A Candidate for Next-generation Copernicus High Resolution Layers: Agriculture

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Horizon 2020
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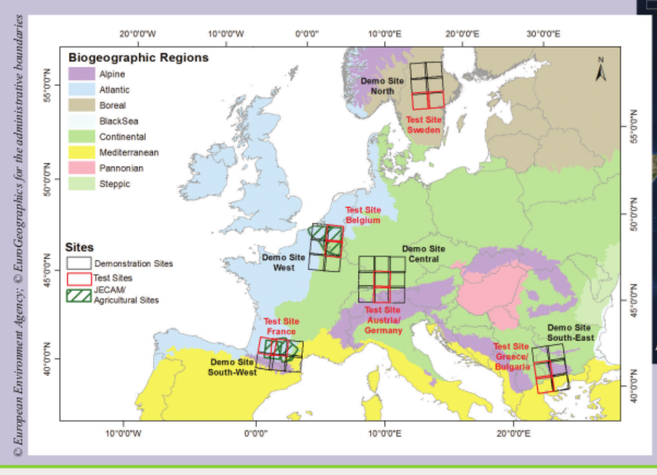
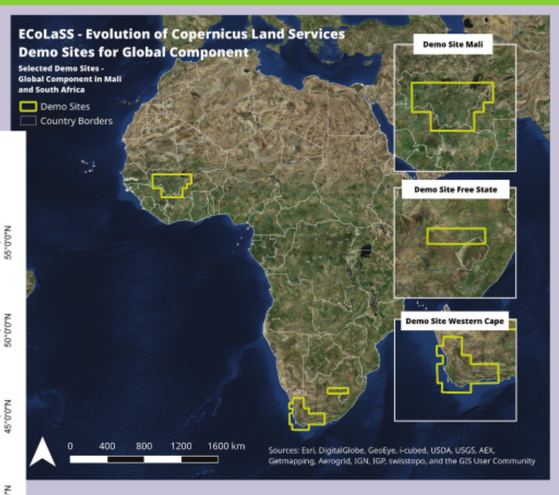
ECoLaSS – Evolution of Copernicus Land Services based on Sentinel data

Prototype & Test-sites: European and African sites, towards European/global Services





ECoLaSS: a Horizon 2020 project

Duration: Jan 2017– Dec 2019 (3 years)

GAF AG and Partners: SIRS, Joanneum Research, UCL, DLR

Key Objectives: Development of…

- Innovative Methods based on high volume data processing of Sentinel (Optical and SAR) time series
- Prototypes for improved and novel next-generation operational Copernicus Land Services, which are demonstrated in large prototype sites of biogeographical diversity.
- an Operationalization Framework including benchmarking of prototypes in view of their innovation potential and technical excellence for operational service implementation into Copernicus Land Services from 2020 onwards.

LPS 2019

Project Concept

Service Requirements
- ✓ User Needs
- ✓ EO and Other Data
- ✓ Infrastructure & Architecture

Methods
- ✓ Sentinel Optical+SAR Integration
- ✓ Time Series Analysis, Classification & Change Detection
- ✓ Incremental HRL Updates

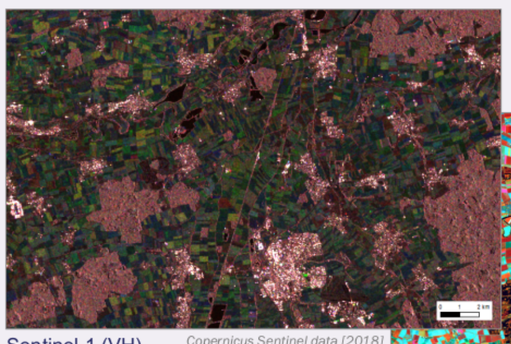
Prototypes
- ✓ Next-generation Services/Products for Continental & Global Component
- ✓ Demonstrated on Large Sites (Europe & Africa)

Operationalization
- ✓ Stakeholder Consultation & Endorsement
- ✓ Operational Maturity
- ✓ Integration into Copernicus Land 2020+

ECoLaSS

Methods/Workflow

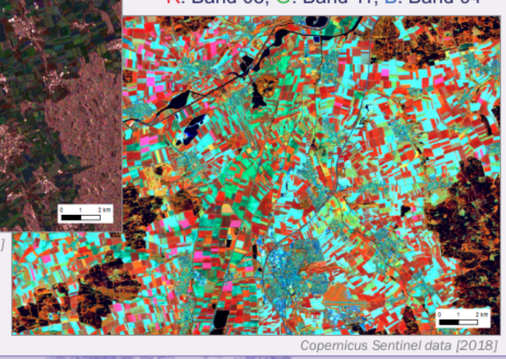
Dense Sentinel-1 and Sentinel-2 time series



Sentinel-1 (VH)
R: 2018-05-06,
G: 2018-06-23,
B: 2018-08-10

Copernicus Sentinel data [2018]

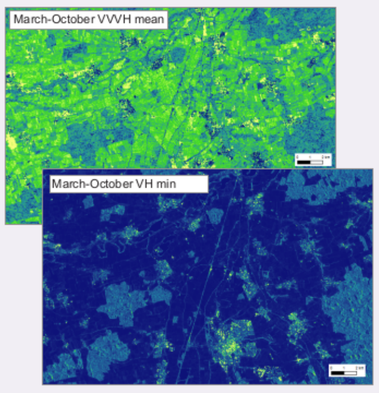
Sentinel-2 (2018-05-07)
R: Band 08, G: Band 11, B: Band 04



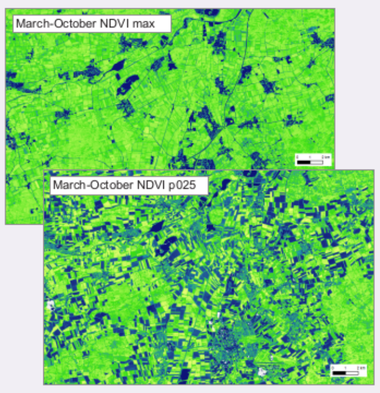
Copernicus Sentinel data [2018]

Extraction of Temporal Features

Temporal Features derived from different Sentinel-1 based indices/bands



Temporal Features derived from different Sentinel-2 based indices/bands

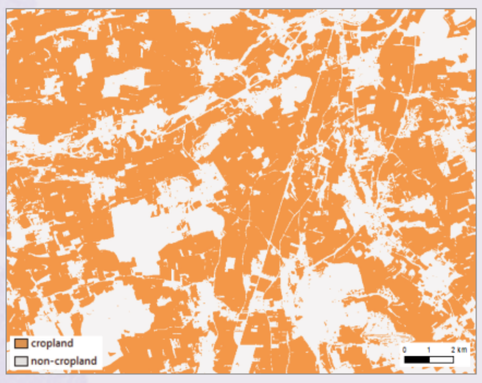


All images produced using Copernicus Sentinel data [2018]

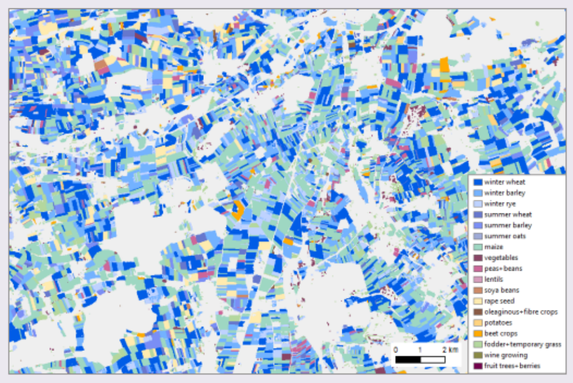
Random Forest Model Training → Forward Feature Selection → Random Forest Classification → Interpretation and Validation → Post-processing

Agriculture Prototypes (New Products)

Demo Site Central



Crop Mask Central
Overall Accuracy (OA) = 94%
Producer's Accuracy (PA) = 82-97%
User's Accuracy (UA) = 89-95%

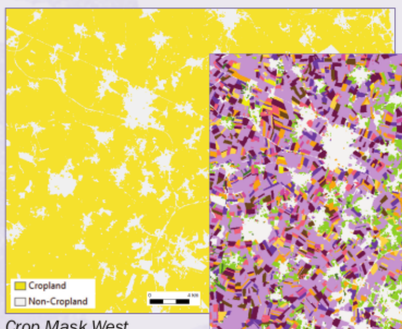


Crop Types Map Central
OA = 97%
PA = 93-96%
UA = 85-98%

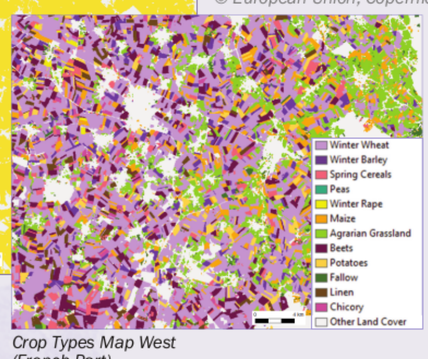
Produced using Copernicus Sentinel data [2018]
© European Union, Copernicus Land Monitoring Service 2015, European Environment Agency (EEA).

Demo Site West

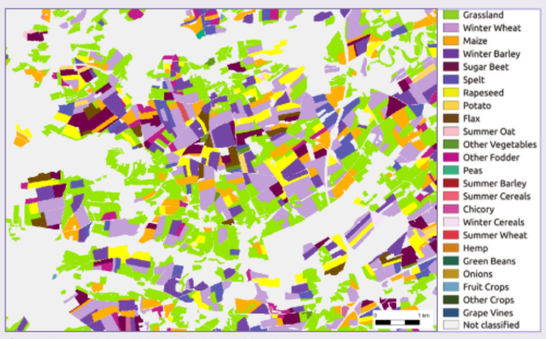
Produced using Copernicus Sentinel data [2016, 2017]
© European Union, Copernicus Land Monitoring Service 2015, European Environment Agency (EEA).



Crop Mask West (French Part)
OA = 95%
PA = 89-98%
UA = 94-97%

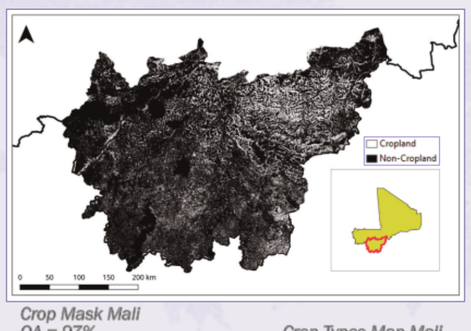


Crop Types Map West (French Part)
OA = 77%
PA = 46-96%
UA = 46-96%

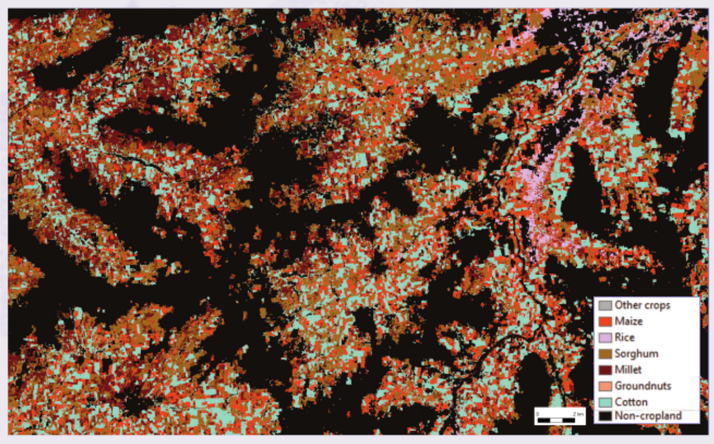


Crop Types Map West (Belgian Part)
OA = 92%
PA = 10-99%
UA = 9-99%

Demo Site Mali



Crop Mask Mali
OA = 97%



Crop Types Map Mali
OA = 54-63%
(depending on stratum)

Outlook

- Comparison of different time periods for classification
- Crop Mask for 2017 and 2018
- Crop Types Map for 2017 and 2018 with 15-20 pan-European classes

SCAN ME

GAFAG an e-GEOS (ASI / Telespazio) Company · SIRS · JOANNEUM RESEARCH DIGITAL · UCL Université catholique de Louvain · DLR

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