OPEN SOURCE SYSTEMS ENABLE NATIONAL CROP MONITORING AT 10-M IN NEAR REAL TIME

SEN2AGRI – SEN4CAP – *SEN4STAT*

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supported by European Space Agency

Sen2-Agri put some pieces of the **EO and IT (r)evolutions together**

Free, open and long term data policy (US, EU,...)

Open source processing tools using ML and AI algo.

WFP surveys

Mobile internet for many

CEOS — Coordination for EO systems redundancy & harmonization

Improved Meteo Data (e.g. GPM, ERAS,...)

JECAM — Joint Experiment for Crop Assessment and Monitoring — Global network with cross site experim.

GEOGLAM — Global Agricultural Monitoring

Best practices & standards

Agromet & models

EO ag. basic products => field level
1. Cropland mapping
2. Crop type mapping
3. Biophys. var. (fCover, LAI, fAPAR)
4. Crop condition monitoring

Meteo-EO-stat model => regional
5. Regional yield stimate/forecast
6. Nat./reg. production estimate

Internet of things & AI
© BioSense Inst.
7. Ag. practices monitoring
8. Early yield estimate
9. Crop production stat.
10. Nitrogen use efficiency
11. Emergence date

Sen2Agri system : an open source system running automatically in NRT or off-line, localy or in the cloud

GEOGLAM
Global Agricultural Monitoring

GPLv3 Free Software — Free as in Freedom

Sen-2 Agri operational system

Version 2.0 since May 2019

Son-2 Agri orchestrator

Temporal synthesis generator

Crop land mask generator

Crop type map generator

Bio-physical indicators generator

L1 time series

Atmospheric corrections

L2A time series

sentinel-2

+ AGRICULTURE

Surface reflectance composite

Dynamic annual cropland mask

Crop type map & extent area

Vegetation status indicators

In situ information

Monthly cloud free surface reflectance composite at 10-20 m

Cropland mask at 10m updated every month

Crop type map at 10 m for the main regional crops

Vegetation status map at 10 m delivered every week (NDVI, LAI, fCover, fAPAR)

Demonstrated at national scale since 2016 and running operationnaly in various contexts

UCLouvain CESBIO CS CS ROMÂNIA

Produce high resolution EO products suitable for Agricultural Monitoring from local to national scales
Processing chains validated over a wide range of cropping systems around the world

slurm

Download and process Sentinel-2 and Landsat 8 dense time series without any effort
Cutting-edge image processing methods are performed automatically over your region and monitored period

SNAP

Access through a Graphical User Interface
System to be installed on a Linux server but easily accessible and configurable on a graphical user interface through your favorite web browser

Free and Open source system under GPL license
Based on Orfeo Toolbox and SLURM

GPLv3 Free Software — Free as in Freedom

Data privacy
Field data and products can be processed and stored locally

UCL

Sen2-Agri system : simple parametrization
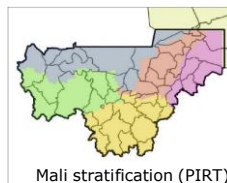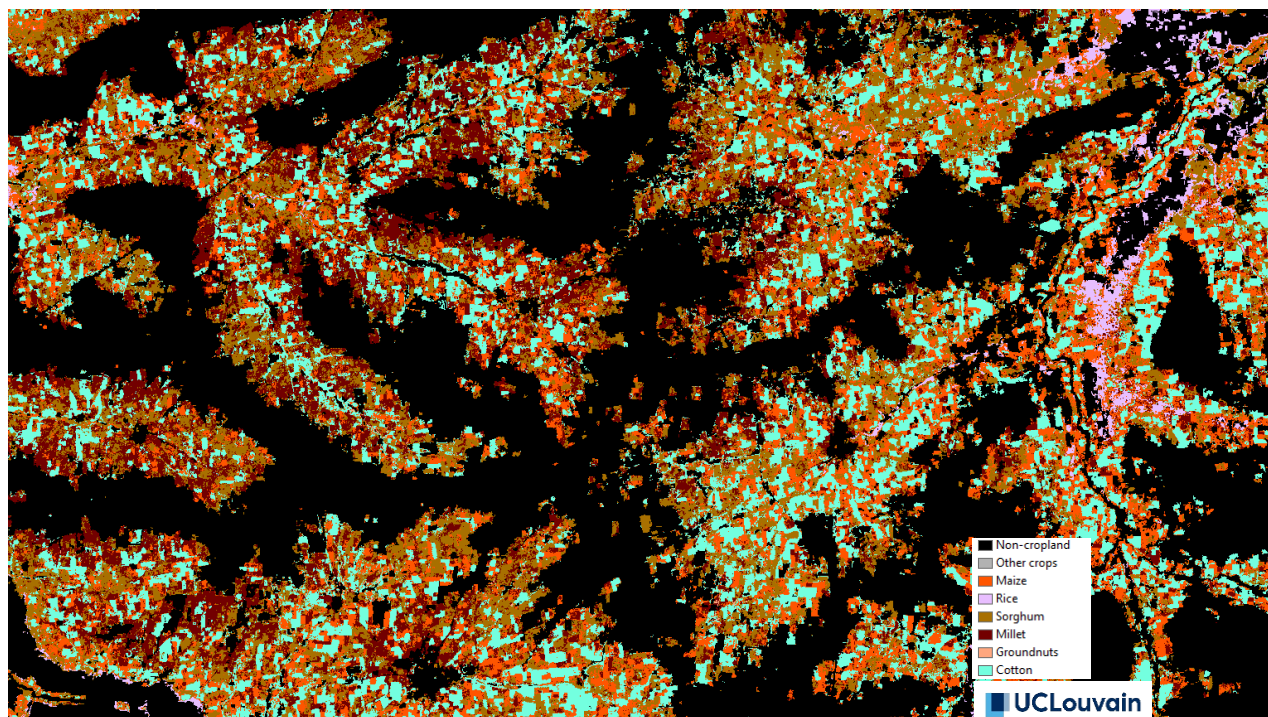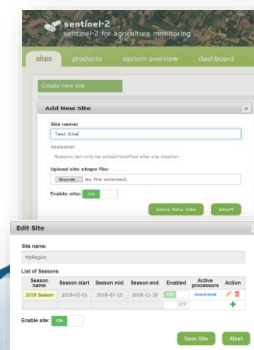## field data collection planning

Before the monitoring period	Monitoring period

System initialization

Start of the season   End of the season...

Sen2-Agri : parameters settings

Area of Interest	Shapefile to be uploaded
Monitoring period	Start and end dates to be defined
S2 or S2 + L8	To be selected
Other parameters	...

Mali stratification (PIRT)

Sen2-Agri : field campaign

Sampling design	Stratification and sampling
Field visit	In situ data collection – early survey
	In situ data collection – mid-season survey
Data upload	Field data quality control and formating

esa   UCLouvain

Legend:
- Non-cropland
- Other crops
- Maize
- Rice
- Sorghum
- Millet
- Groundnuts
- Cotton

UCLouvain

sentinel-2
→ AGRICULTURE

Open Source

Mali: National Statistics

GEOGLAM
Global Agricultural Monitoring

November 2016
5/10/2016-25/11/2016

Cropland Area Indicator
per Mali Commune
for the 2016 growing
season

240 000 ha
120 000 ha
85 000 ha
30 000 ha
15 000 ha
0 ha

UCLouvain   esa
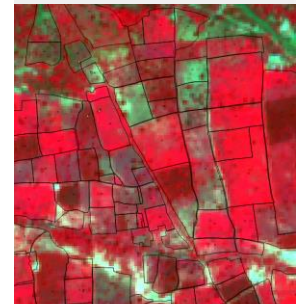
CGIAR   ICRISAT   INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

GEO GROUP ON EARTH OBSERVATIONS

sentinel-2
→ AGRICULTURE

GEOGLAM
Global Agricultural Monitoring

4
3
2
1
0
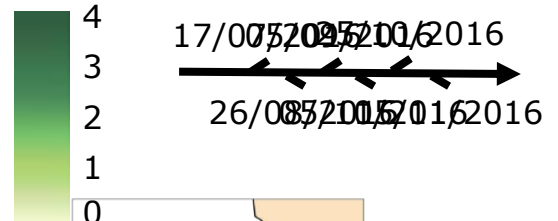
17/05/2016 17/07/2016 25/10/2016

26/08/2016 05/10/2016 15/11/2016

Koutiala

UCLouvain   ICRISAT   esa

4

Sen2-Agri vivid community of users

Downloads since July 2017
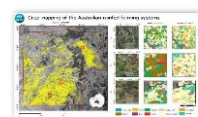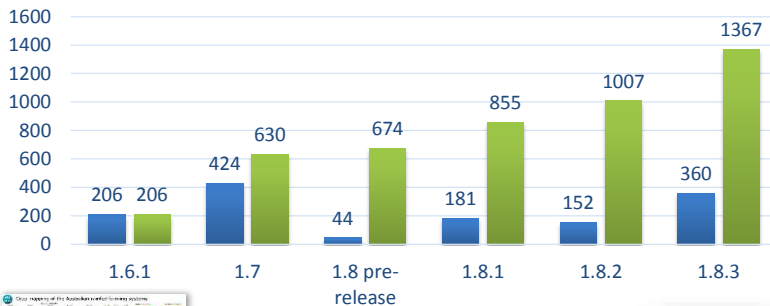
TOP 10 DOWNLOADS

UNITED STATES:	50
GERMANY:	49
ITALY:	46
FRANCE:	31
SOUTH AFRICA	25
INDIA:	20
IRAN:	19
SPAIN:	18
UK:	18
INDONESIA:	16

A comprehensive set of tools to support Sen2-Agri users

Website with various resources   *FAQs*

http://www.esa-sen2agri.org/resources/faq/

Forum - 8 topics

http://forum.esa-sen2agri.org/
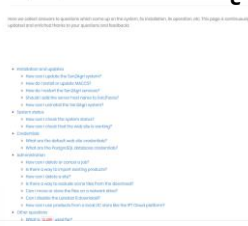
News

› Release of the version 1.7 of the Sen2-Agri system November 30, 2017
› Sen2-Agri system release July 7, 2017
› Demonstration phase results at national and local level July 5, 2017
› Production of a national crop type map over the Czech Republic using Sentinel-1/2 images May 15, 2017
› Sen2-Agri stakeholder meeting in South Africa May 12, 2017
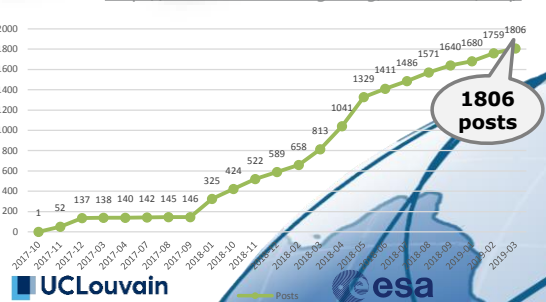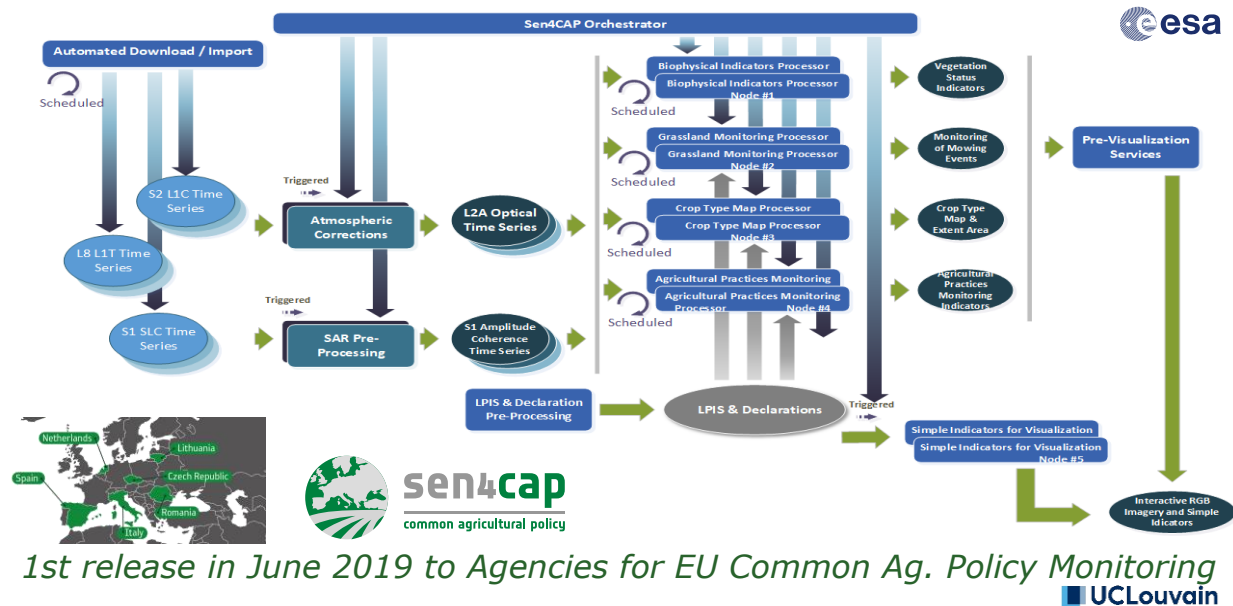› Sen2-Agri project at IRSE-37 May 8, 2017

Related Activities

Sen4CAP open source system: adding to Sen2Agri new modules full processing of Sentinel-1 time series with object-based approach

1st release in June 2019 to Agencies for EU Common Ag. Policy Monitoring

2-day trainings in each 6 Paying Agenciess premisses (Feb.- Apr.19)

Training at AGEA (Rome, ITALY)
19-20/03/2019

Training at NMA (Vilnius, LITHUANIA)
06-07/03/2019

Training at NVWA (Zwolle, THE NETHERLANDS)
11-12/03/2019   © Wilmer Woudwijk

Sentinels indicators to monitor agricultural practices

Crop type mapping

Growing vegetation indicators

Grassland mowing detection

Agricultural practices monitoring

Harvest

Catch Crop period

ESA UNCLASSIFIED

Harvest – Visual check

Winter Catch Crop – Visual check
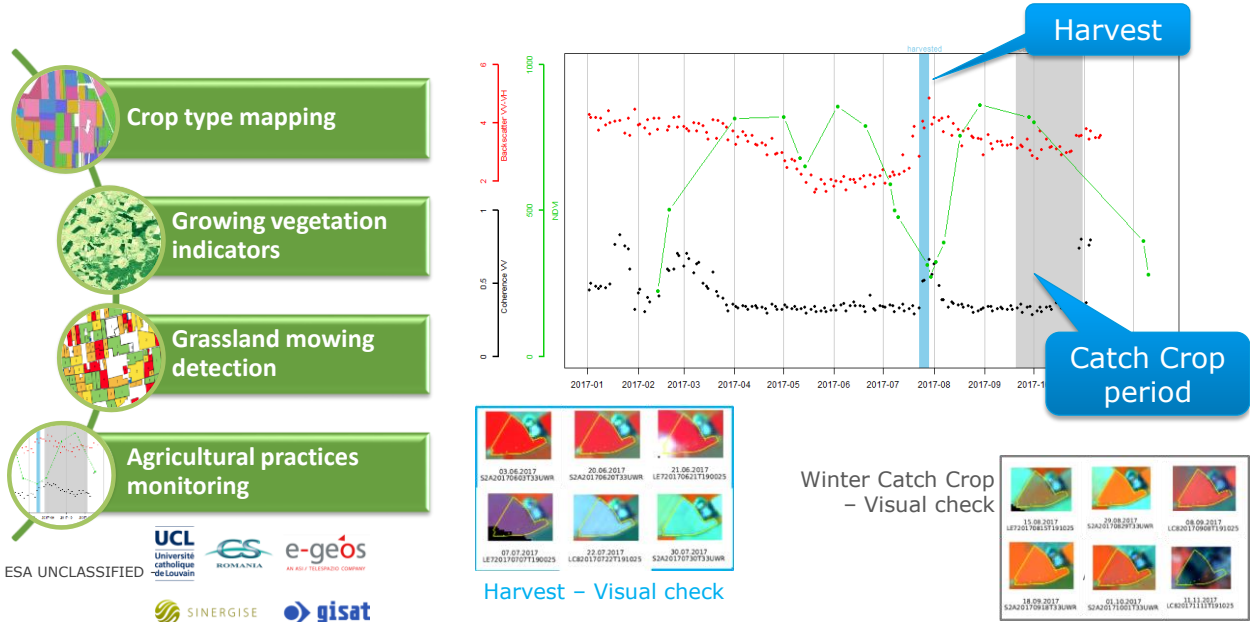
2018: National crop type mapping over 6 countries
Romania (100+ crop types)

Declared crop type

Predicted crop type

Confidence index

Conformity assessment

Crop type
- Alfa-alfa
- Autumn barley
- Autumn common wheat
- Autumn rape
- Been peas
- Corn
- Fresh vegetables
- Sunflower
- Permanent crop
- Grassland
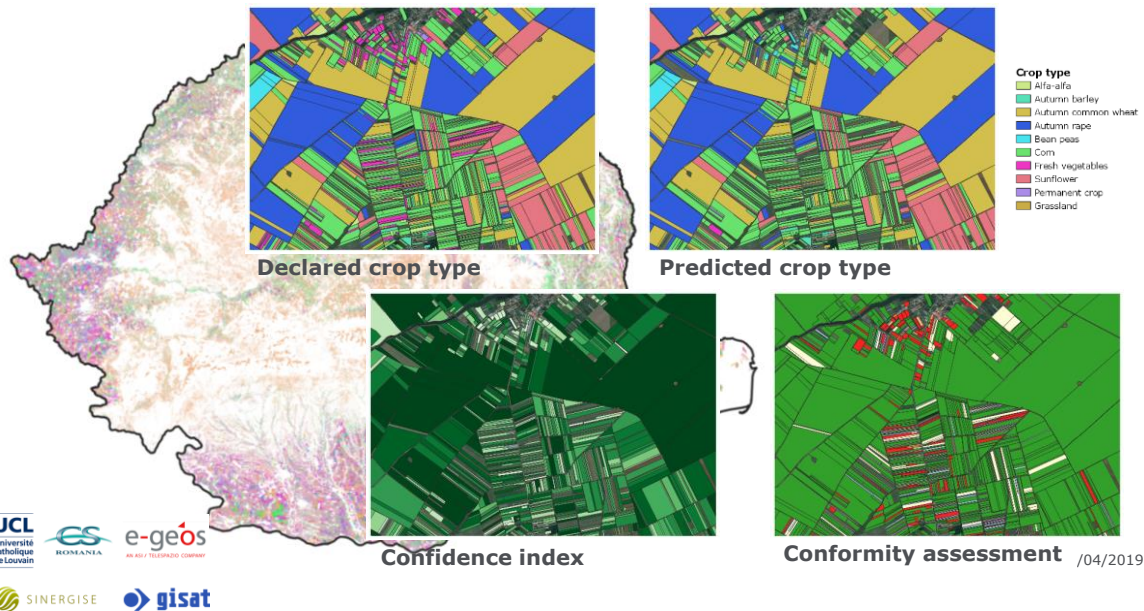
Crop diversification compliance analysis at holding level
(more than 15 millions of parcels using 6 different regulations)

CZECH REPUBLIC

10,41%
1,39%
88,20%

CASTILLA Y LEON

16,77%
0,39%
82,83%

ITALY

6,63%
0,46%
92,91%

- Compliant
- Not compliant
- Missing information

*At holding level

LITHUANIA

0,49%
3,82%
95,69%

NETHERLANDS

5,40%
5,80%
88,81%

ROMANIA

6,77%
5,36%
87,88%

ESA UNCLASSIFIED - For Official Use

UCL Université catholique de Louvain   CS ROMANIA   e-geos AN XSI / TELESPAZIO COMPANY

SINERGISE   gisat
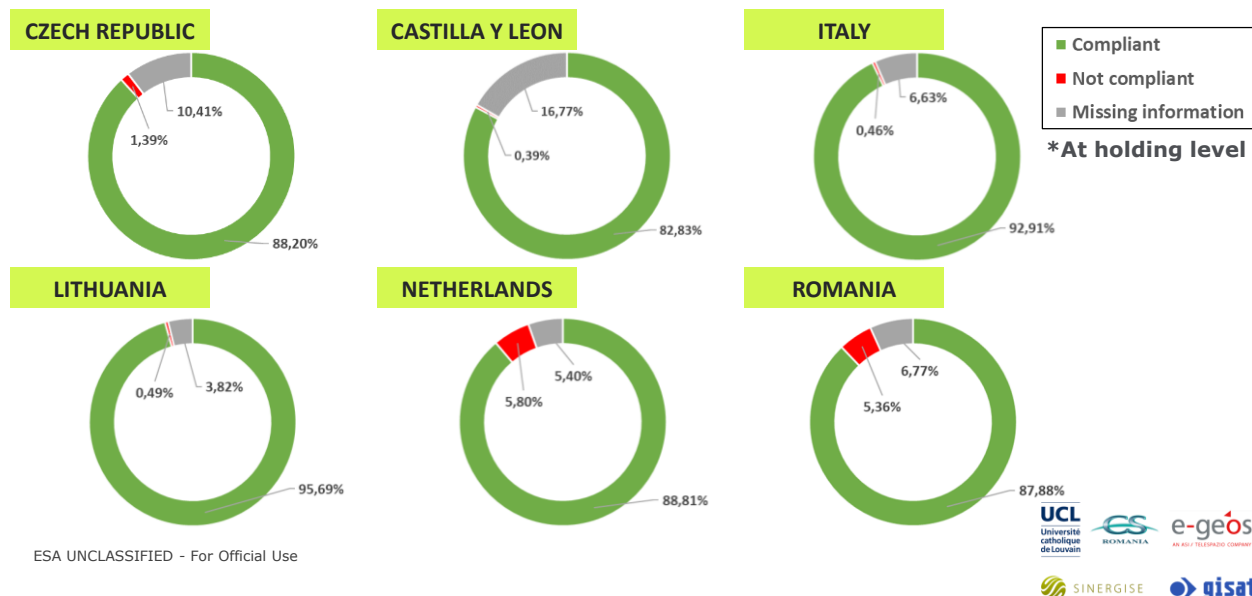
Sen2-Agri Version 2.0 – upgrades and trainings   ·esa

New features:

- **Support for MAJA processing** => Can read new S2 data format
- **Improvement of L2A processor** => parallelization
- Support local DIAS repositories (CreoDIAS, MUNDI, ONDA) and also AWS
- **New visualization tool** open source (WMS in QGIS, Firefox,…)
- + forthcoming ones : **integration of Sentinel-1** incl. coherence from Sen4CAP !

Forthcoming Sen2-Agri webinars (14h CEST) – 1st Thursday every two months

- ✓ 6 June 2019 : special v2.0 + advanced Q&A
- ✓ 4 July 2019
- ✓ 5 September 2019
- ✓ 7 November 2019

ESA Advanced Training Course on Land Remote Sensing – Agriculture
16-20 Sept. 2019 at UCLouvain (Belgium)
Registration opened : landtrainng2019.esa.int

→ 9th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING: AGRICULTURE

·eesa

16–20 September 2019
Université catholique de Louvain
Belgium

#LTC2019   Hosted by UCLouvain