Welcome to the 11th webinar

The webinar will last around 1h

The slides will be available on the Sen4CAP website in the coming 48 hrs (http://esa-sen4cap.org/)

Presenters:

Sophie Bontemps & Diane Heymans from *UCLouvain*

Laurentiu Nicola from *CS GROUP - ROMANIA*

Members of the consortium available to answer your questions

Webinar outline

- Sen4CAP overview
- System evolution
  - New version 3.1 – Support for MAJA 4.5.4
  - Next version 3.2
- New use cases for 2022
  - Test sites
  - Parcels heterogeneity
  - Bare soil detection
- Next events

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Funded by European Space Agency

esa

sen4cap
common agricultural policy

EO Experts

UCLouvain gisat SINERGISE e-geos AN ASI / TELESPAZIO COMPANY ROMÂNIA

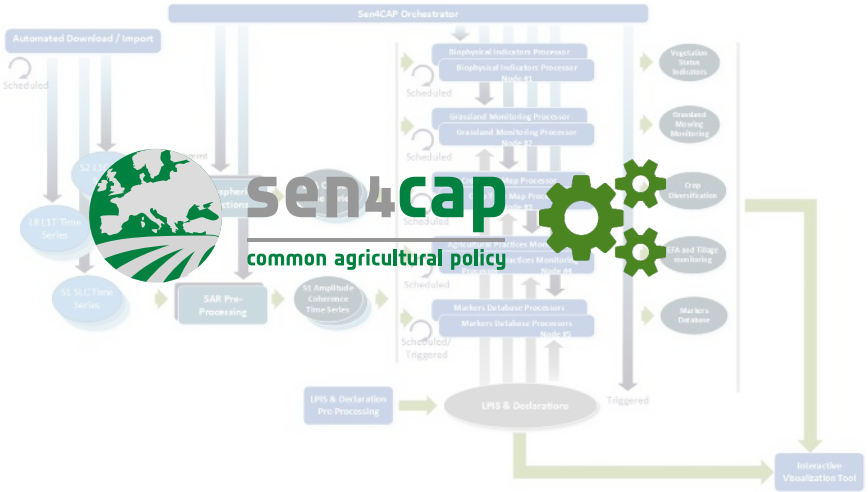
Sen4CAP system

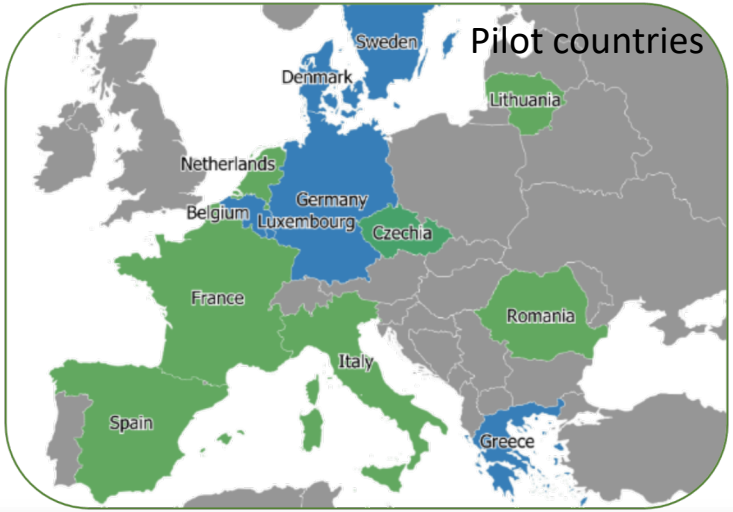
User group:
6+1 Paying Agencies

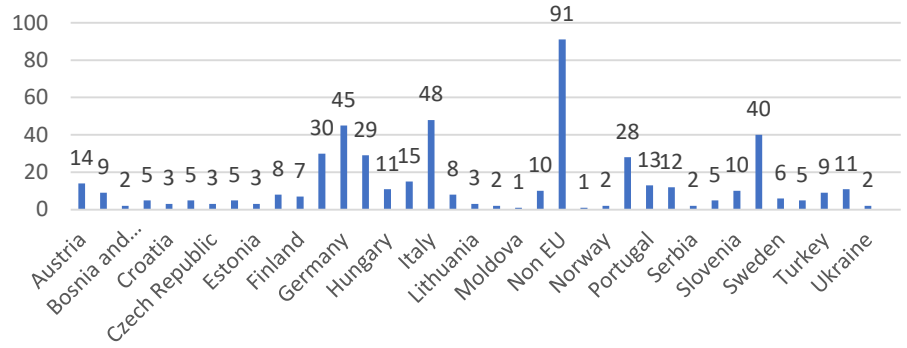
Guidance by DG-Agri, JRC, DG-Grow.

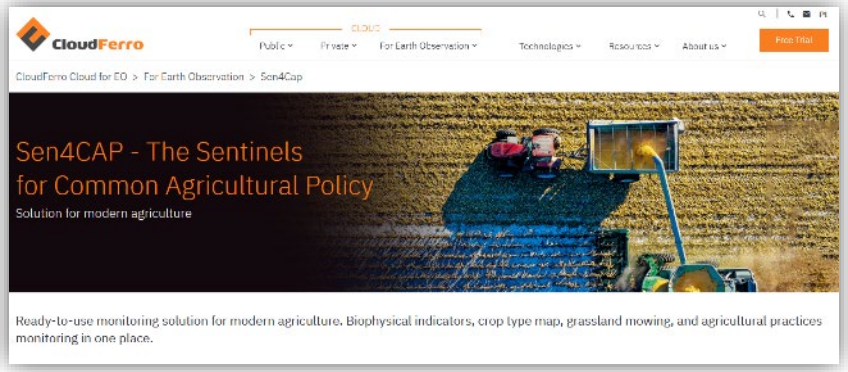
From an ESA project …

…to an open source system uptaken by the CAP community

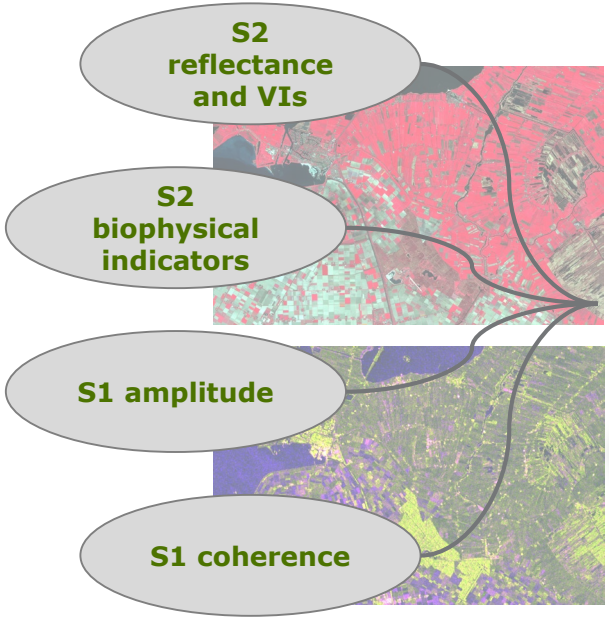






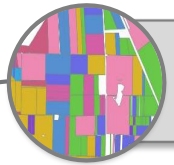


Markers and products assessed through selected use cases but available for many other applications

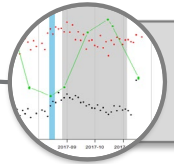


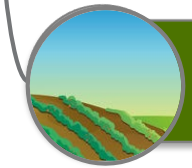
Subsidy applications

API interface


Crop type map

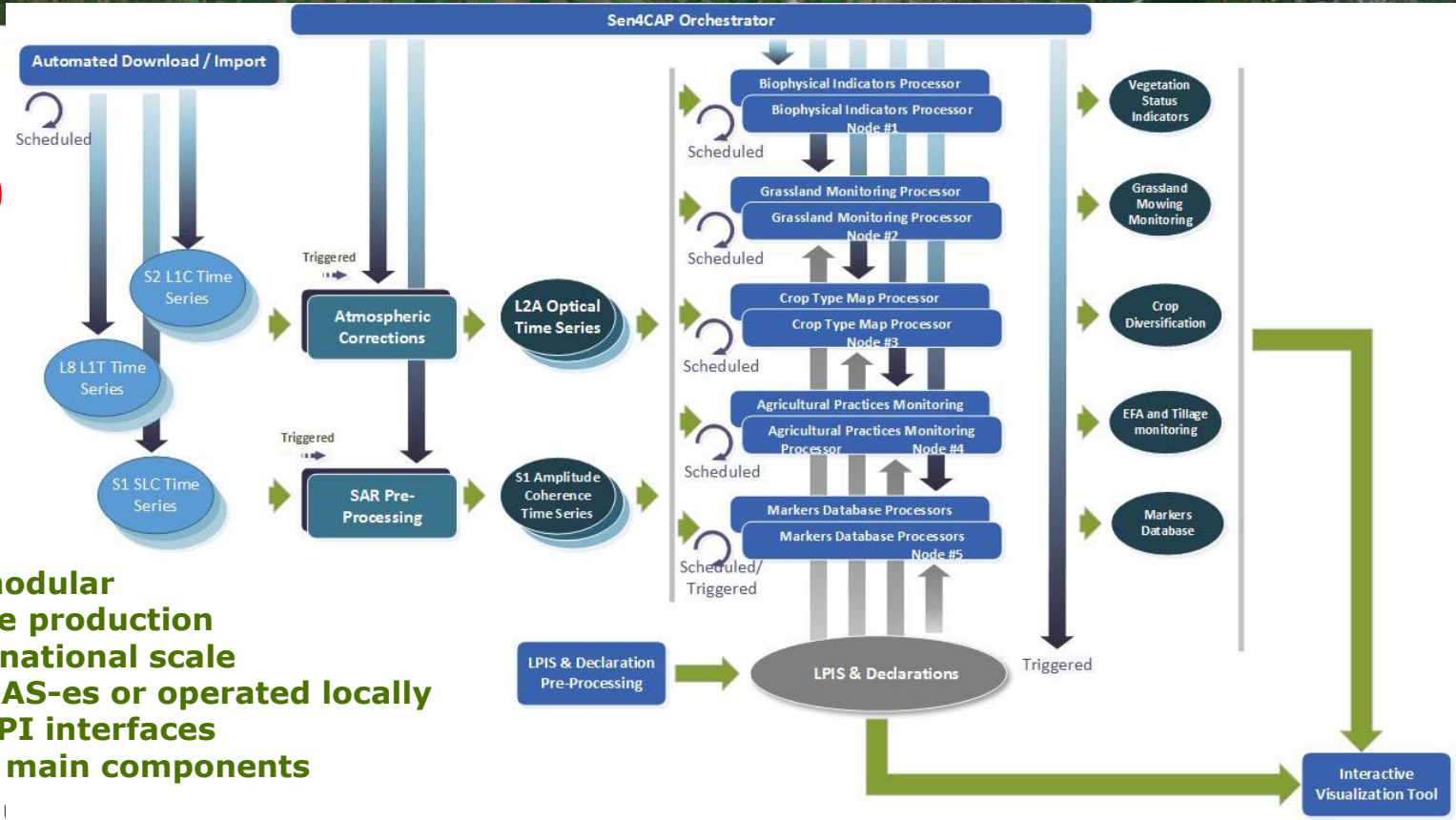
Grassland mowing product


Agri. Practices monitoring product


New schemes

Sen4CAP – An open-source system

Version 3.1 delivered on 20 Jul 2022



- **Sentinel-1 & -2**
- **Automated and modular**
- **For NRT or off-line production**
- **Demonstrated at national scale**
- **Portable on all DIAS-es or operated locally**
- **User-friendly & API interfaces**
- **Dockerization for main components**

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Sen4CAP system : simple parametrization and subsidy application upload

Before the monitoring period | Monitoring period

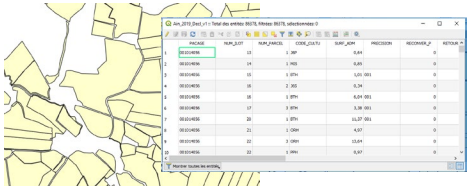
System initialization

Start of the season → End of the season...

Sen4CAP system : main parameters settings

Area of Interest	Shapefile to be uploaded
Monitoring period	Start and end dates to be defined
S1+S2 / S1+S2+L8	L8 to be selected

Subsidy application

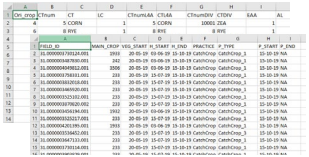


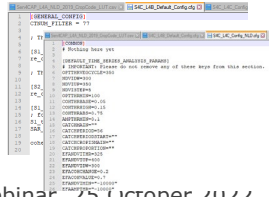
Upload data

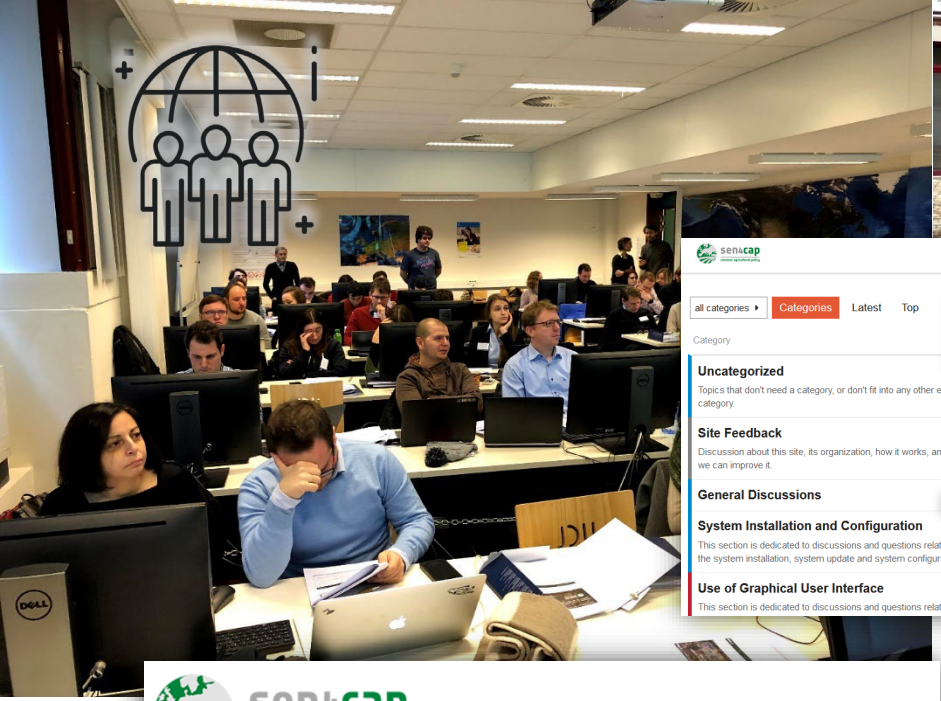
Sen4CAP system : data from PA

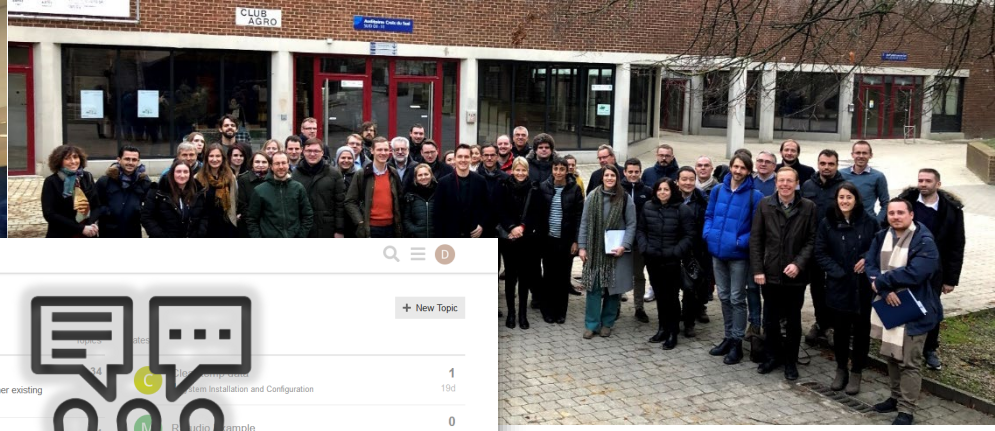
Subsidy application (shp)	Subsidy application layer (shapefile)
Tables and config files (csv)	L4A crop code LUT L4B config file L4C config file + agri practices tables

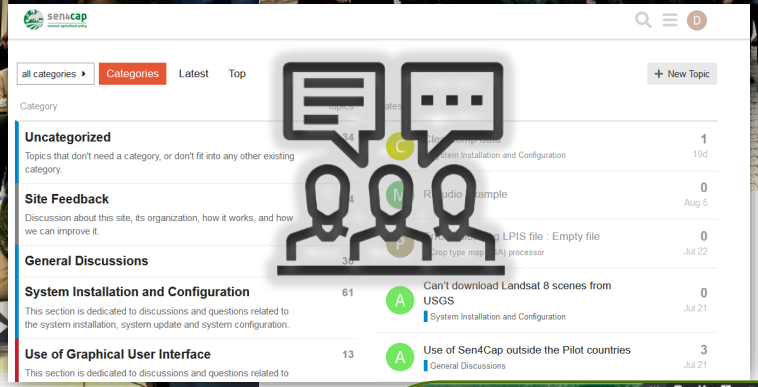
Tables and config files

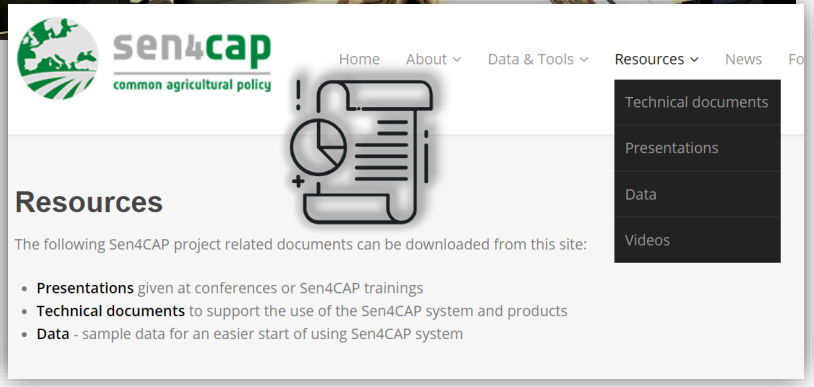









sen4cap
all categories
Categories
Latest
Top
+ New Topic
Category
Uncategorized
Topics that don't need a category, or don't fit into any other existing category.
Site Feedback
Discussion about this site, its organization, how it works, and how we can improve it.
General Discussions
System Installation and Configuration
61
This section is dedicated to discussions and questions related to the system installation, system update and system configuration.
Use of Graphical User Interface
13
This section is dedicated to discussions and questions related to
Can't download Landsat 8 scenes from USGS
System Installation and Configuration
0
Jul 21
Use of Sen4Cap outside the Pilot countries
General Discussions
3
Jul 21


sen4cap
common agricultural policy
Home
About
Data & Tools
Resources
News
Technical documents
Presentations
Data
Videos
Resources
The following Sen4CAP project related documents can be downloaded from this site:
Presentations given at conferences or Sen4CAP trainings
Technical documents to support the use of the Sen4CAP system and products
Data - sample data for an easier start of using Sen4CAP system

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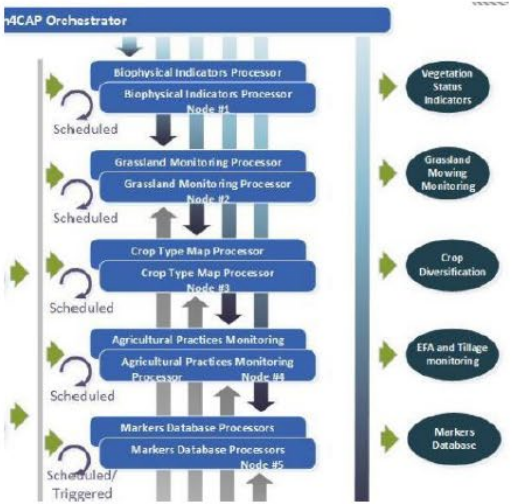
Members of the consortium available to answer your questions:
Laura de Vendictis from e-GEOS; Lucie Savelkova, Lubos Kucera from GISAT; Katja Bajec from Sinergise; Cosmin Cara, Cosmin Udroiu, Laurentiu Nicola and Florin Tutunaru from CS Romania
gisat
e-geos
ROMANIA

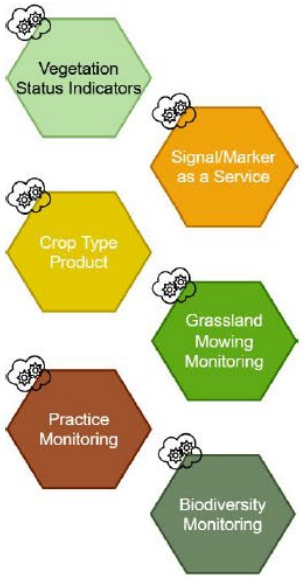
Checks by Monitoring (CbM) and Area Monitoring System - as a Service

sen4cap
common agricultural policy



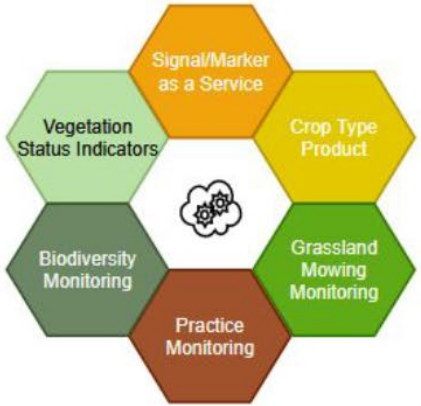
Processing on premise

EO WIDGET



Data as a Service

Customer



CbM - aaS

DK

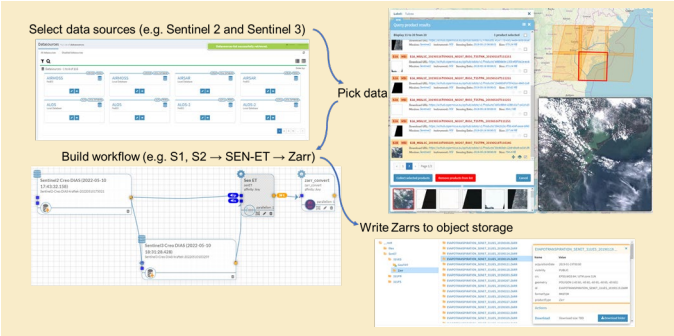
An open-source collaborative ICT system for EO agriculture scientists

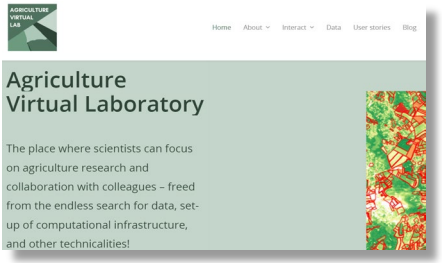
Agriculture Virtual Laboratory (AVL)

Approach

- Base solution on proven and well-established technologies
- Focus on seamless integration rather than on re-inventing wheels

1. Common components
2. Thematic processing subsystem
3. Exploitation subsystem





https://agriculturevlab.eu/

Technology

TAO, SNAP, xcube, geoDB, cate, Sentinel Hub, Python stack, OTB, R, GDAP, Sen2-Agri, Sen4CAP, Sen4Stat, SenET, etc.

Tailored Data cube generation and visualization // GeoDB	**Xcube Generator, Cube Viewer, GeoDB**
Interactive programming environment	**Jupyter Notebooks**
Web toolbox	**Cate**

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Sen4CAP versions

Version 1.0 release candidate

Open-source

Possibility for the PAs to access a test machine with the system

Version 1.1, 1.2, 1.3

1st consolidated version

Big evolutions:
- Corrections in the advanced processors
- Sen2Cor L2A compatible
- Move of the system database to a docker container
- …

Version 2.0

Big evolutions:
- Markers database
- Tillage processor
- Dockerization
- …

Version 3.0

Big evolutions:
- Web interface (system configuration)
- Products visualization
- Additions in MDB
- Secured services
- Dockerization
- ..

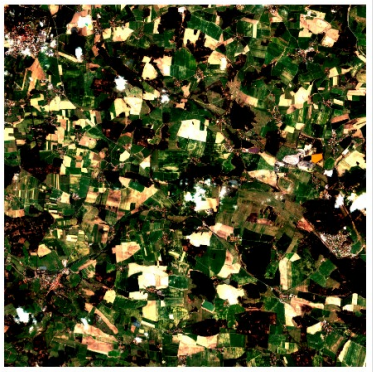
Version 3.1

Big evolution:
- **Support for MAJA 4.5.4**

Version 3.1 supports MAJA 4.5.4

- MAJA 4.5.4 has **support for the ESA's recent changes in the Sentinel-2 products format**
- MAJA 4.5.4 other improvement:
  - MAJA version 4 was a complete recoding of MAJA version 3's internal scheduler -> one bug in the aerosol estimation method
  - In the case of rare images, high optical thicknesses and low surface reflectance values appeared -> propagated to the next images, as the method is multi-temporal
  - Not existing if using CAMS

Example of MAJA v3 L2A



Same product as (left) with MAJA v4 before bugfix. After bugfix, both images are identical.

System installation or update

1. New installation:

```
## open a terminal -- go into /install_script folder:

cd /path/to/Sen4CAPDistribution/install_script

## Run the install script

sudo ./sen4capPlatformInstallAndConfig.sh
```

2. Update your previous version:

```
cd /path/to/Sen4CAPDistribution/install_script

sudo ./update.sh
```

3. Don’t forget to also update the GIPP files

4. The full time series must be pre-processed with the same algorithm (MAJA or Sen2COR) – **don’t change within the season**

Next version 3.2 to come

- Possibility of using FMask
- Updates for collection 2 of USGS (some changes in the L1T products structure)
- Some corrections for past seasons executions
- Possibility to cut S1 AP/COHE by S2 tiles (optional)
- Try to determine dynamically the interval for computing the Coherence (6 days if S1A and S1B or 12 days if only S1A)
- More comprehensive markers Database:
    - New signal statistics & markers: median, p25 & p75
    - Jupyter Notebook (python) to easily access the MDB and create new indices based on existing "signal statistics"
- Other corrections

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  - **Parcels heterogeneity**
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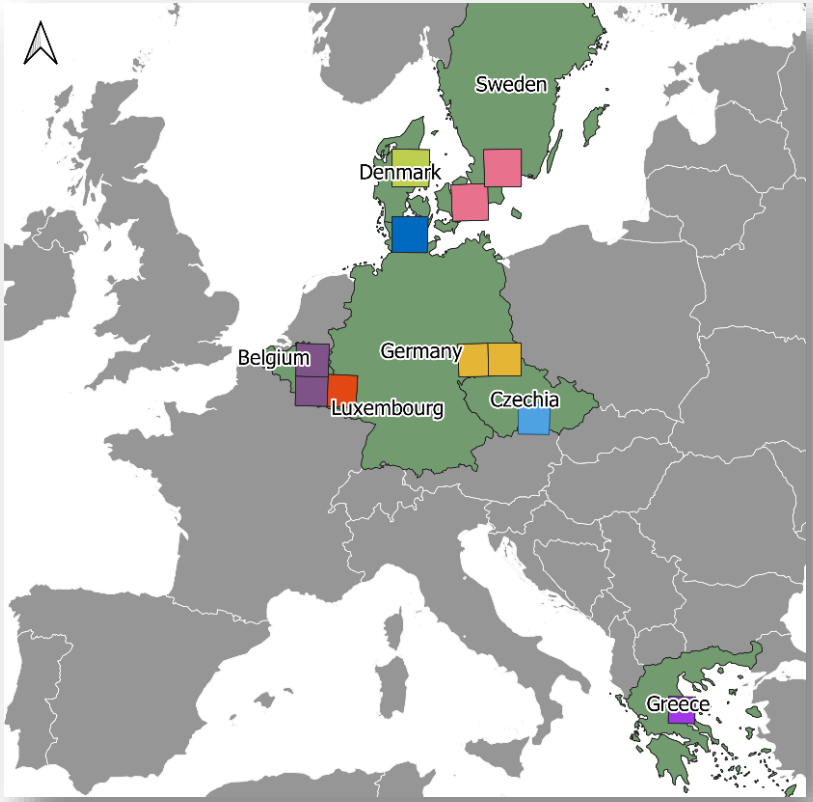
R&D with 7 pilot countries (8 Paying Agencies), sharing calibration and validation data

- 1 or 2 S2 tiles
- 1 or 2 years (2020-**2021**)
- All Sentinel-1 and Sentinel-2 preprocessed

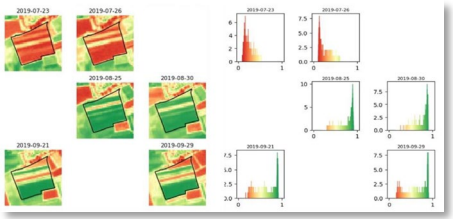


Sites list

Site name	Short name	Seasons			
		Season name	Season start	Season mid	Season end
Czechia	czechia	2020	2020-01-01	2020-07-03	2020-12-31
		2021	2021-01-01	2021-07-03	2021-12-31
Danish	danish	2021	2021-01-01	2021-07-03	2021-12-31
Greece	greece	2021	2021-01-01	2021-07-03	2021-12-31
Luxembourg	luxembourg	2020	2020-01-01	2020-07-03	2020-12-31
		2021	2021-01-01	2021-07-03	2021-12-31
Saxony	saxony	2021	2021-01-01	2021-07-03	2021-12-31
SaxonyV2	saxonyv2	2020	2020-01-01	2020-07-03	2020-12-31
		2021	2021-01-01	2021-07-03	2021-12-31
Schleswig	schleswig	2021	2021-01-01	2021-07-03	2021-12-31
Sweden	sweden	2021	2021-01-01	2021-07-03	2021-12-31
SwedenV2	swedenv2	2021	2021-01-01	2021-06-03	2021-12-31
Wallonie	wallonie	2020	2020-01-01	2020-07-03	2020-12-31
		2021	2021-01-01	2021-07-03	2021-12-31

New uses cases of 2022

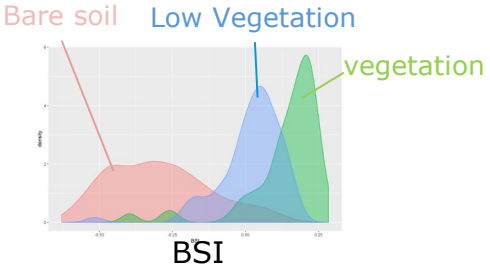
Sub-parcel **heterogeneity** marker(s)



MILENOV Pavel *et al.*, 2021, JRC

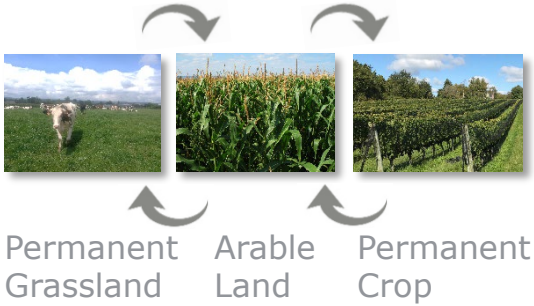
Per pixel analysis

Bare soil markers



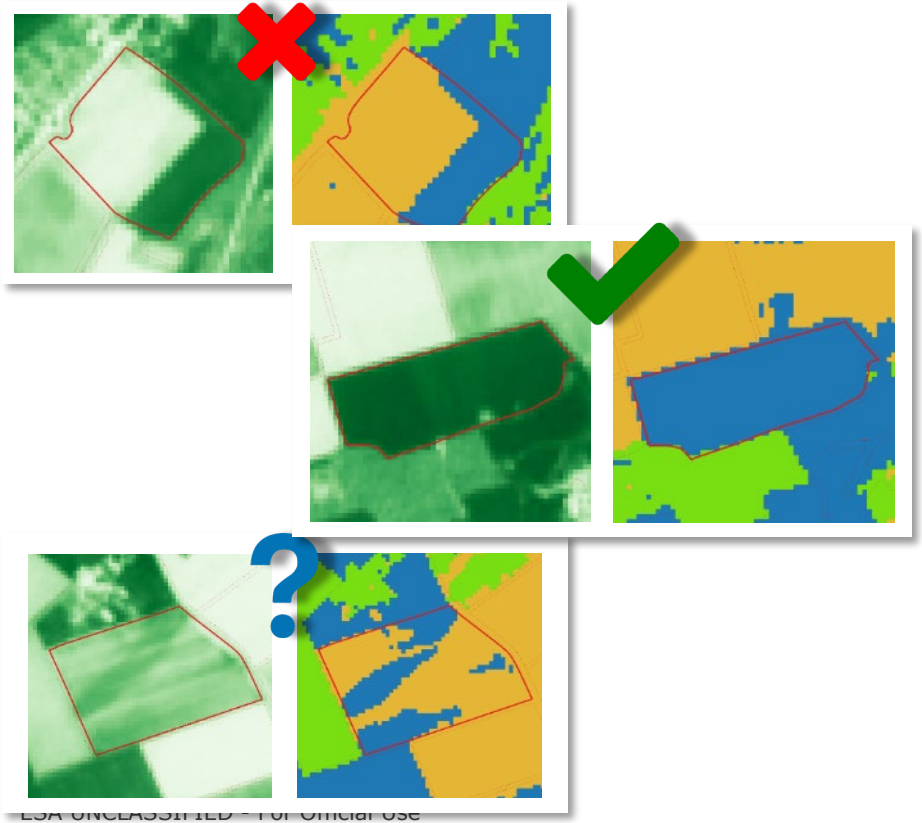
New Optical & SAR variables – all year round

Change of cover from year to year



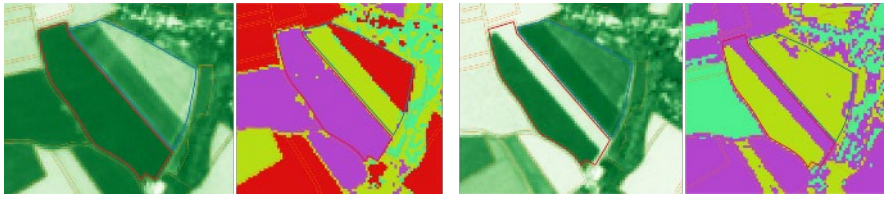
Multi-annual analysis

Sub-parcel heterogeneity detection

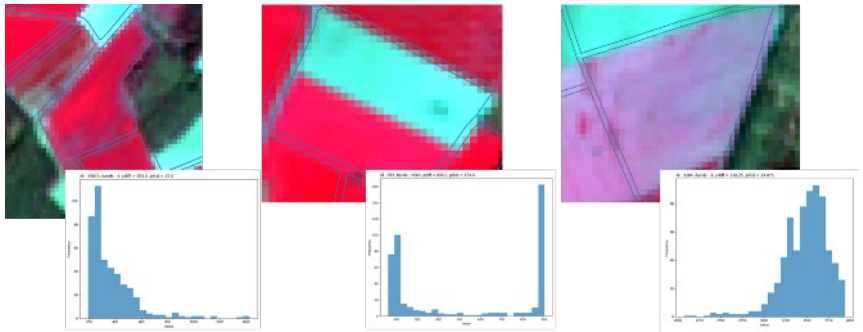


Benchmarking of 3 appraoches

- Clustering by tile



- Coefficient of variation at the parcel-level
- Statistical distribution check at the parcel-level



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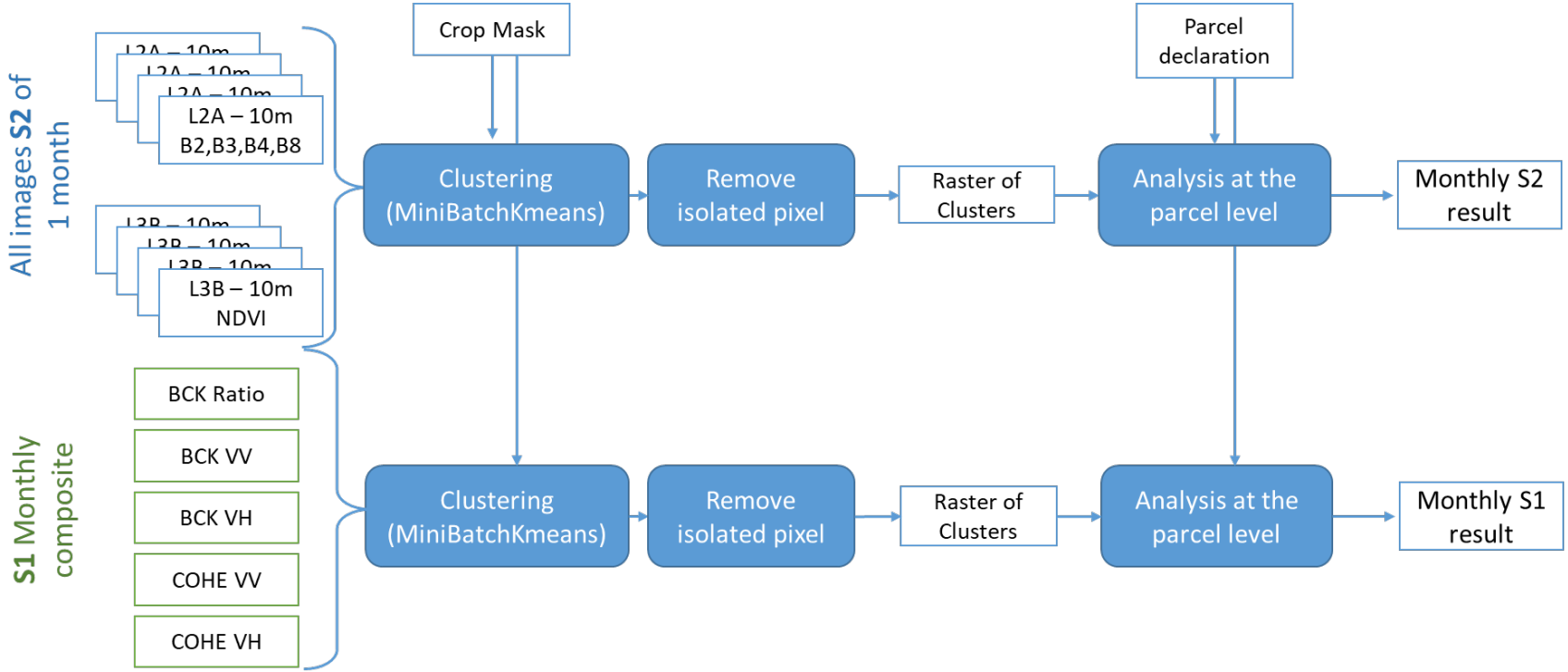
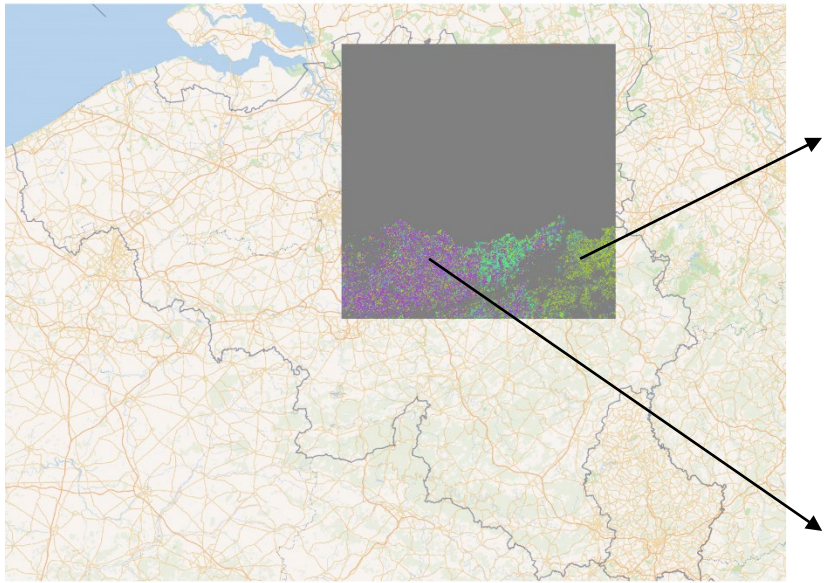
Selected methodology and workflow



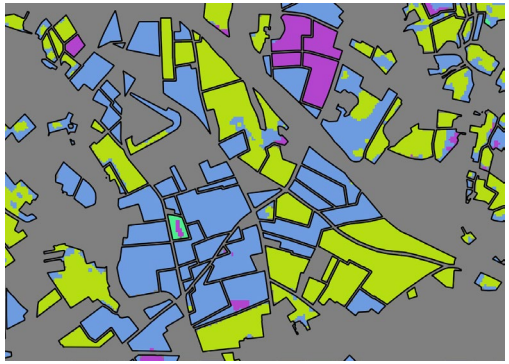
Preliminary results – Wallonia (Belgium)

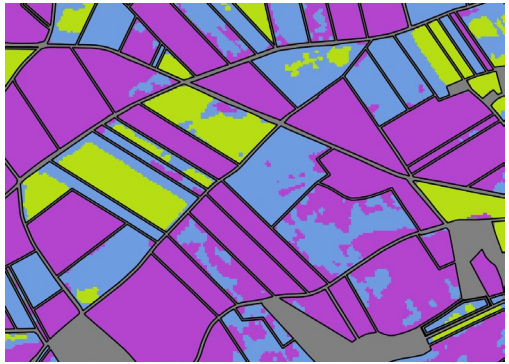
S2 clustering - October



Clusters

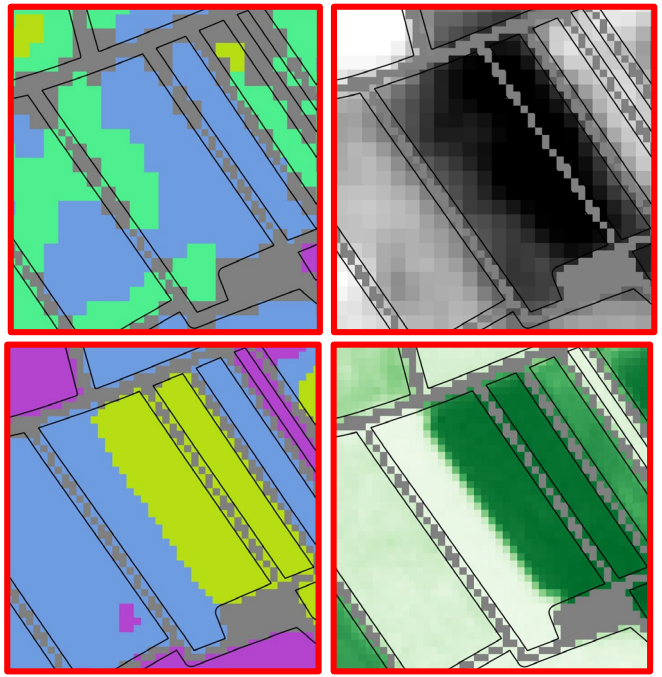
NDVI



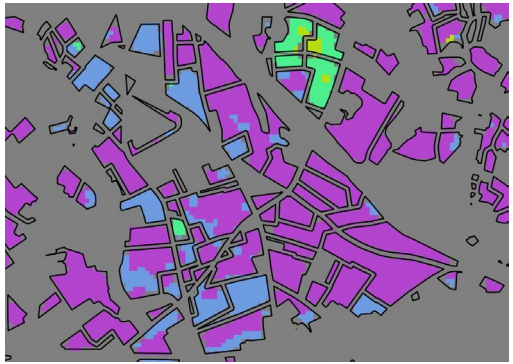


Preliminary results - Wallonia (Belgium)

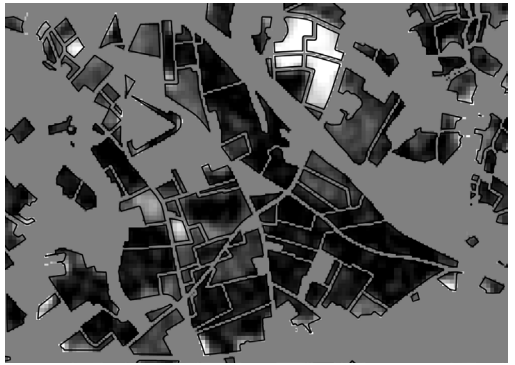
S1 clustering - October

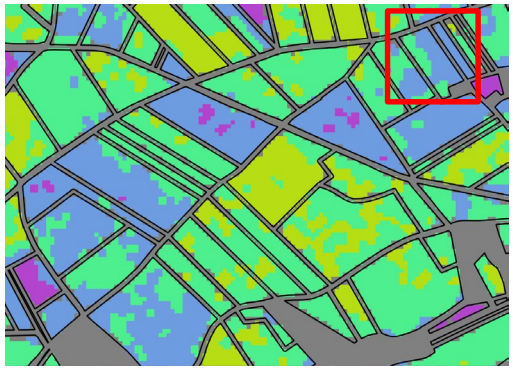


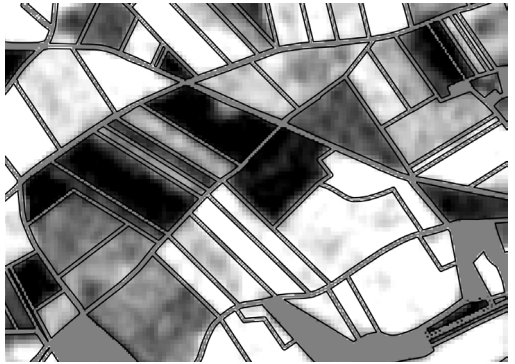
Clusters



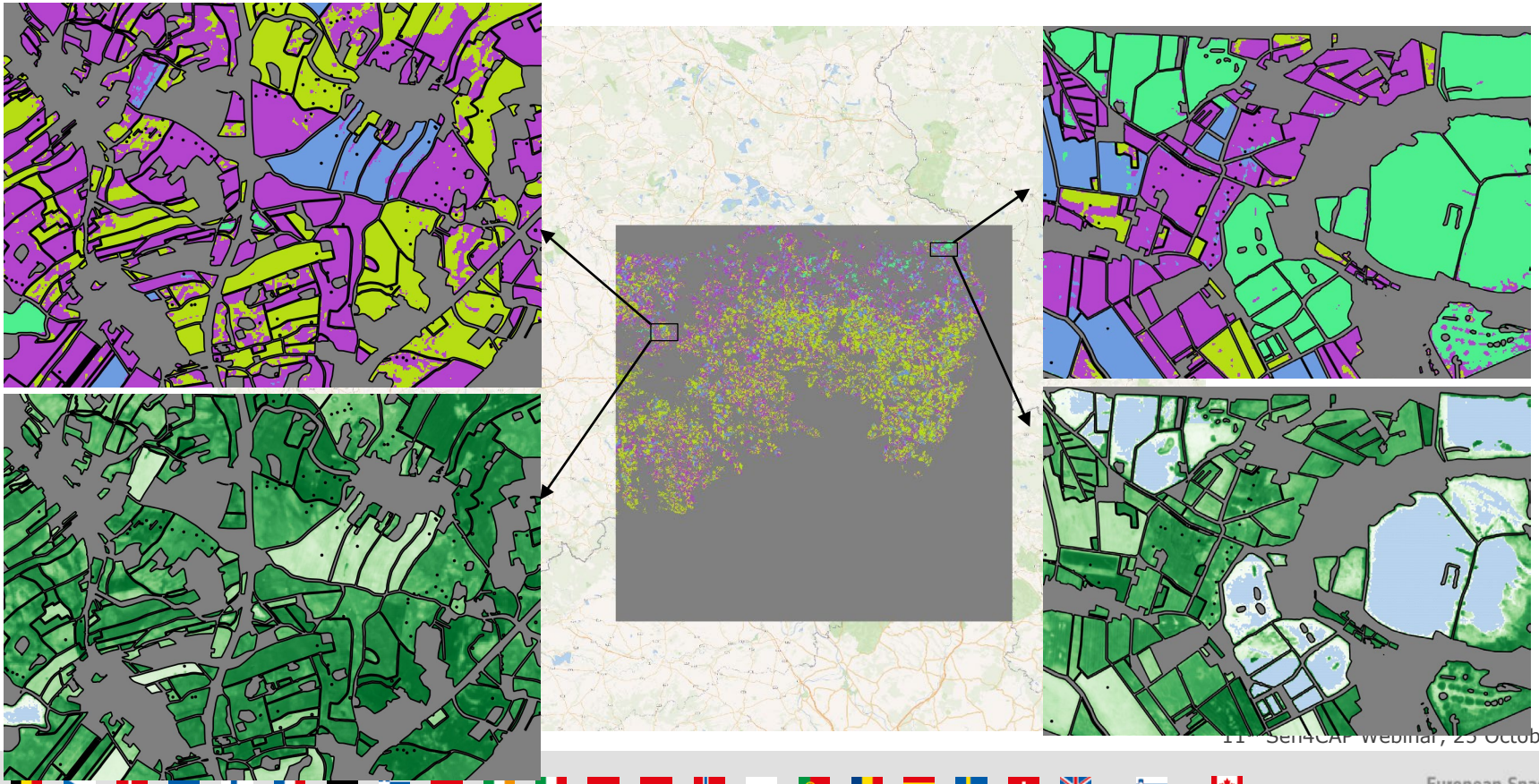
Coherence VV





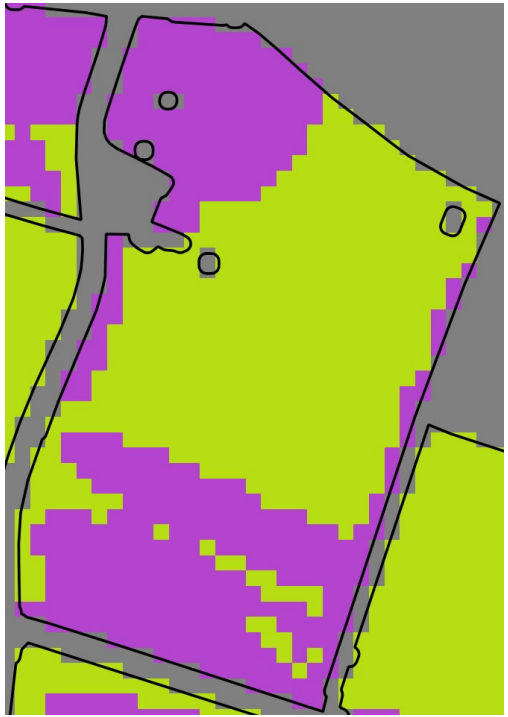


Preliminary results – Saxony (Germany)



Preliminary results – Saxony (Germany)

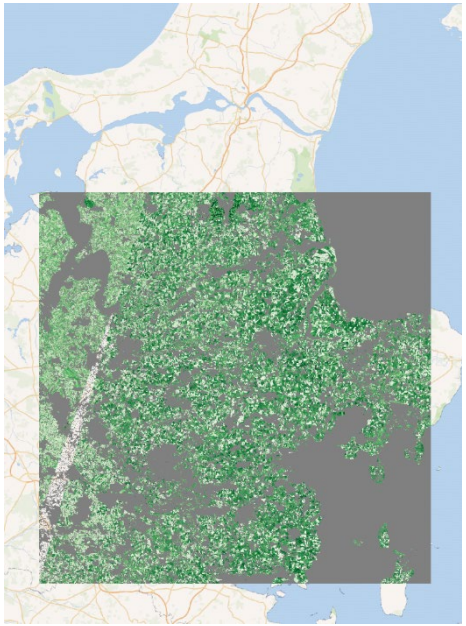
Clustering – S2 - June

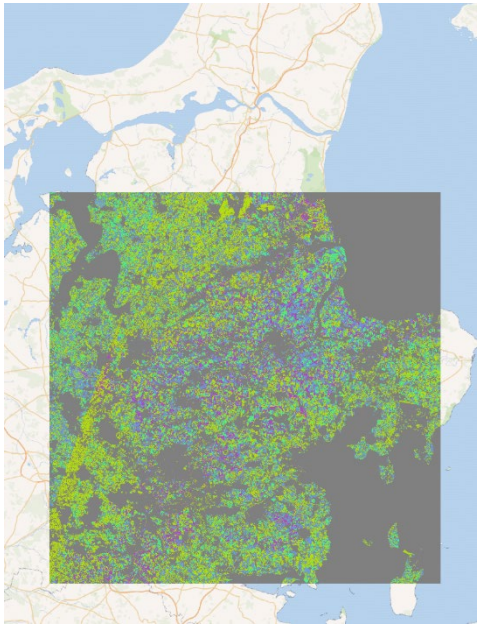


S2 (NDVI) – 09/06/2021

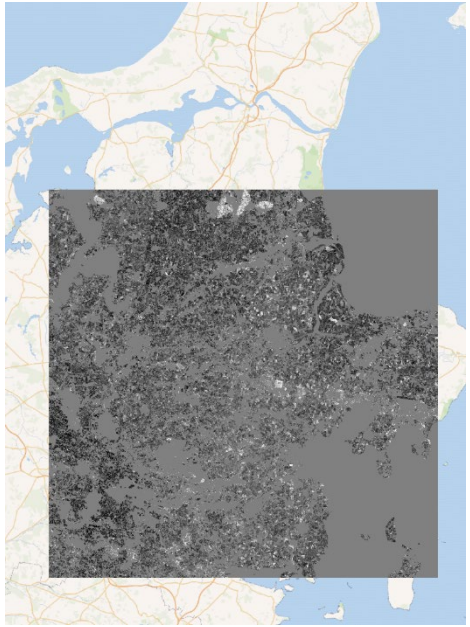
S2 (NDVI) – 19/06/2021

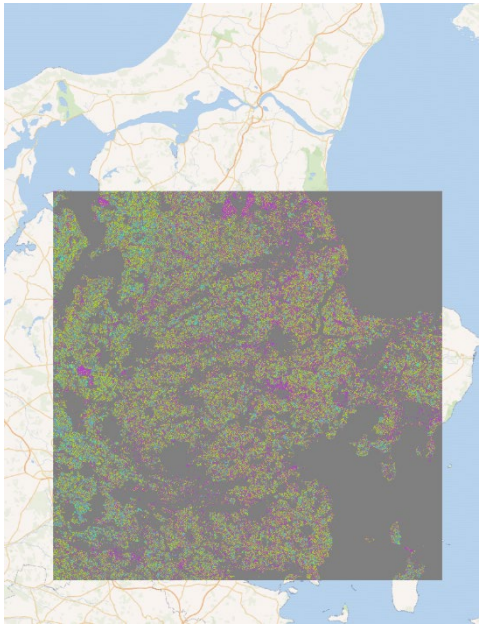
Preliminary results - Denmark





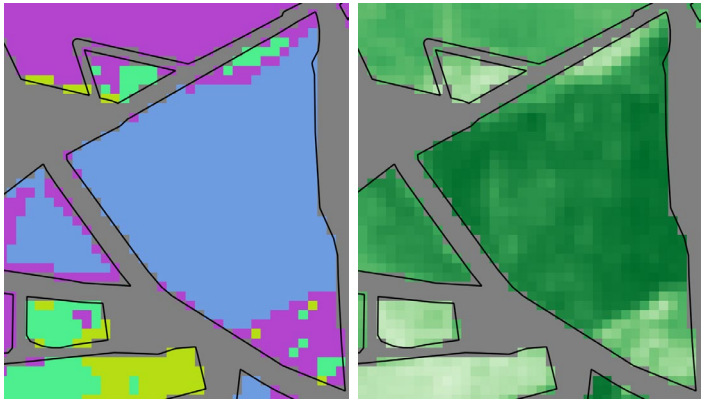
S2 clustering - March



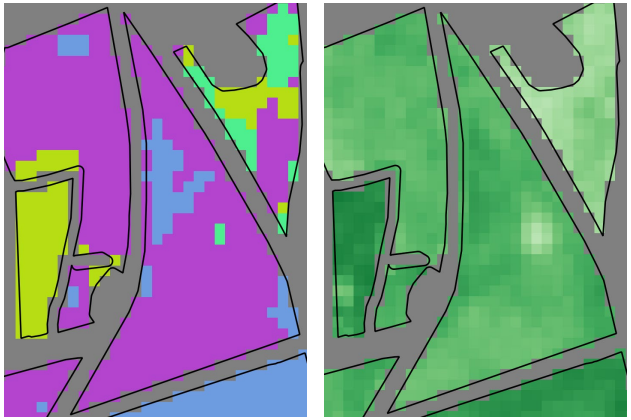


S1 clustering - March

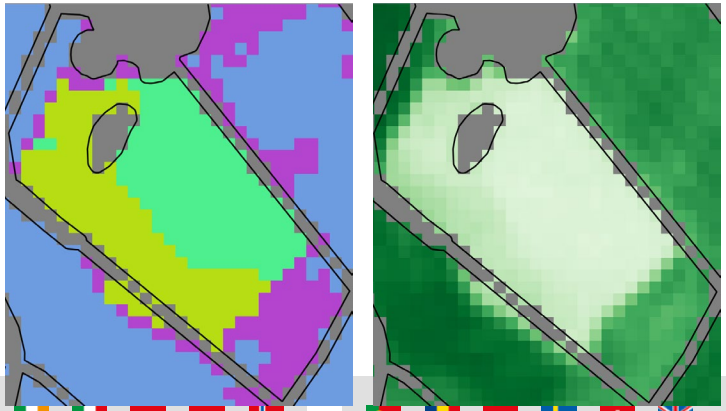
Preliminary results - Denmark



Maximum difference of NDVI between 2 clusters : **0.151**

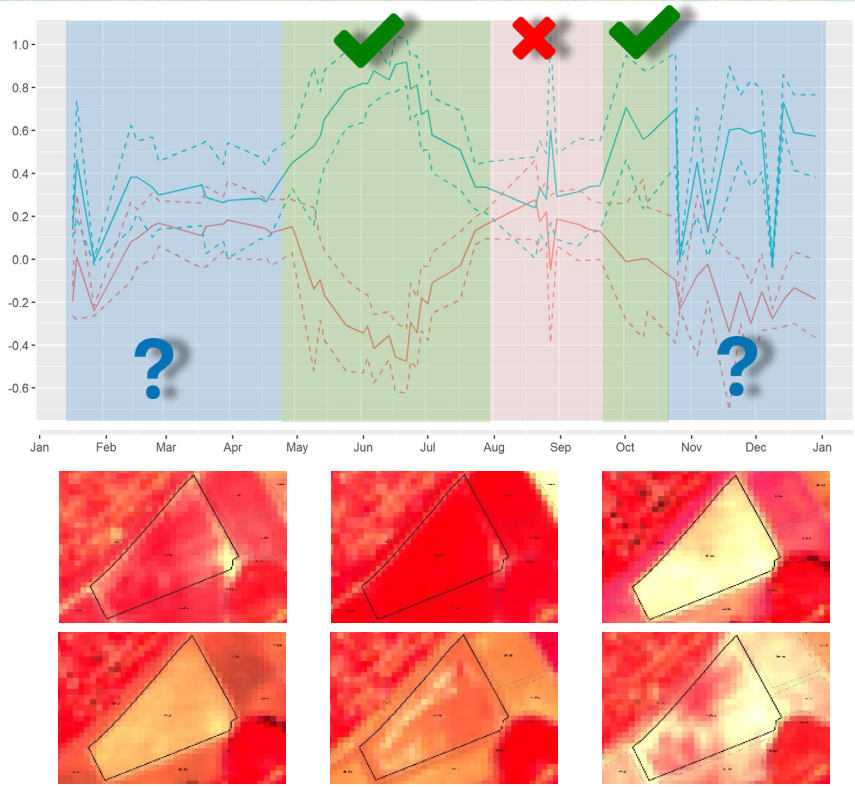


Maximum difference of NDVI between 2 clusters : **0.100**



Maximum difference of NDVI between 2 clusters : **0.074**

Bare soil detection



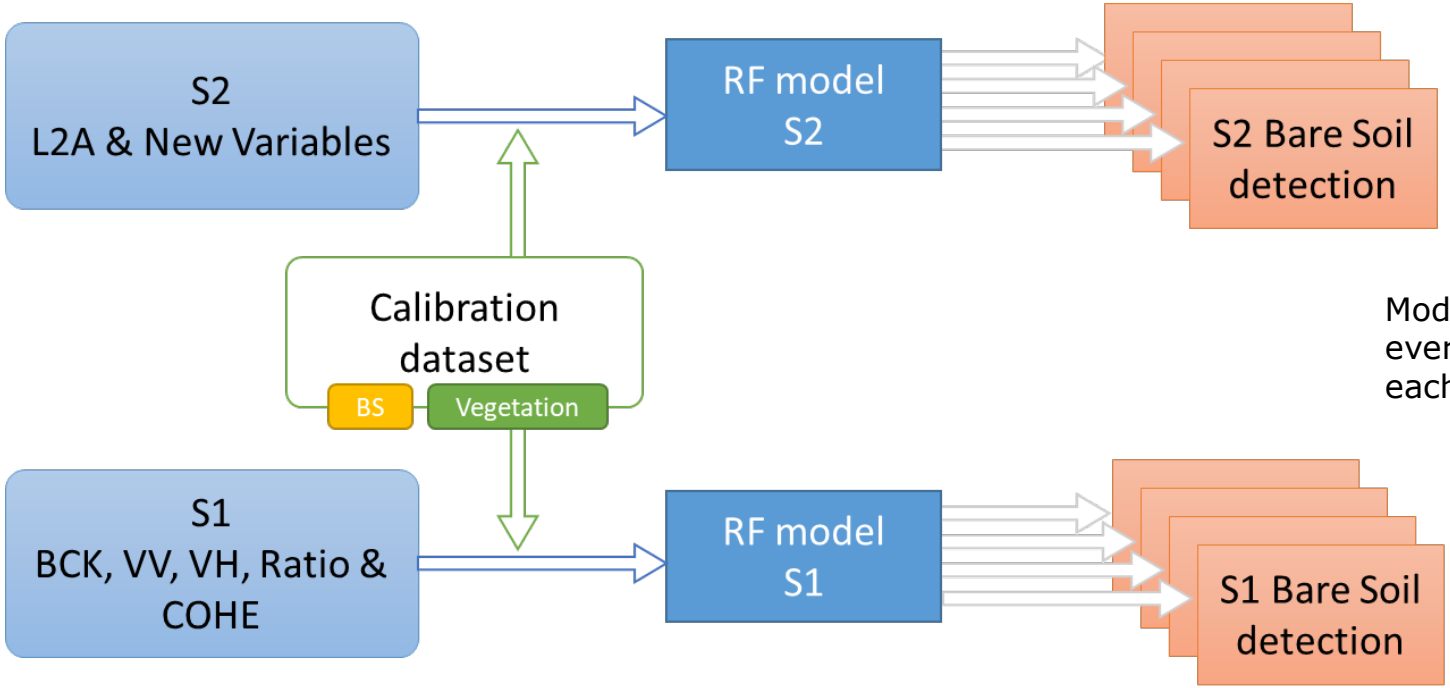
Challenges

- In « summer », corresponding to the main crop harvesting
- But also in « winter » to monitor the period of green cover

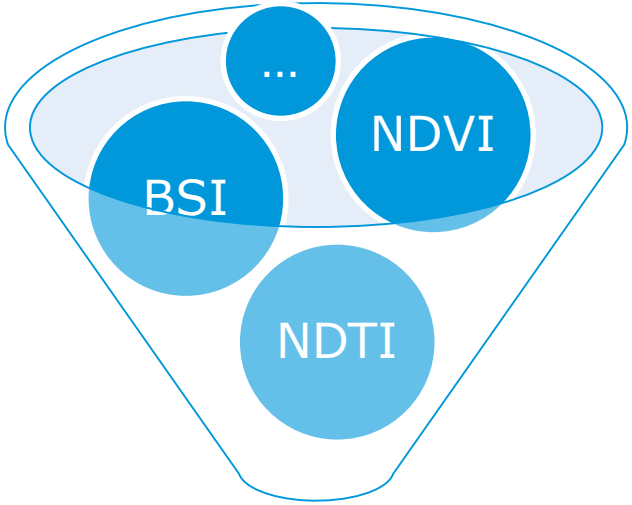
- Sentinel-2 and Sentinel-1, combining different ratios and features related to bare soil

- Distinguishing between bare soil and scenescent vegetation

Selected methodology and workflow



Bare Soil calibration dataset based on S2



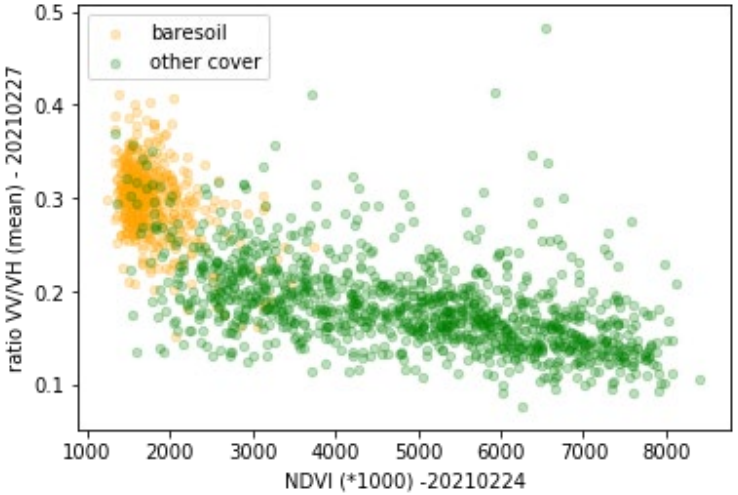
Expert based Thresholds

Calibration Dataset

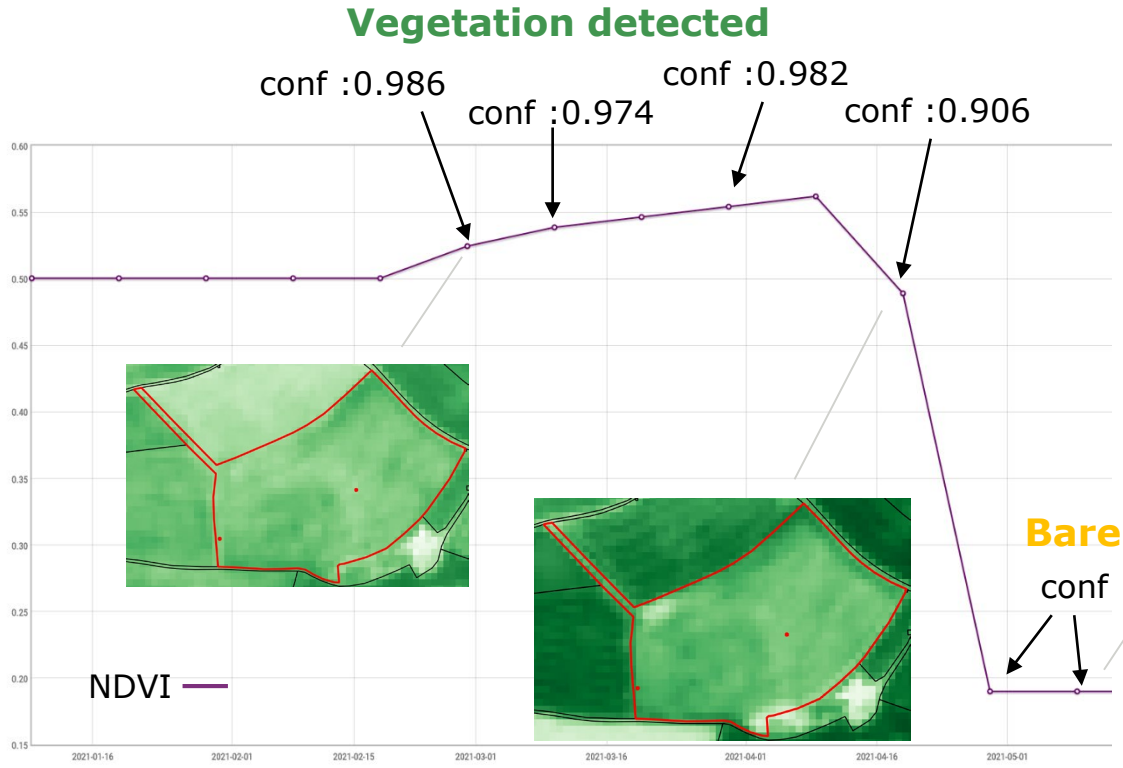
BS

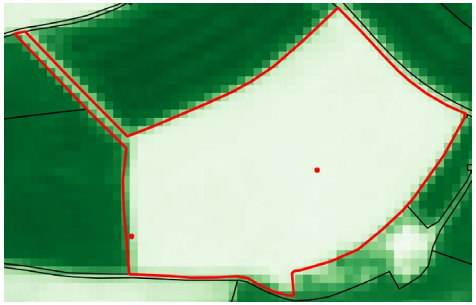
Vegetation

Bare Soil in situ - Wallonia

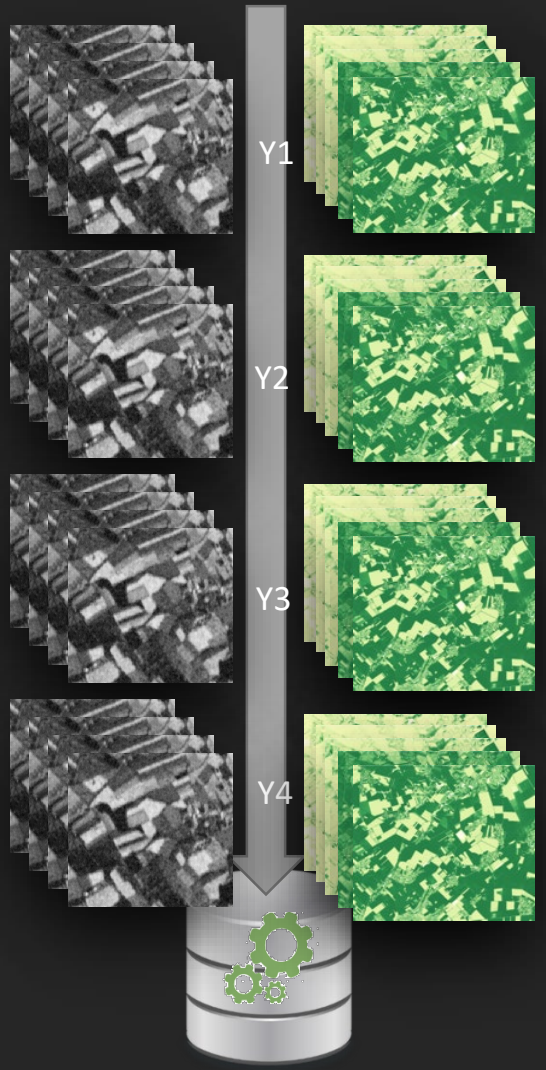


Preliminary results in Luxembourg





Parcel of Maize
→ destruction of the cover crop



Multi-year rotation

Perennial Crop

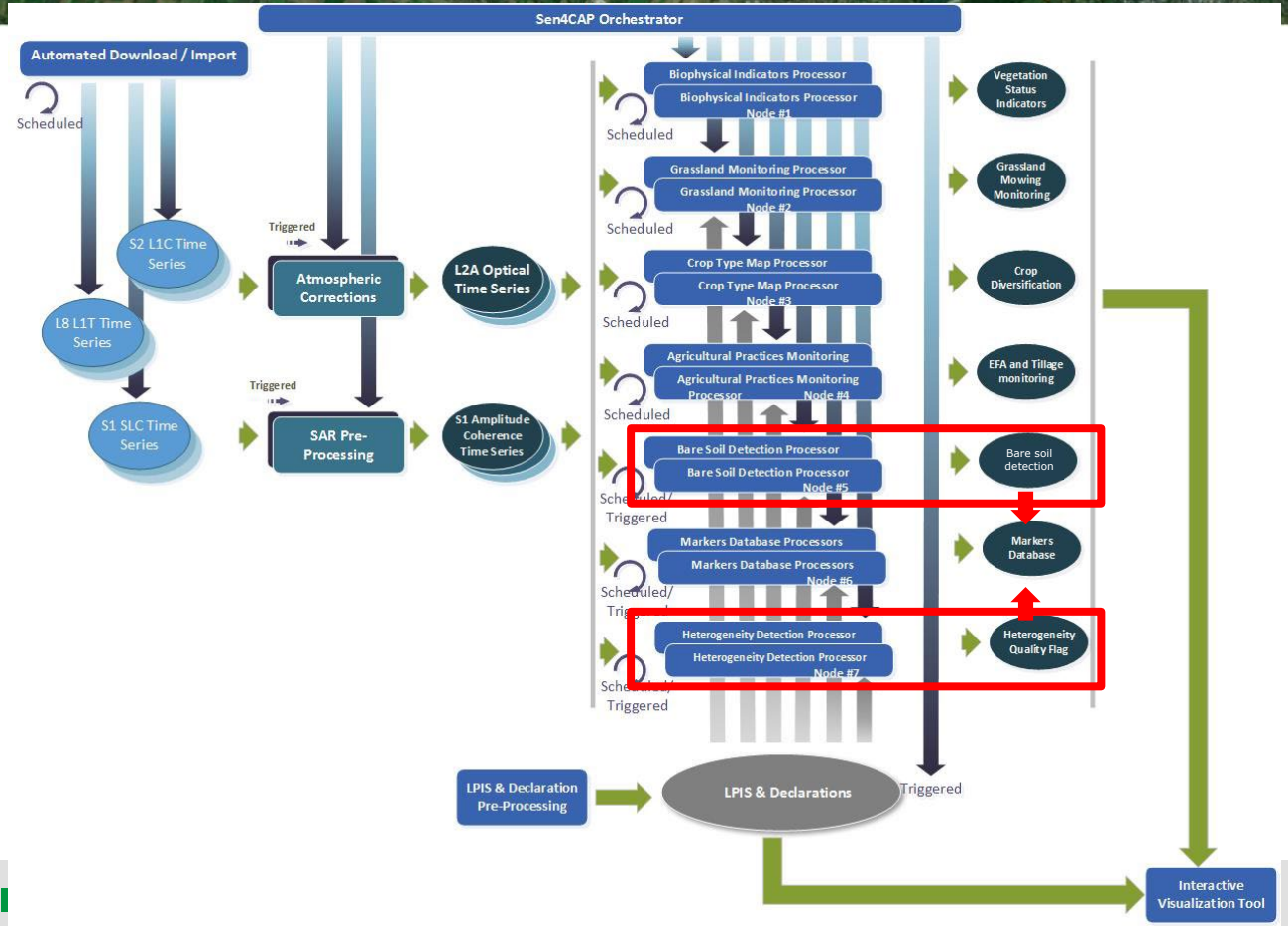
Arable Land

Permanent Grassland

sen4cap
common agricultural policy

Next steps

- Finalization of the R&D for the 2 first use cases and implementation in the system
- Conducting the R&D for the last use case
- Validation with users and algos adjustments



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Webinar outline

- Sen4CAP overview
- System evolution
  - New version 3.1 – Support for MAJA 4.5.4
  - Next version 3.2
- New use cases for 2022
  - Test sites
  - Parcels heterogeneity
  - Bare soil detection
- **Next events**

Next events

- **Forum** for your questions about the system 3.1 (and other)
- **Workshop with pilot countries** for use cases 2022
    - Hosted by Czech State Agricultural Intervention Fund
    - On 24 November in Prague
    - Feedback will be shared with the whole community
- Next version **Sen4CAP 3.2**: end of November 2022
- Next webinar **13 December 2022**

- **Your questions ???**

Thank you for your attention
and your contribution
sen4cap
common agricultural policy