GrasSAT - Tools for information to farmers on grasslands yields under stressed conditions to support management practices

POLNOR CCS 2019/Project co-financed by the National Center for Research and Development as the Program Operator: "Applied Research" Program under the Norwegian Financial Mechanism 2014-2021 / POLNOR 2019, Track / area: Food and natural resources.

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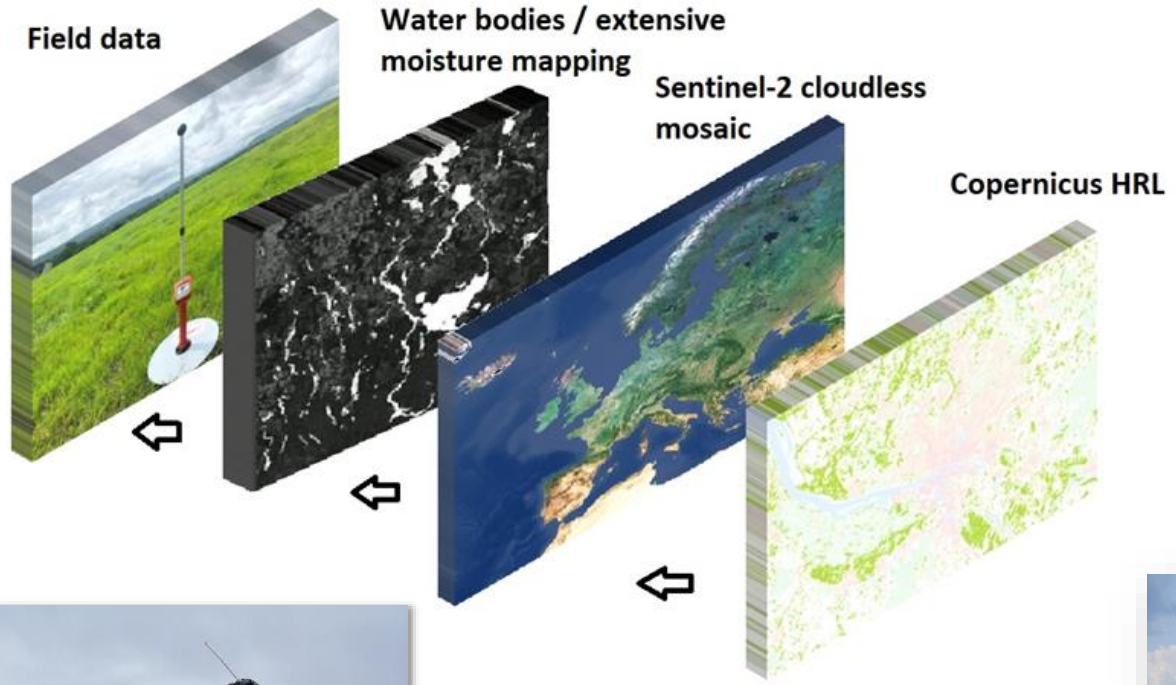
*Institute of Geodesy and Cartography; University of Life Sciences Poznan**; NIBIO***; NORCE **** GEOMATIC*****

INPUT DATA

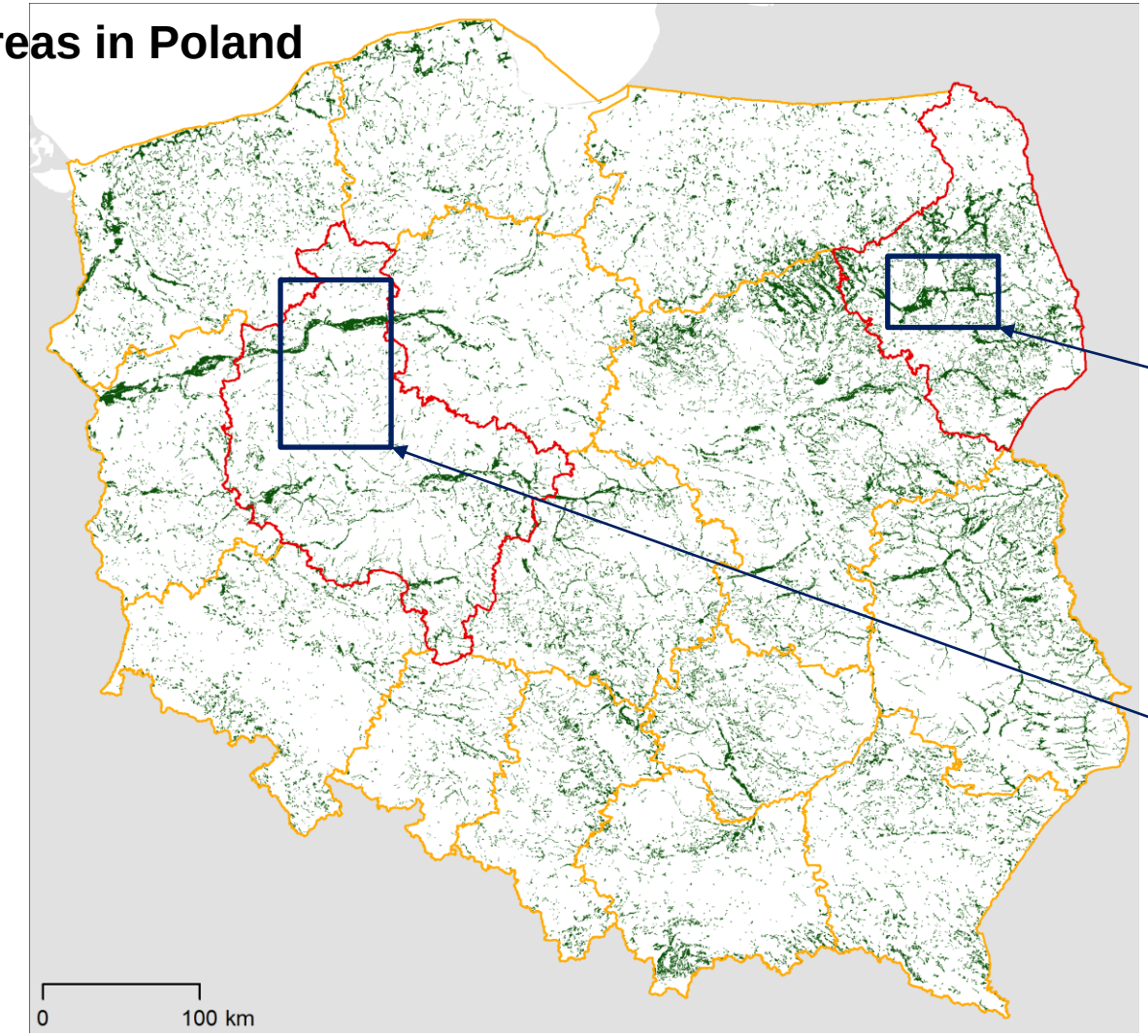


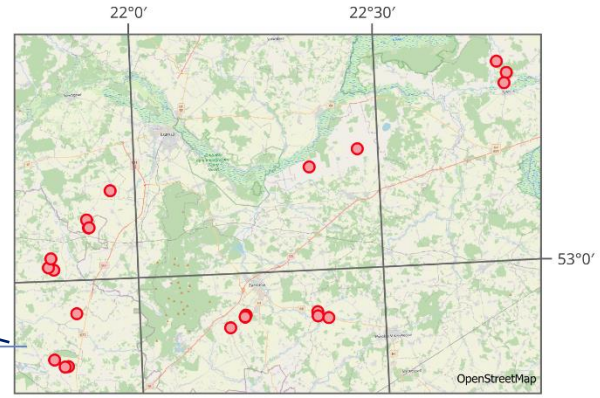
Field measurements

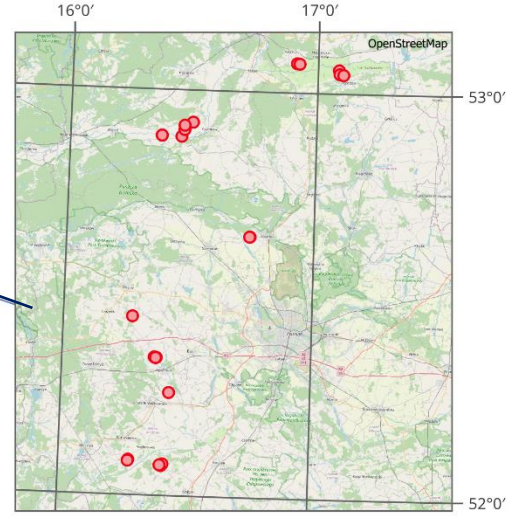
- LAI (LAI-2200C Plant Canopy Analyser)
- APAR (AccuPAR)
- Chlorophyll (CCI) - SPAD
- **Soil moisture** (PICO-64)
- Biomass (platemeter EC20 and cutting, height, fresh and dry matter sward)
- **Soil samples - pH, P, K, Mg, N**
- Photo, metadata
- Spectral responses by the ASD FieldSpec4 Hi-Res
- Radiation temperature (with EVEREST AGRI-THERM II)

Plan of field campaigns, Poland test sites

Grasslands areas in Poland

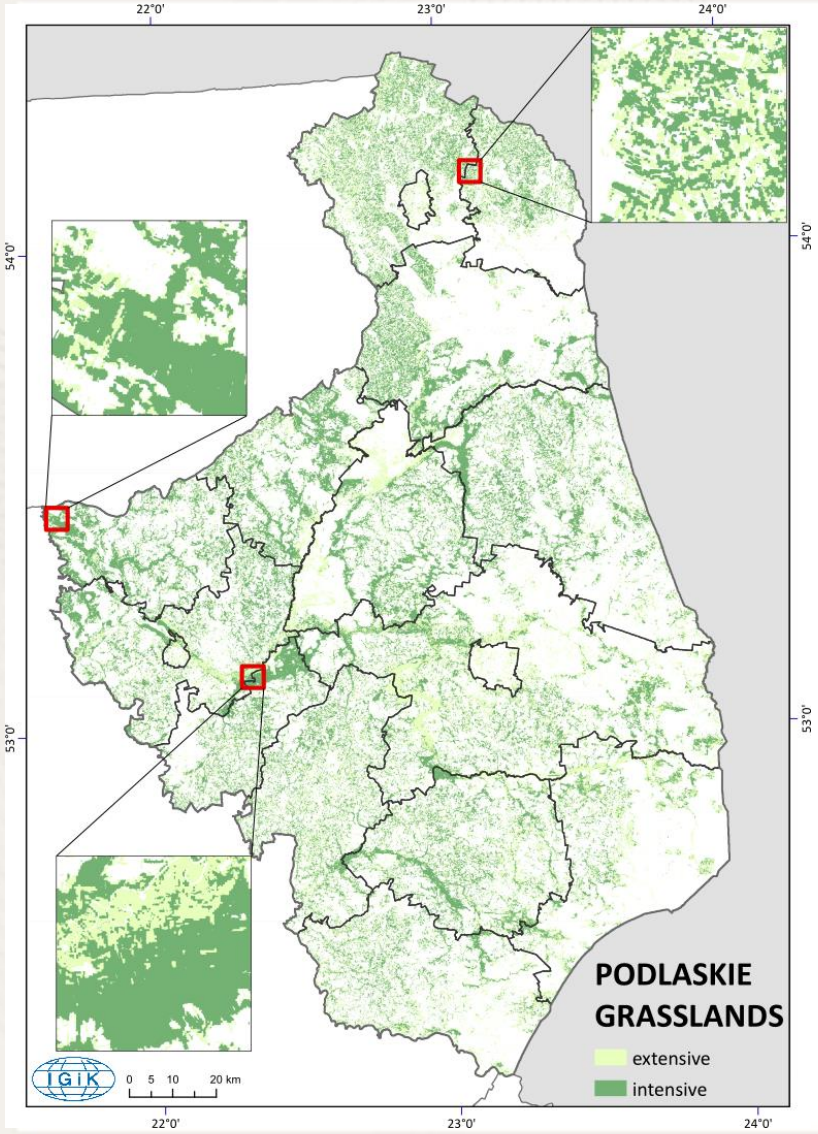






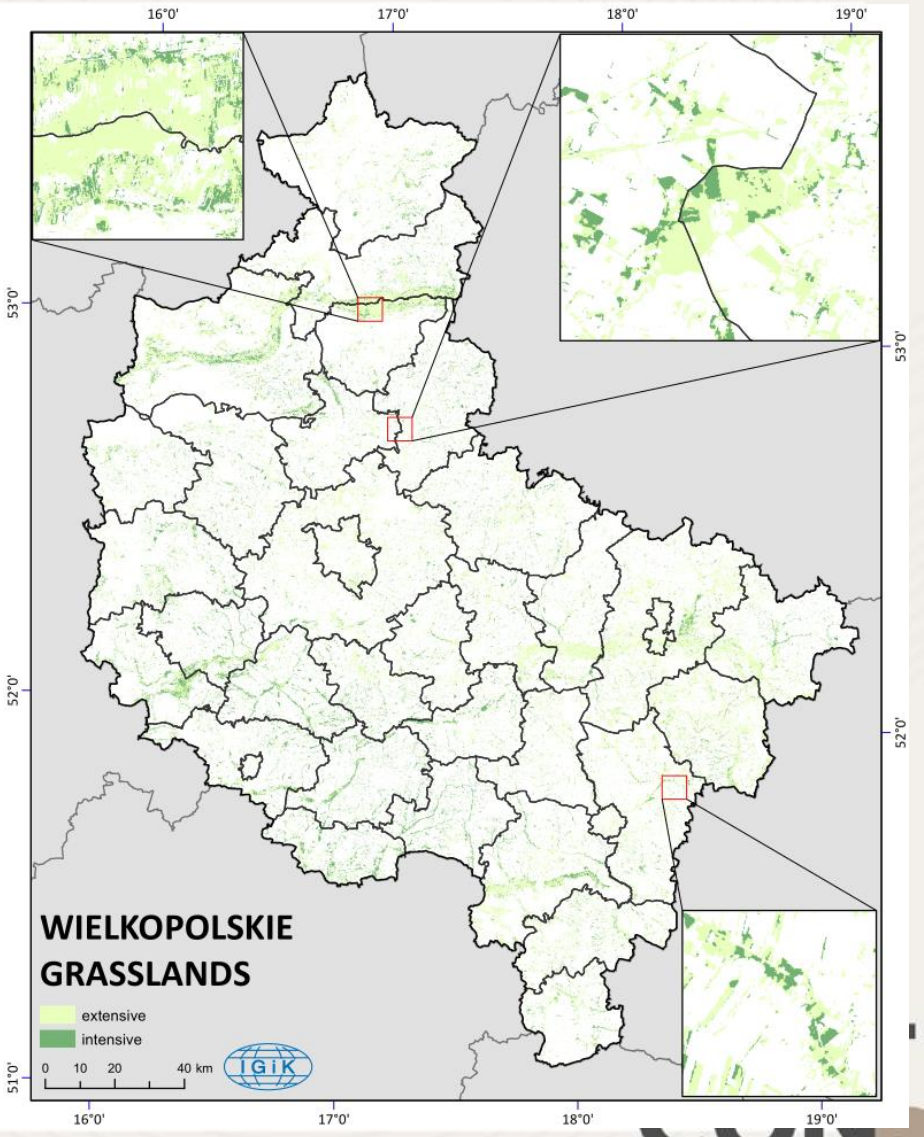
The area of grasslands in Poland is 12% of the country area- 3 millions of ha)

Grasslands classification

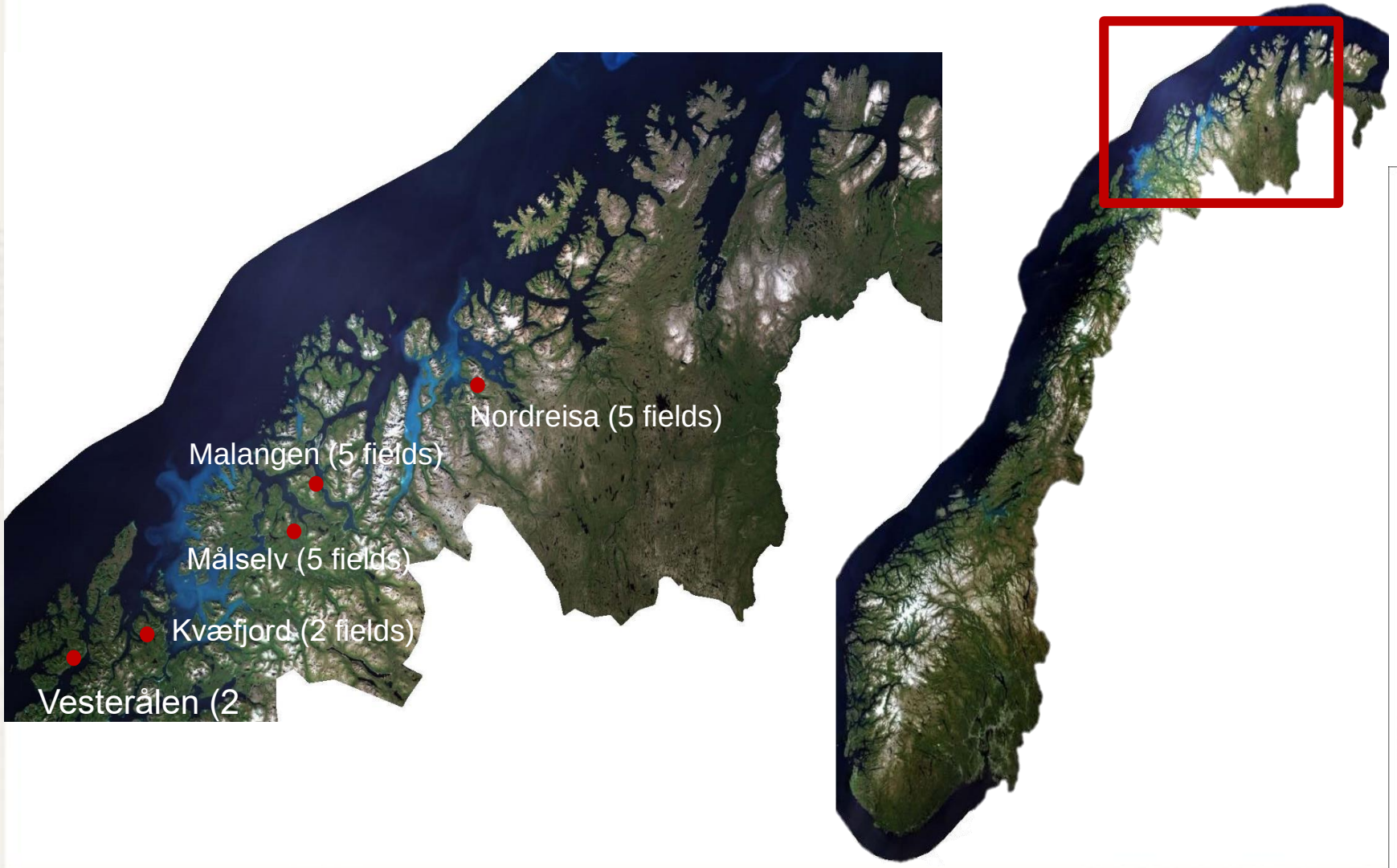


Extensive grasslands

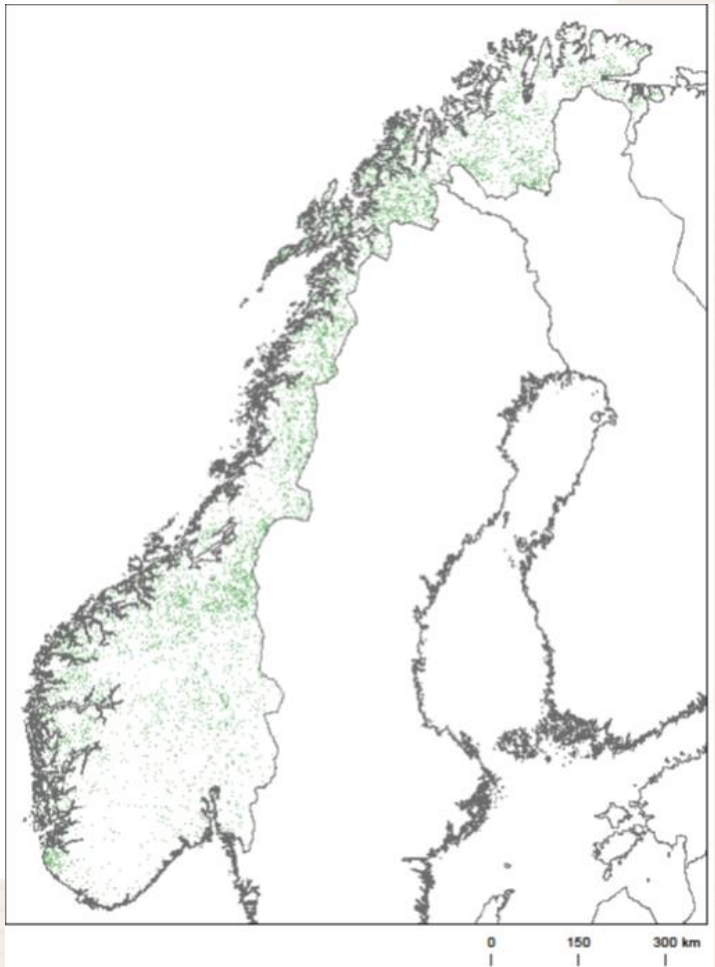
Intensive grasslands



First/Second/Third year field campaigns during growing season



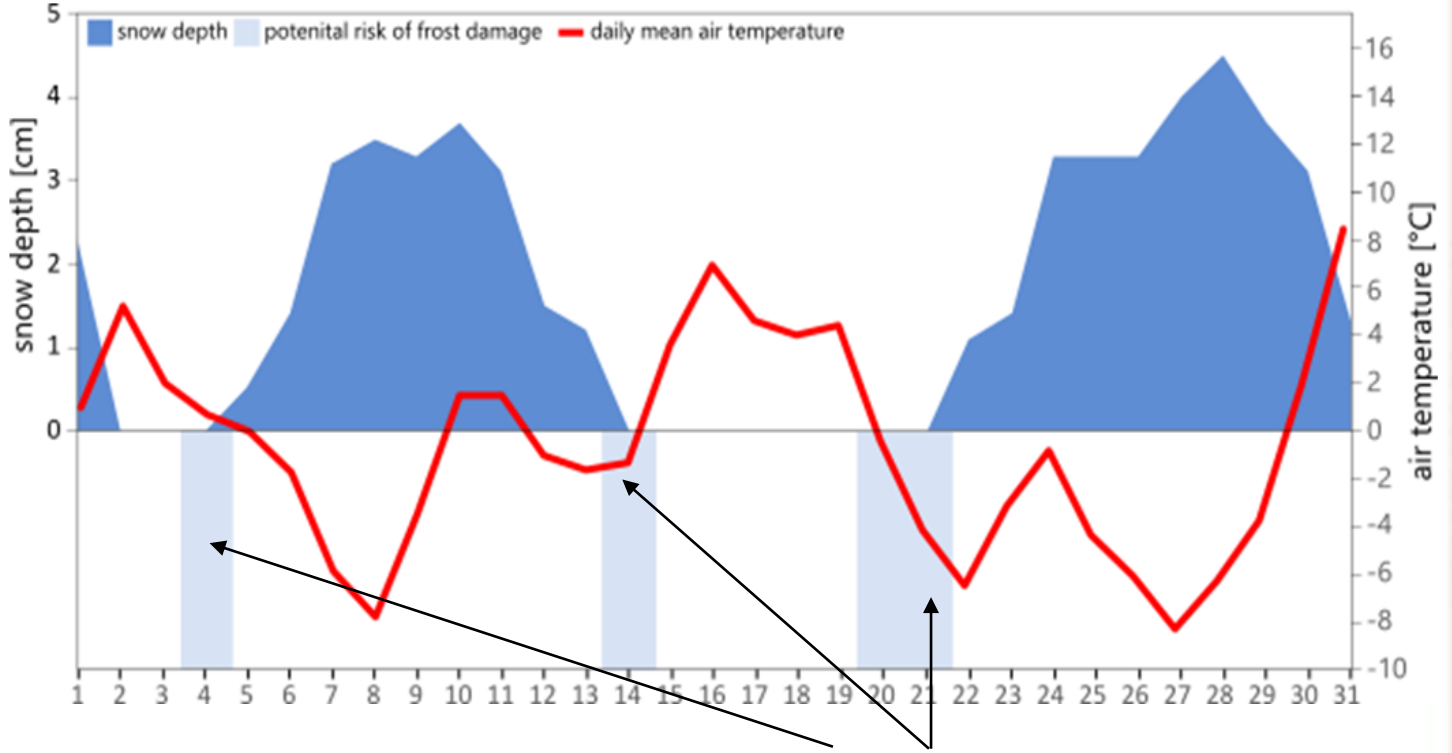
Grasslands areas in Norway



Risks: Frost damage, droughts and lack of water

MOBILE APP

Reports and Alerts (last 30 days)



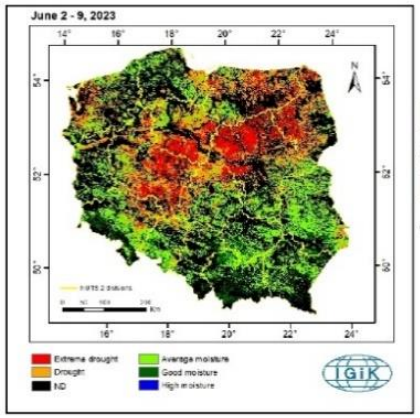
SNOW COVER DURATION (no. of days)

24

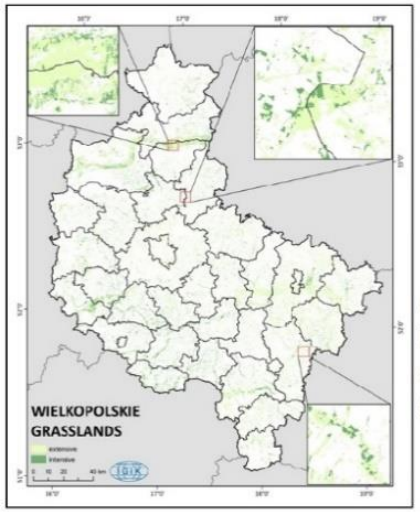
CROP FREEZING DANGERS (no. of obs.)

3

Risk: droughts at the time of grass development

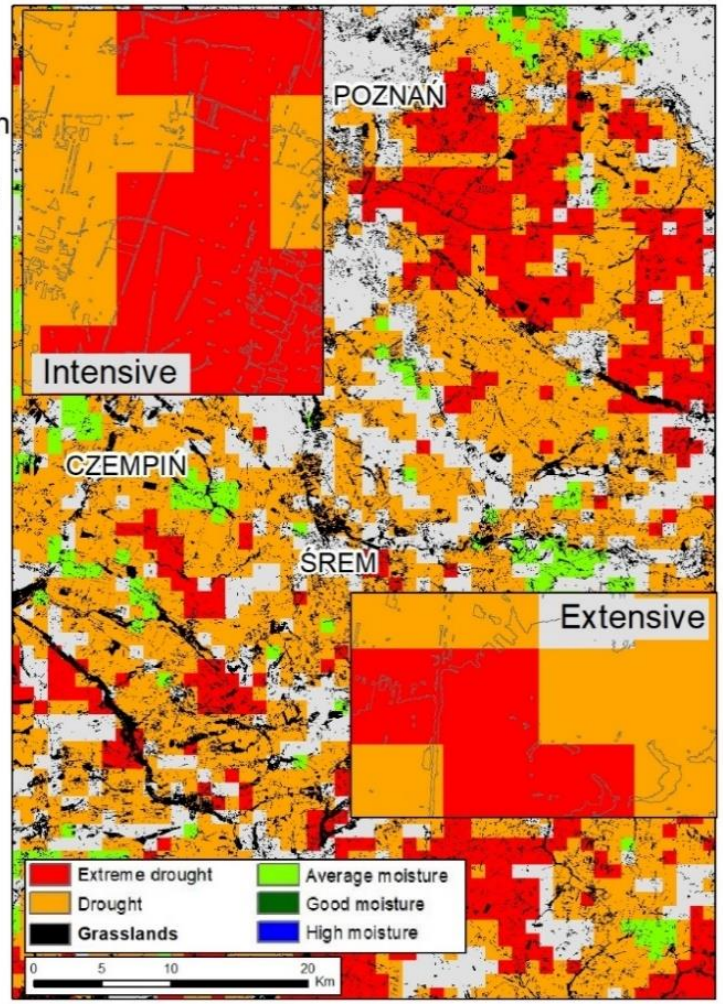


Drought Identification
Satellite System
DISS - Terra MODIS
June 2 - 9, 2023

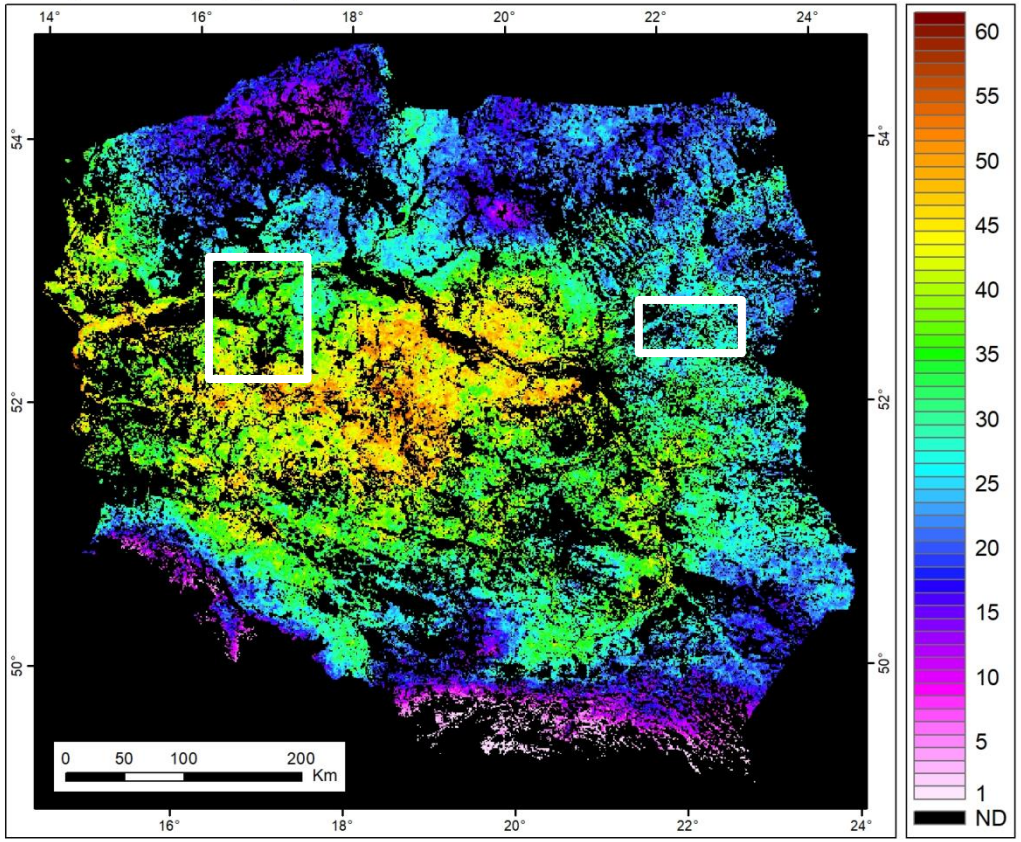


Study area:
Wielkopolskie
Voivodeship
NUTS 2 PL41

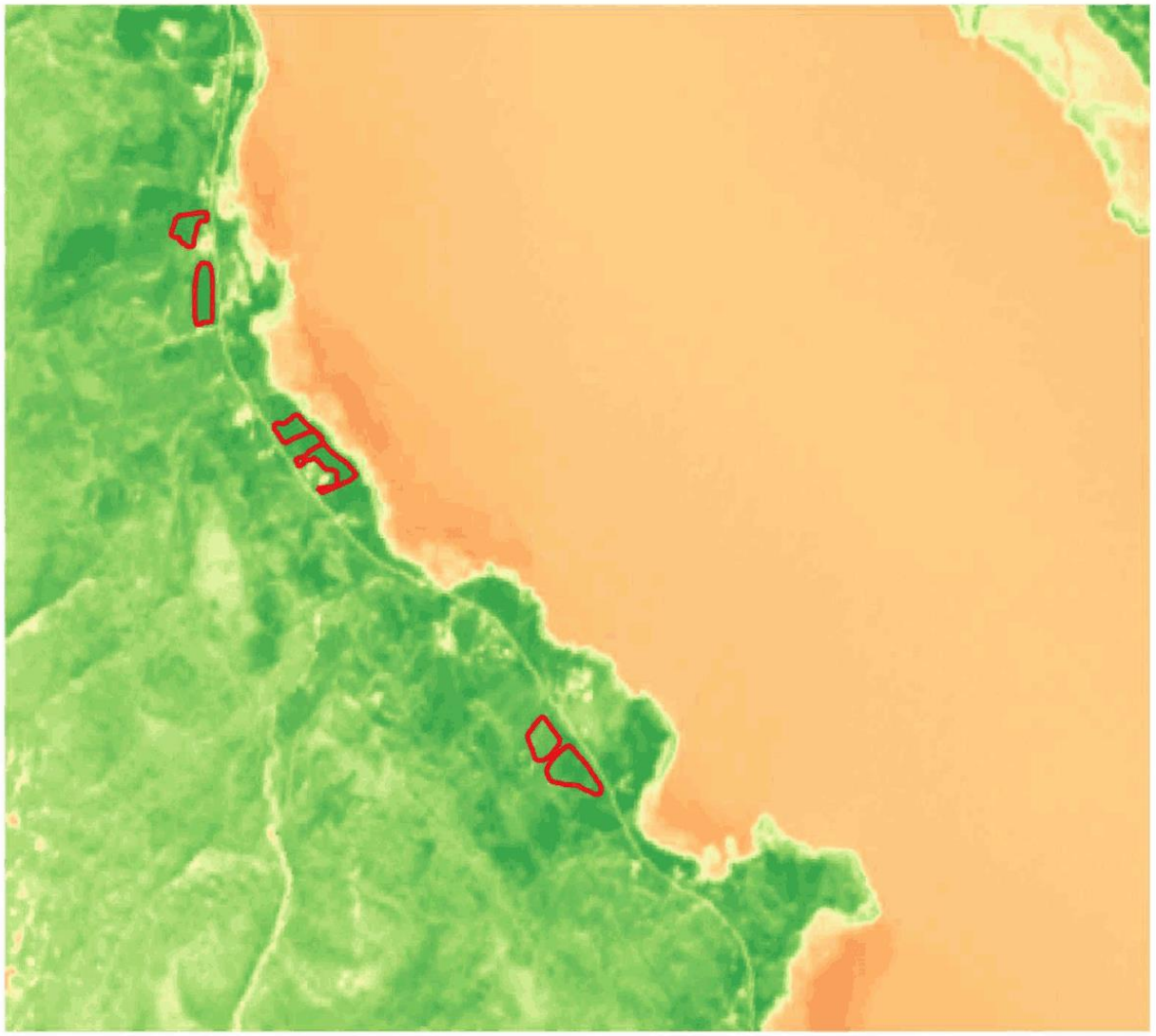
Grasslands
Use Intensities
Classification
Sentinel-2

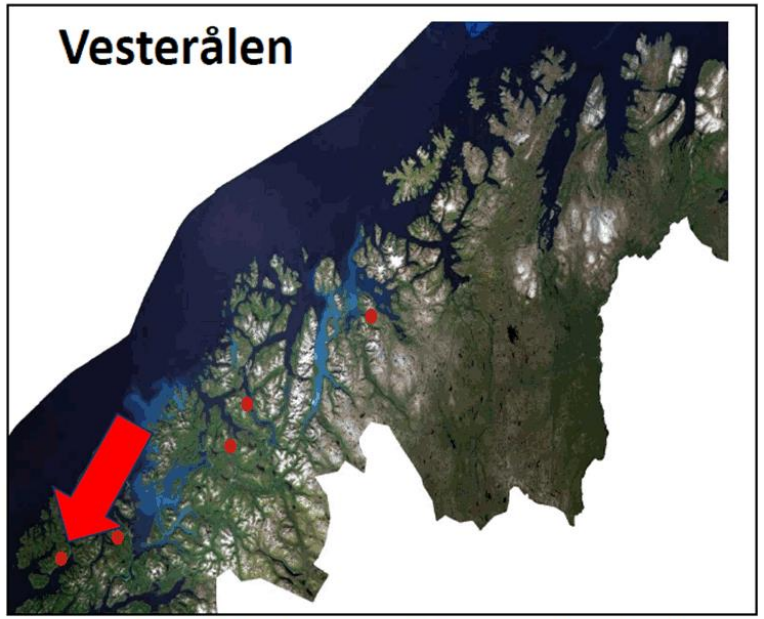


Frequency (%) of drought in 2001-2020



Map of Normalized Difference Vegetation Index (NDVI)





Normalized Difference Vegetation Index

Sentinel-2, June, 2023

1

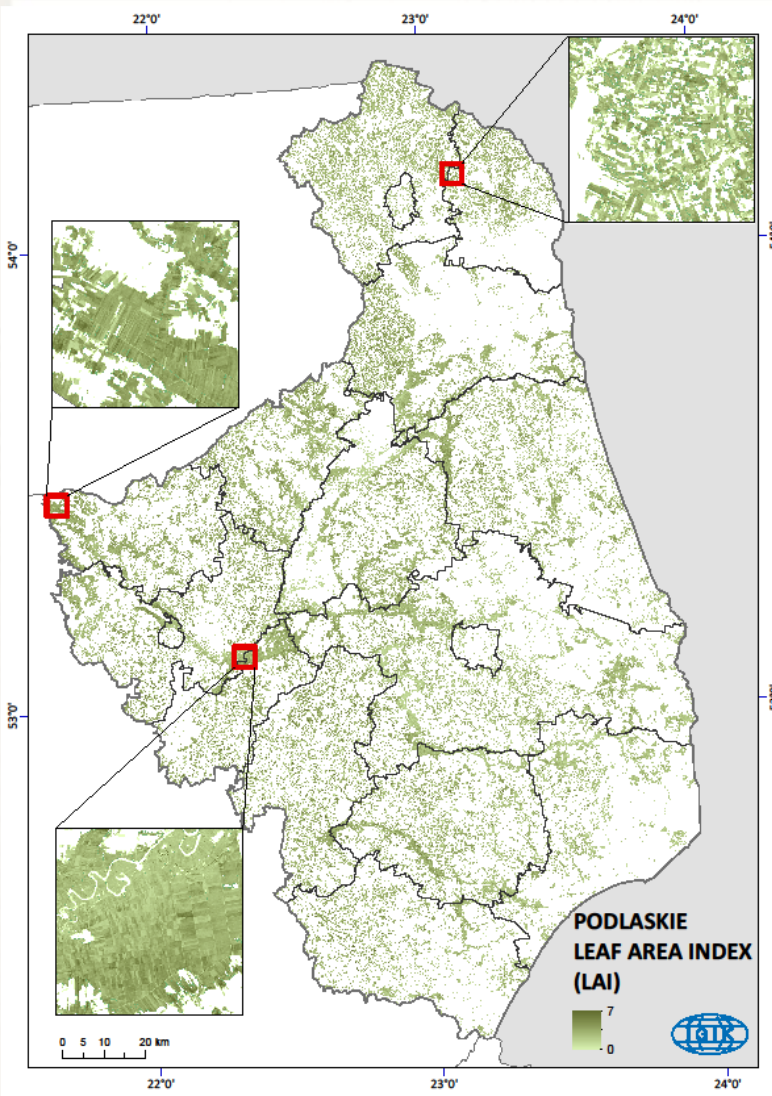
-0.5

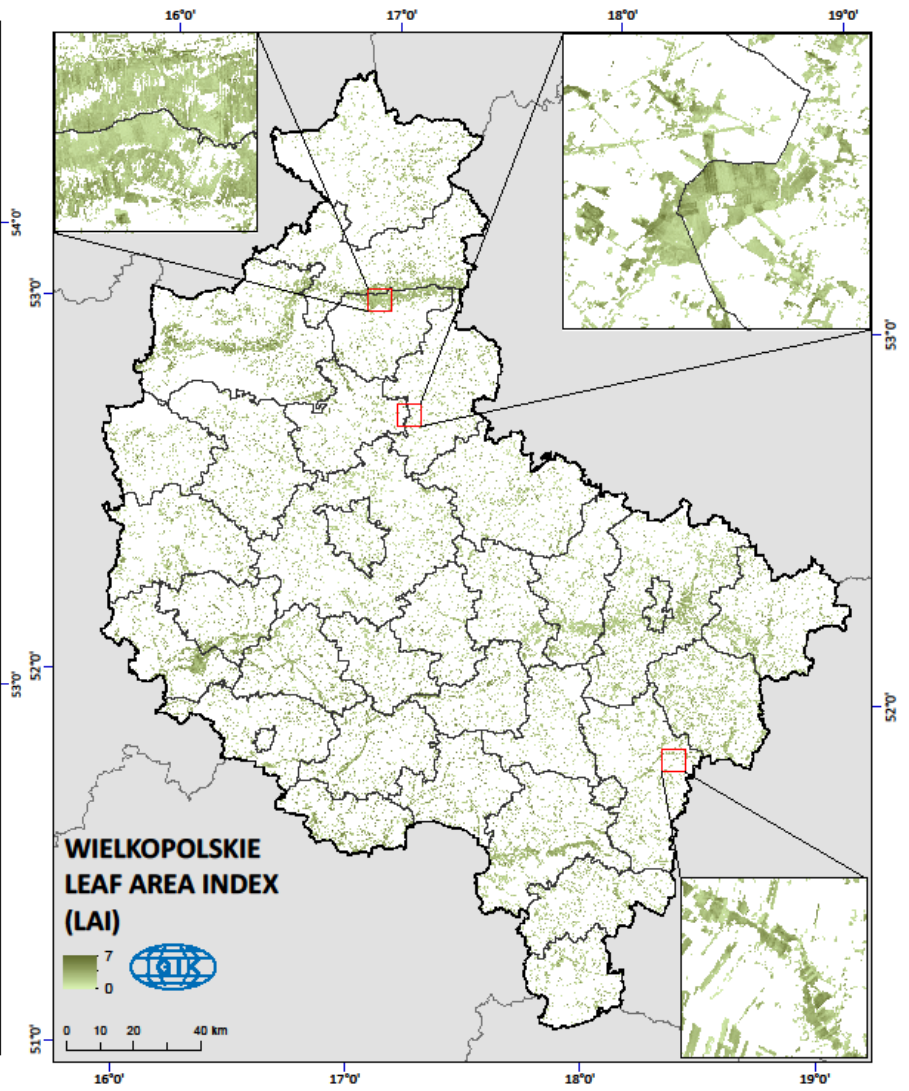
0 250 500 m

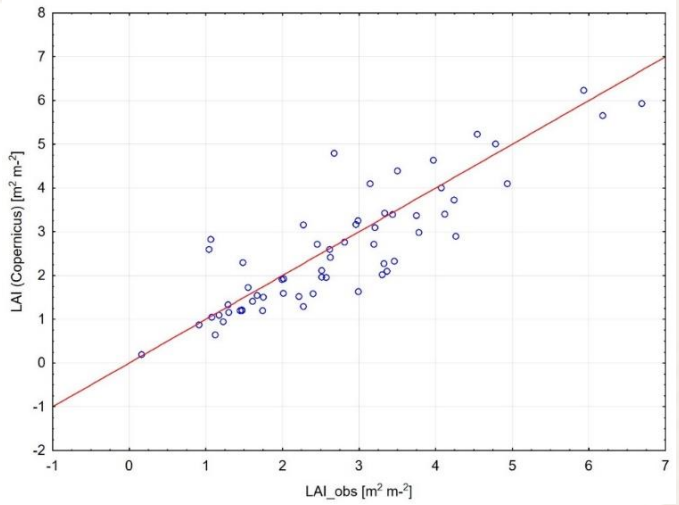
EPSG:25833

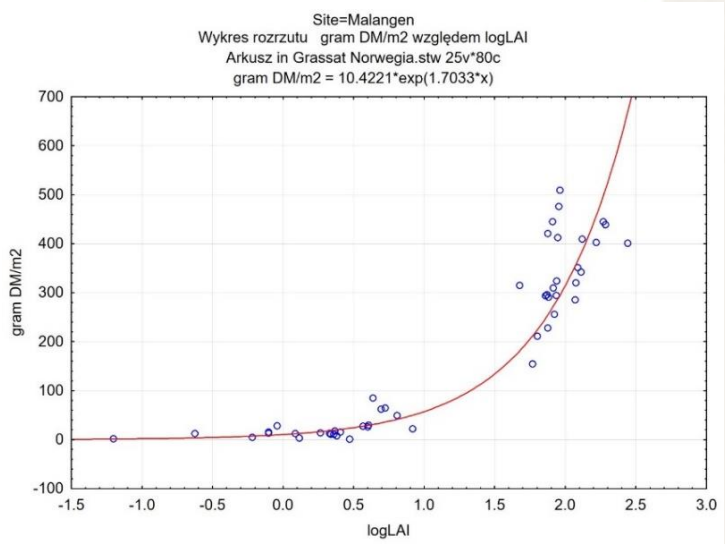
Maps of Leaf Area Index (LAI) for the study areas -

LAI from Copernicus towards LAI measured

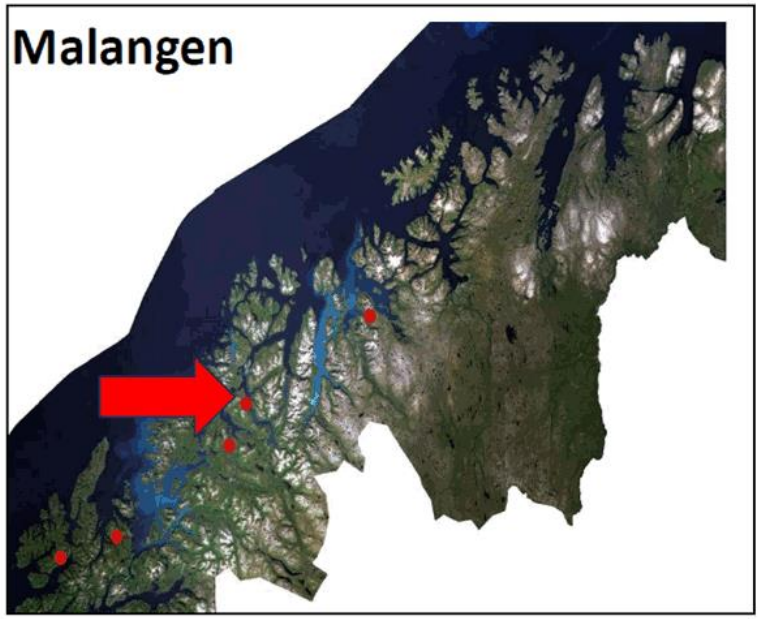




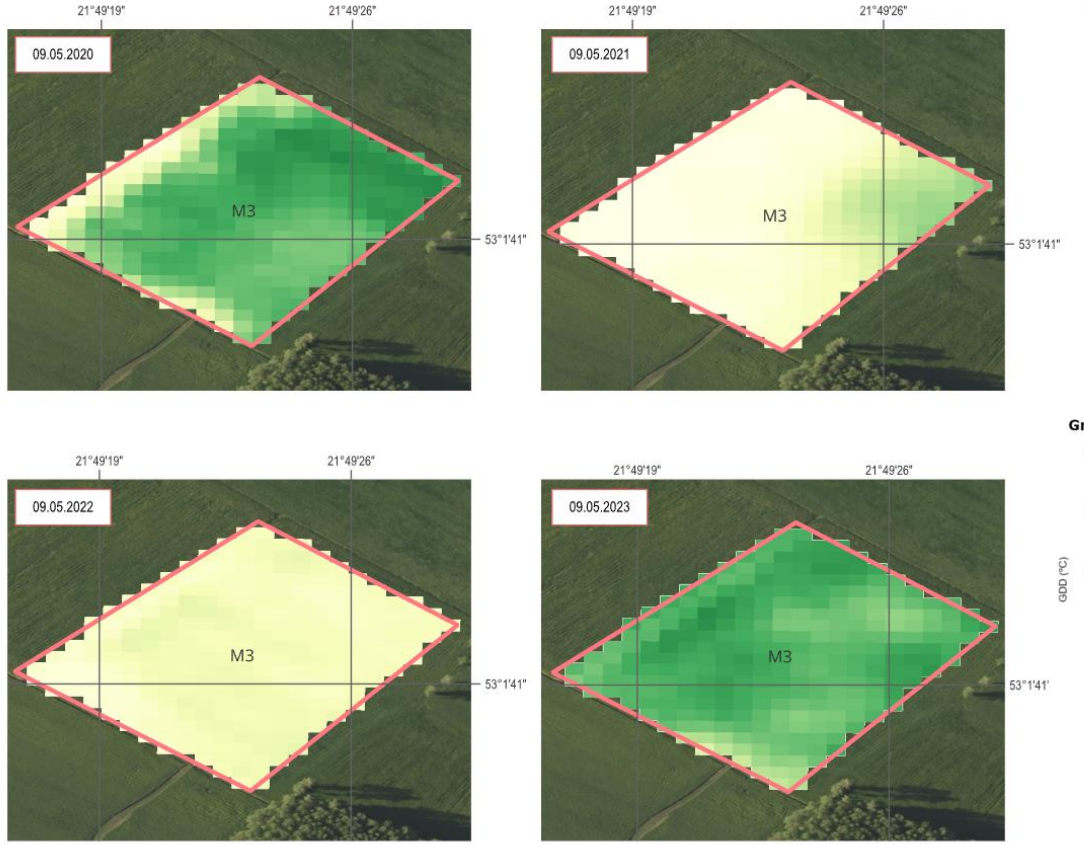


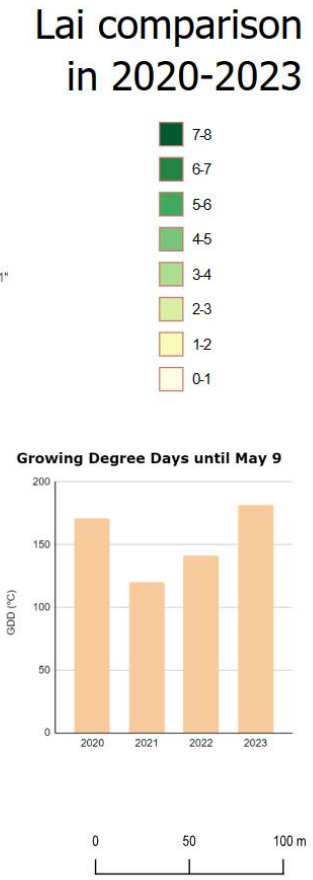


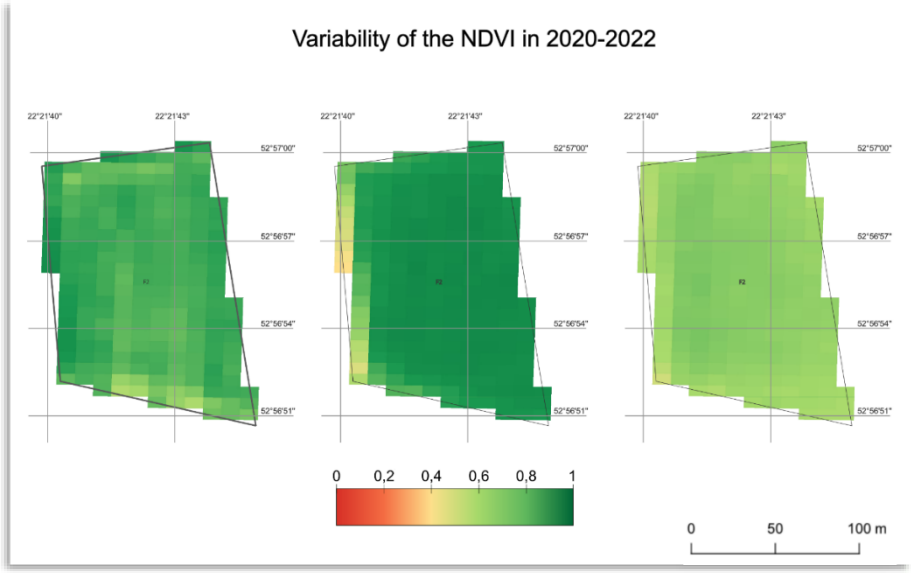
Maps of Leaf Area Index (LAI)



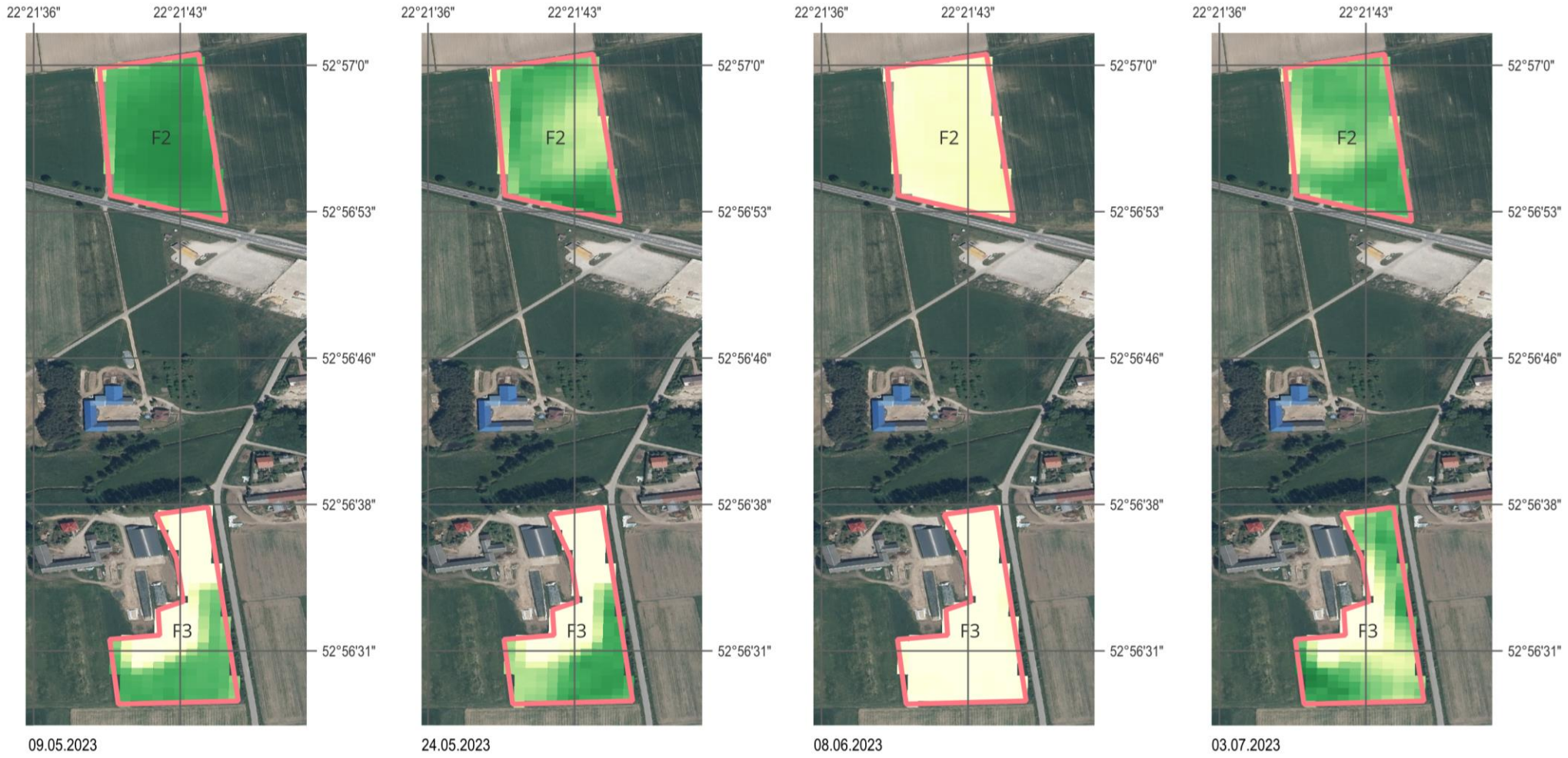
LAI for the field M3 at 2020-2023



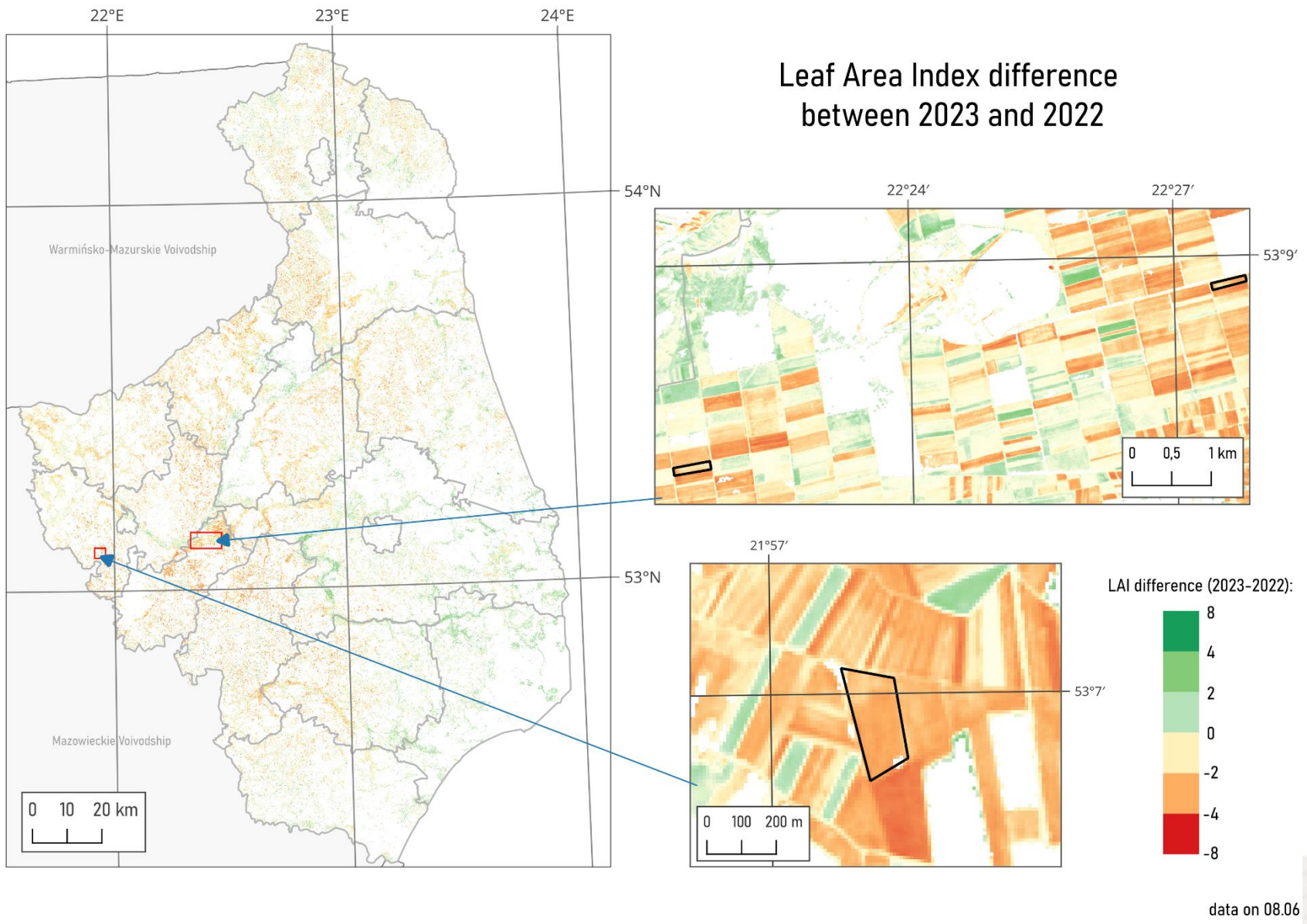




LAI at the field F2 and F3 at the 2023

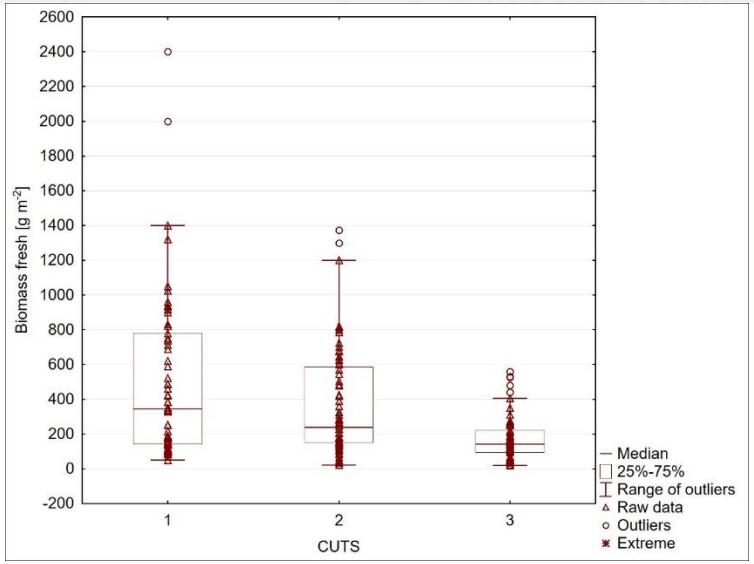


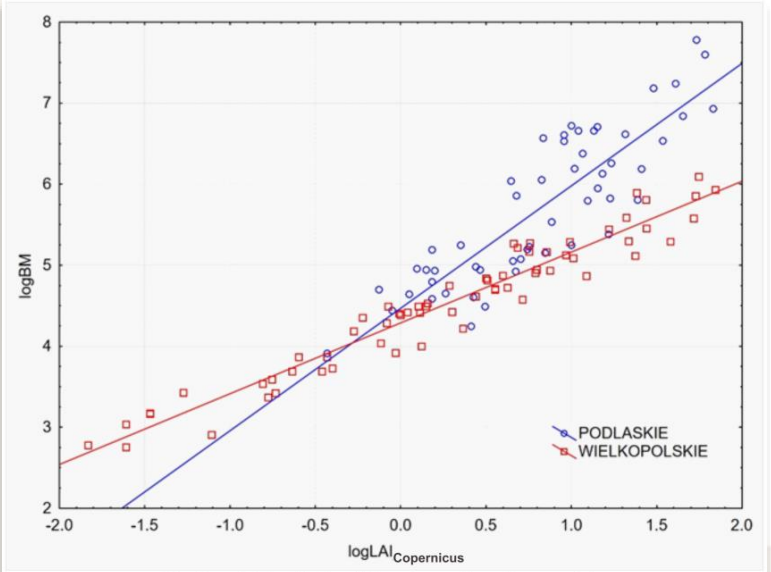
Difference between LAI in 2023 and LAI in 2022 for 08.06



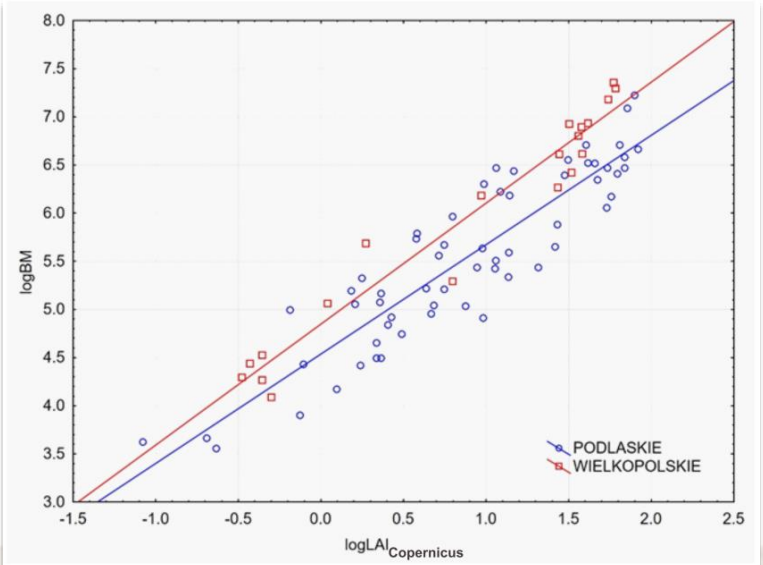
Estimated parameters for wet biomass models

	Podlaskie Voivodship	Wielkopolskie Voivodship
1st cut	BM = exp(1.51 * logLAI + 4.47)	BM = exp(0.87 * logLAI + 4.29)
2nd cut	BM = exp(1.14 * logLAI + 4.54)	BM = exp(1.26 * logLAI + 4.85)
3rd cut	BM = exp(1.23 * logLAI + 4.08)	BM = exp(1.05 * logLAI + 5.01)

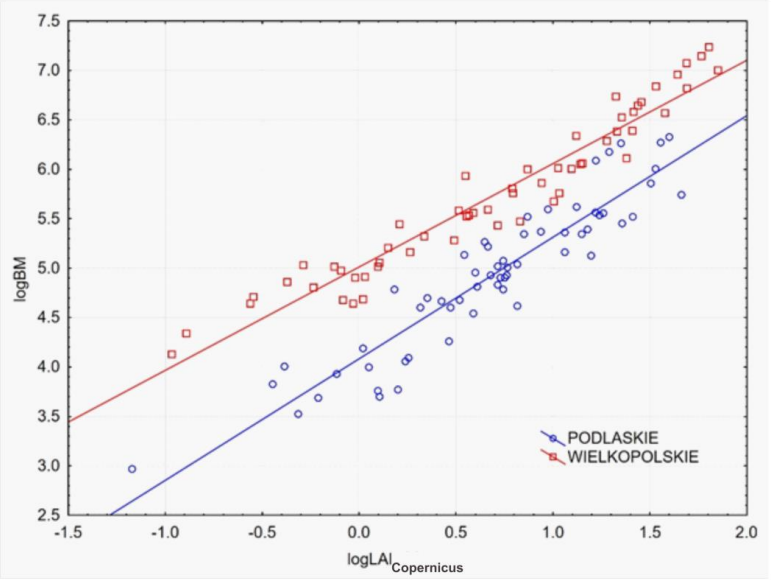




Scatterplot for first cut biomass estimation models
$R_p = 0.90$ $R_w = 0.97$



Scatterplot for second cut biomass estimation models
$R_p = 0.93$ $R_w = 0.97$



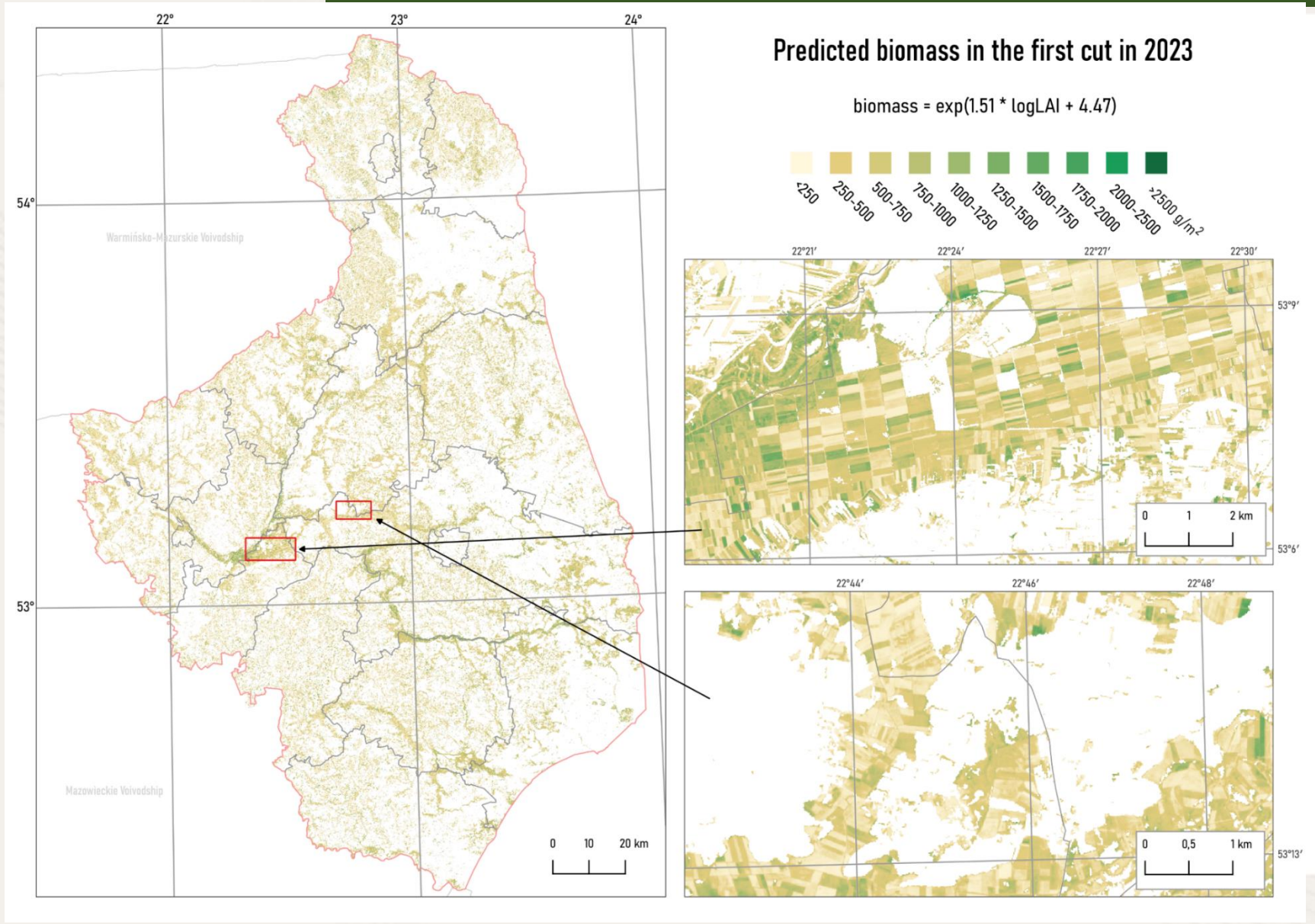
Scatterplot for second cut biomass estimation models
$R_p = 0.93$ $R_w = 0.97$

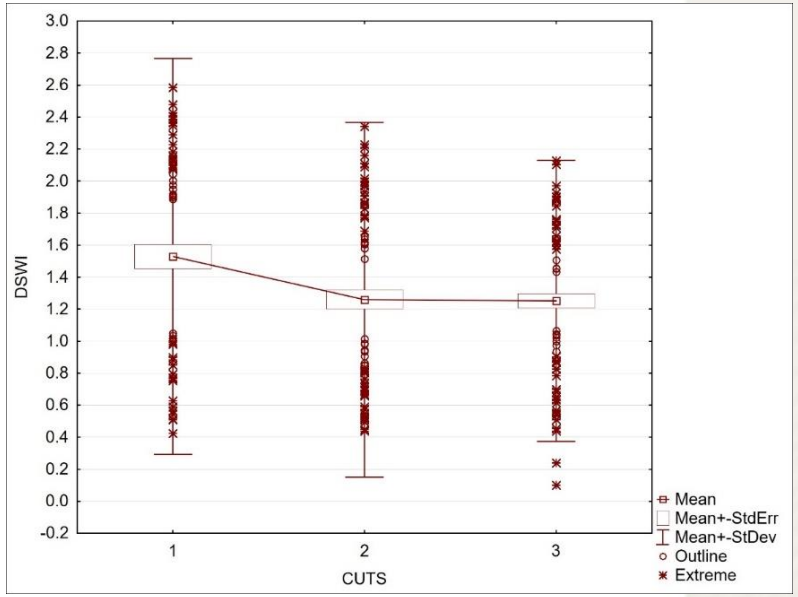
Predicted Biomass

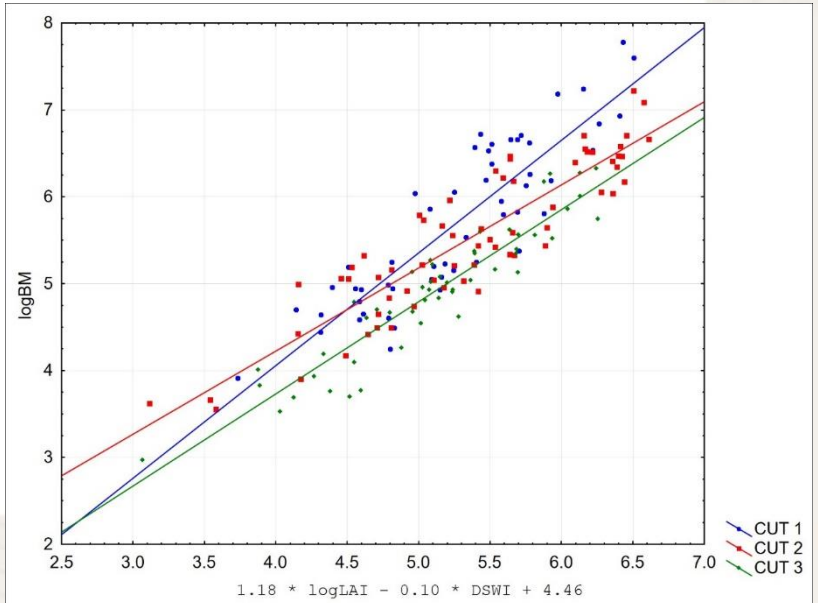
DSWI - INDEX

$$logBM = 1.18 * logLAI - 0.10 * DSWI + 4.46 + Res$$

R=0.93; stdErr=0.29; N=135

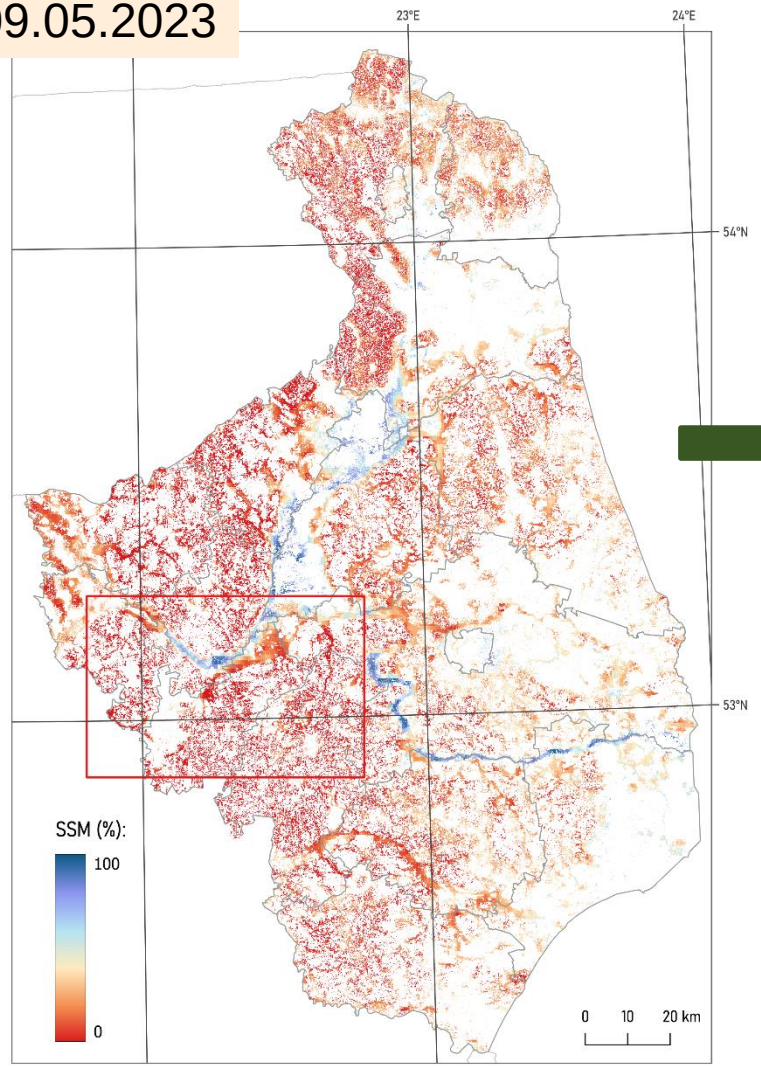




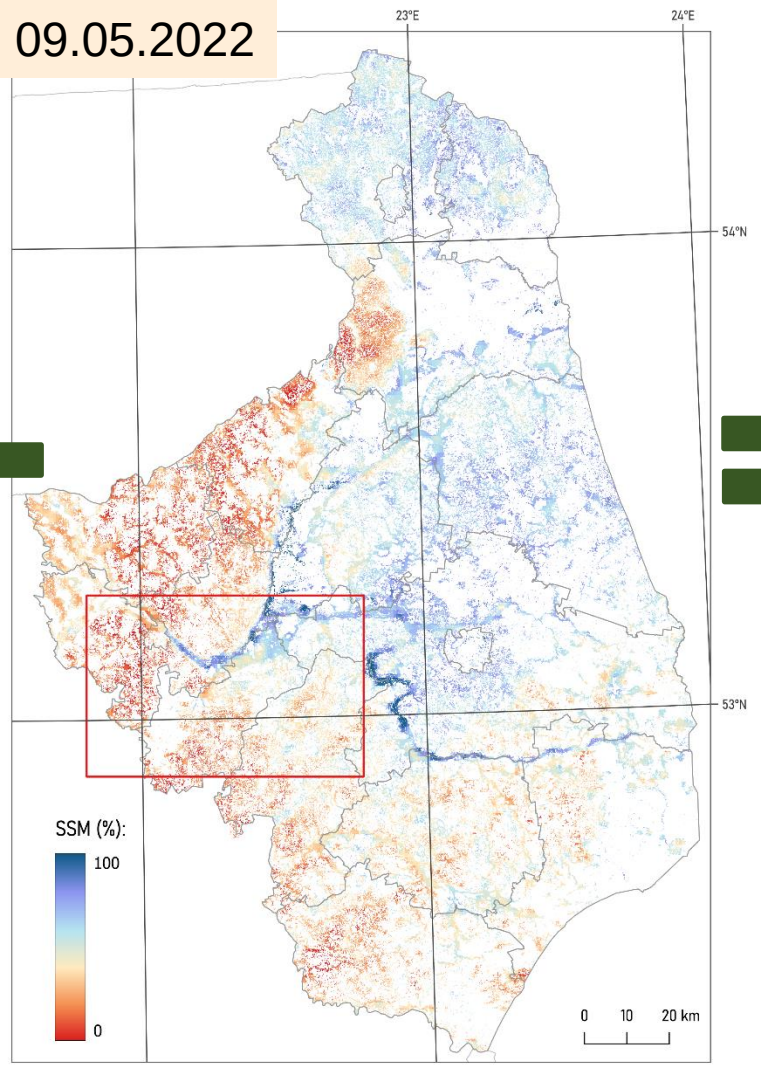


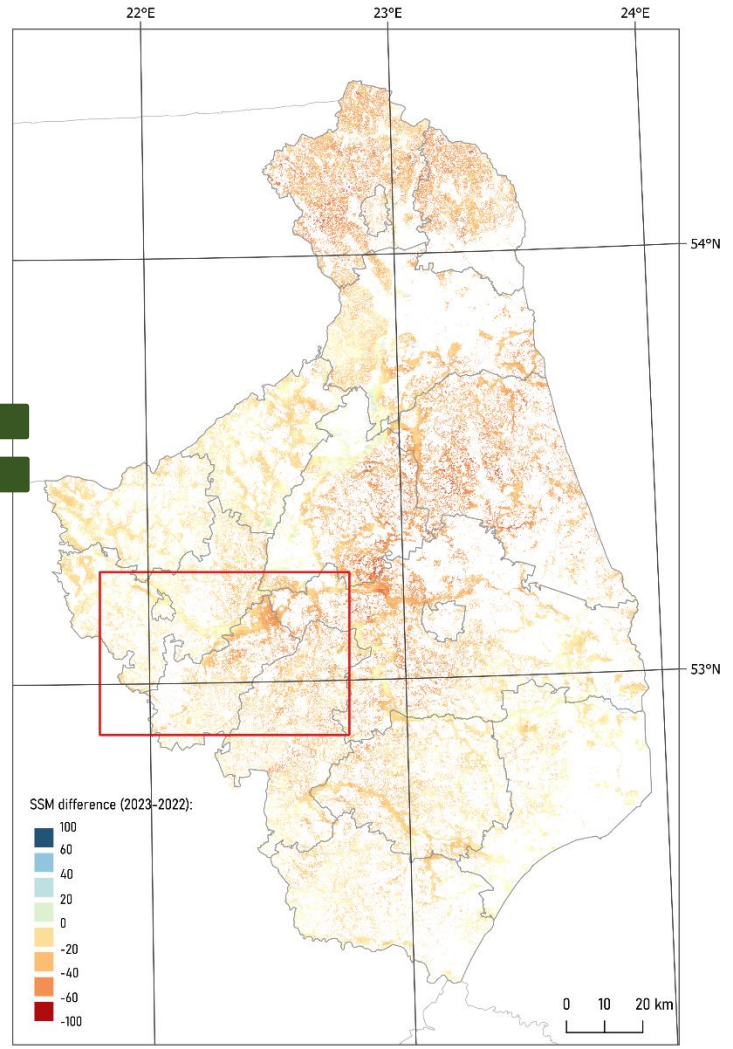
Difference of Surface Soil Moisture in the grasslands

09.05.2023

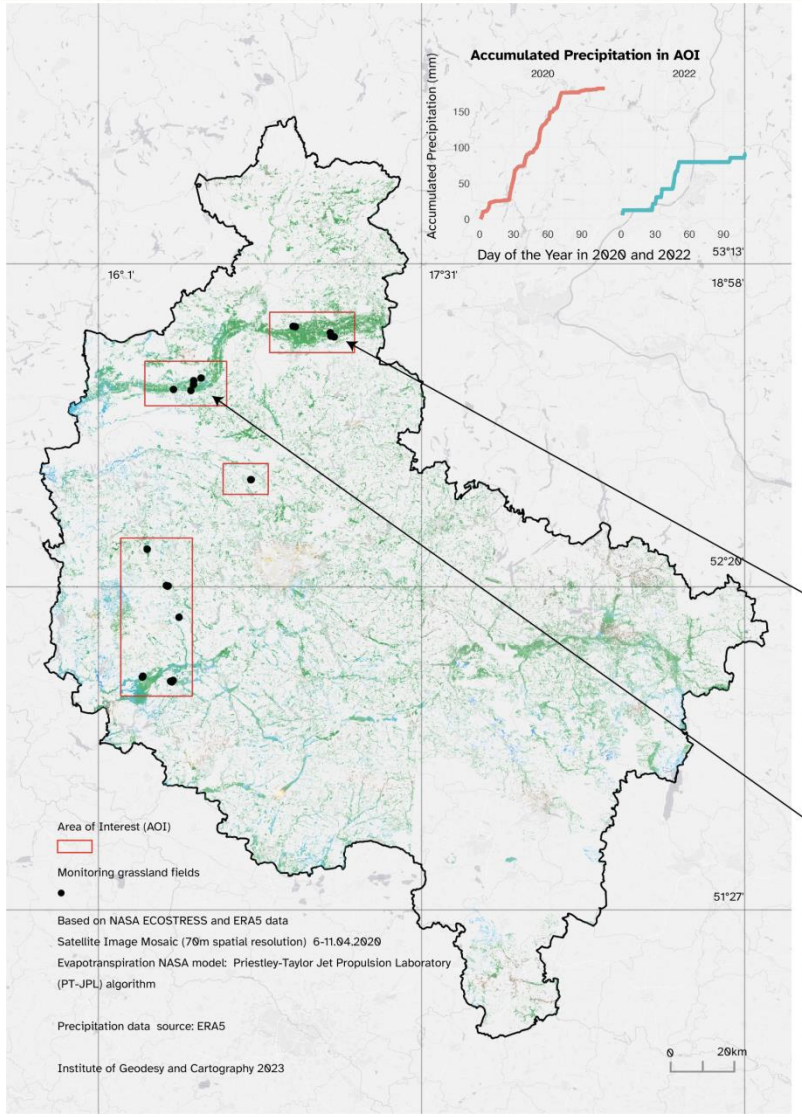


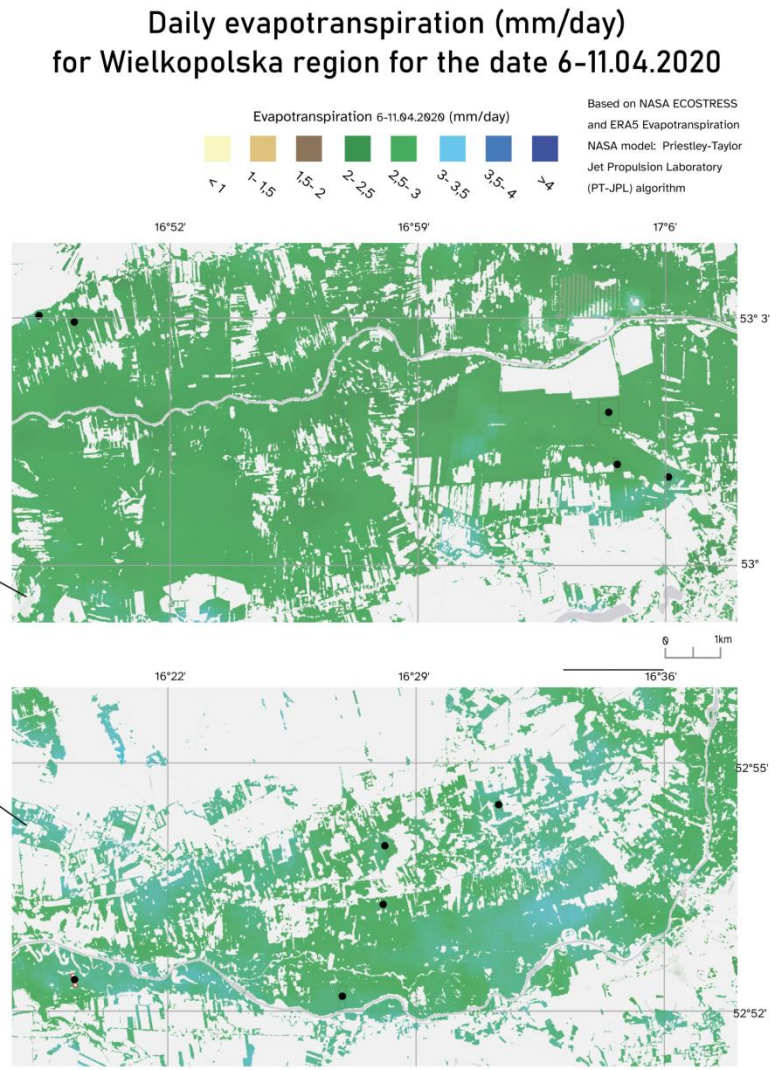
09.05.2022





Evapotranspiration - EcoStress





GrasSat – complementary tool for managing grassland production

GrasSat - complementary tool for managing grassland production

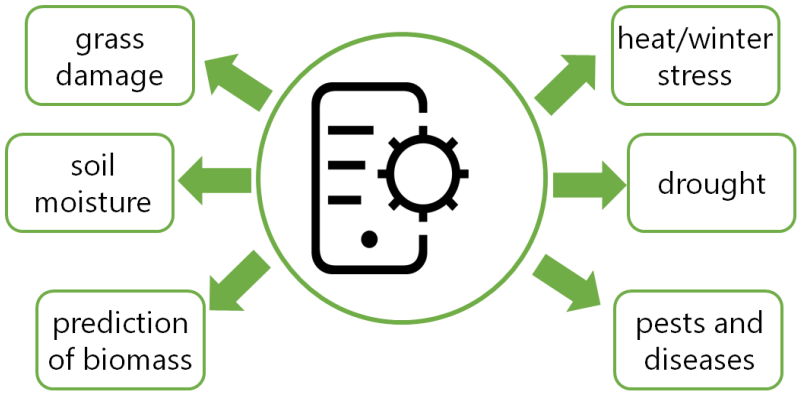
GrasSAT - Tools for information to farmers on grasslands yields under stressed conditions to support management practices

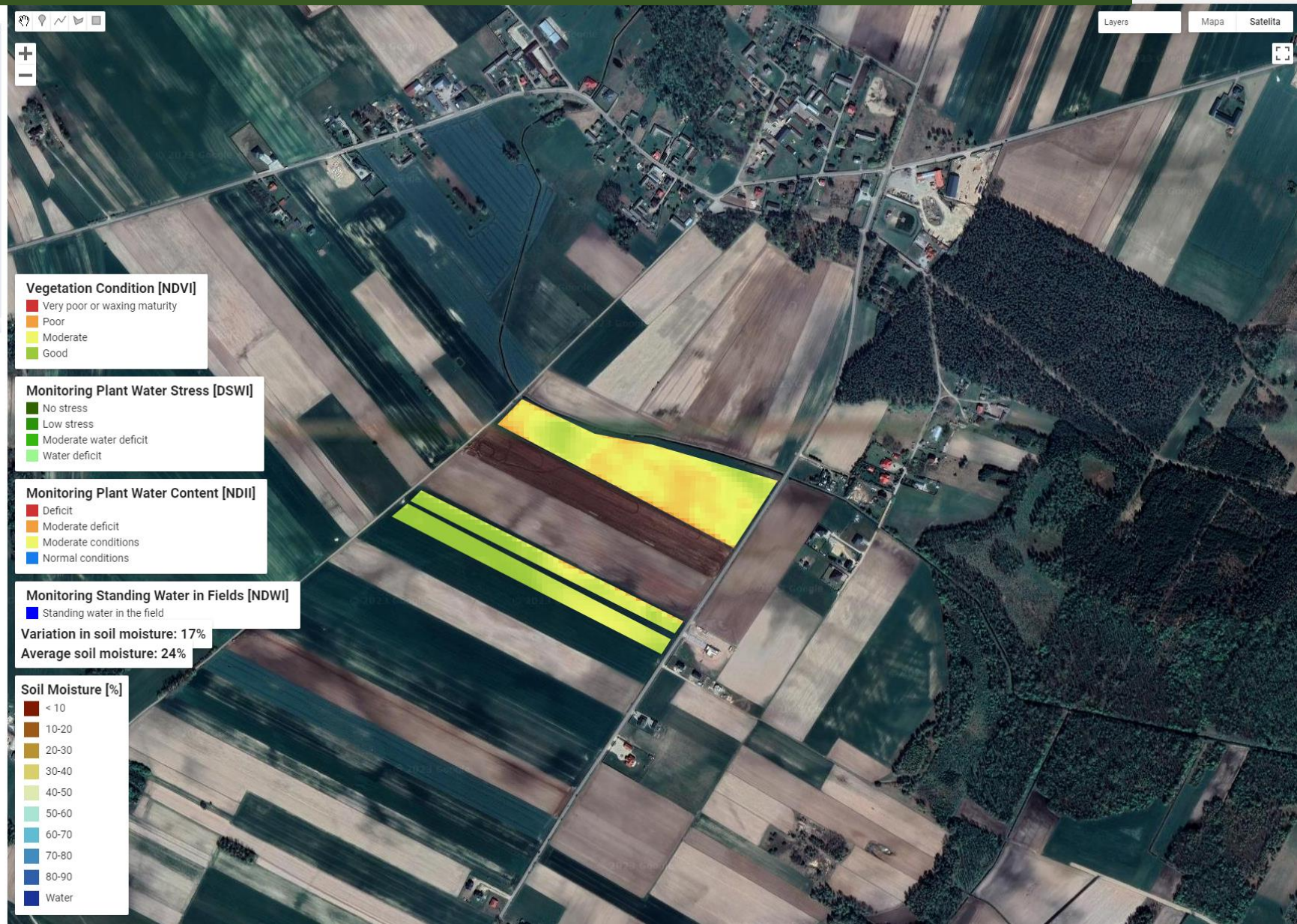
Founded by: National Centre for Research and Development (NCBiR)
Duration of the project: June 2020 – June 2023

Project contact: Remote Sensing Centre, Institute of Geodesy and Cartography
Professor Katarzyna Dąbrowska-Zielińska, e-mail:katarzyna.dabrowska-zielinska@igik.edu.pl

Partners: Poznan University of Life Sciences (PULS), Norwegian Institute of Bioeconomy Research (NIBIO), Norwegian Research Centre (NORCE), GEOMATIC Michał Wyczałek-Jagiełło

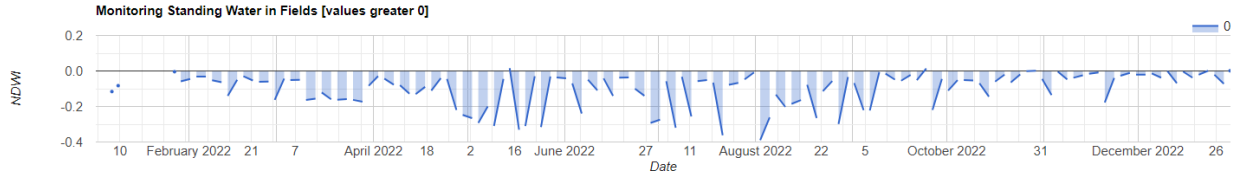
Mobile application system

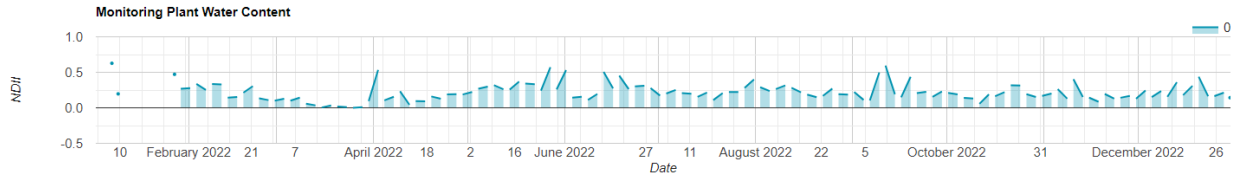


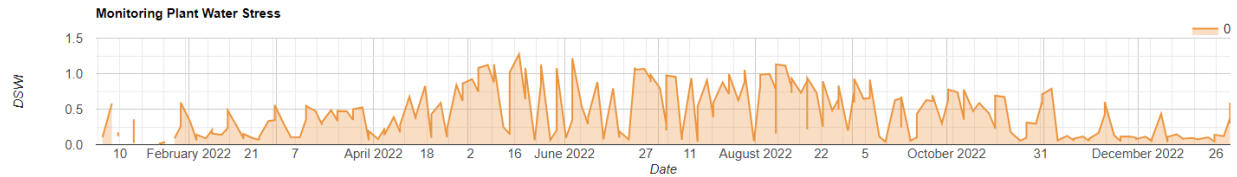


Grasslands Growth Indications for proper management

Results Section for Monitoring Water Stress







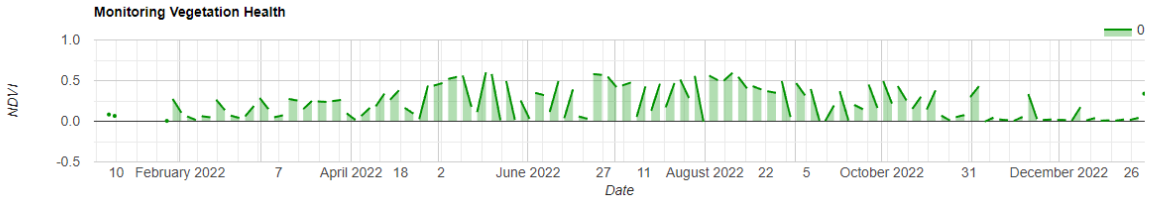
Moisture Processing Date from Sentinel-1 (S1)
2022_01_05

Number of Sentinel-2 (S2) Images
41

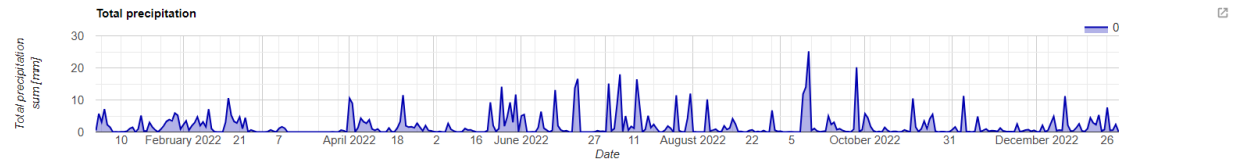
Sentinel-2 Image Acquisition Date
Date (2022-02-28 09:45:59)

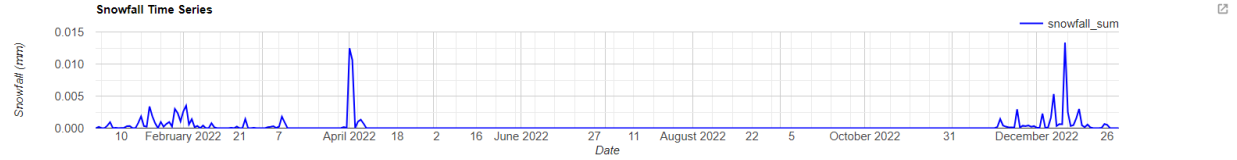
Area of Monitored Region [ha]
75.89

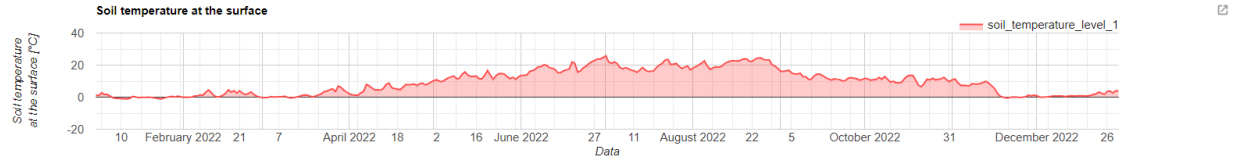
Vegetation Condition Results Section



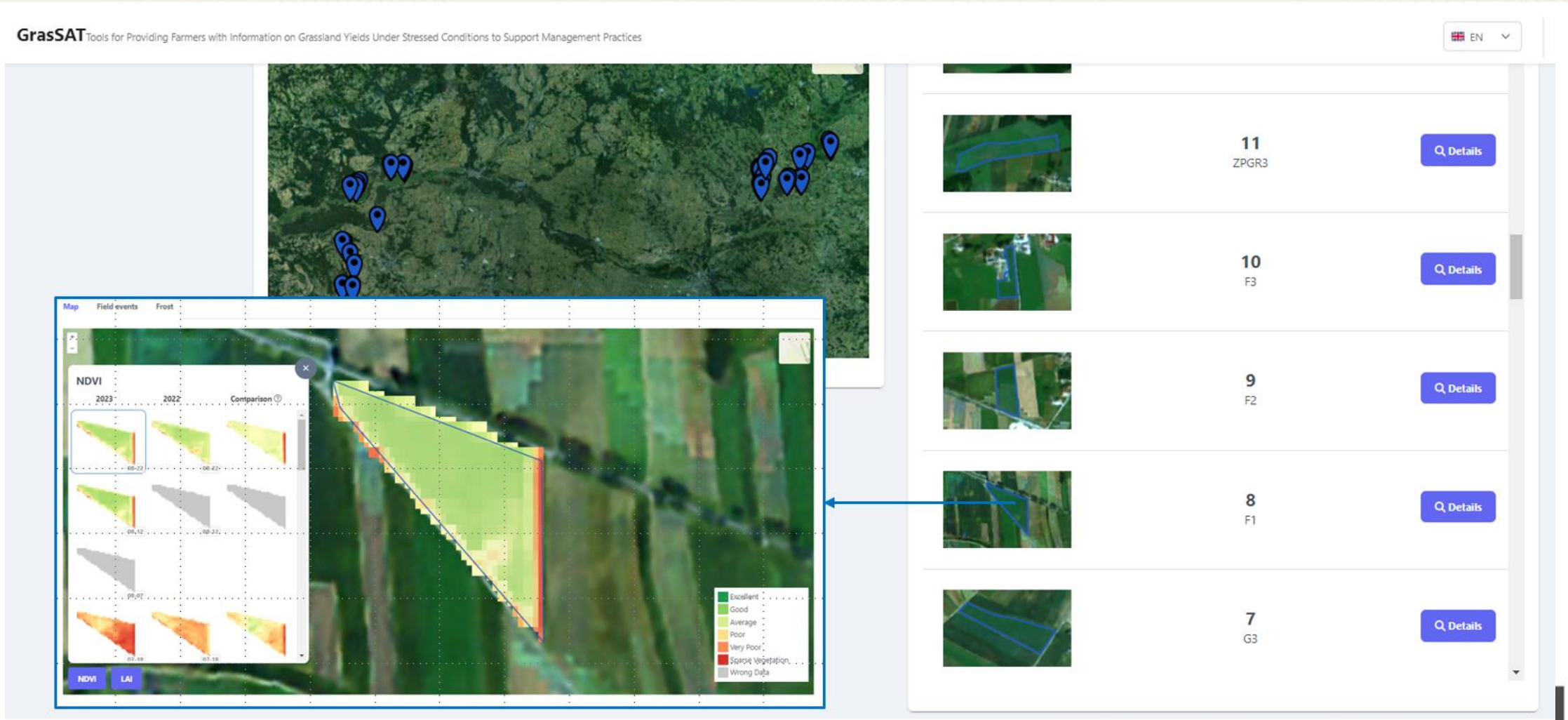
Meteorological Parameters Section







Grasslands Tools for Growth Indications for proper management



Project co-financed by the National Center for Research and Development as the Program Operator: "Applied Research" Program under the Norwegian Financial Mechanism 2014-2021 / POLNOR 2019, Track / area: Food and natural resources.