
sen4cap
common agricultural policy
Sentinels for Common Agricultural Policy
Evolution of Sen4CAP system – 3 new use cases

Funded by European Space Agency

esa

sen4cap
common agricultural policy

EO Experts

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

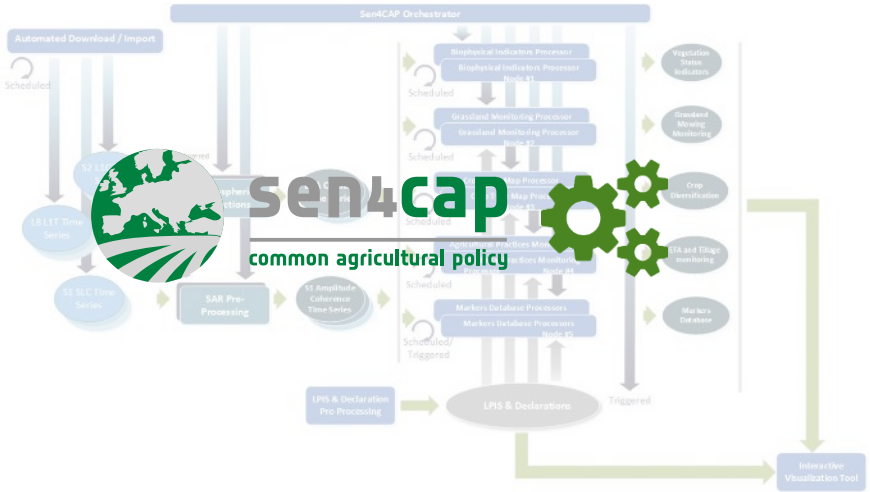
Sen4CAP system

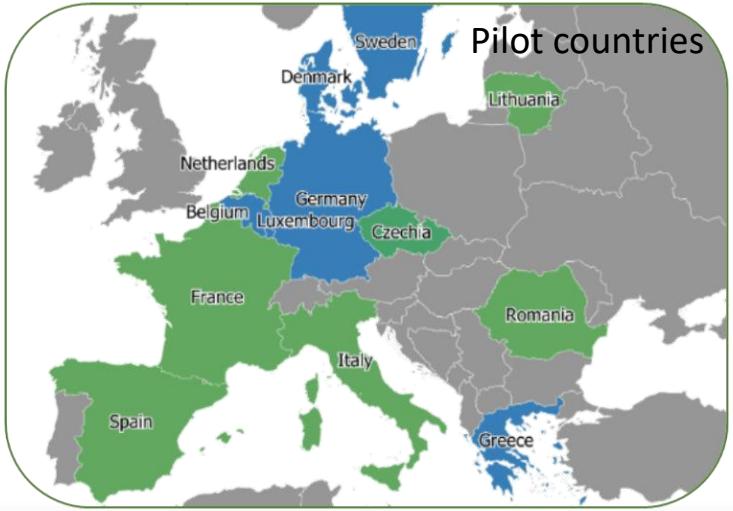
User group:
6+1 Paying Agencies

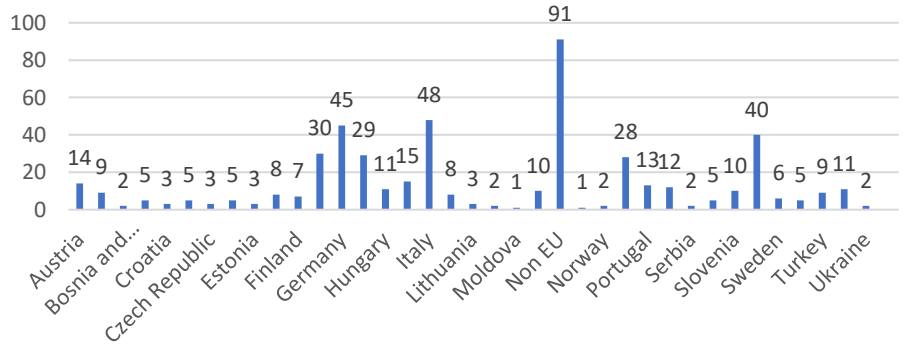
Guidance by DG-Agri, JRC, DG-Grow.

From an ESA project …

…to an open source system uptaken by the CAP community

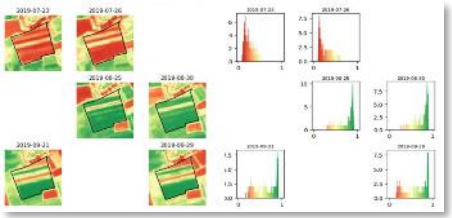






New uses cases of 2022

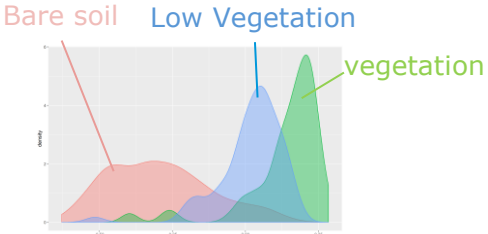
Sub-parcel **heterogeneity** marker(s)



MILENOV Pavel *et al.*, 2021, JRC

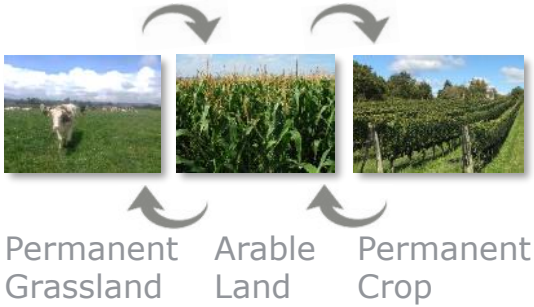
Per pixel analysis

Bare soil markers



New Optical & SAR variables – all year round

Change of cover from year to year



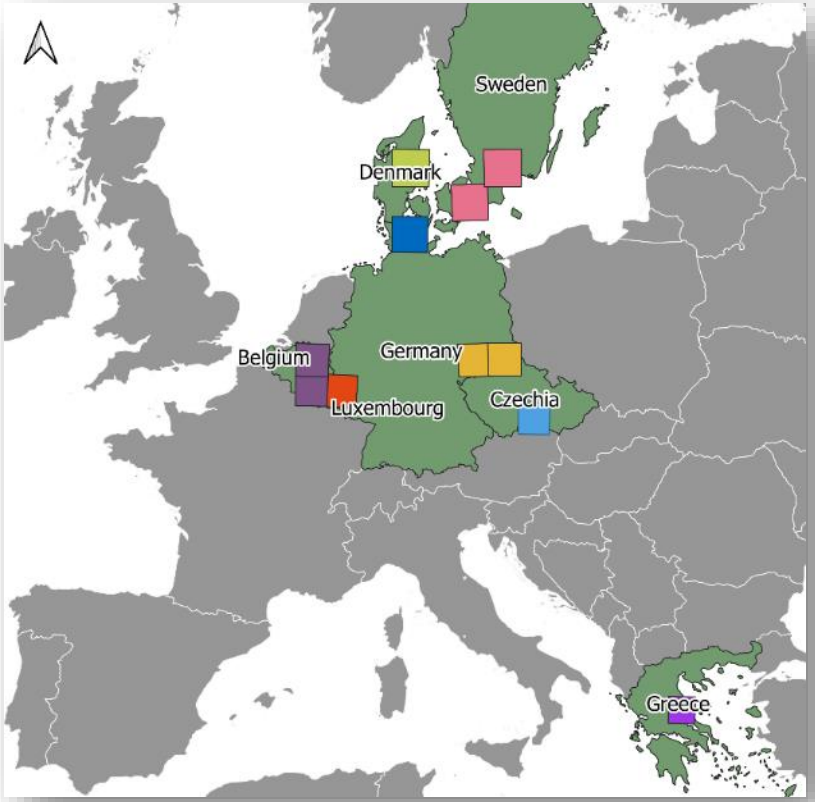
Multi-annual analysis

Relying on CREODIAS NoR to develop methodologies for the 3 new use cases

- Working on test sites spread over Europe
- Pre-processing Sentinel-1 and Sentinel-2 time series over 1 or 2 years over each test sites
- Algorithms development
- Generation of final products to be submitted to the pilot test sites:
    - Detection of heterogeneous parcels
    - Detection of bare soil periods during the growing season
    - Detection of « land cover » changes at the parcel-level between years (between « permanent grassland », « permanent crop » and « annual crop »)

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

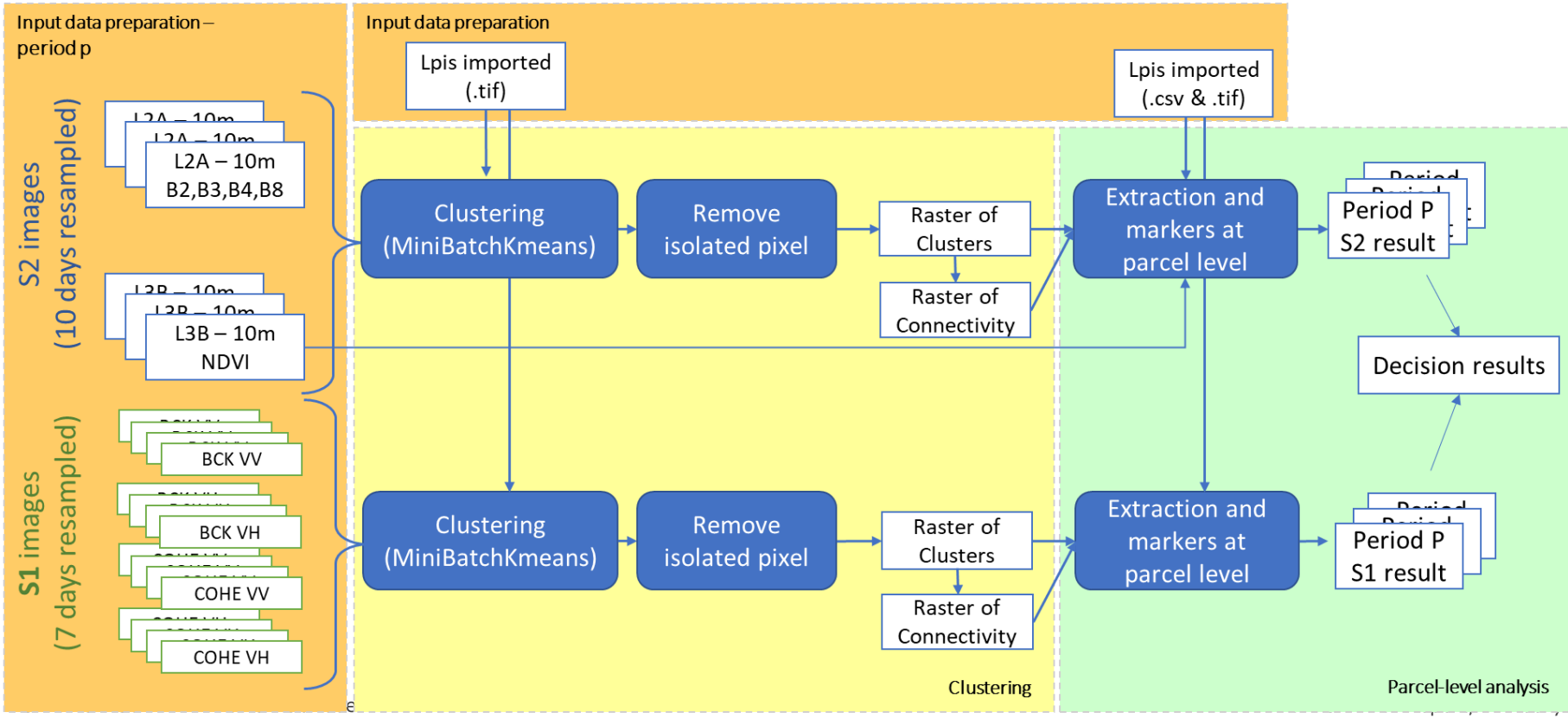
- 1 or 2 S2 tiles
- 1 or 2 years (2020-**2021**)
- All Sentinel-1 and Sentinel-2 preprocessed



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

Heterogeneity Workflow



Heterogeneity – Decision

STRONG: All periods with all markers = 1

MODERATE: At least 1 period with all markers = 1

WEAK: One marker missing each period

POOR: Half of the markers = 1

Saxony Results: **27,5%** with a detection

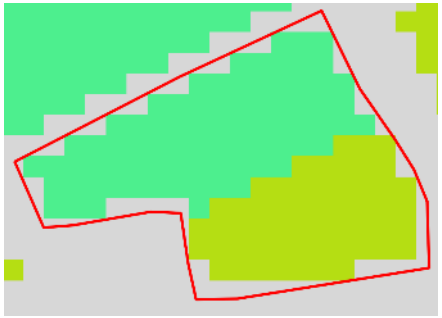
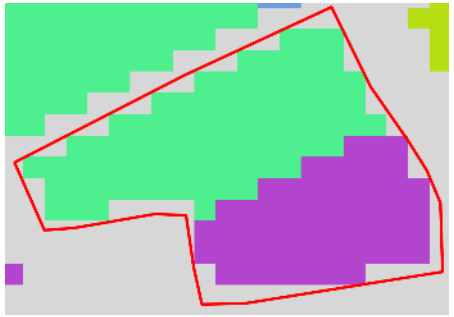
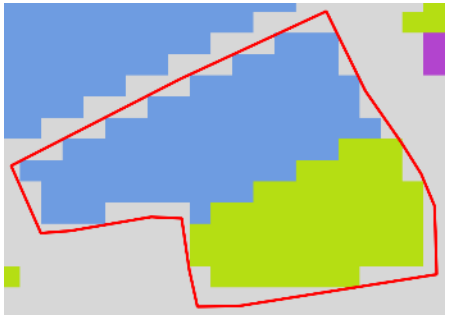
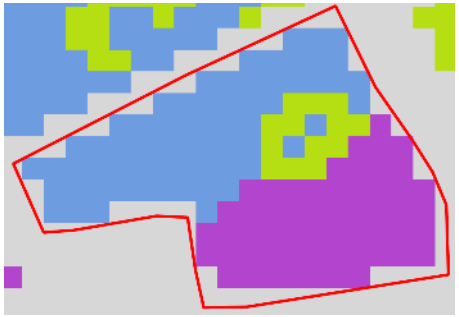
→ POOR: 71%
→ WEAK: 27%
→ MEDIUM: 1%
→ STRONG: 1%

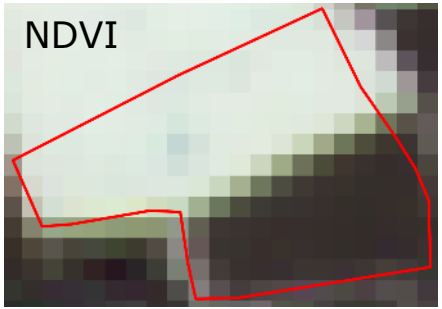
Greece Results: **8,5%** with a detection

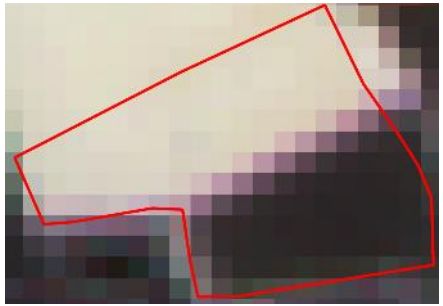
→ POOR: 68,5%
→ WEAK: 29,5%
→ MEDIUM: 1%
→ STRONG: 1%

Heterogeneity – Example in Greece

Last confirmed detection – p6 | Detection – p7 | Detection – p8 | No Compacity – p9





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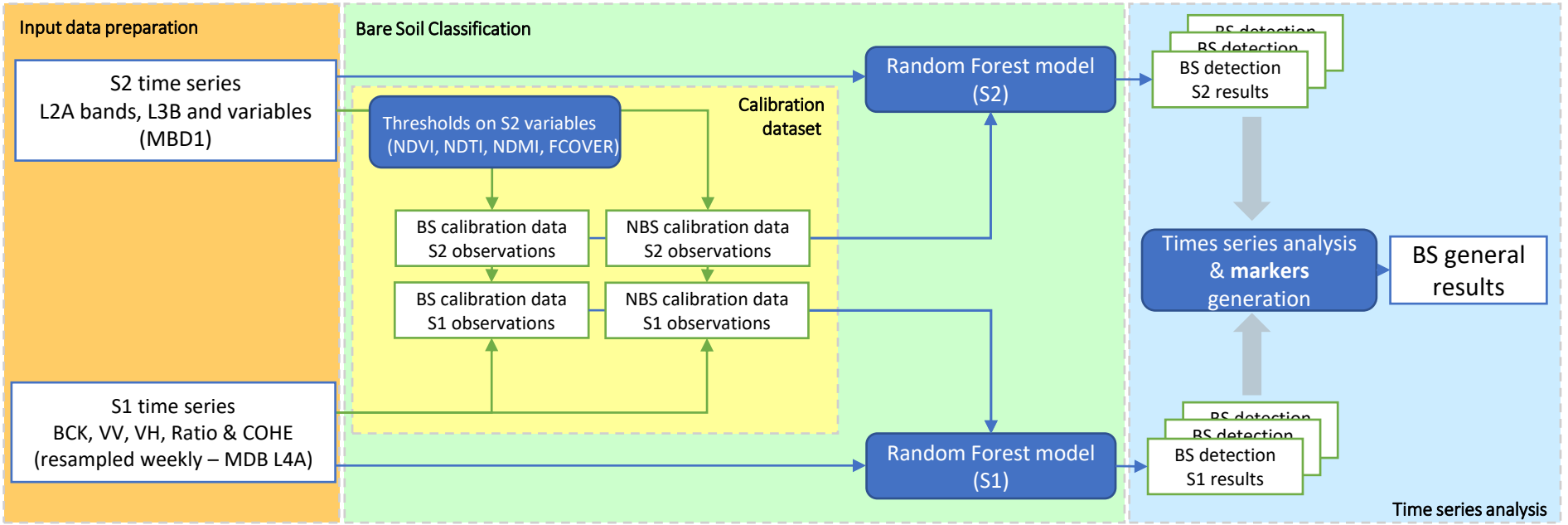
STRONG detection with S2

Heterogeneity – Example in Greece

STRONG detection

Bare Soil Workflow



Results & use of S1 as confirmation of S2

Czechia :
52,5% of the parcels with a detected bare soil (M1_S2)

Confidence	S2	S2 & S1
Doubtful	19.07%	17.30%
With S1 conf		1.78%
Poor	6.34%	4.75%
With S1 conf		1.59%
Medium	18.49%	13.91%
With S1 conf		4.58%
Good	25.92%	16.64%
With S1 conf		9.28%
Strong	30.17%	11.51%
With S1 conf		18.66%

→ 36% with a S1 confirmation

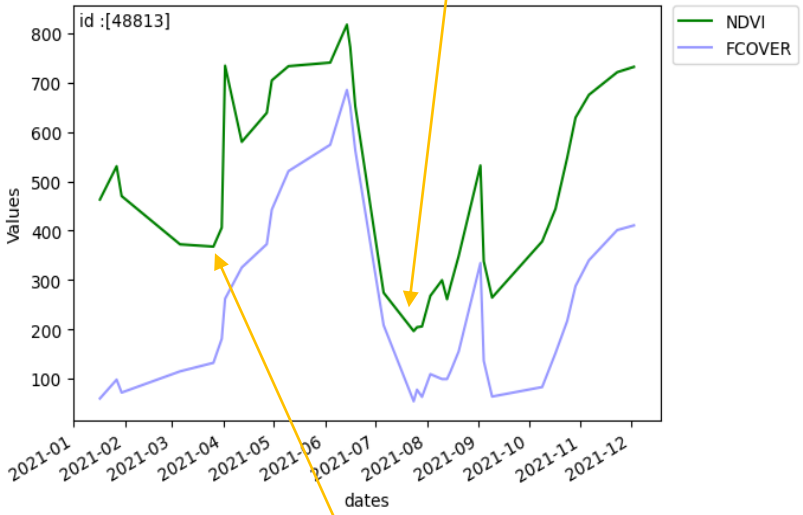
Sweden :
32,7% of the parcels with a detected bare soil (M1_S2)

Confidence	S2	S2 & S1
Doubtful	32.66%	29.41%
With S1 conf		3.25%
Poor	6.52%	5.77%
With S1 conf		0.75%
Medium	13.07%	11.76%
With S1 conf		1.32%
Good	12.50%	10.63%
With S1 conf		1.88%
Strong	35.24%	17.62%
With S1 conf		17.62%

→ 25% with a S1 confirmation

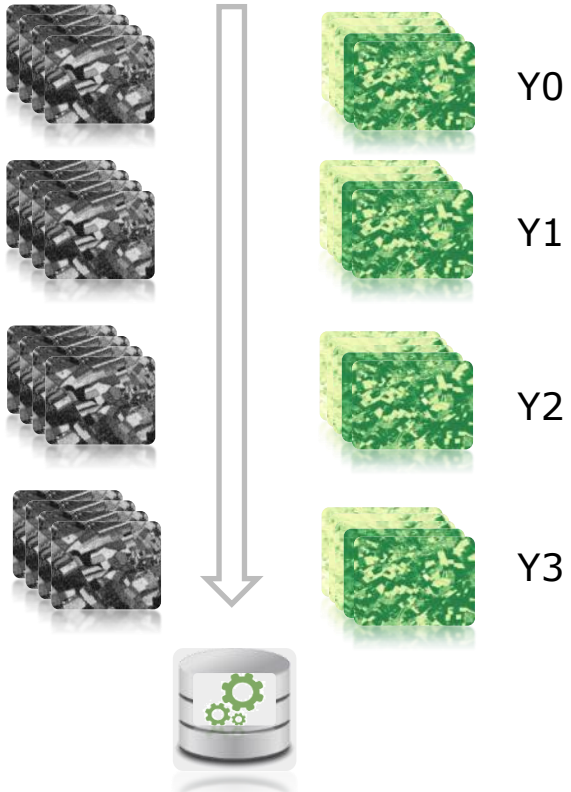
Bare Soil – Example in Czechia

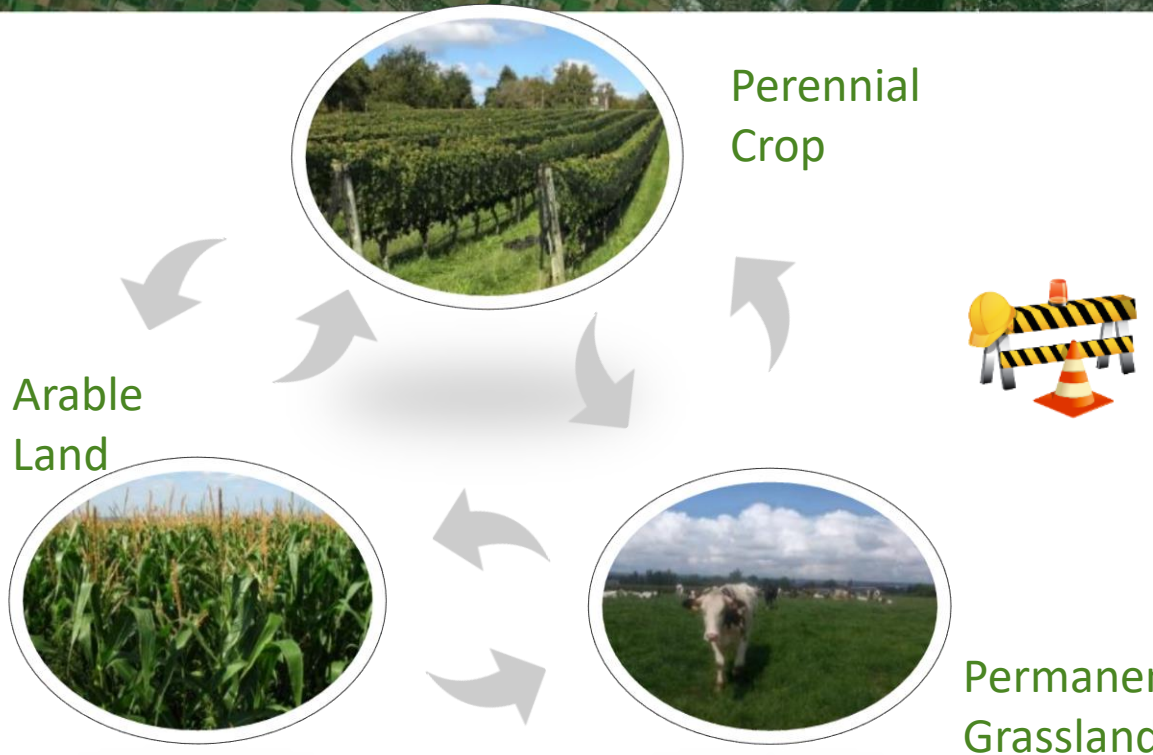
NewID	M1_S2	M2_S2	M3_S2	M4_S2	M5_S2	M6_S2	START_BS_S2	END_BS_S2	Conf_S2	Look_nextS2
48813	1	2	1	1	13	11	24-07-21	29-07-21	Strong	TRUE



M1_S1	M2_S1	M3_S1	M4_S1	M5_S1	M6_S1	START_BS_S1	END_BS_S1	Conf_S1	Look_nextS1
1	0	-9				01-03-21	01-03-21	Doubtful	TRUE

Change of Agricultural Category

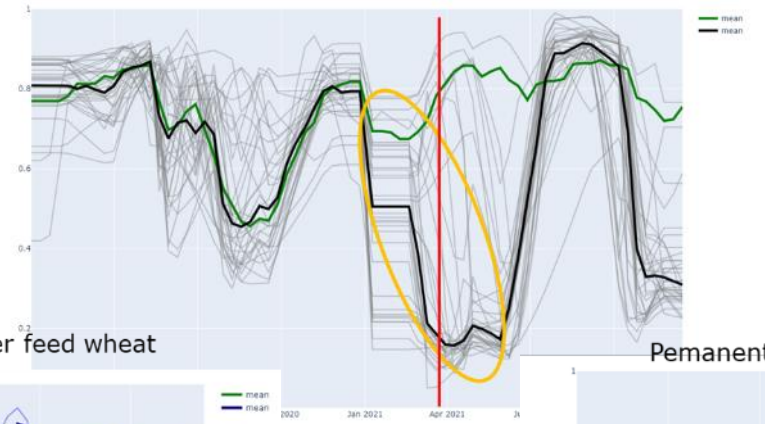




Examples - Permanent Grassland to Arable Land & Permament crop

Change is visible, from different moments depending on the change

Pemanent grasslands becoming silage maize



Exploratory analysis completed – workflow to be defined

Pemanent grasslands becoming winter feed wheat

Pemanent grasslands becoming orchard