

Testing Sen4CAP on CREODIAS



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ESA EOStat project (2018-2021)



Official Agriculture Statistics with Sentinel Data



Users



WHAT DOES IT TAKE?



Technical
Implementation
Team



The Agency for Restructuring and
Modernisation of Agriculture (ARMA)



The Central Statistical Office (CSO)



Space Research Center



Institute of Geodesy and Cartography



14,7 million ha
of land under
agriculture production



1.5 million
of agriculture holdings



10 million
of individual parcels

23

types of crops
classified (for ARMA)

**DATA AT
GLANCE**

12 days

of processing on CreaoDIAS
computing infrastructure for
2019 and 2020 season



18 Terrabytes

of Sentinel 1 and 2 data used



13

types of crops
classified (for CSO)



Statistics Poland

Agricultural statistics:

- Crop type classification using Sen2Agri and further Sen4CAP
- Monitoring of crop growth conditions on low-resolution satellite data
- Crop yield forecasting and feasibility at a parcel level



Common Agriculture Policy:

- Verification of agricultural activities
- Catch crop detection
- Verification of maintenance of vegetation against erosion

Region of Interest (ROI)



The screenshot displays the sen4cap web application interface. At the top, there is a header with the sen4cap logo (a satellite icon) and the text "sen4cap sentinel for common agricultural policy", and the ESA logo on the right. Below the header is a green navigation bar with links: sites, products, system overview, dashboard, custom jobs, monitoring, users, data sources, and logout. The "products" link is currently selected.

Below the navigation bar, there is a filter section with a "Filter" button and a "Reset Filter" button. A list of products is shown on the left, with the following items:

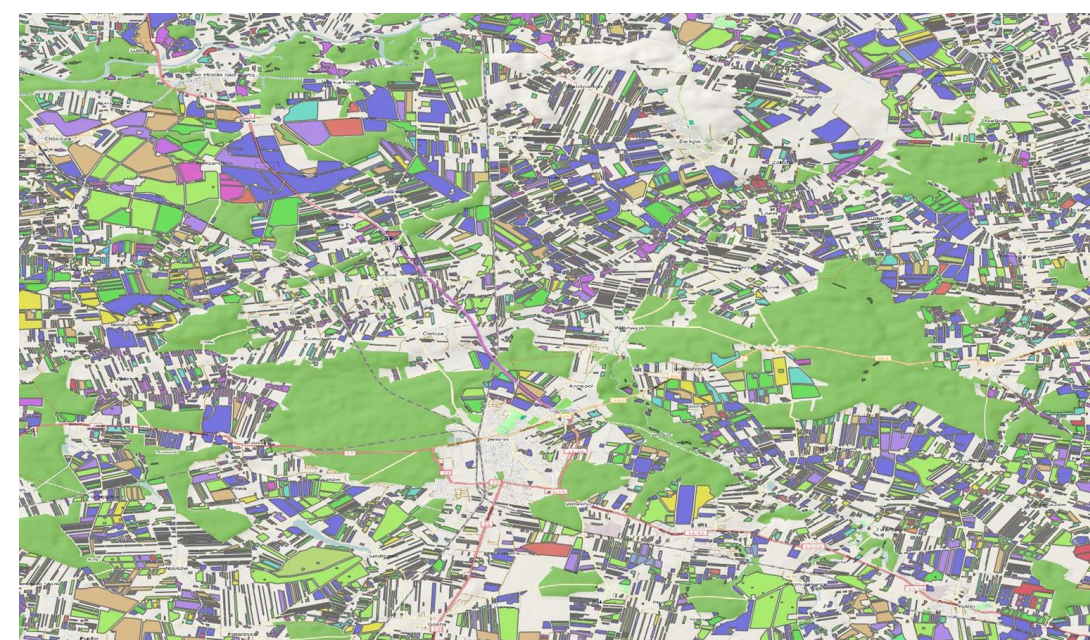
- T33UXT
 - L2A Atmospheric correction
 - L3A LAI mono-date product
 - L4A Crop type product
 - S2AGRI_S4C_L4A_PRD_S5_20200115T082859_V201900
 - S2AGRI_S4C_L4A_PRD_S5_20200211T151031_V201900
 - S2AGRI_S4C_L4A_PRD_S5_20200228T202322_V201900
 - S2AGRI_S4C_L4A_PRD_S5_20200325T201402_V201900
 - Sentinel 1 L2 Amplitude product
 - Sentinel 1 L2 Coherence product

The main area of the interface shows a map of Poland and surrounding regions. A red dashed box highlights a specific Region of Interest (ROI) in the western part of Poland, near the border with the Czech Republic. The map includes labels for various cities and regions, such as Gdansk, Szczecin, Poznan, Warsaw, Lodz, Wrocław, and Krakow. The map also shows the borders of Poland, the Czech Republic, and Slovakia.

Sen4CAP crop classification (Level-4A product)



	roslina	nr_produce	dzrol	crop	ori_id	ori_hold	ori_crop	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2
277	pszenica ozima	42742404.00...	36621.00000...	18	36621	42742404	18	18	0.847000000...	20	0.074000000...
278	zyto ozime	27592645.00...	36624.00000...	34	36624	27592645	34	19	0.162000000...	20	0.107000000...
279	zyto ozime	72572152.00...	3663.000000...	34	3663	72572152	34	34	0.578000000...	20	0.197000000...
280	kukurydza	27602825.00...	36632.00000...	11	36632	27602825	11	11	0.930000000...	26	0.014000000...
281	zyto ozime	32812012.00...	36633.00000...	34	36633	32812012	34	34	0.707000000...	20	0.146000000...
282	tuz	27907501.00...	3015.000000...	30	3015	27907501	30	30	0.138000000...	11	0.121000000...



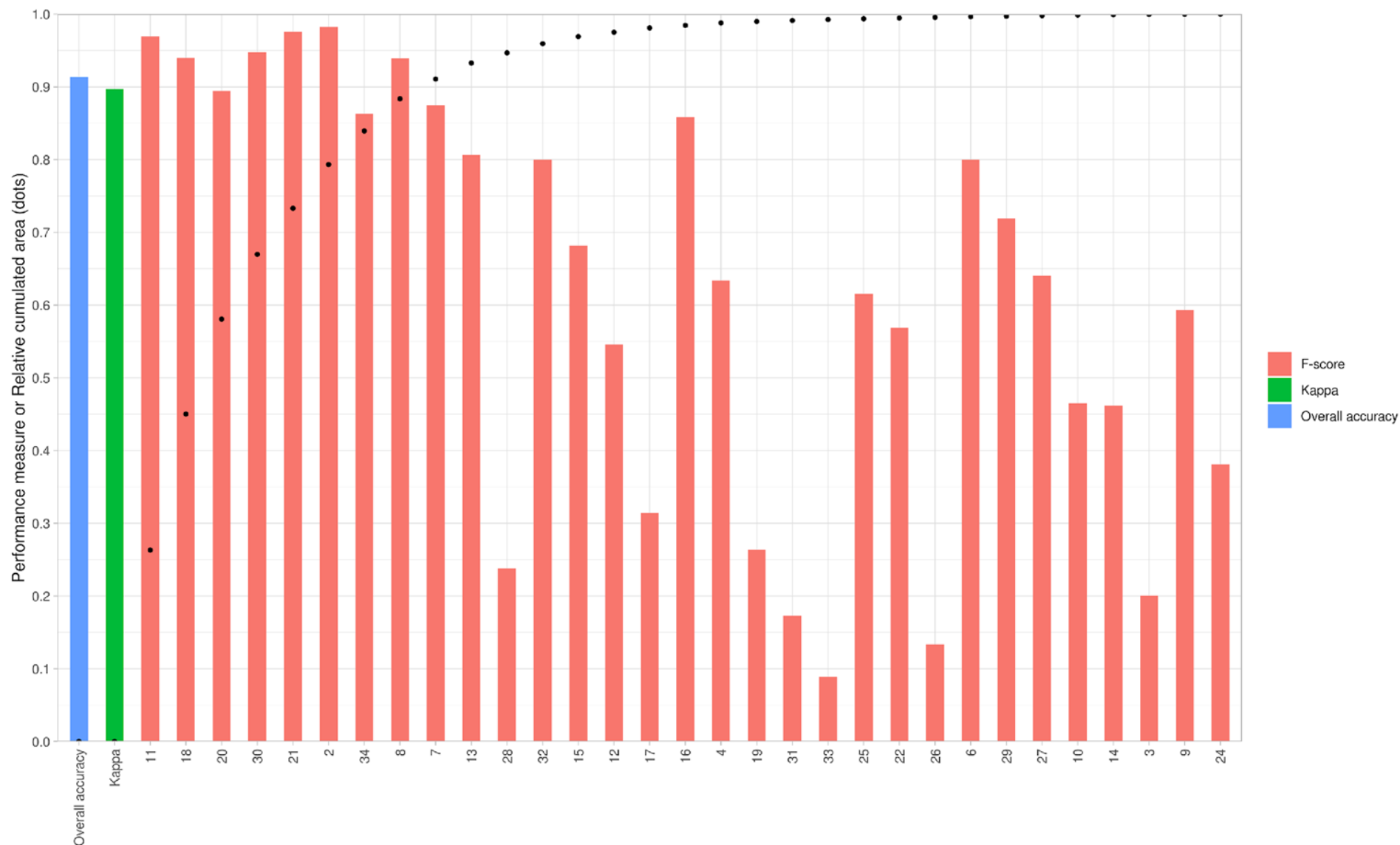
Overall classification accuracy is: 0.91
Overall classification kappa is: 0.90

Crop classification was performed for 2019 for 34 different crop types.

Sen4CAP crop classification algorithm is based on the fusion of the optical and radar data (Sentinel-1 & 2)

Sen4CAP classification gives two most probable crop types with the associated uncertainties estimates.

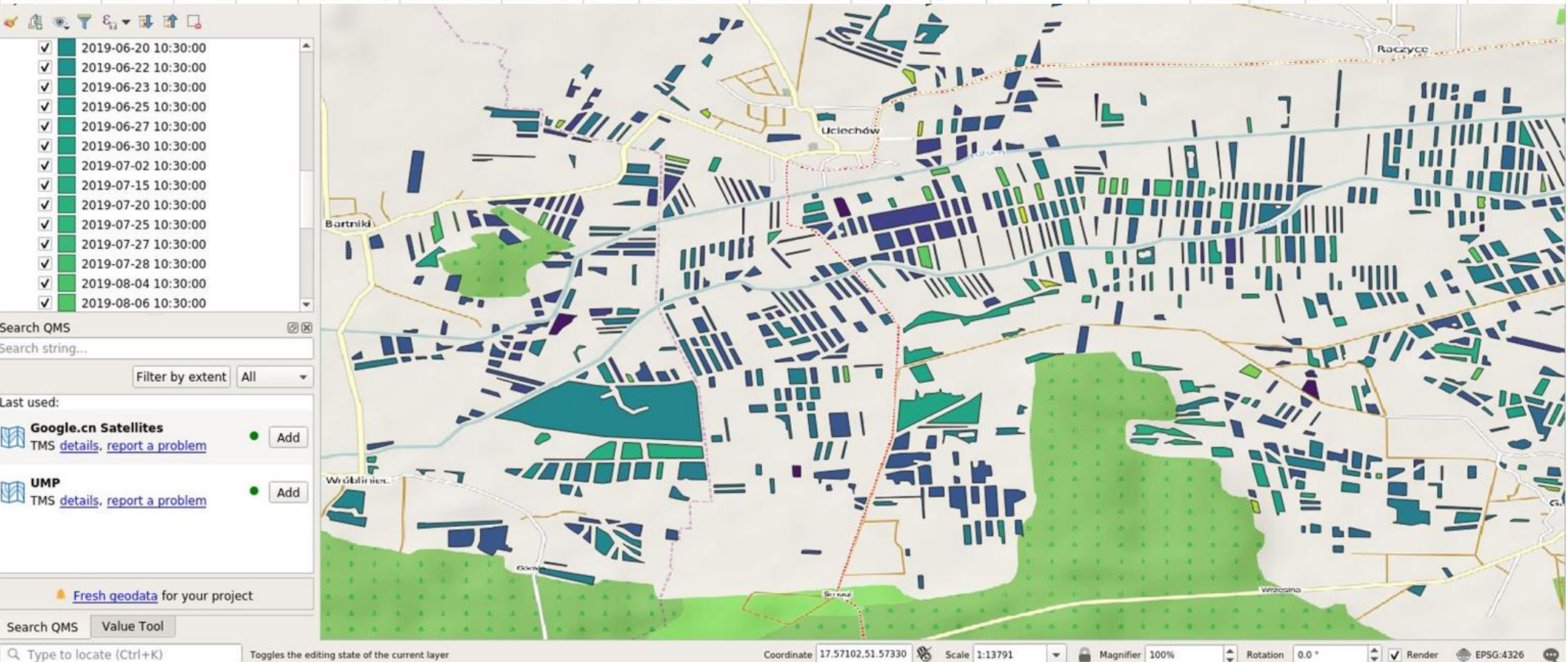
Sen4CAP crop classification (Level-4A product)



Sen4CAP grass mowing (Level-4B product)



Ori_hold	Ori_id	Ori_crop	mow_n	m1_dstart	m1_dend	m1_conf	m1_mis	m2_dstart	m2_dend	m2_conf	m2_mis	m3_dstart	m3_dend	m3_conf	m3_mis	m4_dstart	m4_dend	m4_conf
37182145	24082	28	0 0	0	0	0.000000...	0	0	0	0.000000...	0	0	0	0.000...	0	0	0	0.000000000...
40672486	2409	30	1	2019-06-10 ...	2019-06-20 ...	0.768000...	S2	0	0	0.000000...	0	0	0	0.000...	0	0	0	0.000000000...
75090634	2983	30	2	2019-06-22 ...	2019-06-30 ...	0.665000...	S2	2019-09-05 10...	2019-09-15 ...	0.557000...	S2	0	0	0.000...	0	0	0	0.000000000...
29894652	2984	30	1	2019-05-18 ...	2019-06-17 ...	0.524000...	S2	0	0	0.000000...	0	0	0	0.000...	0	0	0	0.000000000...
27597402	2411	30	1	2019-06-02 ...	2019-06-10 ...	0.680000...	S2	0	0	0.000000...	0	0	0	0.000...	0.0000000000000000	0	0	0.000000000...
63215395	24111	28	1	2019-08-24 ...	2019-08-26 ...	0.510000...	S2	0	0	0.000000...	0	0	0	0.000...	0	0	0	0.000000000...
36987575	24132	28	2	2019-06-02 ...	2019-06-12 ...	0.620000...	S2	2019-09-05 10...	2019-09-18 ...	0.901000...	S2	0	0	0.000...	0	0	0	0.000000000...



Higher level products using Sen4CAP

Crop and catch crop phenology



Producer: xxxxxxx; parcel: D3; classified crop: winter rapeseed;
declared crop: winter rapeseed

Coordinates

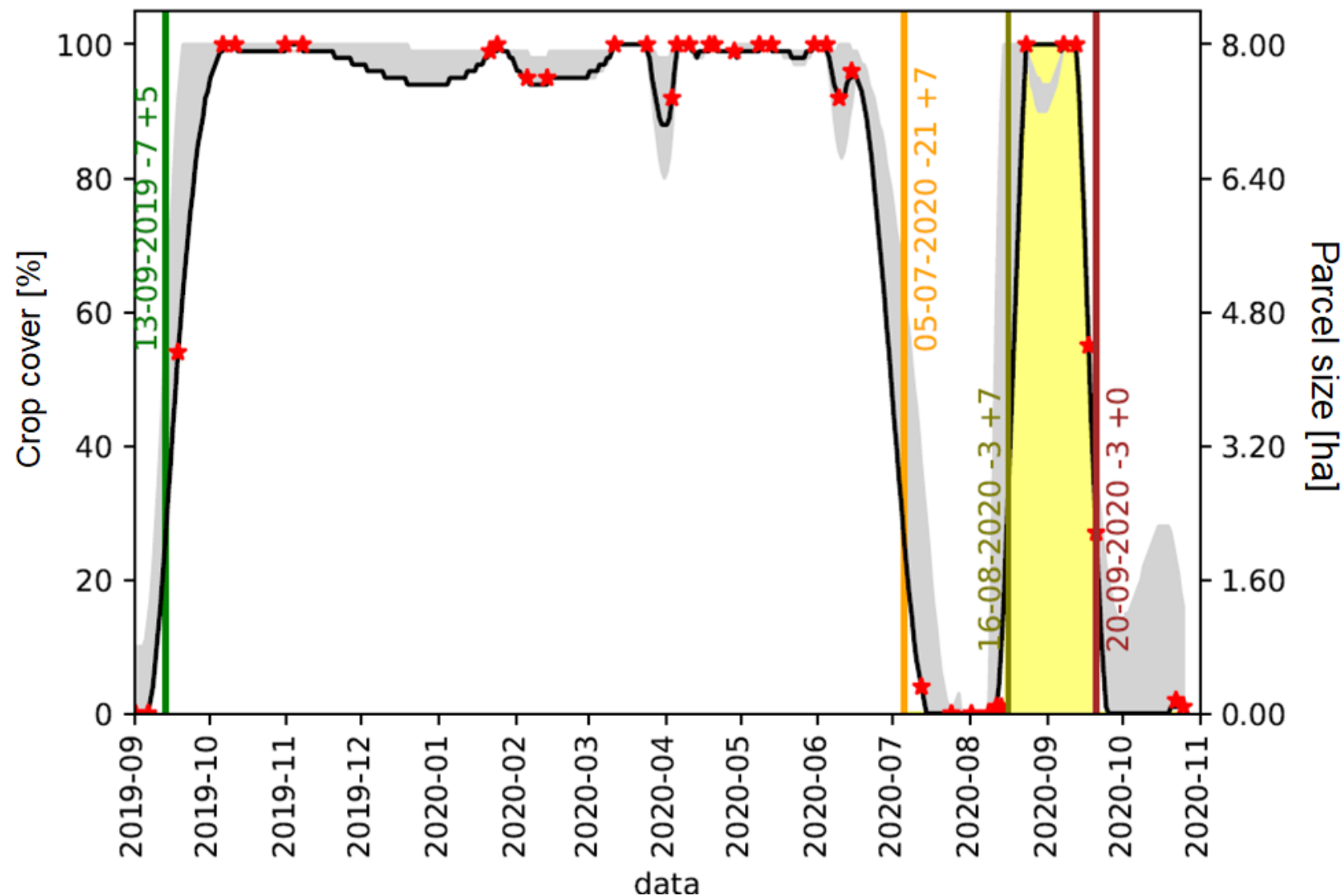
nuts2: wielkopolskie
lau1: obornicki
lau2: Rogoźno
id: 301602_5.0015

Statistics

size: 632 pixels
inhomogeneity: 4%

Legend

- greening
- harvest
- interpolation
- Sentinel-2
- catch crop
greening
- catch crop
harvest
- catch crop
- uncertainty

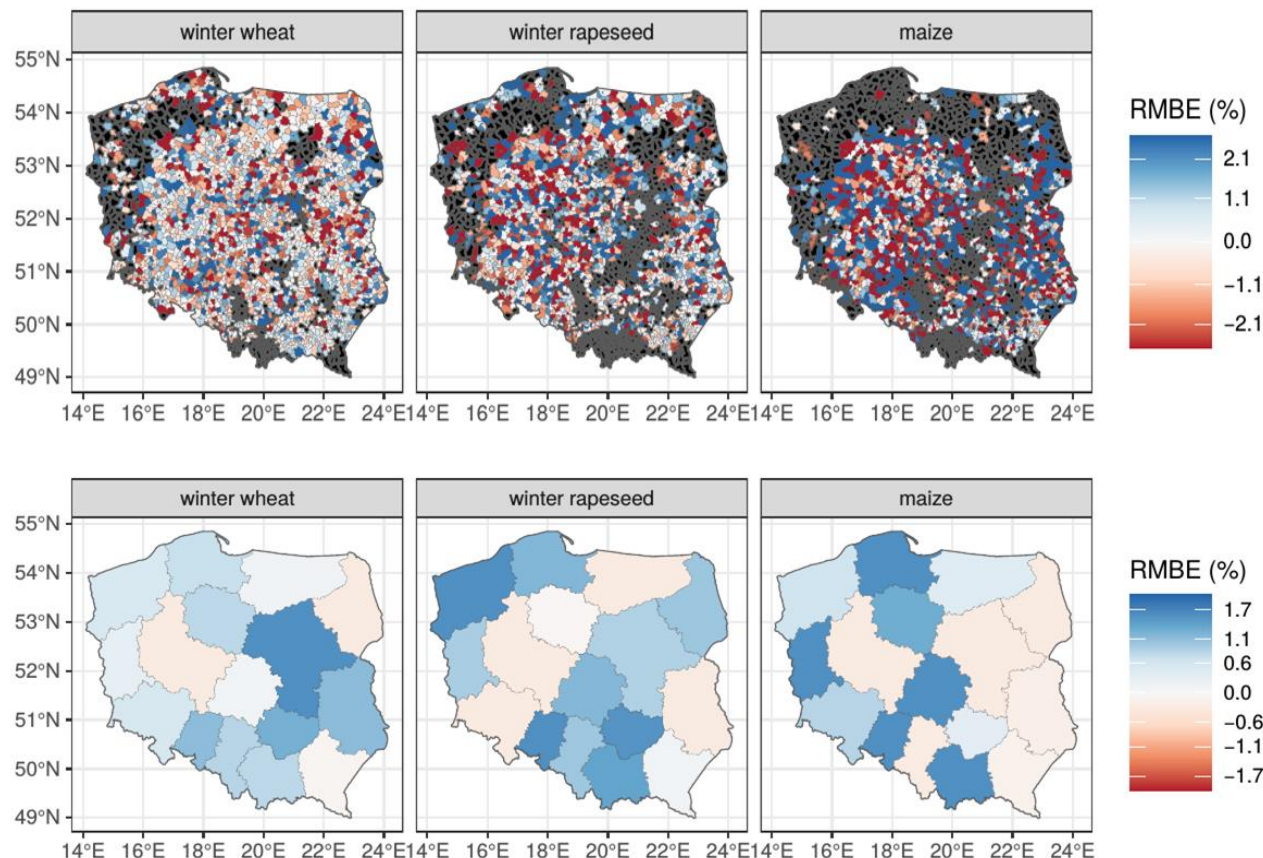
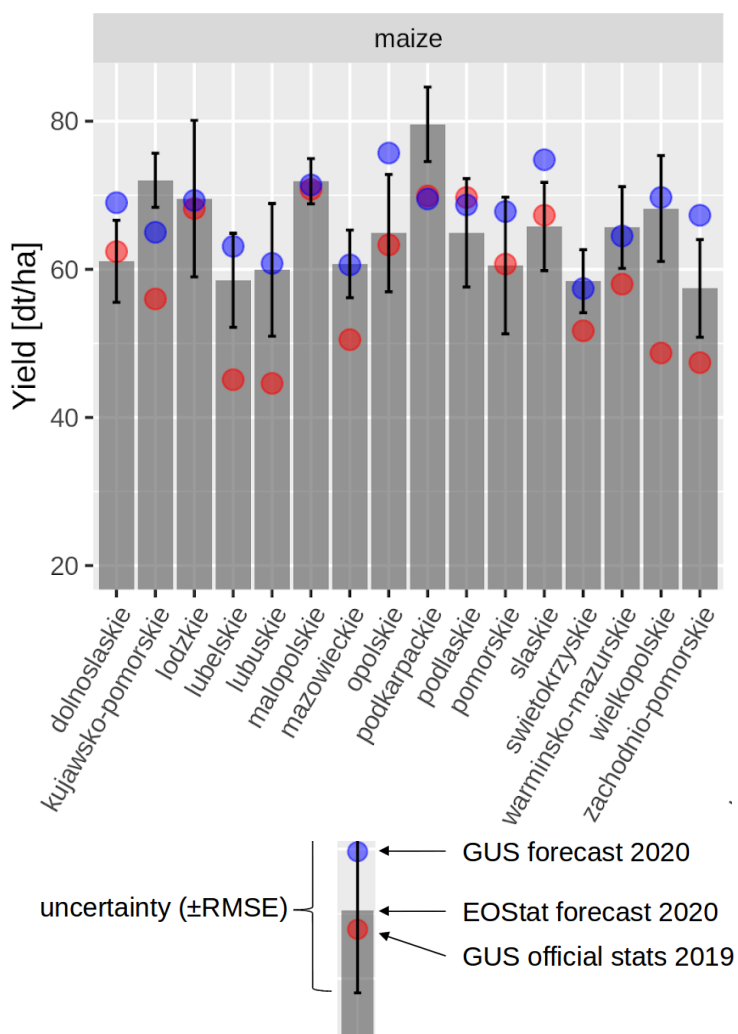


Higher level products using Sen4CAP

Crop yield forecasting



Latest Sen4CAP version 2.0 provides S4C Marker Database along with the L4A crop classification and L3B vegetation status products. Fusion of these data sets allows for improvement of our crop yield forecast. This is still to be implemented.

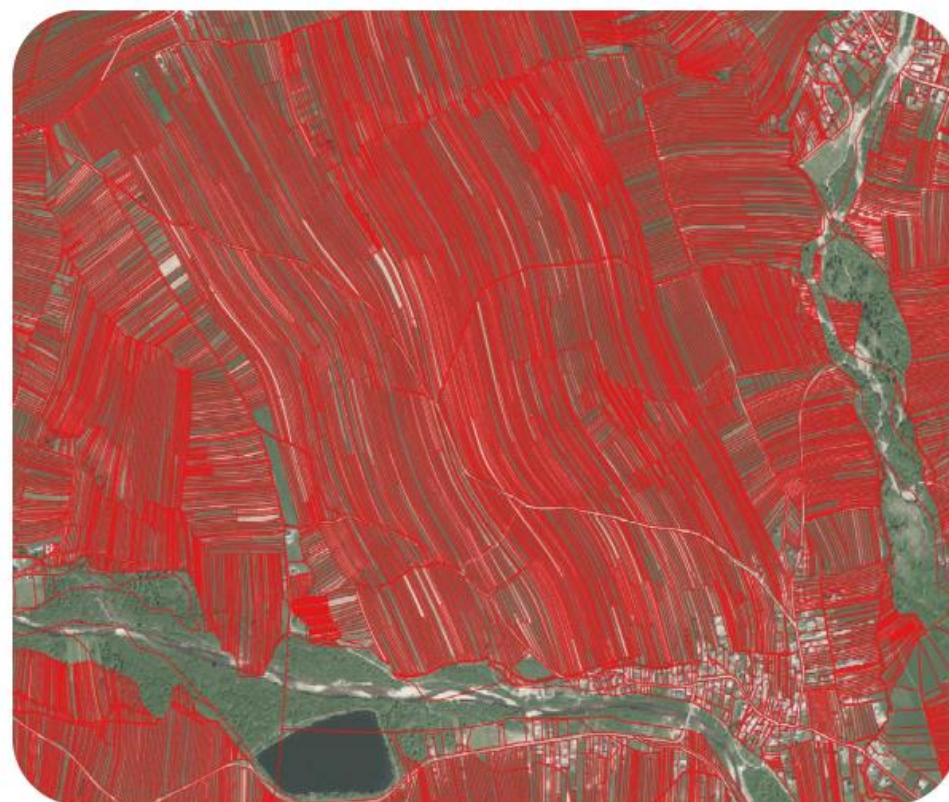


Ideas for Sen4CAP follow-up?



In Poland ~50% of agriculture field can be analysed using Sen4CAP and Sentinel imagery.

We need a **new version of Sen4CAP** system capable of processing VHR imagery (<3m).



Sentinel-2 10m imagery



0 100 200 300 m



Planet Dove 3m imagery



0 100 200 300 m



Virtual machine with the Sen4CAP installation is available at:
<https://creodias.eu/-/sen4cap>

Thank you for you attention!