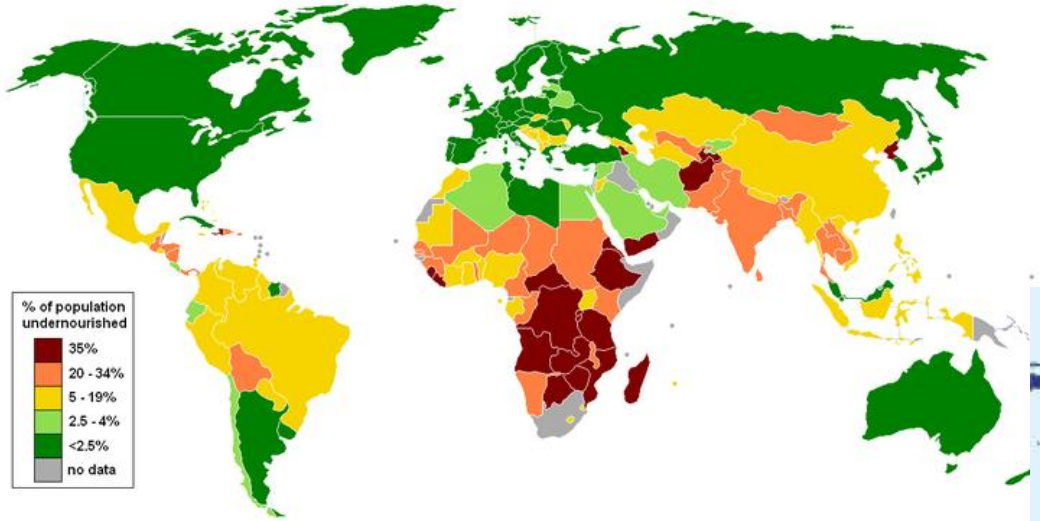
REMOTE SENSING APPLICATION IN AGRICULTURAL WATER MANAGEMENT

Elizaveta Khazieva

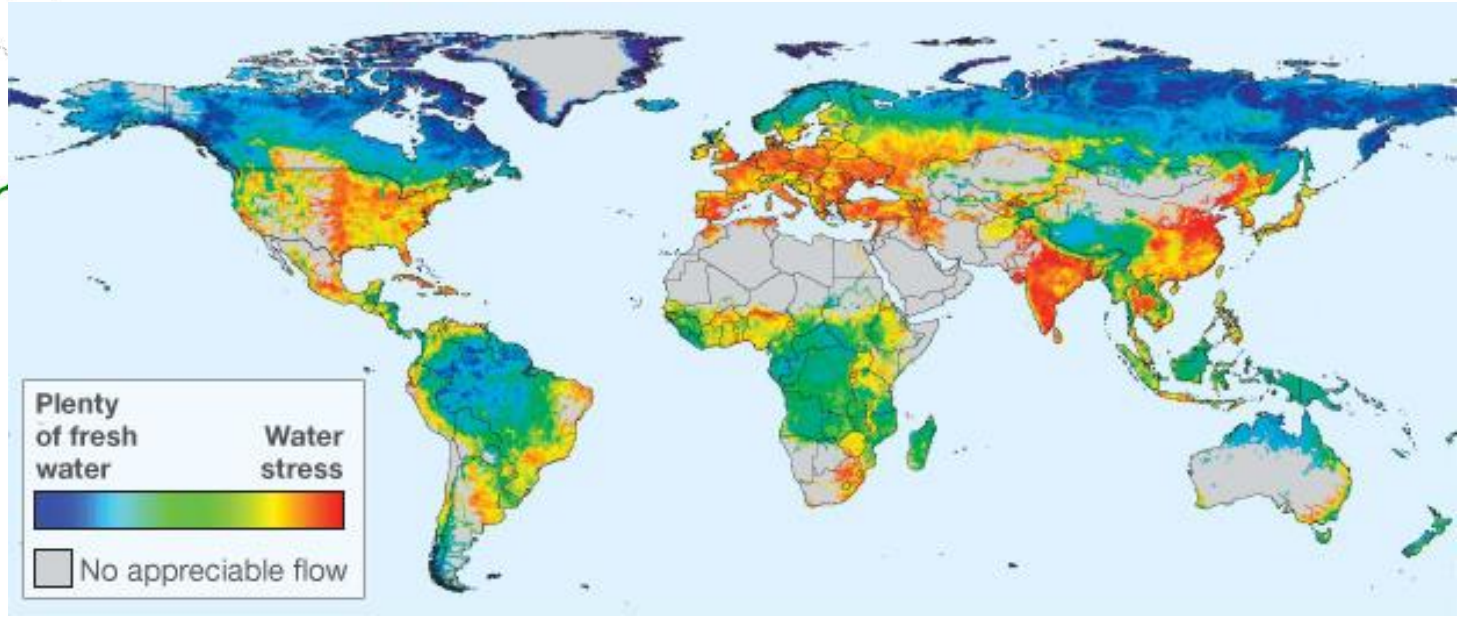
Islamabad, 2018

Agriculture and Food security

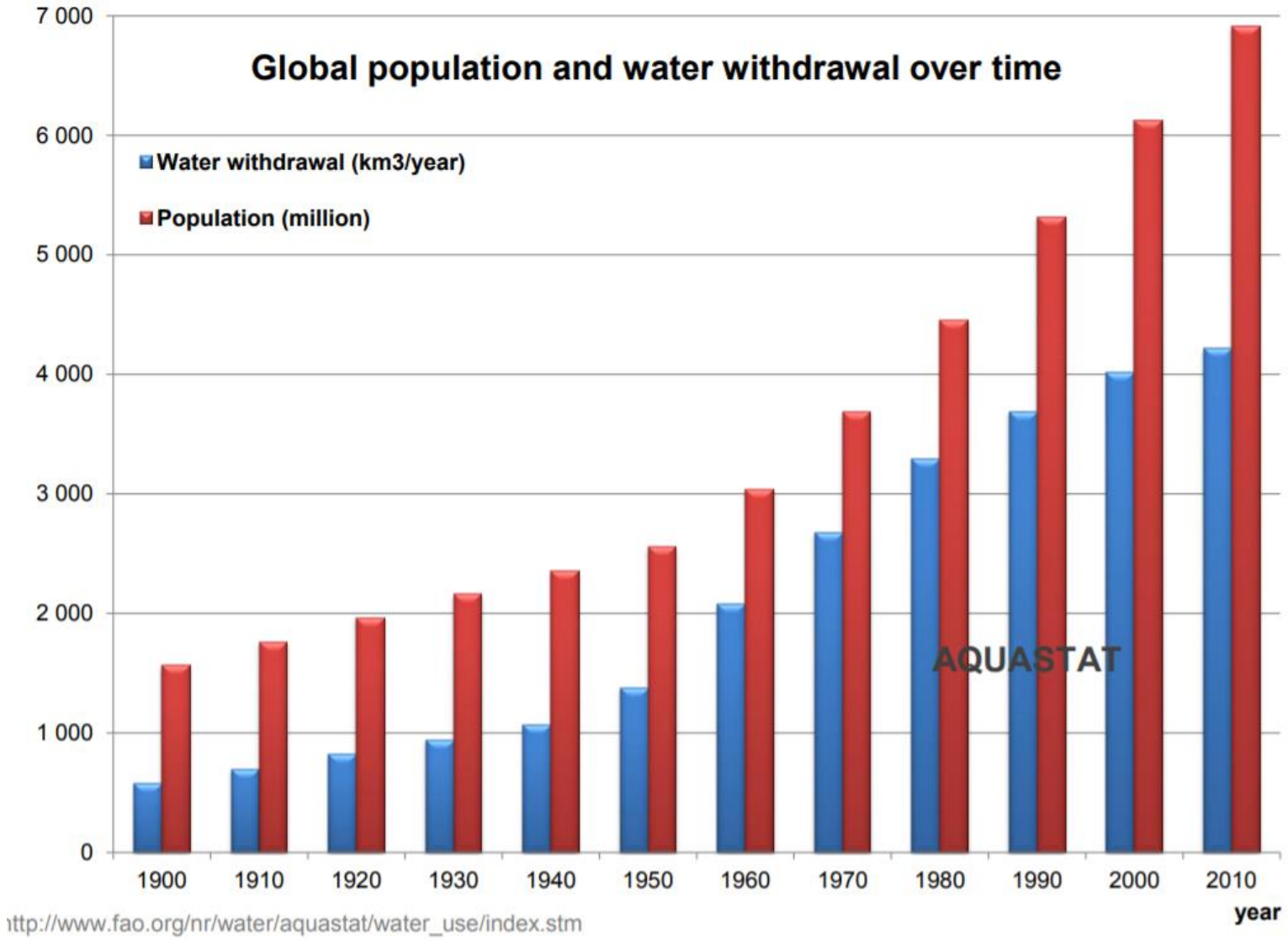
Map depicting the percentage of global undernourishment, 2008



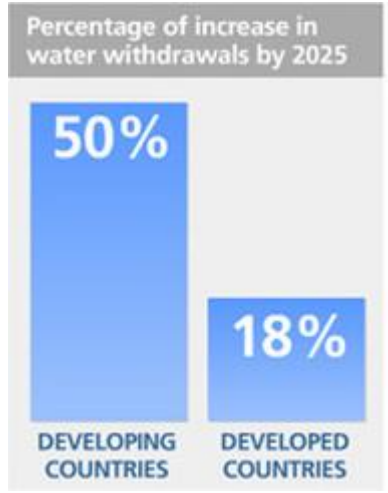
Global Water supply

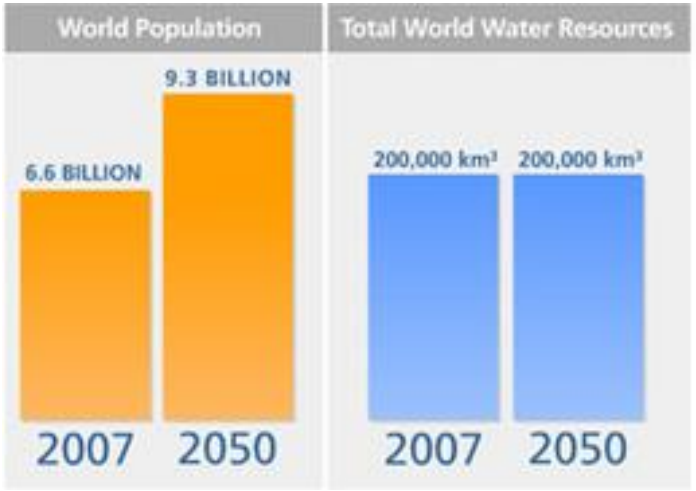


Global water resources

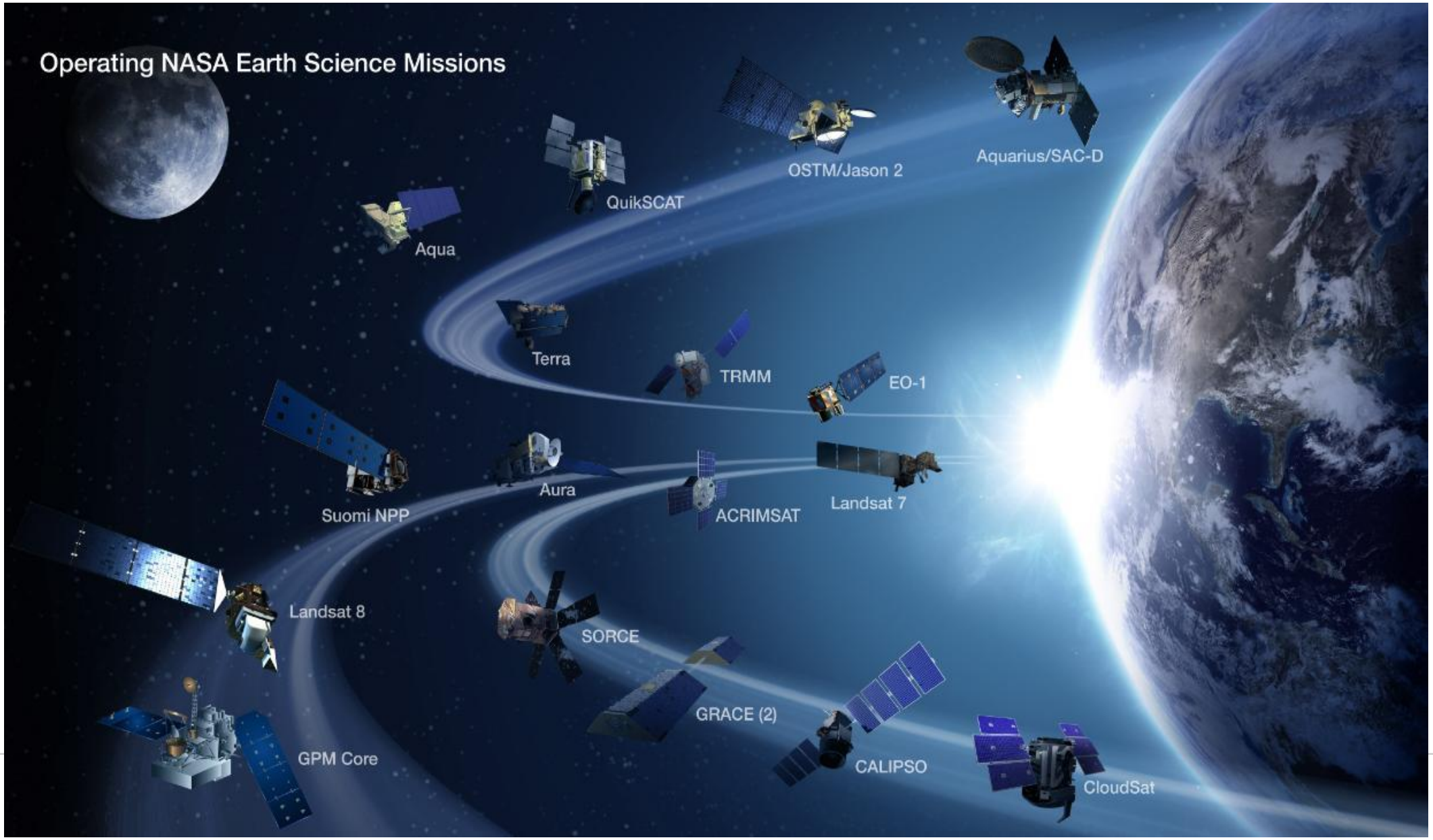


http://www.fao.org/nr/water/aquastat/water_use/index.stm





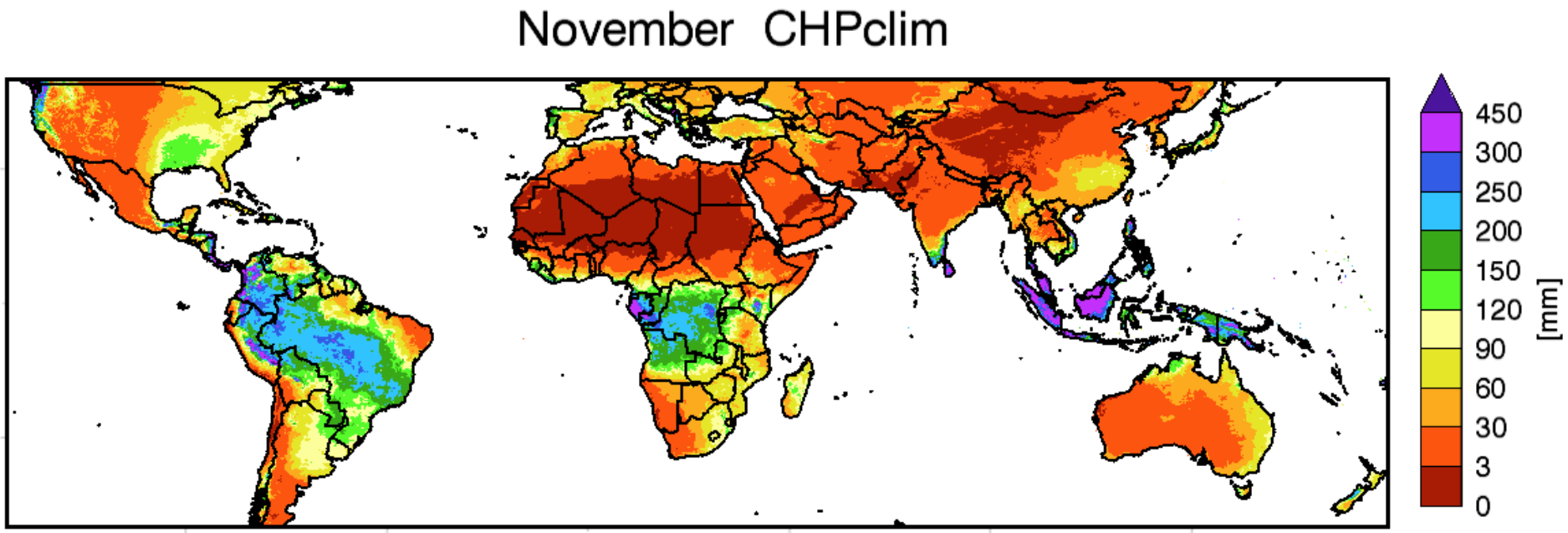
Satellites around the Earth

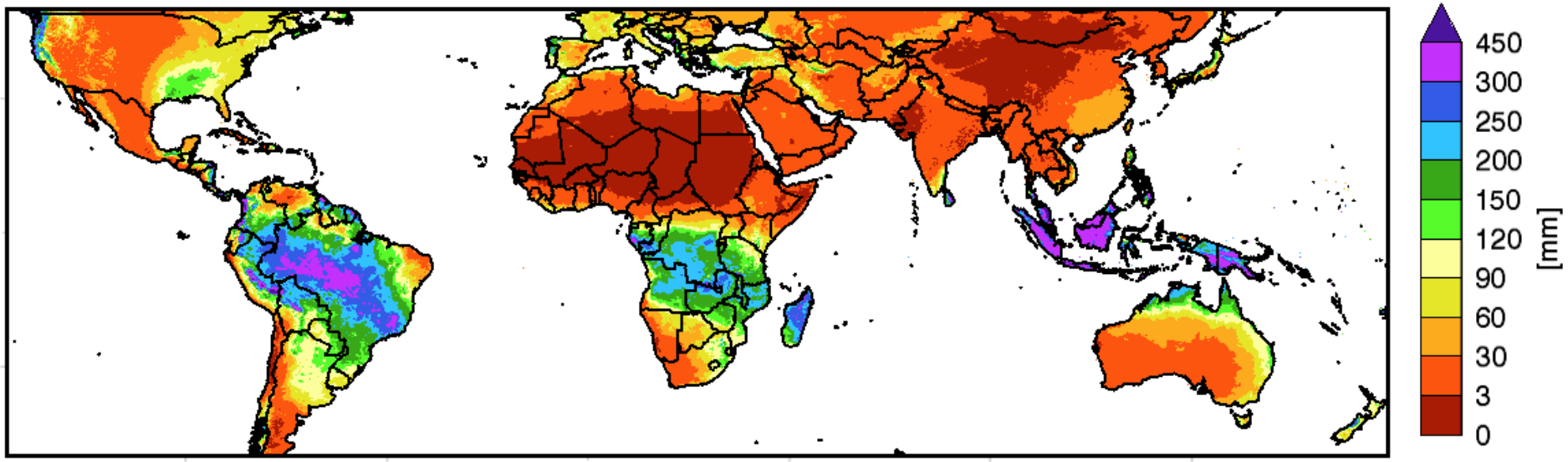


Satellites around the Earth

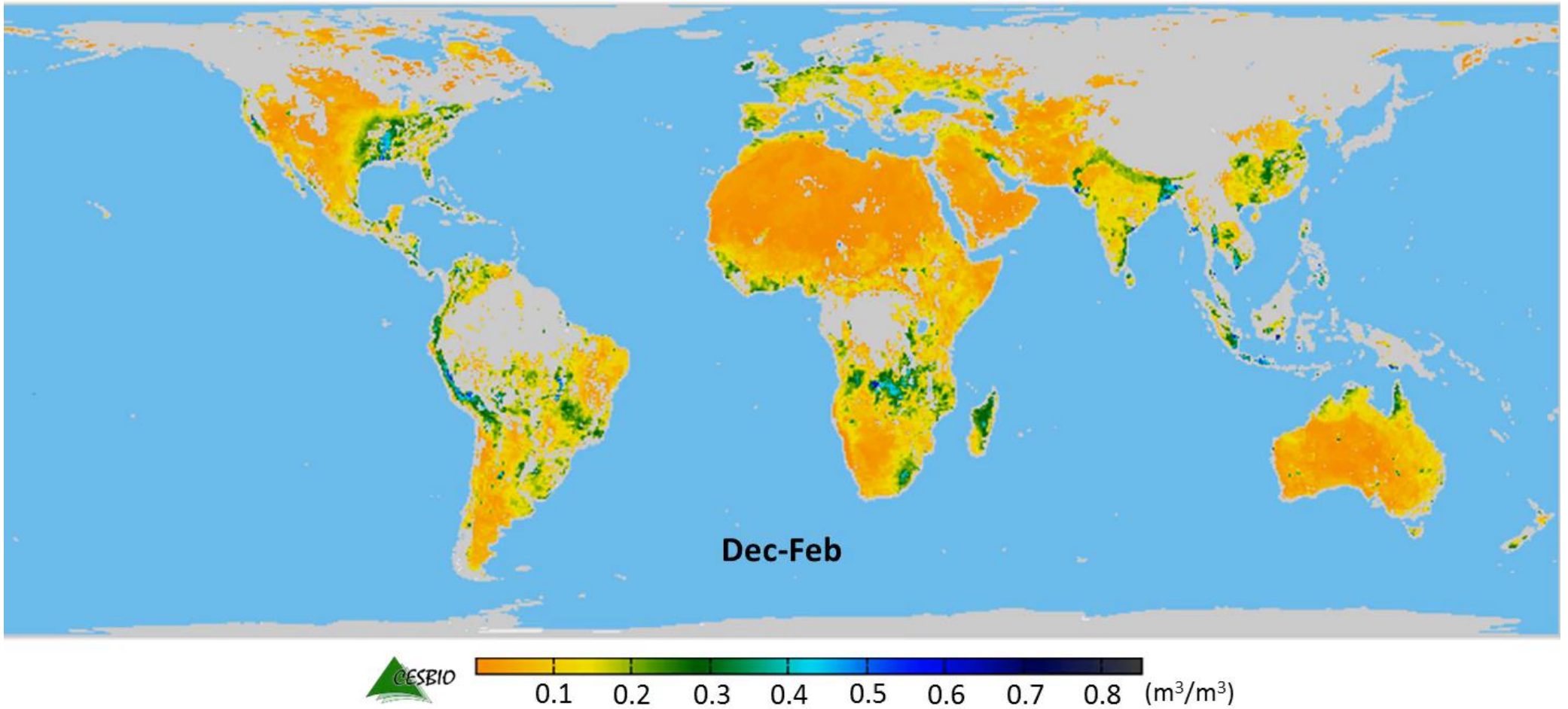
Vegetation monitoring, Evapotranspiration	**Landsat:** 07/1972 – present **Sentinel**: 05/2015 - present
Precipitation	**Tropical Rainfall Measuring Mission** (TRMM): 11/1997 – 04/2015 **Global Precipitation Measurements** (GPM): 02/2014 – present
Snow Cover, Vegetation Index for Evapotranspiration	**Terra**: 12/1999 – present **Aqua**: 05/2002 – present
Soil Moisture	**Soil Moisture Active Passive** (SMAP): 01/2015 – present
Ground Water	**Gravity Recovery and Climate Experiment** (GRACE): 03/2002 – present

CHIRPS

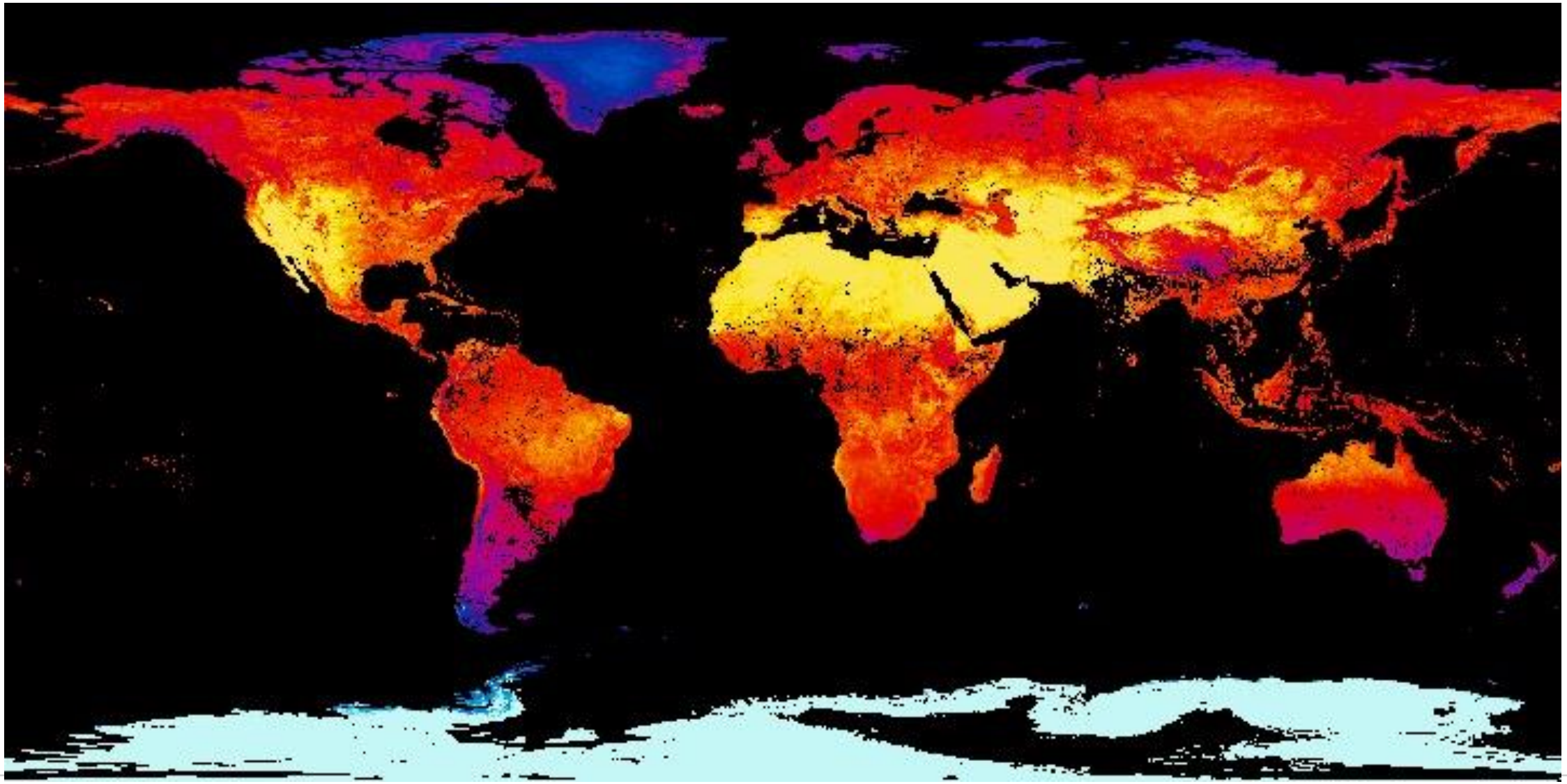

November CHPclim
450
300
250
200
150
120
90
60
30
3
0
[mm]


December CHPclim
450
300
250
200
150
120
90
60
30
3
0
[mm]

Soil Moisture and Ocean Salinity (SMOS)

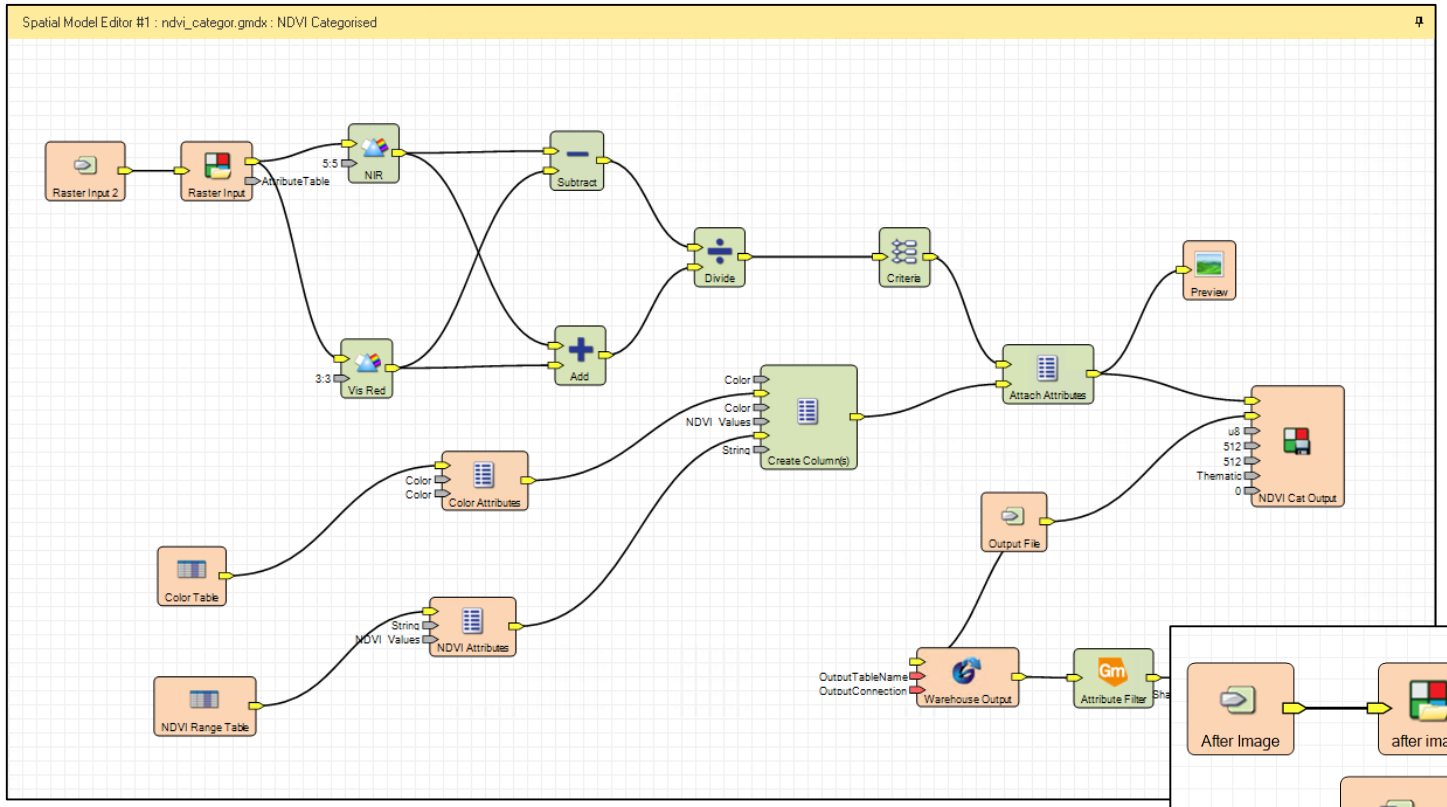


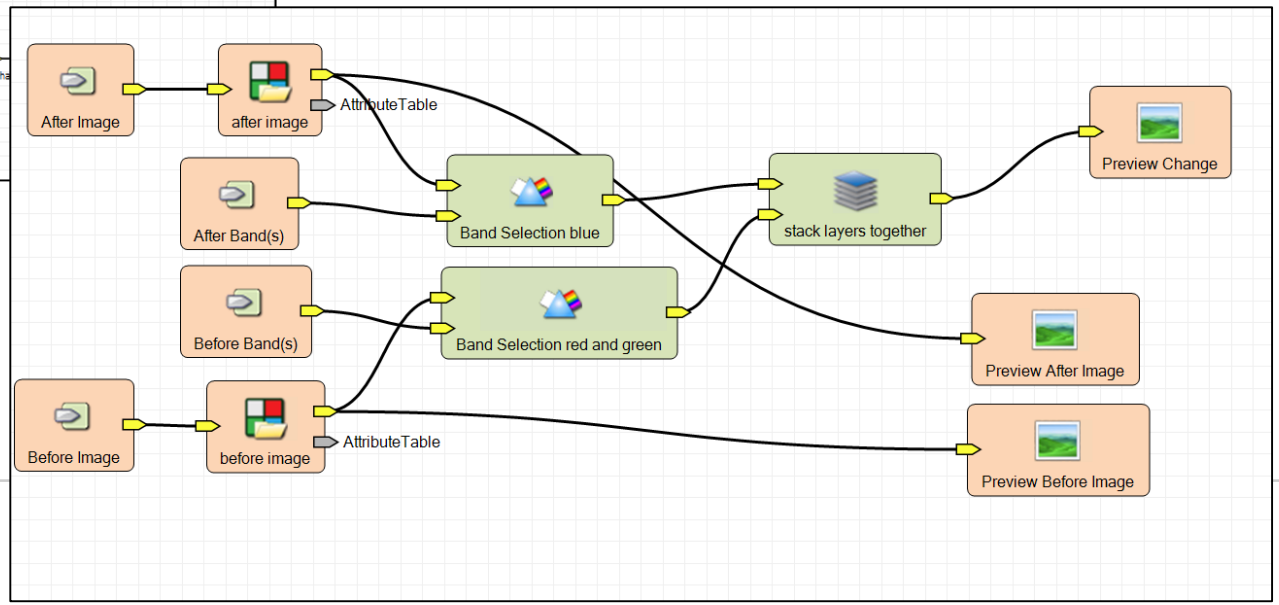
Land Surface Temperature



Summer temperature (2000 – 2016)

Spatial Modelling





JavaScripts

Google Earth Engine

Search places and datasets...

Help | esavelye43

Scripts | Docs | Assets

users/esavelye43/test

Writer

No accessible repositories.

Reader (4)

users/allieber/geomed2017

- 000 Inspecting CHIRPS
- 000 Inspecting Temperature
- [00] Javascript Syntax
- [01] Hello World
- [02] Hello Image
- [03] Apply a Computation
- [04] Apply a Spatial Reducer
- [05] Load and Filter CHIRPS Data
- [06] Chart CHIRPS Time Series
- [07] UI Panel
- [08] Timeseries at each point
- [09] Write a Function (NDVI)
- [10] Map Function (NDVI) over Collection
- [extra1] Export
- [extra2] Calculate Monthly CHIRPS Averages
- [extra3] Determine Anomalies
- [extra4] Perform a saveAll Join

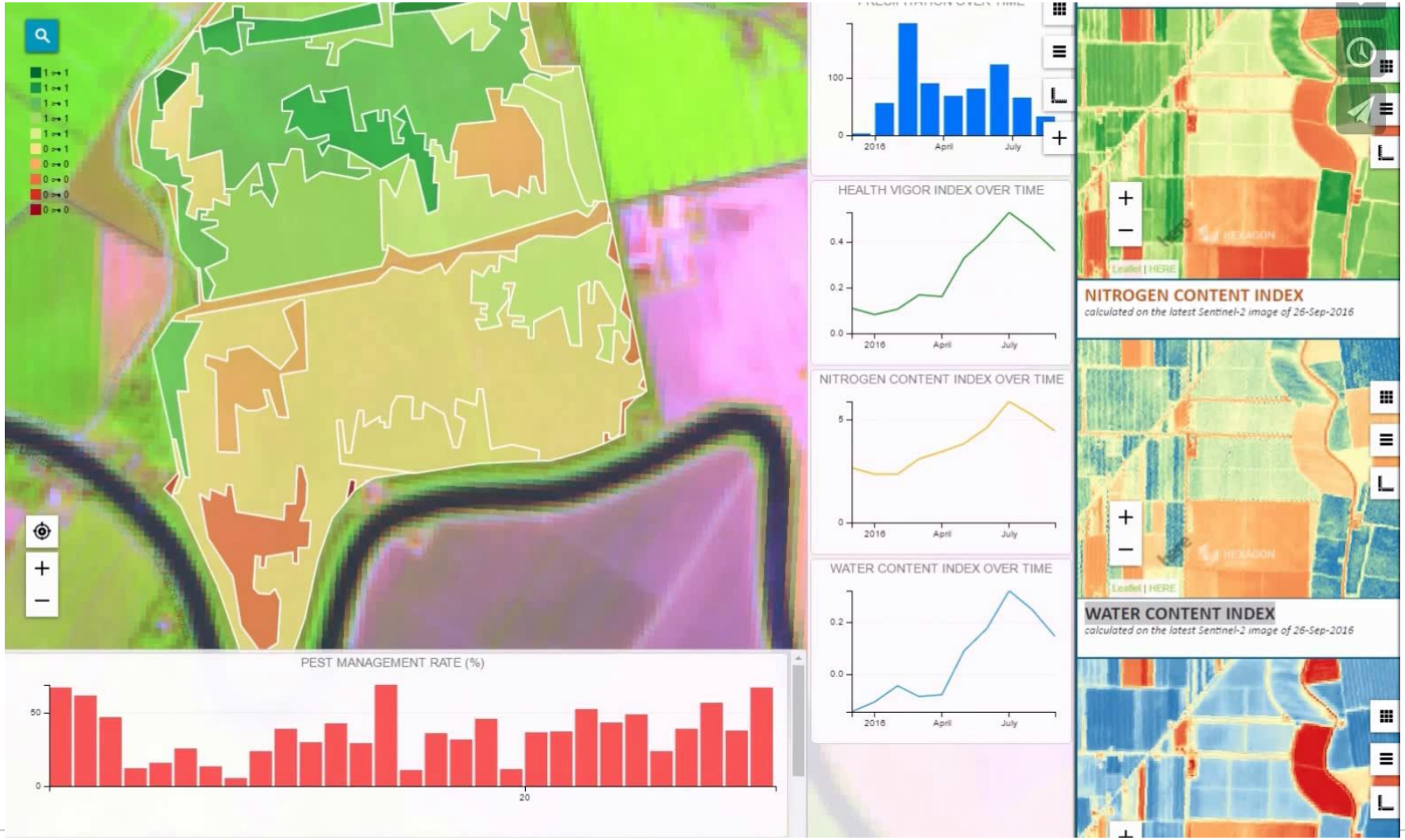
[09] Write a Function (NDVI) | Get Link | Save | Run | Reset

```
Imports (2 entries)
  var imageCollection: (Deprecated) ImageCollection "USGS La…
  var l8: (Deprecated) ImageCollection "USGS Landsat 8 TOA R…
var filtered = l8.filterDate('2016-01-01', '2016-03-31');
var rgb_viz = {min:0, max:0.3, bands:['B4','B3','B2']};
Map.addLayer(filtered, rgb_viz, 'RGB', false);


var median = filtered.median();
Map.addLayer(median, rgb_viz, 'median');

var ndvi = median.normalizedDifference(['B5', 'B4']);
var ndvi_viz = {bands: 'NDVI', min:0, max:0.3, palette:'black,

function addNdvi(img) {
  var nd = img.normalizedDifference(['B5', 'B4']);
  return img.addBands(nd.rename('NDVI'));
}

var ndvi = addNdvi(median);
print(ndvi);
Map.addLayer(ndvi, ndvi_viz, 'NDVI');
```

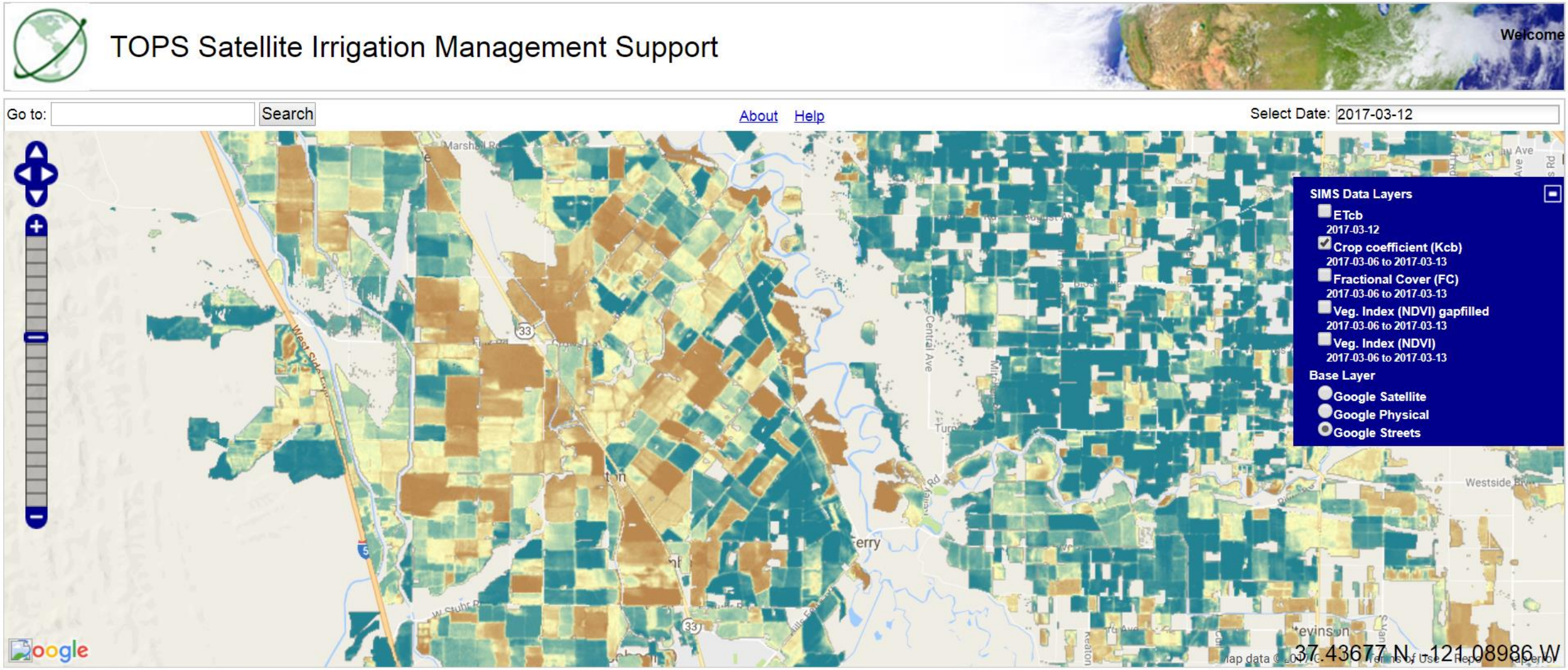
Inspector | Console | Tasks

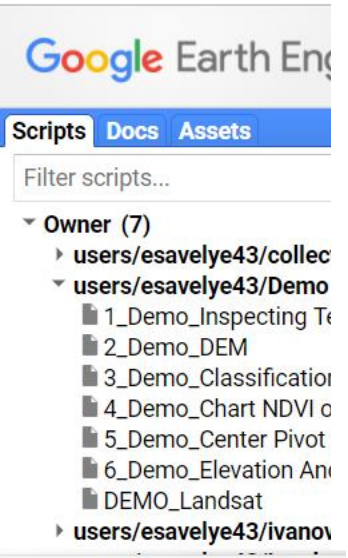
Click on the map to inspect the layers.

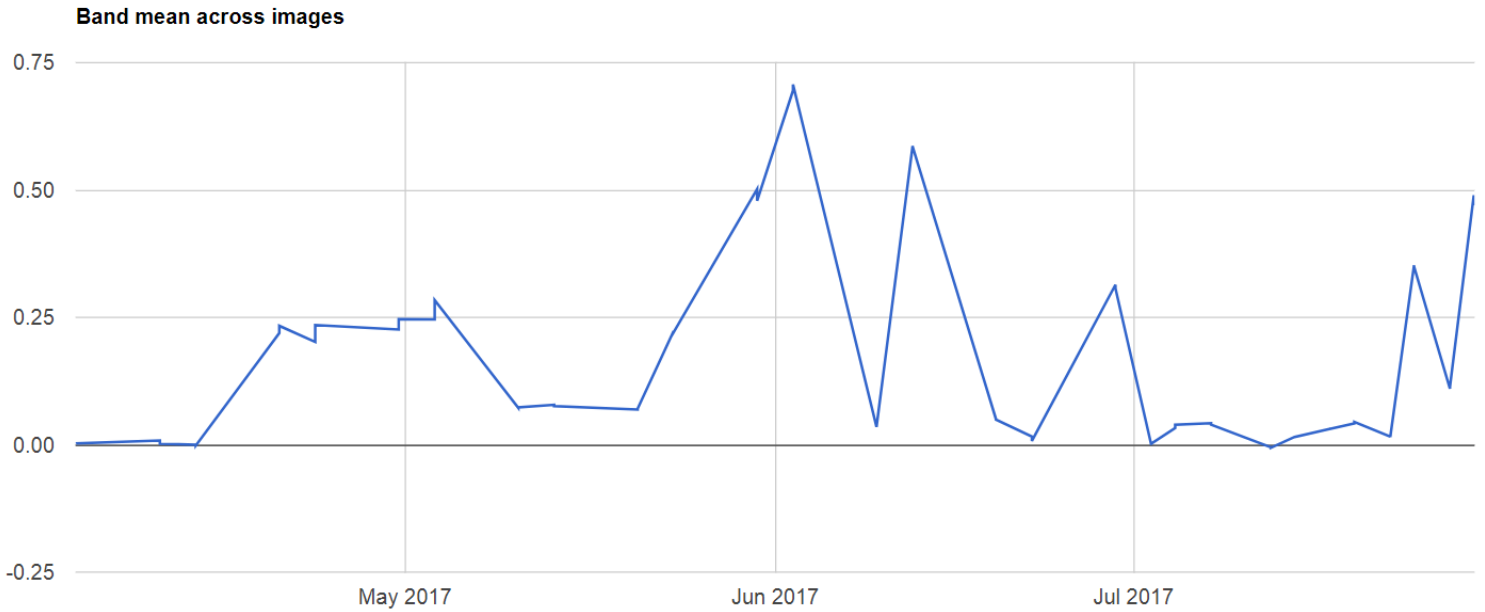
Geospatial Apps

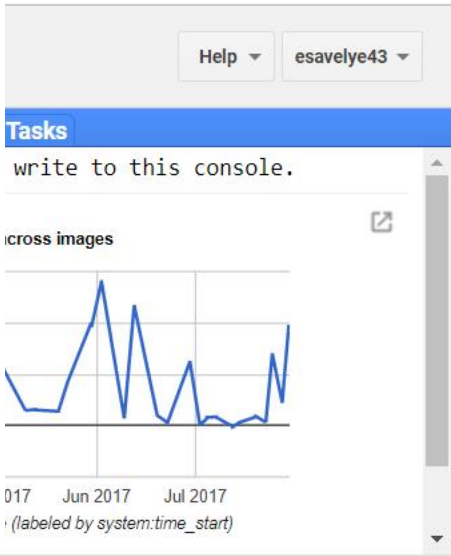


Geospatial Apps

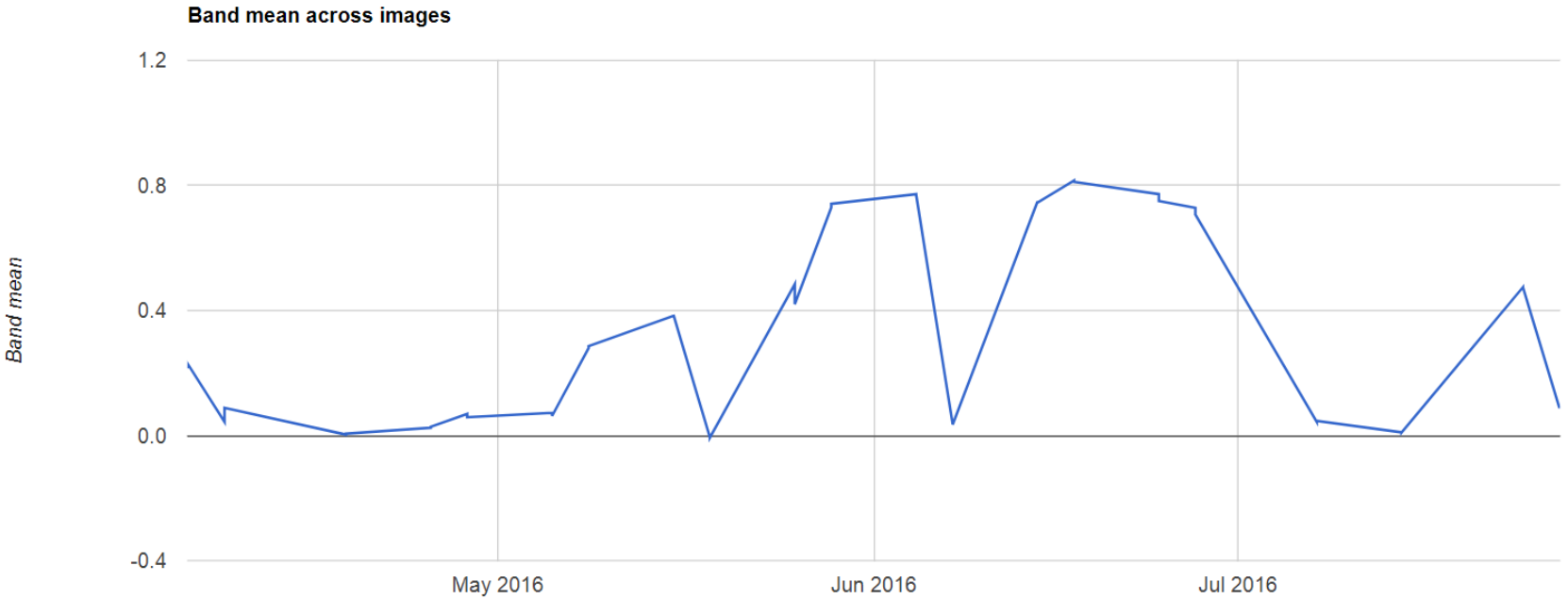


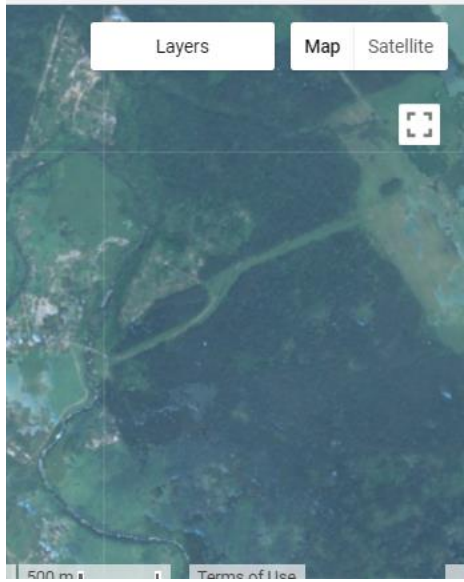

Google Earth Eng
Scripts
Docs
Assets
Filter scripts...
Owner (7)
users/esavelye43/collec
users/esavelye43/Demo
1_Demo_Inspecting Te
2_Demo_DEM
3_Demo_Classificatio
4_Demo_Chart NDVI c
5_Demo_Center Pivot
6_Demo_Elevation An
DEMO_Landsat
users/esavelye43/ivanov


Band mean across images
Band mean
0.75
0.50
0.25
0.00
-0.25
May 2017
Jun 2017
Jul 2017


Help
esavelye43
Tasks
write to this console.
cross images
017
Jun 2017
Jul 2017
(labeled by system:time_start)

Geometry Im
Google

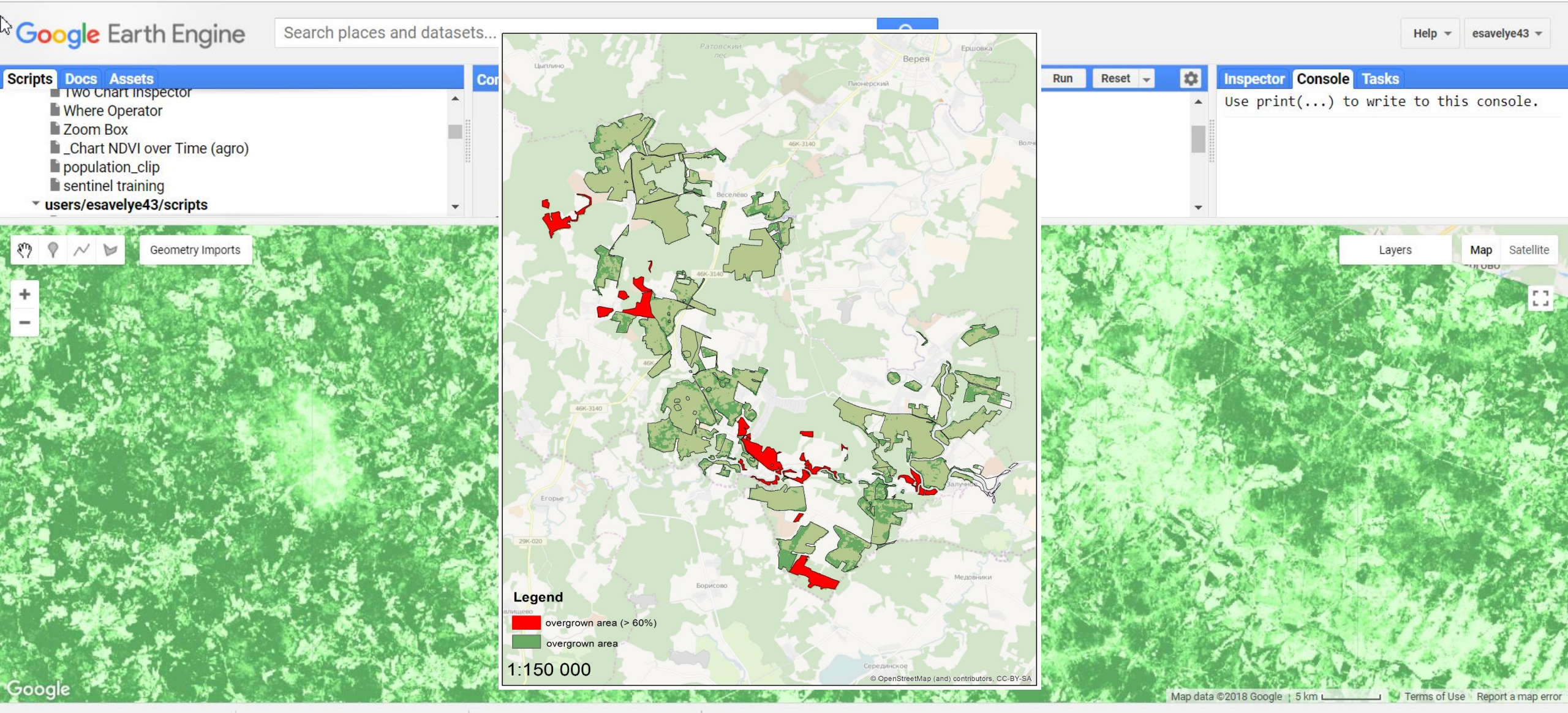

Band mean across images
Band mean
1.2
0.8
0.4
0.0
-0.4
May 2016
Jun 2016
Jul 2016


Layers
Map
Satellite
Terms of Use

Overgrown area detection

Based on: NDVI index

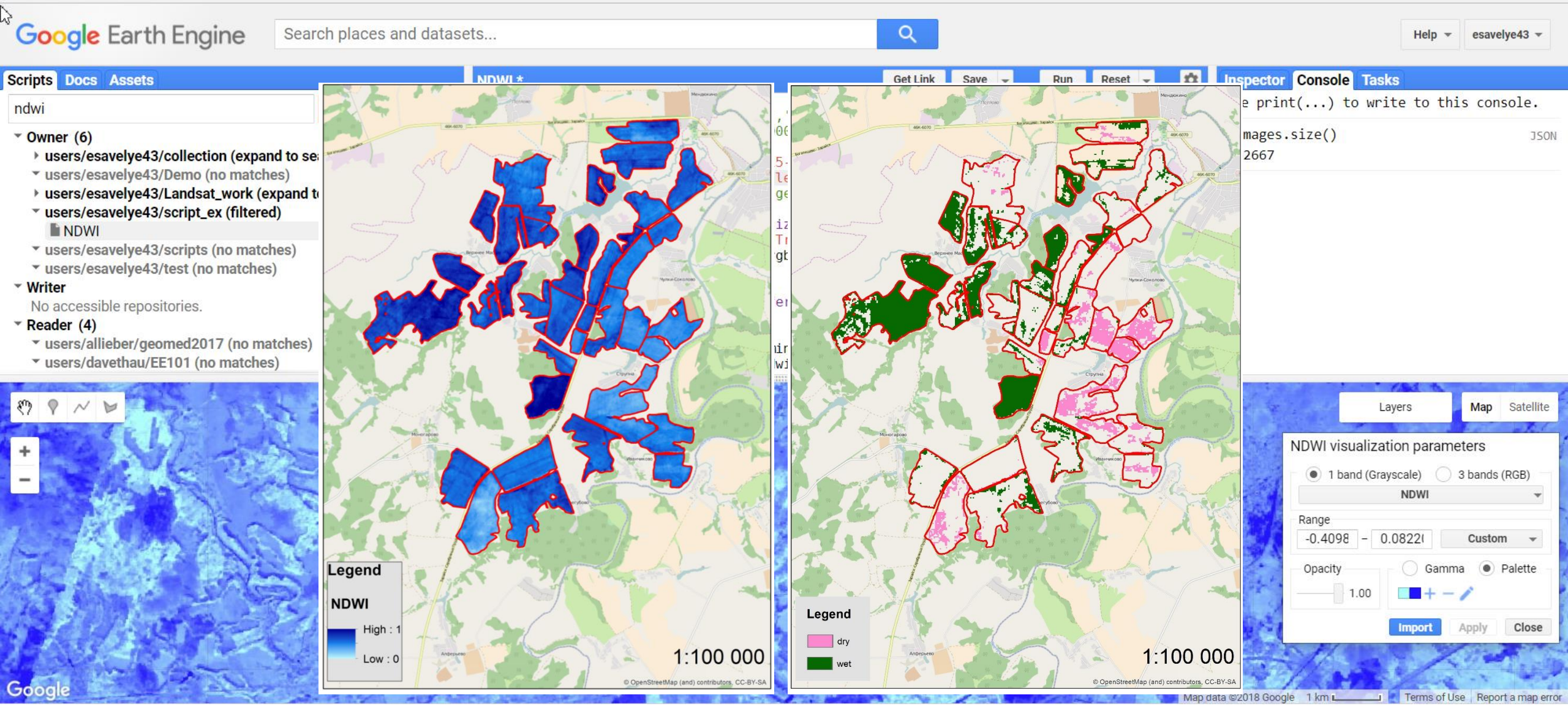
Expression: (NIR – Red)/(NIR + Red)



Water content assessment

Based on: The Normalized Difference Water Index (NDWI)

Expression: (NIR - MidIR) / (NIR - MidIR)



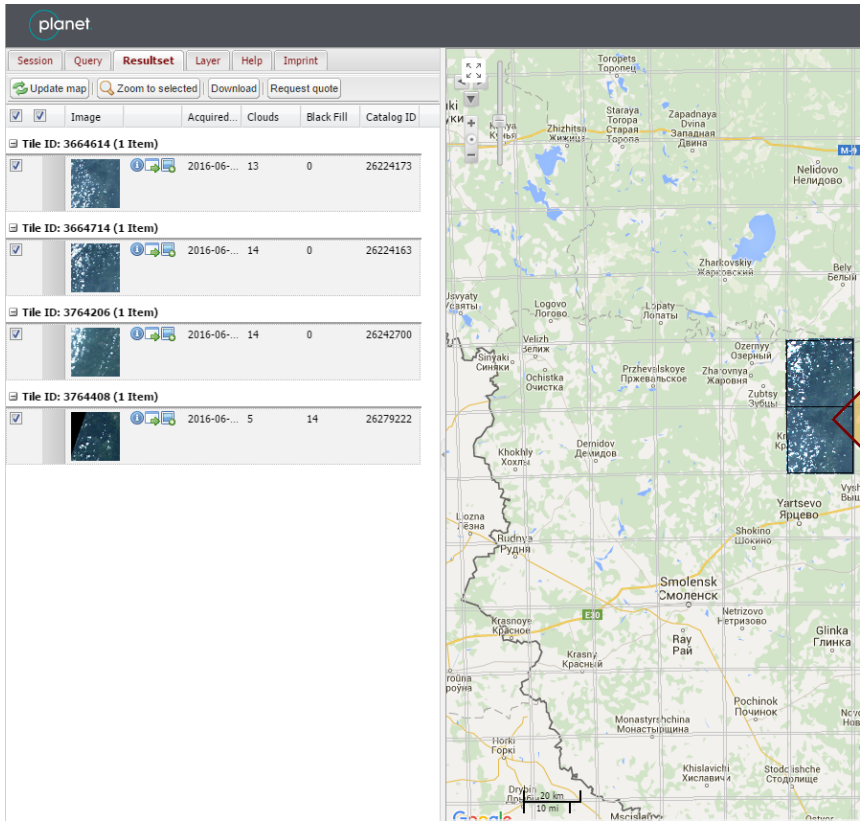
Chlorophyll content assessment

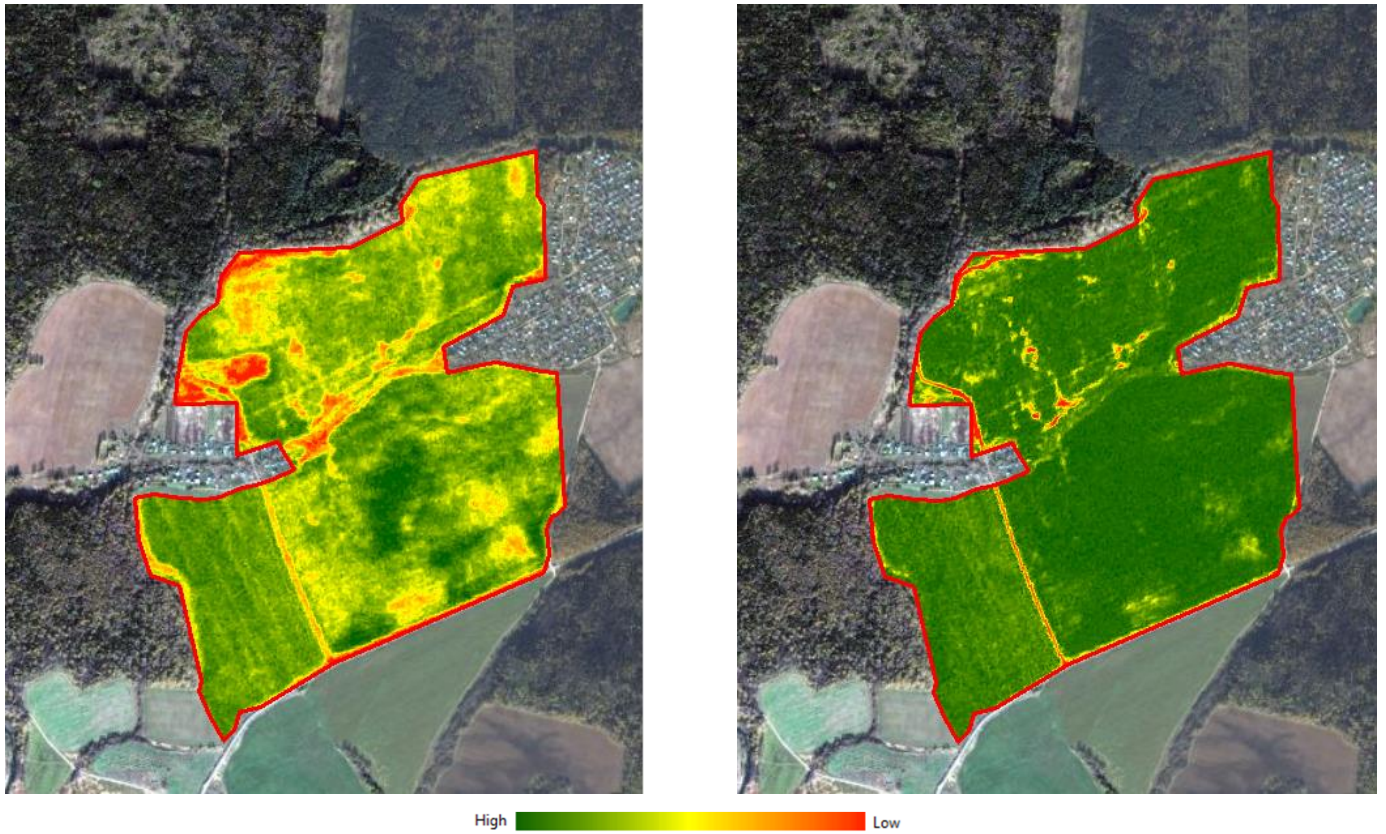
Data: RapidEye

Source: http://eyefind.rapideye.com/

Based on: Improved Modified Chlorophyll Absorption Ratio Index (MCARI)

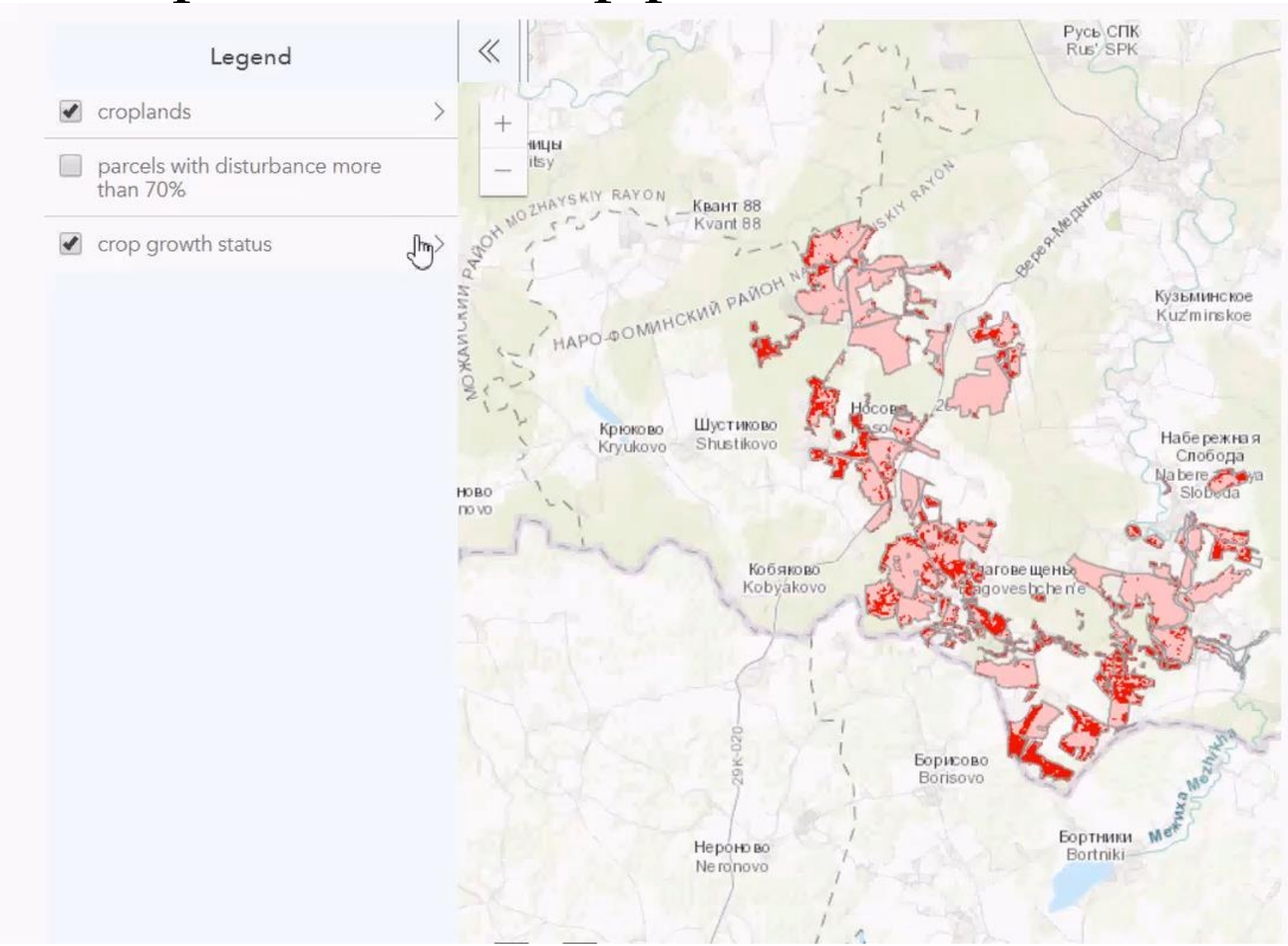
Expression: (1.5*(2.5(NIR – RedEdge) – 1.3(NIR – Green)))/SQRT((2*NIR + 1)^2 – (6*NIR – 5*SQRT(RedEdge)) – 0.5





Relative chlorophyll maps. May and June, 2015

Identification of problematic crop parcels



THANK YOU

es.khazieva@gmail.com