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SEPAL

System for Earth Observation
Data Access, Processing and
Analysis for Land Monitoring



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Thanks to

Governments of Norway, Germany, Finland, Japan

European Commission

USGS, USFS, NASA, ESA, JAXA, Google

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Many more...



SEPAL objectives

Improve data access, processing, and delivery of satellite data and information products to enable autonomous land monitoring capacity.

Technology and Innovation has rapidly advanced NFMS and MRV

Technology and innovation is enabling forest measurement and reporting like never before



Open Foris

20,000 installations and used in over 60 countries - in many countries provides the complete basis for data collection and analysis – 10 years of development in collaboration with countries



SEPAL

2,000 registered and active users representing 225 organizations in 85 countries



Impact

70% of 44 FREL/FRL submissions to UNFCCC have used Open Foris tools or platforms many autonomously

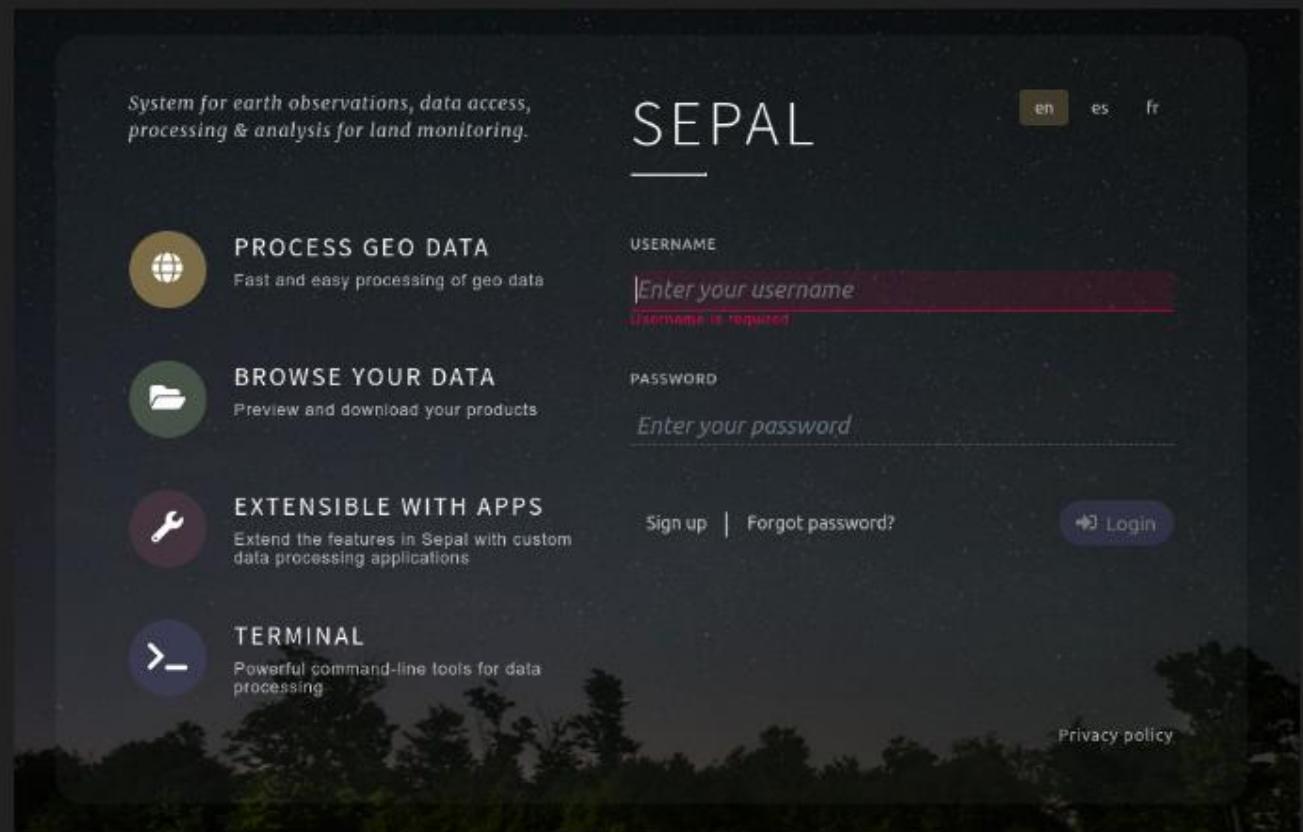


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Cloud-based catalyst for autonomous land monitoring

- Open source
- Easy query, access and processing of earth observation data
- Reduce time from innovation to adoption
- Remove fear of making mistakes; fail fast





SEPAL functionality

Optical and RADAR

Create composites / mosaics of Landsat and Sentinel Process and integrate SAR imagery (Sentinel 1 and ALOS) into analysis

Time series analysis

Analyze spatio-temporal trends using sophisticated algorithms (BFAST and LandTrendR)

Classification and change detection

Automatic and supervised classification and change detection

Image segmentation

Object based image analysis

Sample-based area estimation

Stratified area estimator design and analysis

Integrate user-supplied and very high resolution imagery

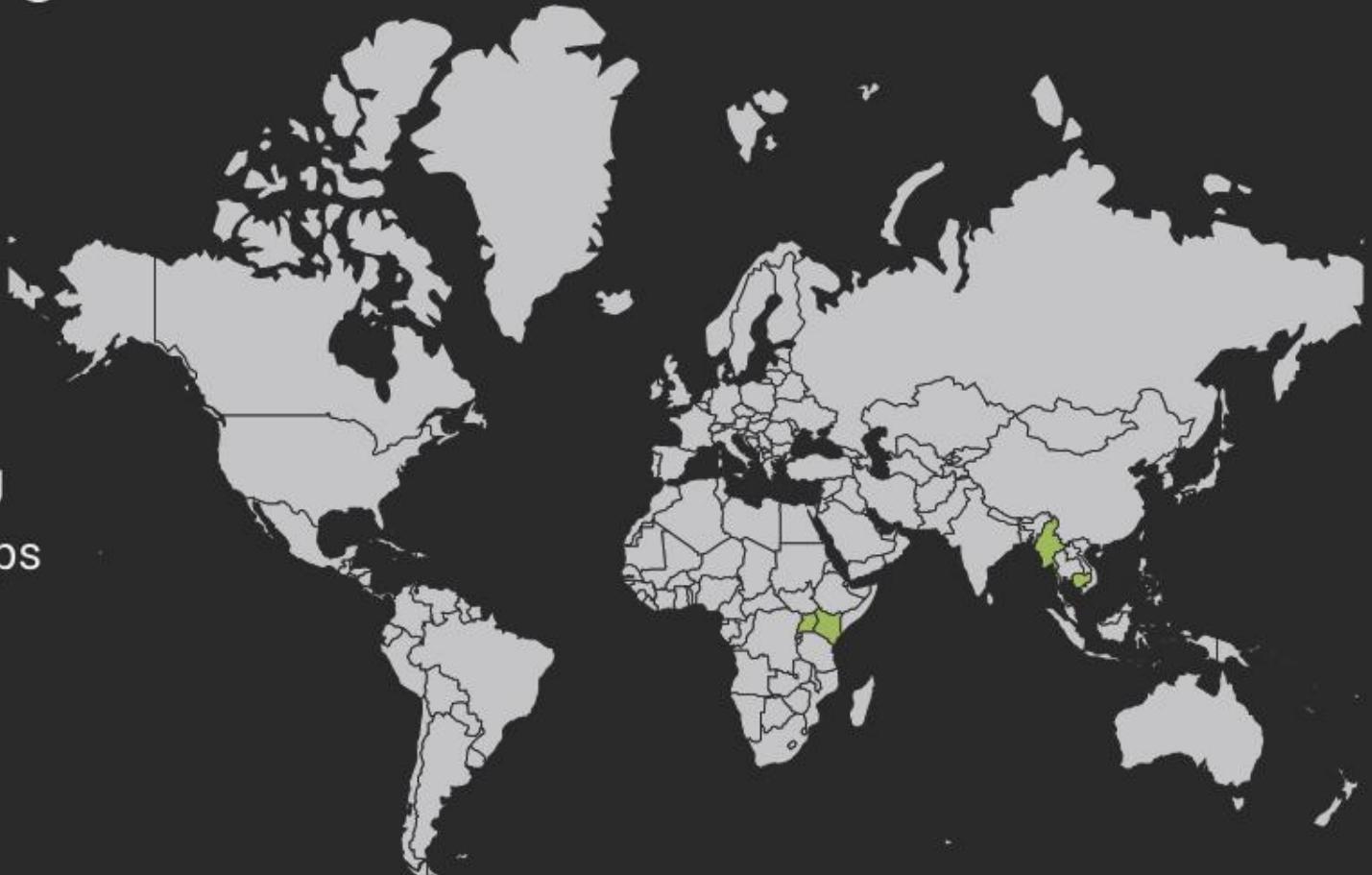
Integrate your own imagery and use very high resolution imagery for validation and calibration with Collect Earth Online integration

Forest restoration monitoring and planning

- In collaboration with ETH Zurich and Wageningen University and Research
 - Global map of tree cover potential and predicted changes in potential forest extent due to climate change
 - Module for forest restoration monitoring
 - Customizable tree cover potential maps at scale
 - Degraded forest identification
 - Identification of areas potentially suitable for restoration
 - Monitoring regrowth of forest cover
 - Integrated with sample based methods
- (Collect Earth Online)



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SEPAL on the go

Mobile and tablet compatibility



Search and process
satellite imagery



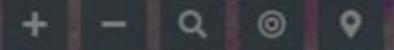
Access super computers



Store and access data



Analyze data using
predefined processing
chains



19m/px

A cloud based platform
for improving data
access, processing, and
delivery of satellite
data to enable
autonomous land
monitoring capacity



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SEPAL – a collaborative platform

In partnership with



European Space Agency



Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety



Global Forest Observations Initiative



SERVIR



Spatial
Informatics
Group



ETH zürich

phase, amp, residuals (HSV)



SEPAL – a collaborative platform

- Ecuador modules for change detection, degradation, and real-time alert modules to support REM (KFW)
- JICA/JAXA collaboration for JJ-FAST – JICA CB efforts
- SERVIR Regional Land Cover Monitoring System Module (NASA/USFS)
- Peatlands Monitoring Module (NICFI-Indonesia)
- Forest Enhancement Monitoring (FLRM) Module (Japan)
Many Universities contributing (e.g. Wageningen, ETH-Zurich)
- Collect Earth Online integration (many partners)

When modules become operational they are available to all

phase, amp, residuals (HSV)

Assumptions for peatland monitoring with remote sensing

Peatland conditions can be estimated through biophysical parameters detectable from remotely-sensed data.

Vegetation changes can be indicative of some kinds of condition improvements / degradation.

Soil moisture is an important indicator of peatland condition.

Physical location of canals and management activities are important indicators of peatland condition.

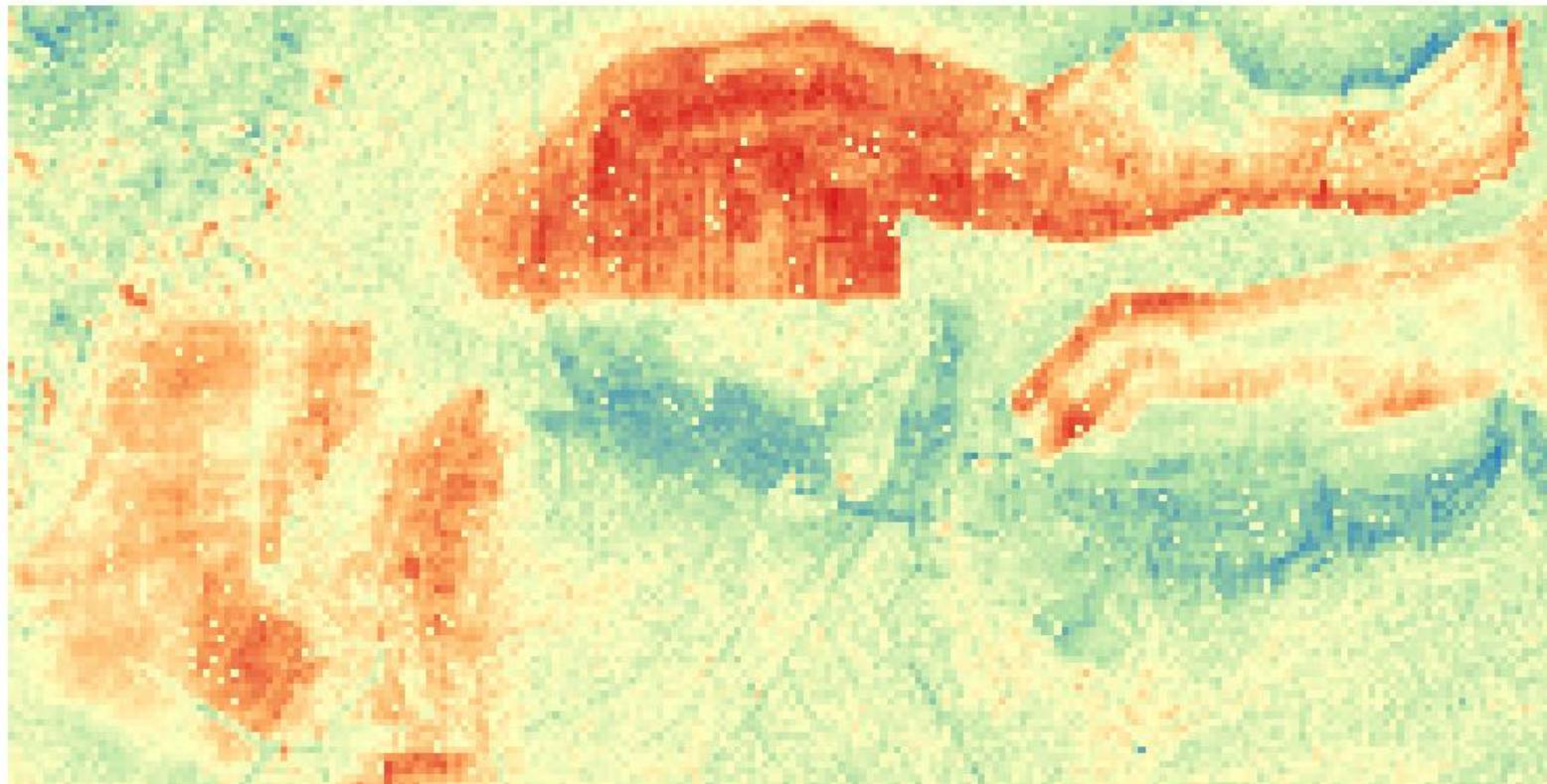
Data as a ‘weight of evidence’ approach:

1. Dam detection with high-spatial resolution optical imagery
2. Time-series analysis of field-based observations
3. Time-series analysis of optical spectral indices
4. Radar-based surface soil moisture estimates and trends over time

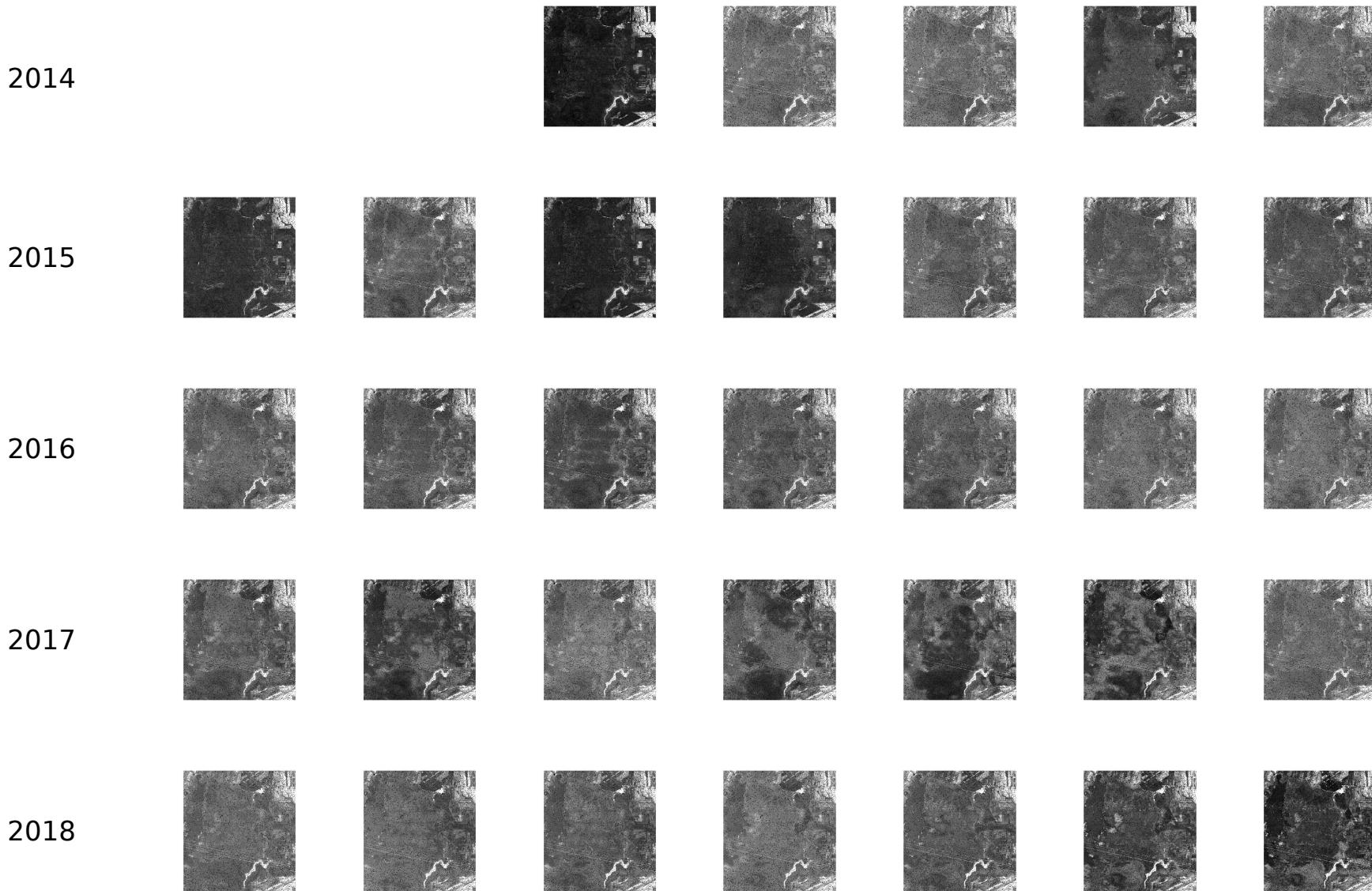
Soil moisture maps at 100m resolution

Down-scaling GLDAS soil moisture using Sentinel-1

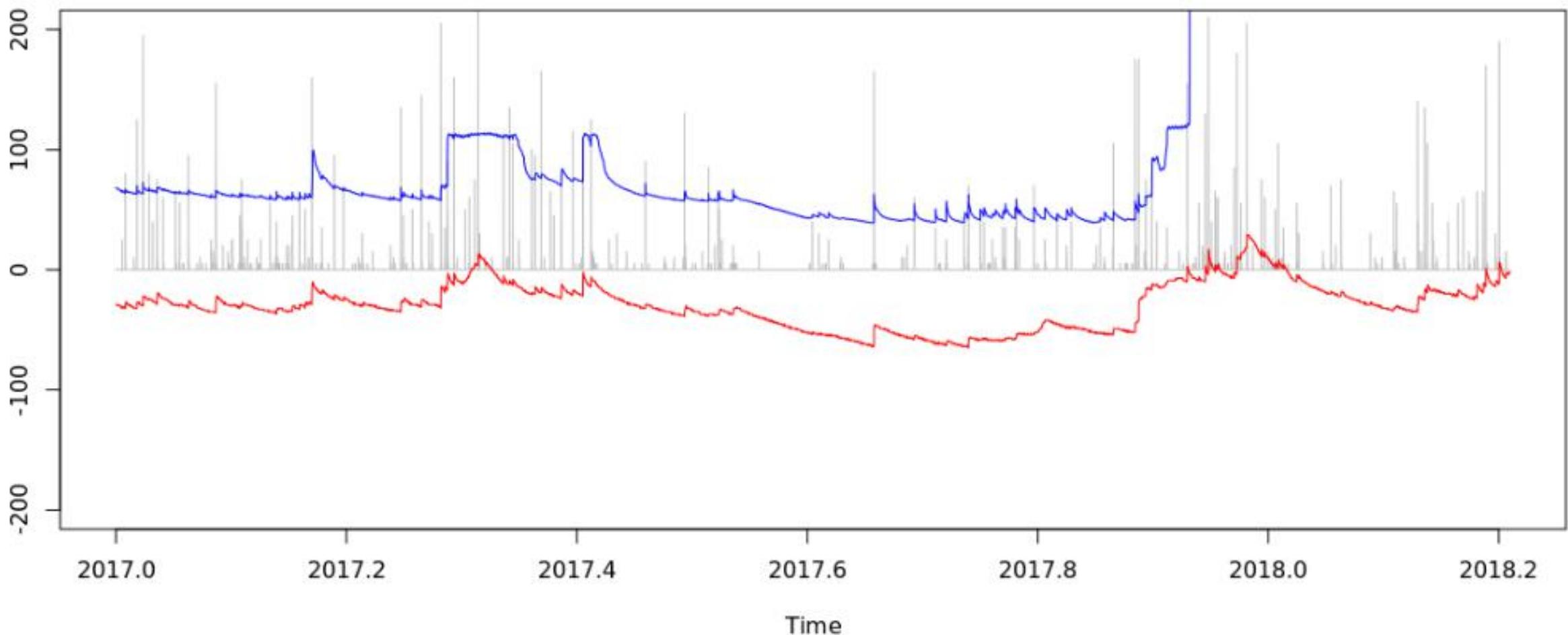
GLDAS info here: <https://ldas.gsfc.nasa.gov/index.php>



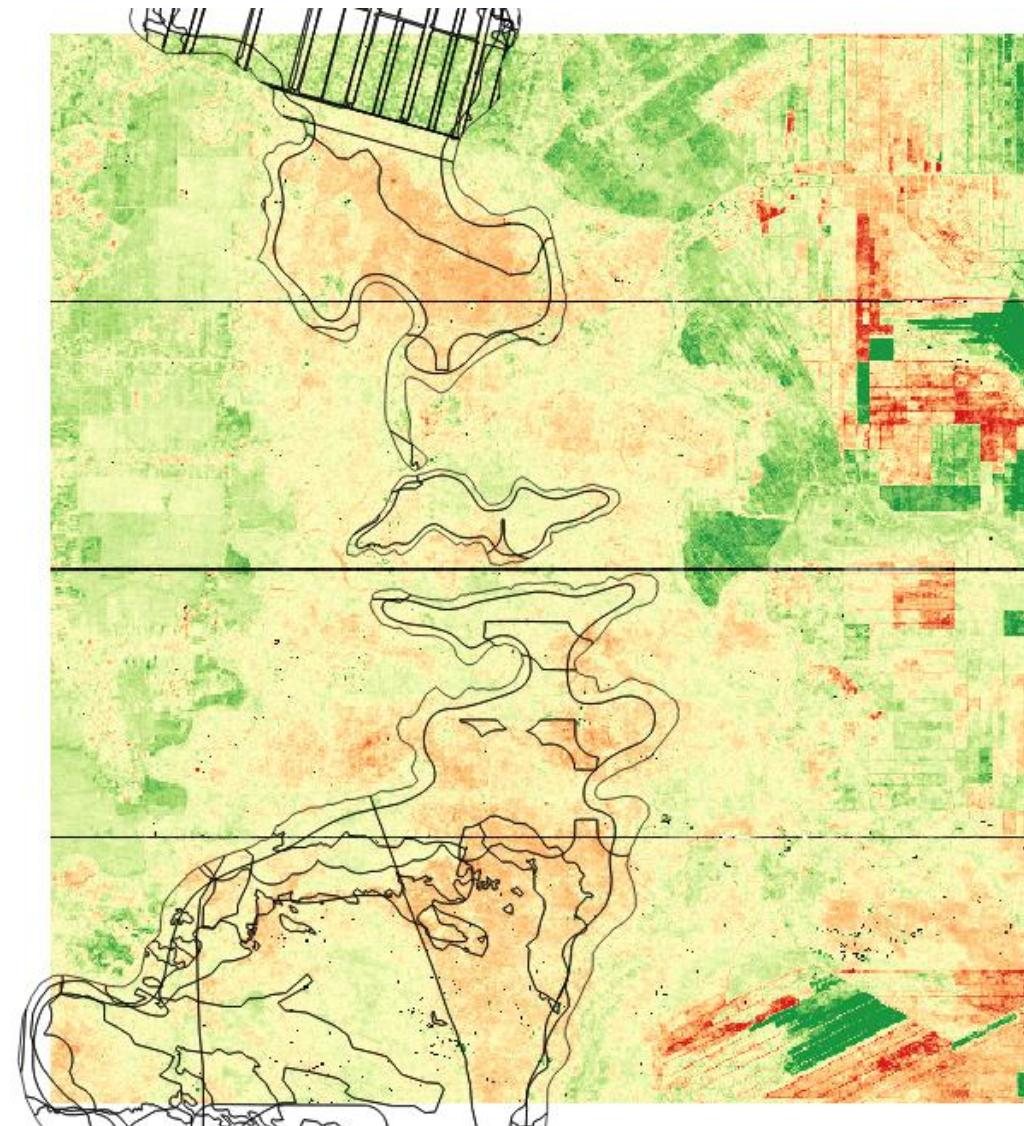
Surface Soil Moisture Maps - 2014 to 2018



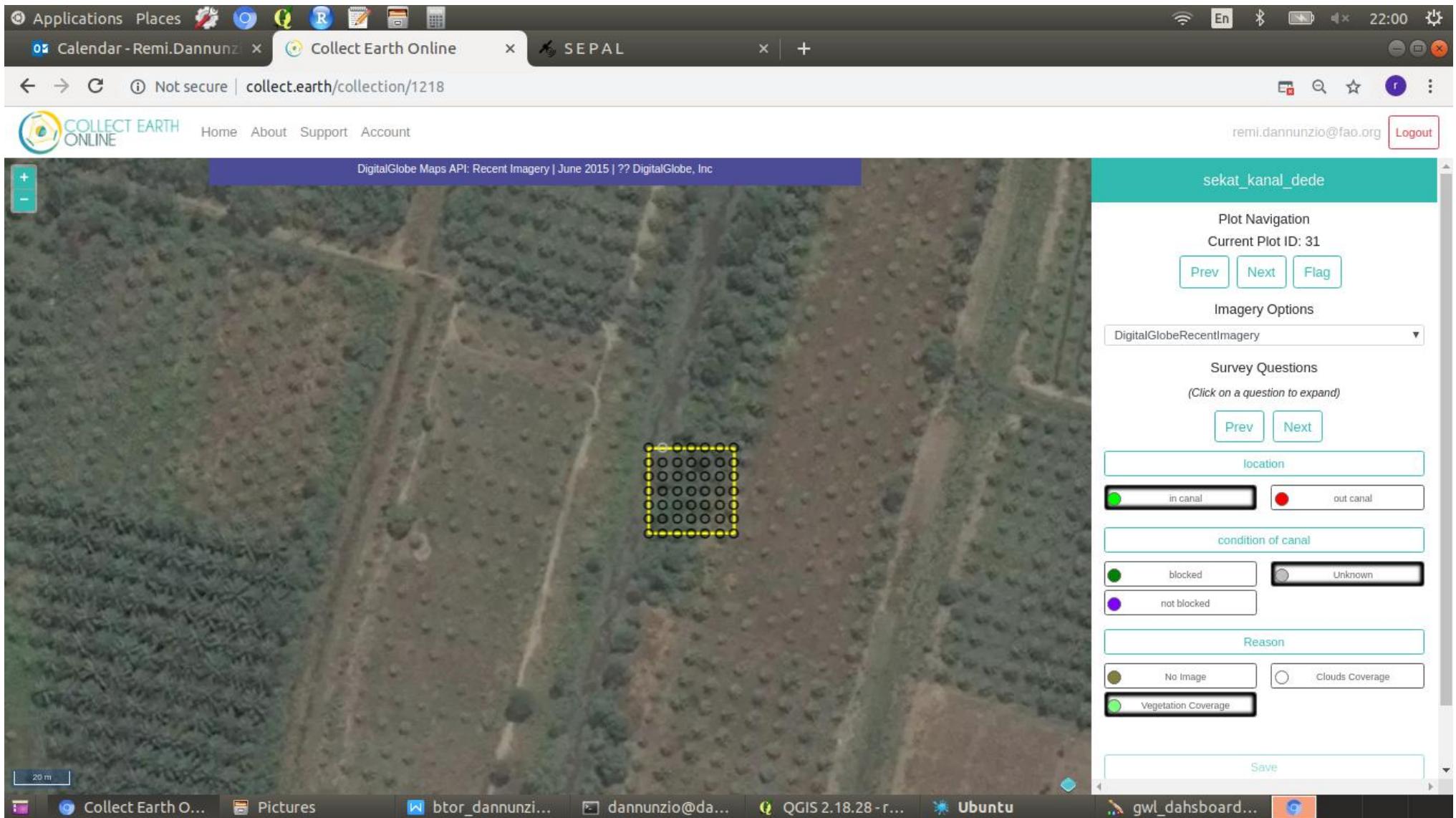
Field observation data to build a Soil Moisture / Ground Water Level model



Vegetation moisture index as a proxy for soil moisture



Canal blocking validation in CEO



- Improve connection between data / users / information products for monitoring
- Increase production speed of products required for MRV
- Open, flexible system for rapid and standardized image processing
- Building capacity for autonomous creation of national statistics

To access SEPAL: sepal.io



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Image courtesy of NASA: Landsat 1