EOStat – Agriculture Poland
Support of Ukraine in collection of agricultural statistics using tools developed within EOStat project according to the State Statistics Service of Ukraine (SSSU) needs

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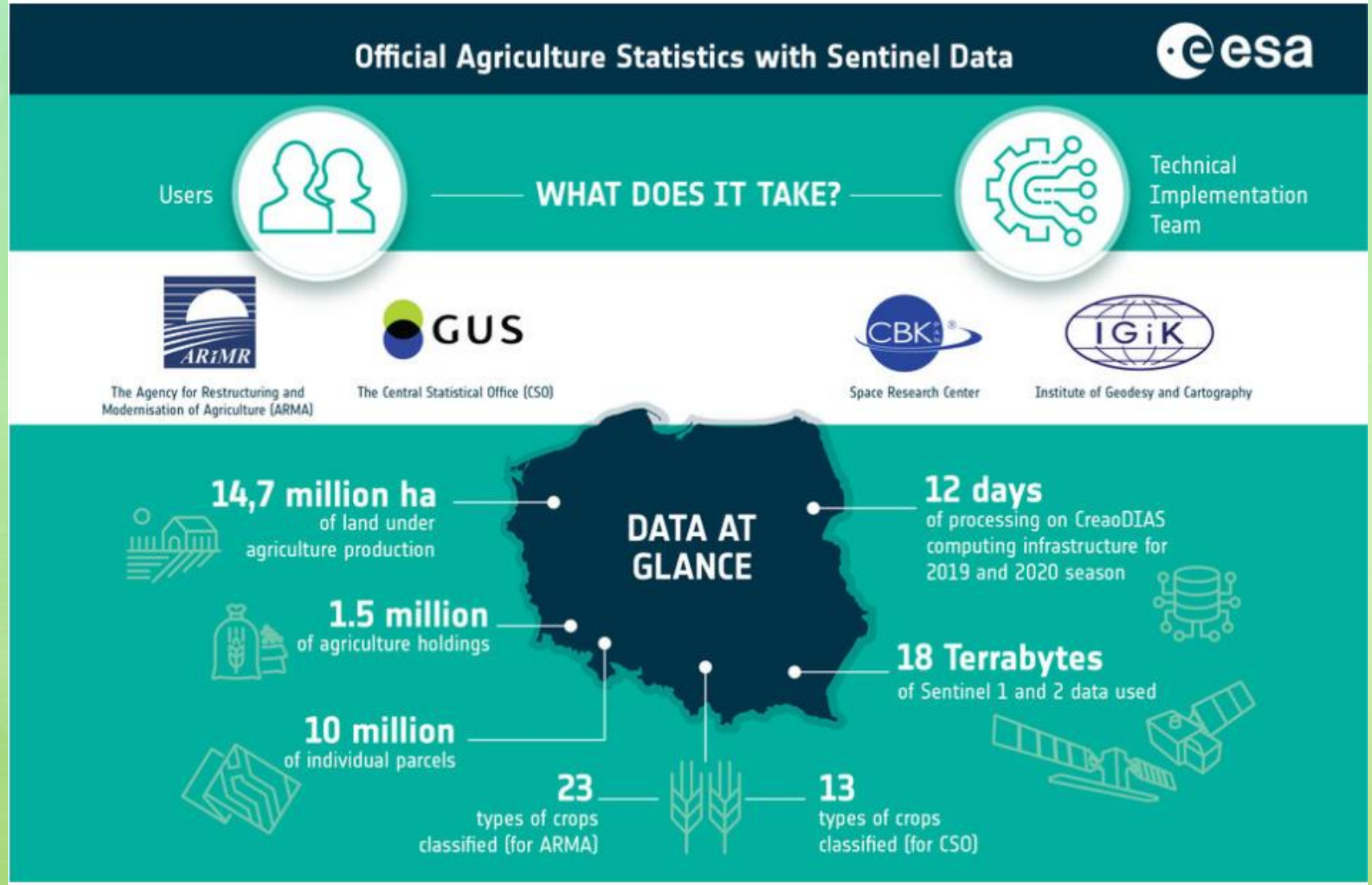
EOStat outline

Data from the Copernicus Sentinel satellites are enabling the national monitoring of agricultural activity in Poland and Ukraine – a colossal task that will support the efforts of key national agencies to assess a country's cropland, productivity, and food security, as well as the implementation of the EU Common Agricultural Policy in years to come.

EOStat aims to bring together ground-based and Earth observation tools to collect agricultural information, with the Sentinels being a key component.

The consortium of the *EOStat project for Statistics Poland* proposes to implement the EOStat system of crop recognition and yield prediction in the territory of Ukraine in order to estimate the crop yield losses for 2022 compared to previous years 2017 – 2021.



— Data at a glance: How Sentinel data is supporting agricultural monitoring in Poland

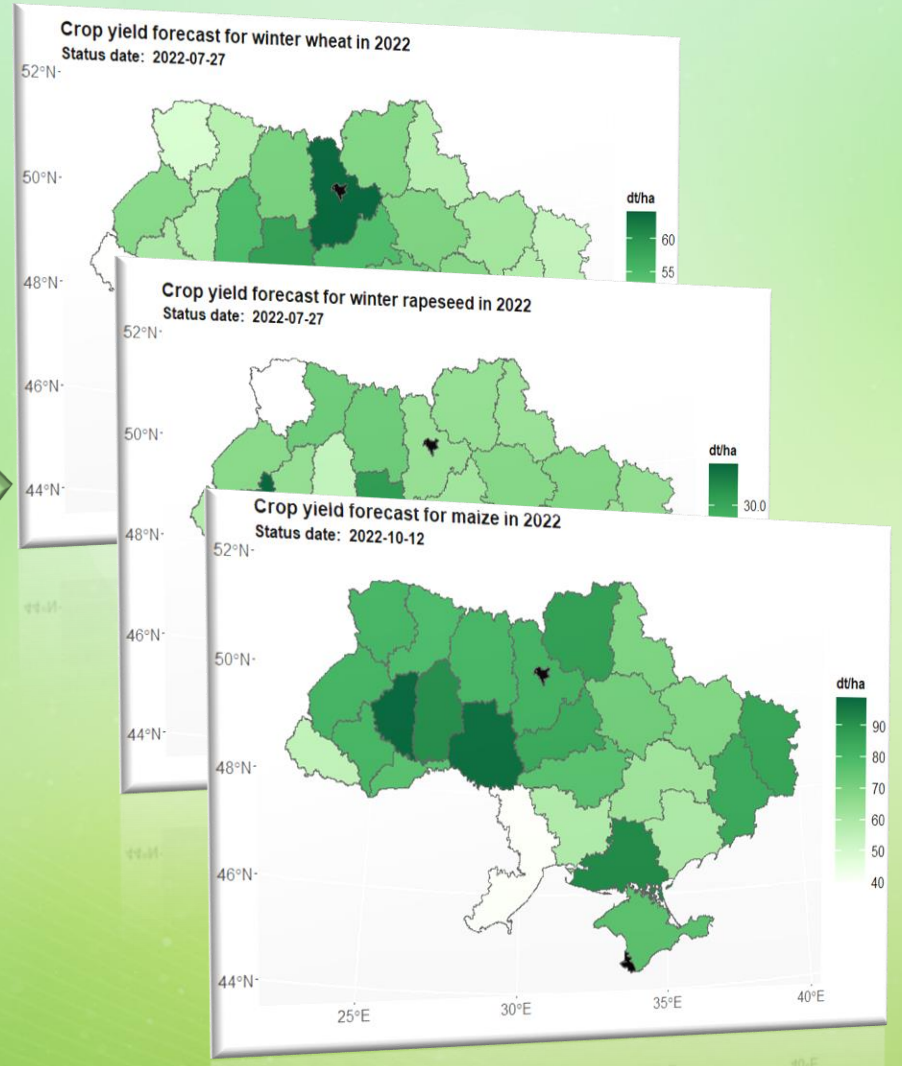
From: ESA / Applications / Observing the Earth / Copernicus / Sentinel data enables new system for agricultural monitoring in Poland (12/11/2020)

Cloud Computing for estimation yield losses in territory of Ukraine

Input data

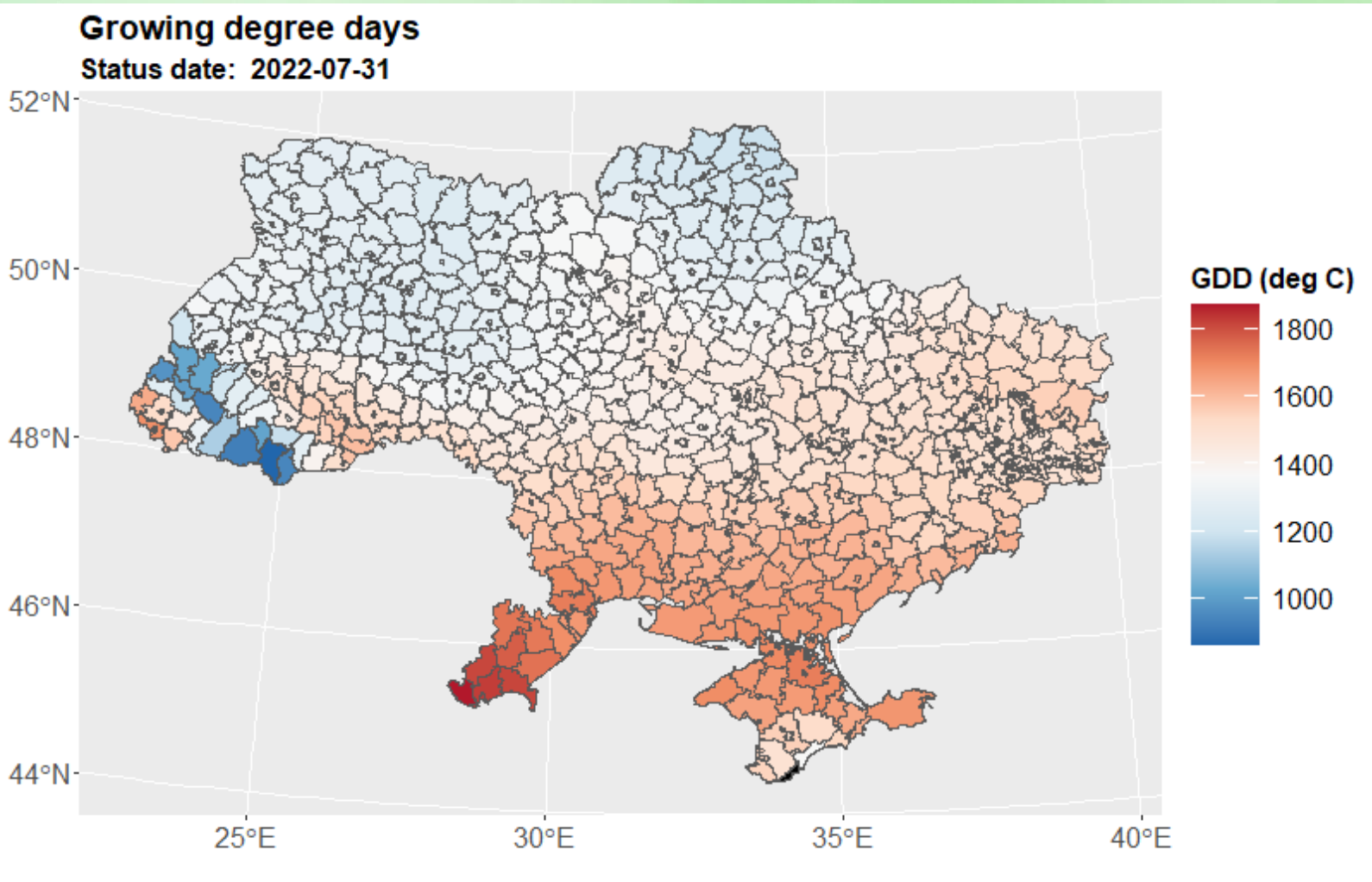
Name	Source	Temporal resolution	Spatial resolution
Satellite data			
NDVI	Sentinel-3	1 day	300 m
Vegetation Condition Index (VCI)	Sentinel-3	1 day	300 m
Land Surface Temperature (LST)	Sentinel-3	1 day	1000 m
Temperature Condition Index (TCI)	Sentinel-3	1 day	1000 m
Agrometeorological data			
Air temperature (2 m)	ERA-5	1 hour	0.25° x 0.25°
Precipitation	ERA-5	1 hour	0.25° x 0.25°
Solar radiation	ERA-5	1 hour	0.25° x 0.25°
Soil moisture (0-7 cm)	ERA-5	1 hour	0.25° x 0.25°
Soil moisture (7-28 cm)	ERA-5	1 hour	0.25° x 0.25°
Crop classification			
Crop classification	CBK PAN	static	polygons
Administrative units			
Region/Raion	public	static	polygons
Statistical data			
Yield data – in situ (2017-2021)	SSSU	1 year	region/raion

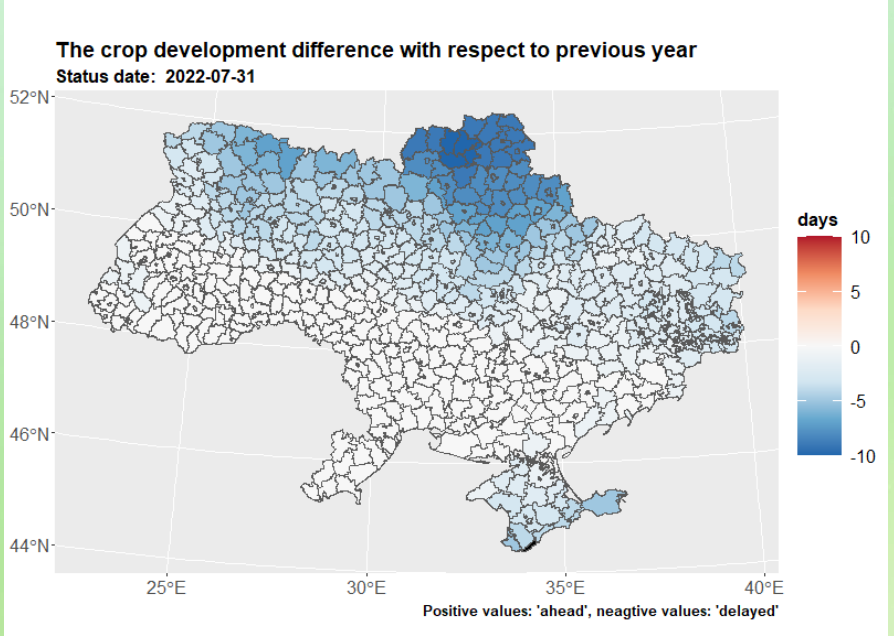
Crop yield prediction

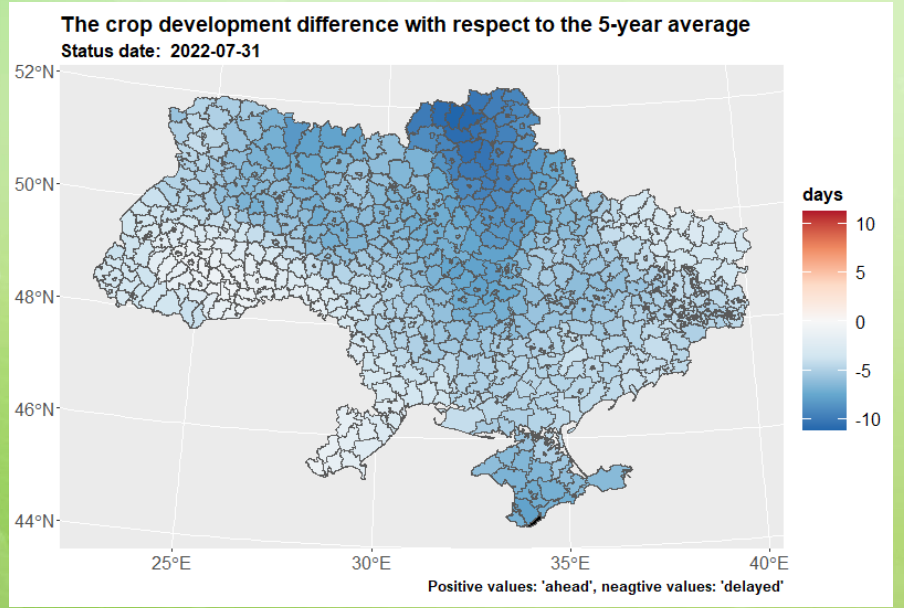


Growing degree days (GDD) – end of July 2022

To ensure comparability of vegetation indices from season to season, the indices were transformed from normal calendar time to thermal time. Thermal time as cumulated daily temperatures above a **5°C for winter wheat and winter rapeseed** determines the development stage that is reached by a crops. GDD differences in relation to previous year 2021 and the 5-year average over raions are presented as well.

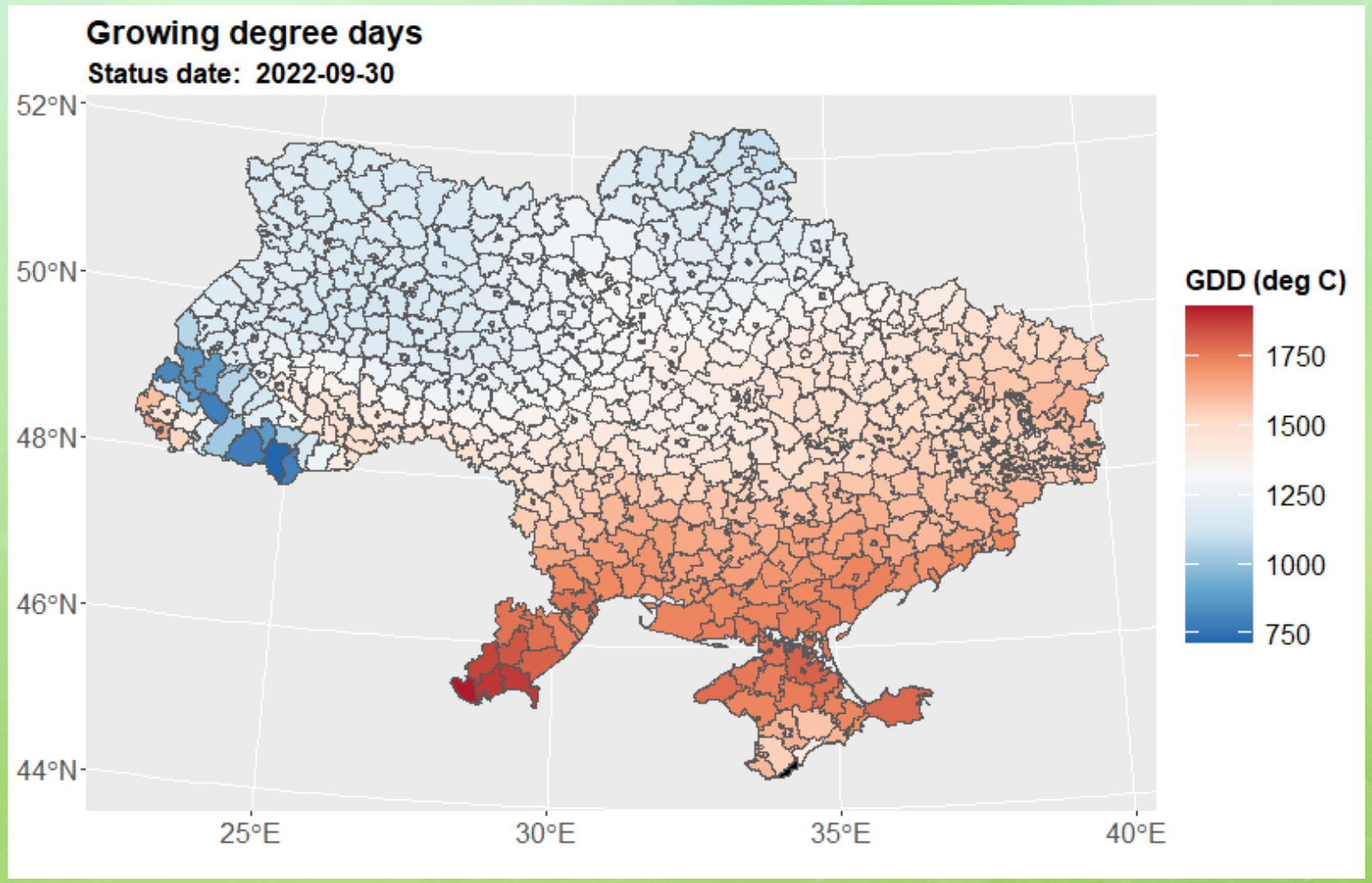


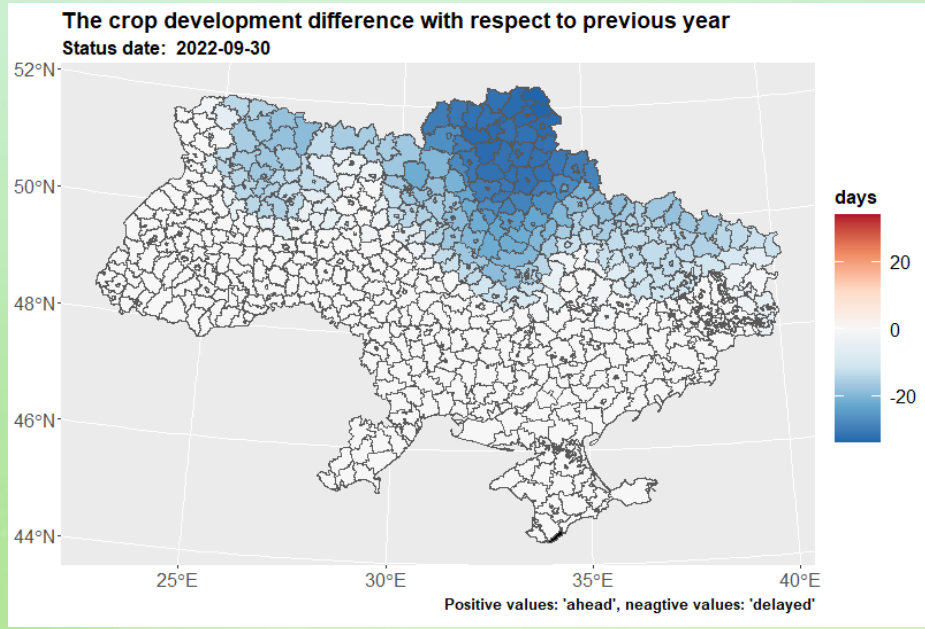


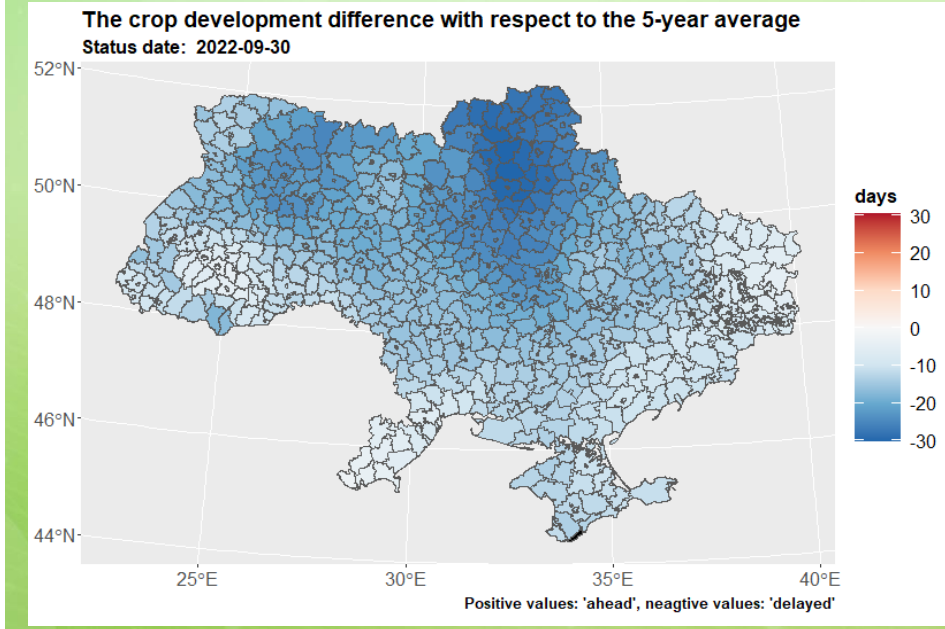


Growing degree days (GDD) – end of September 2022

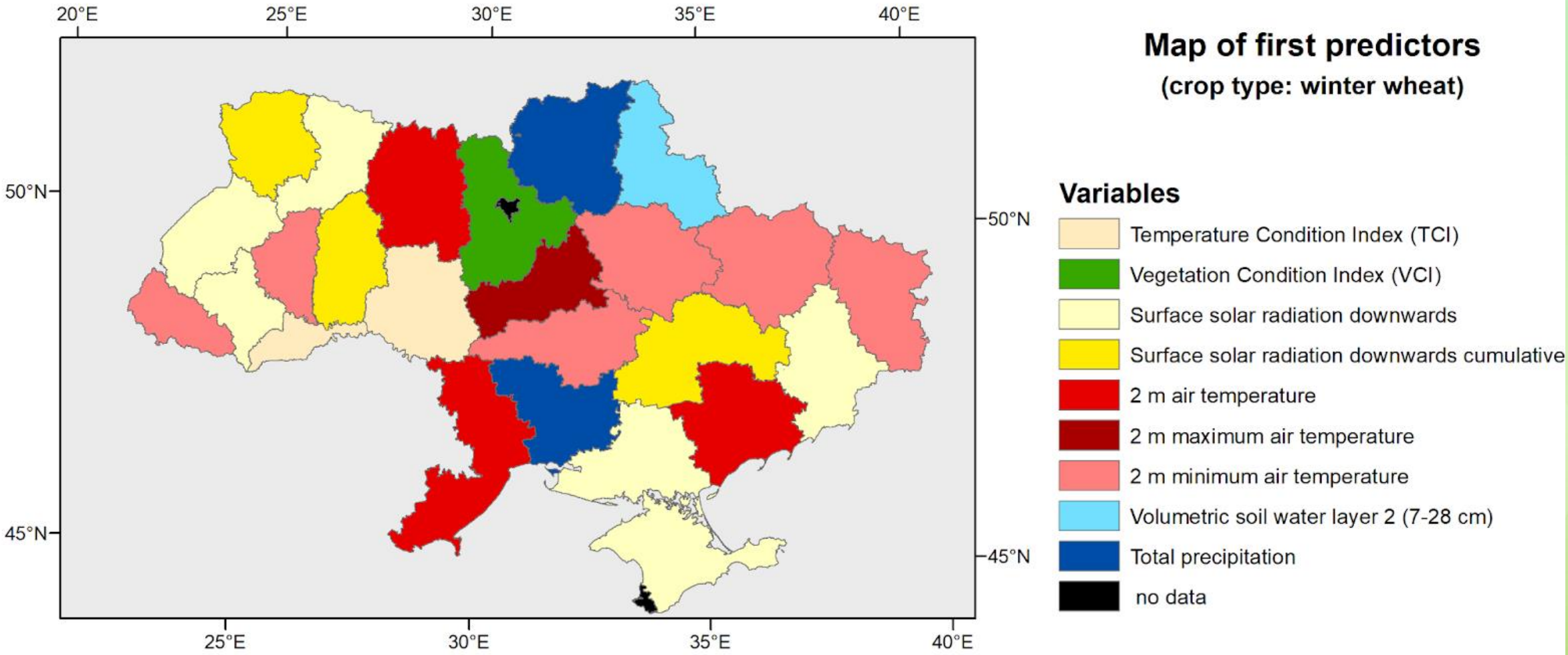
Thermal time as cumulated daily temperatures above a **10°C for maize** determines the development stage that is reached by a crops. GDD differences in relation to previous year 2021 and the 5-year average over raions are presented as well.



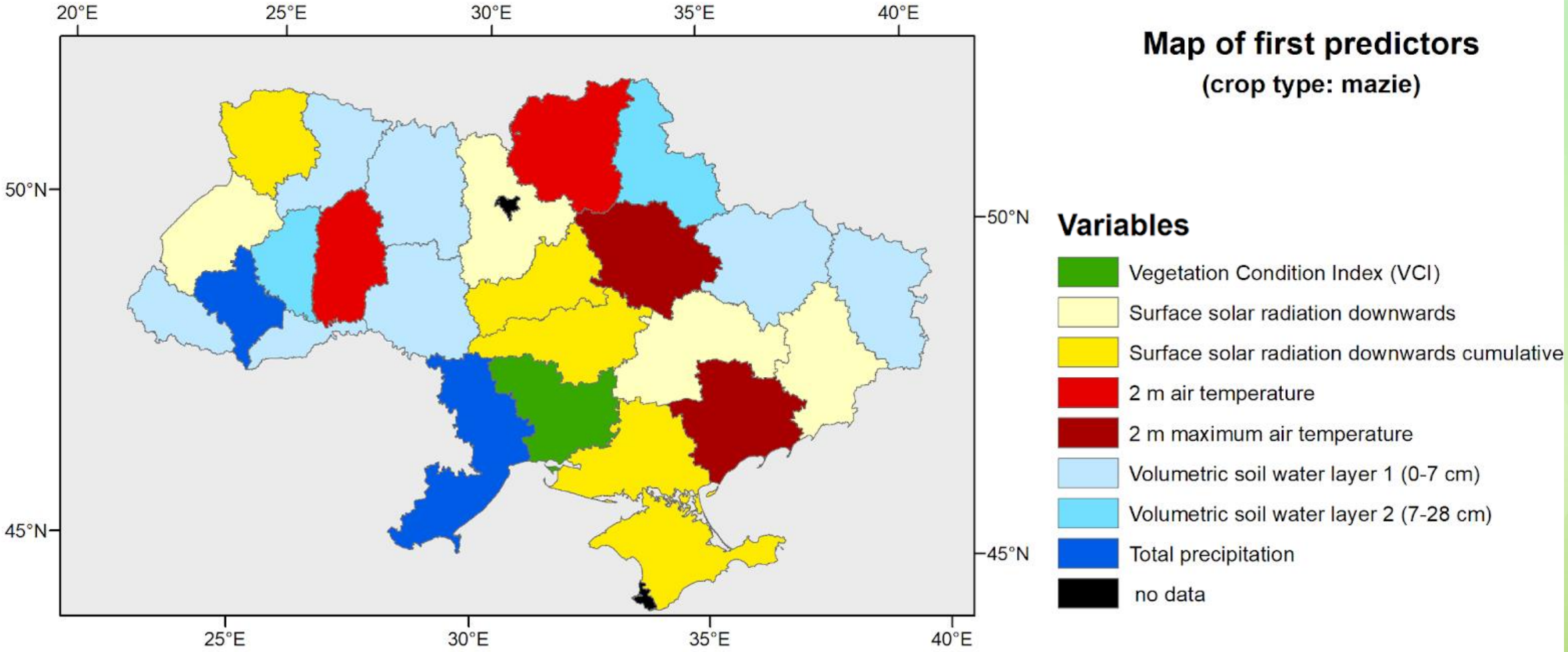




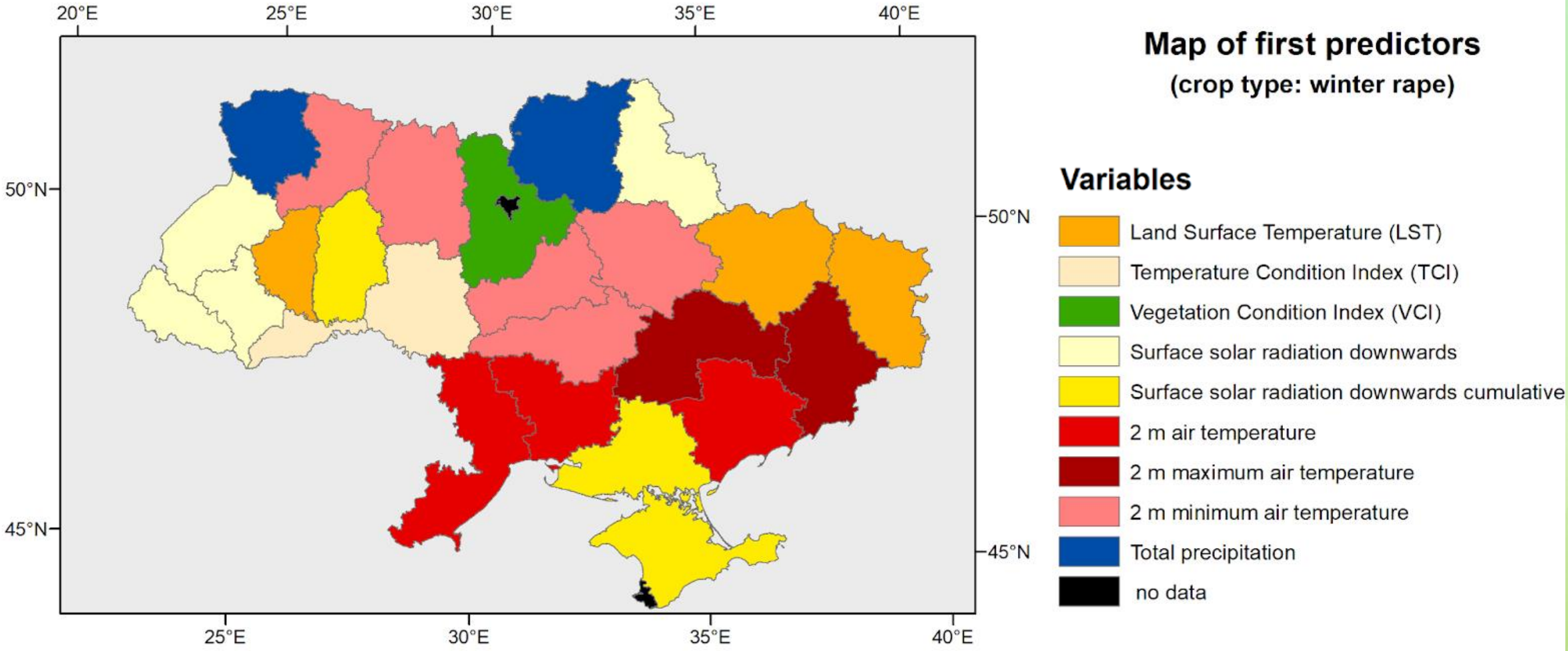
Map of main predictors for estimating winter wheat yields



Map of main predictors for estimating maize yields

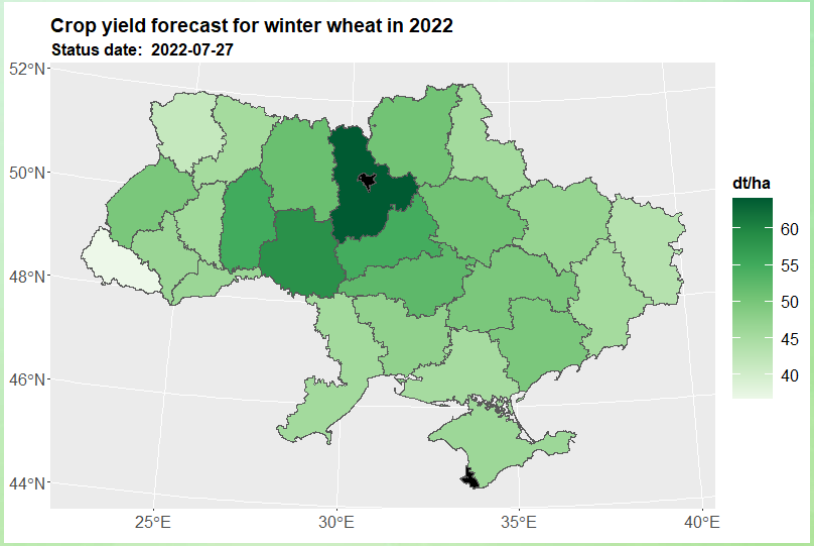


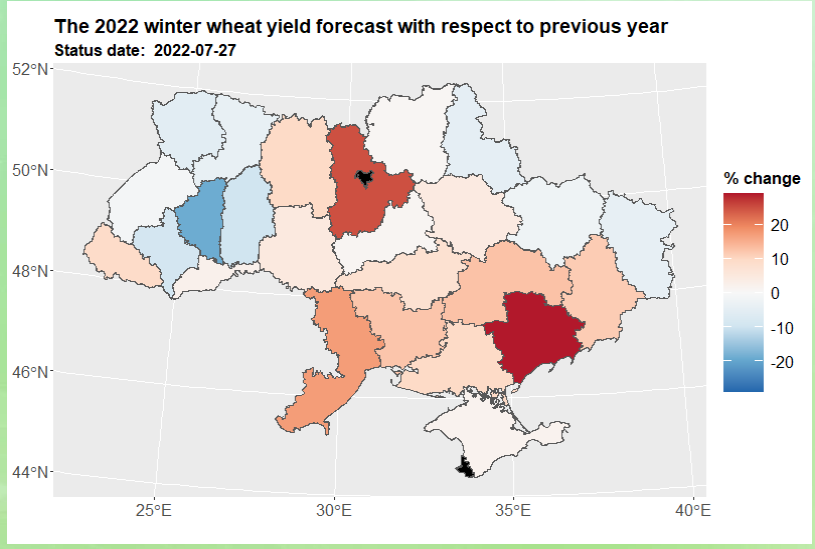
Map of main predictors for estimating winter rape yields

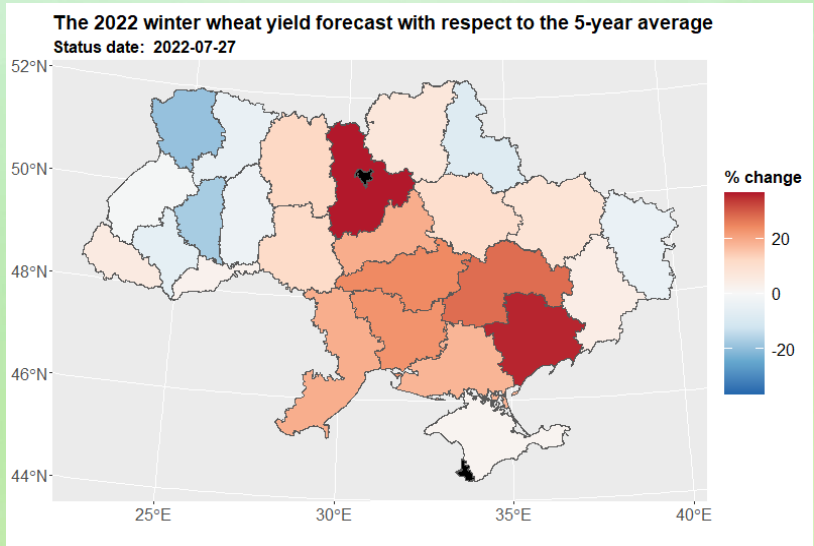


Winter wheat yields

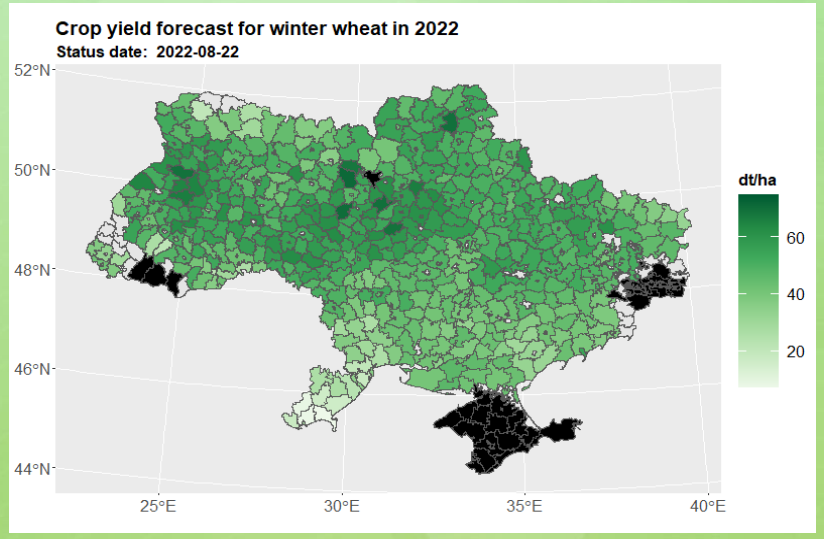
Regions

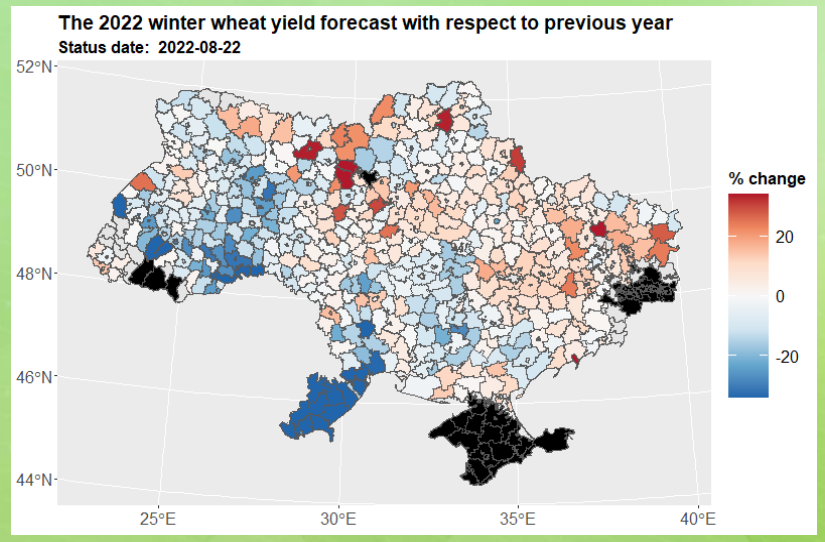


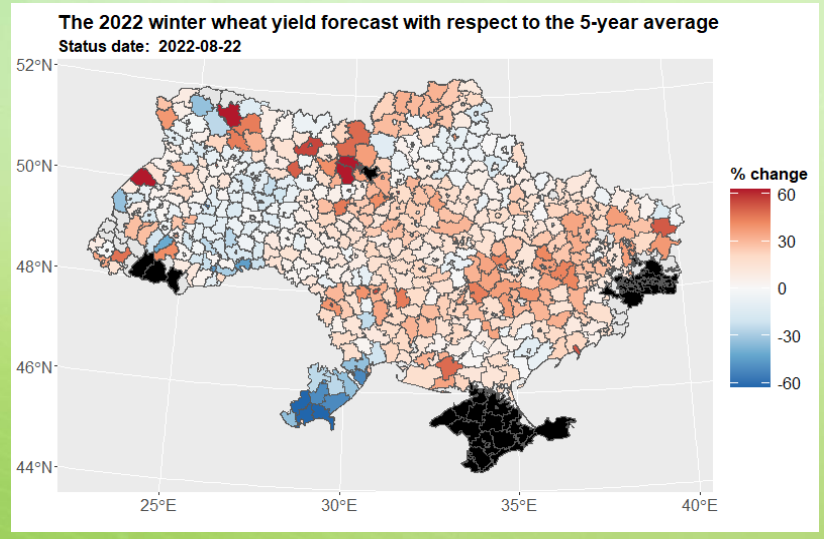




Raions





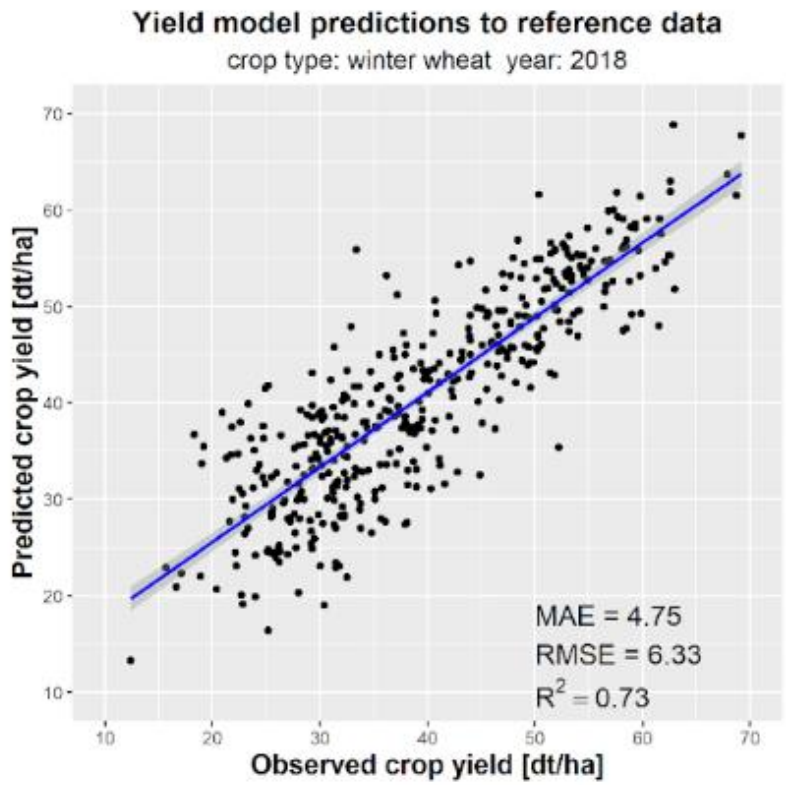


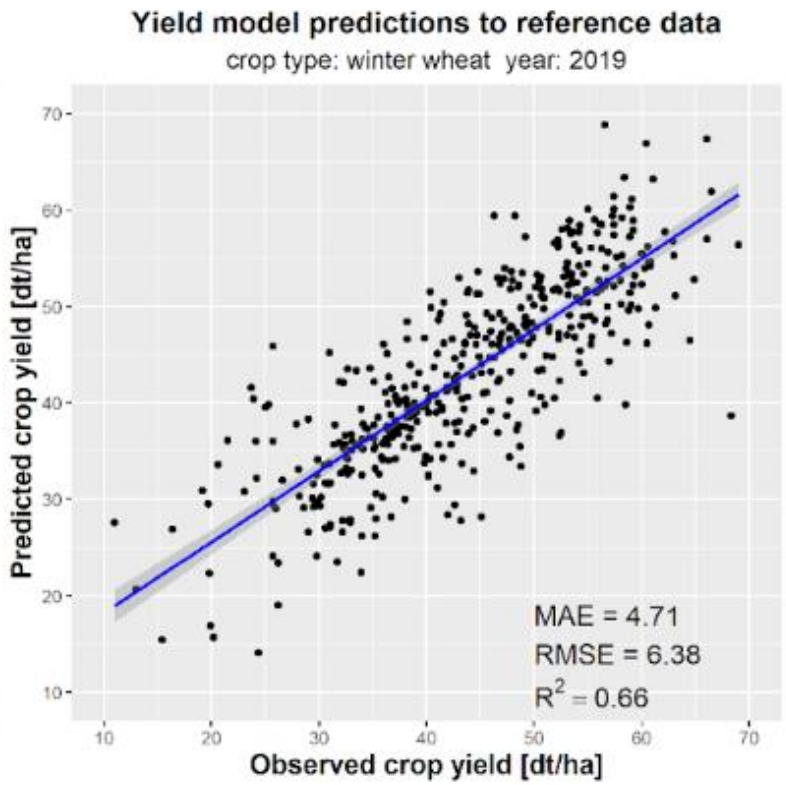
Crop yields in 2022

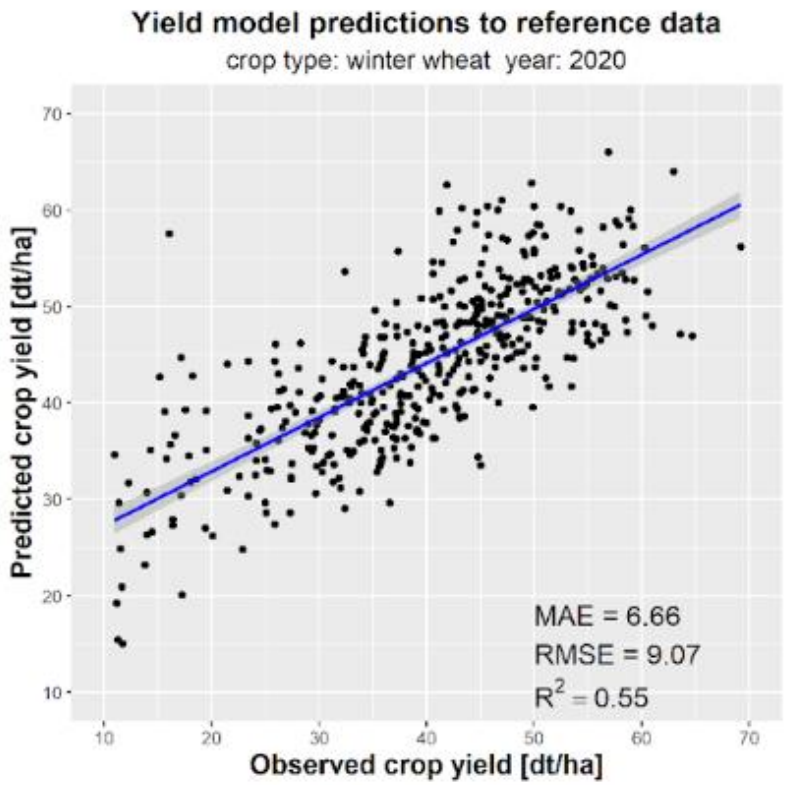
Yield reduction comparing to 2021

Yield reduction comparing to the 5-year average

Comparison of model prediction results with reference data for raions of winter wheat for the 2018–2020 years

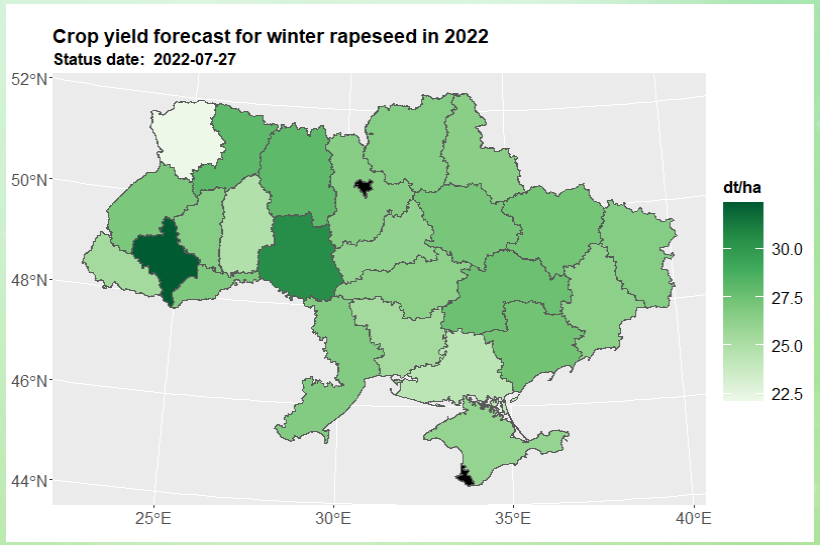


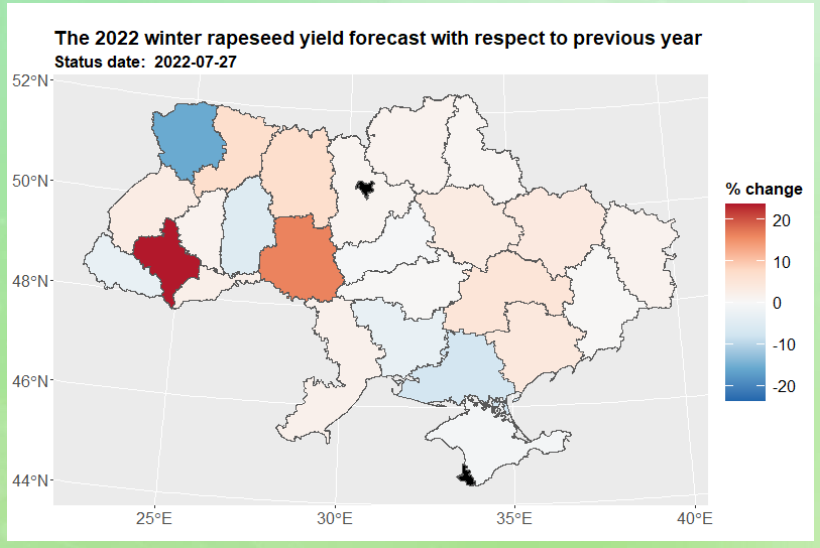


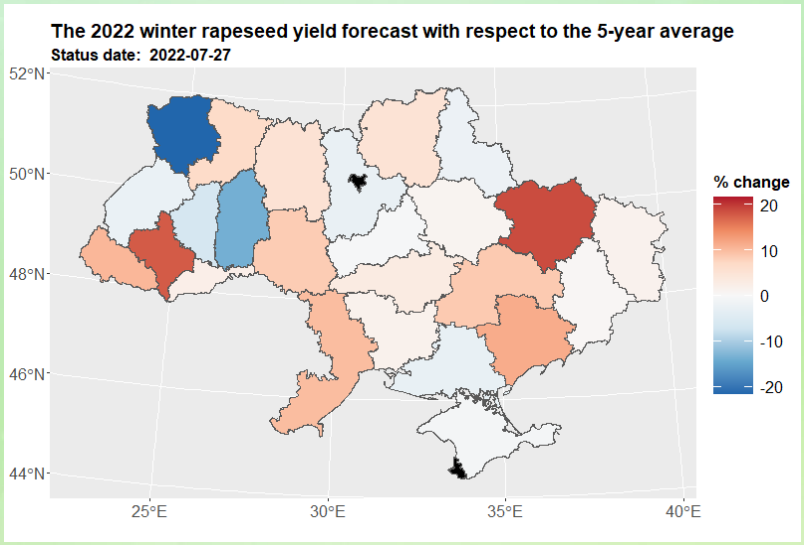


Winter rape yields

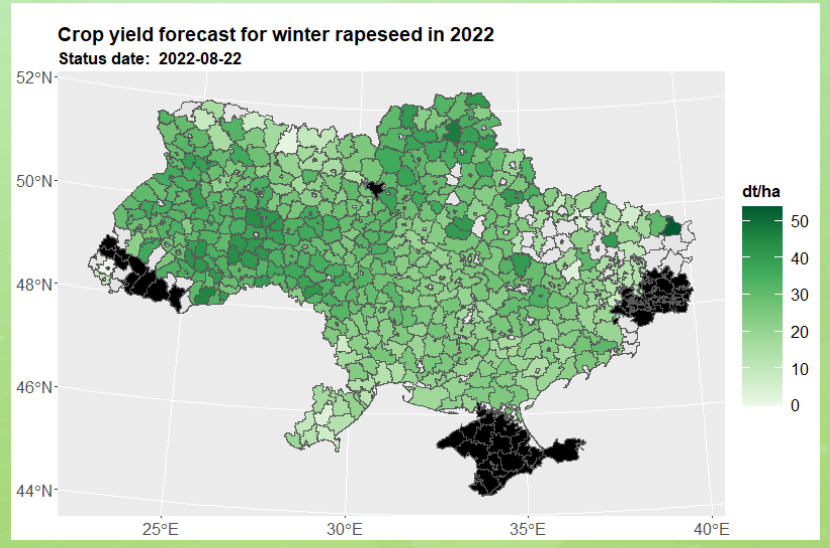
Regions

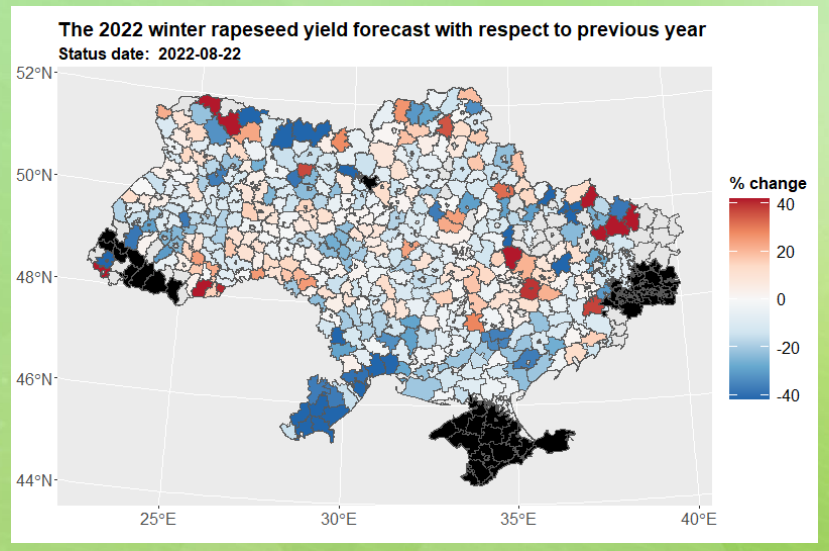


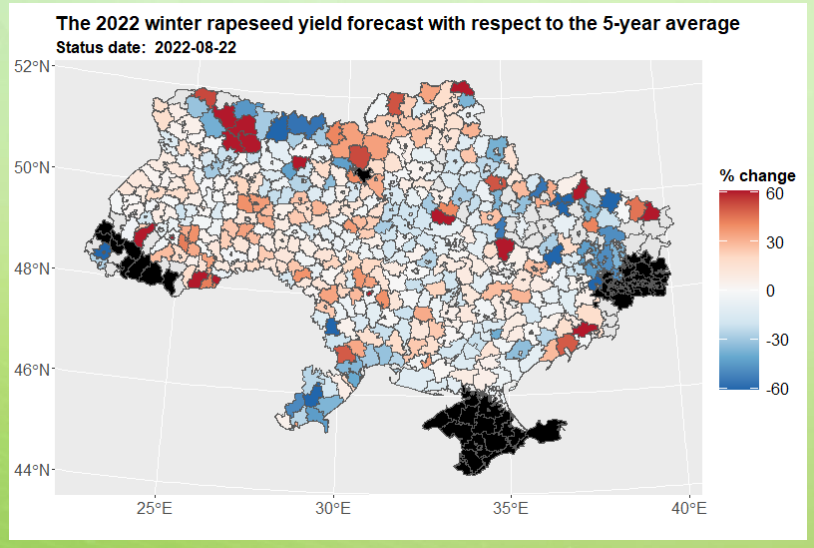




Raions





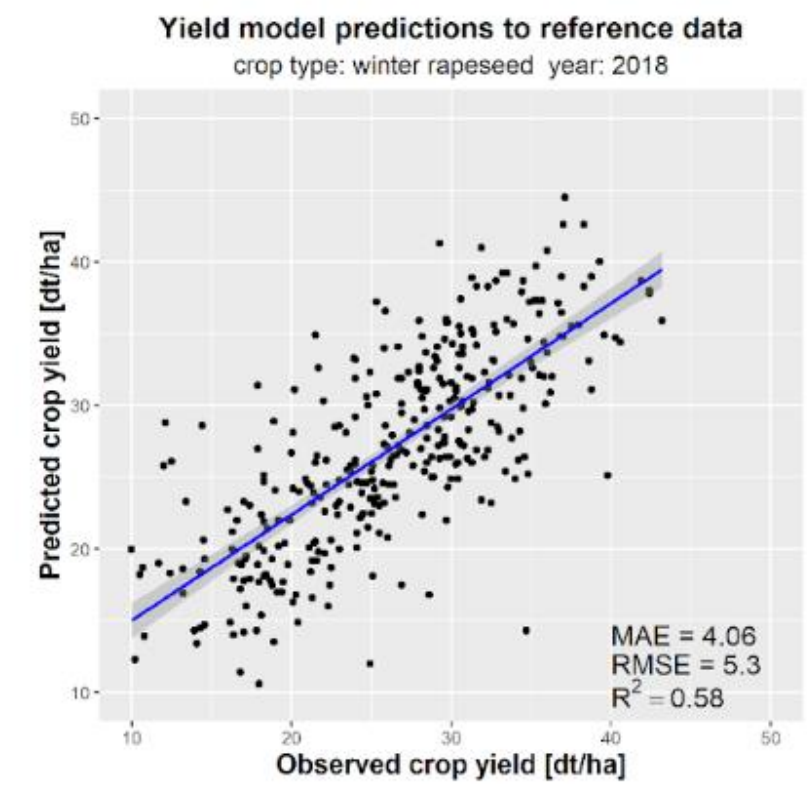


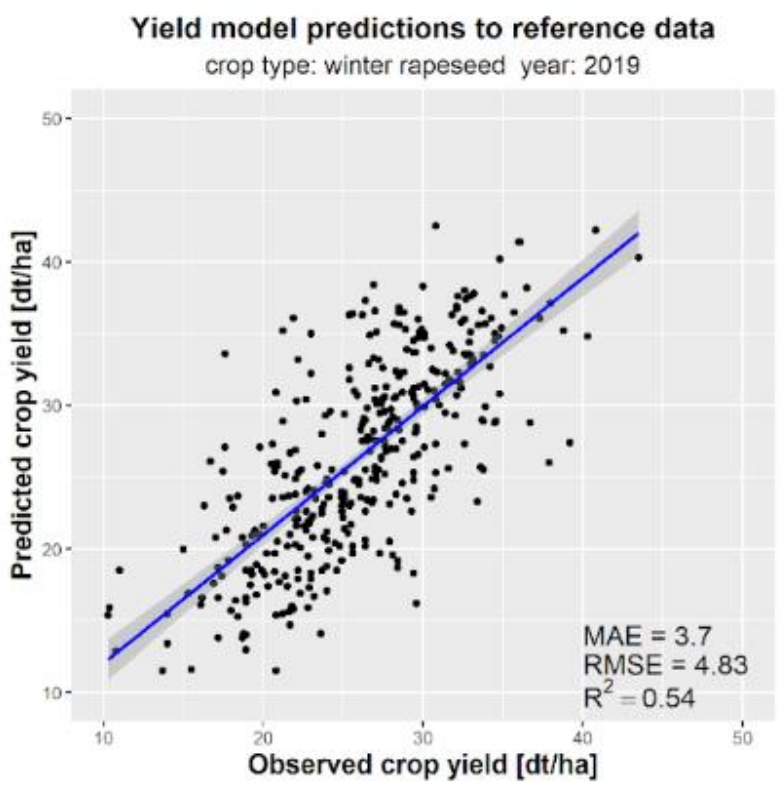
Crop yields in 2022

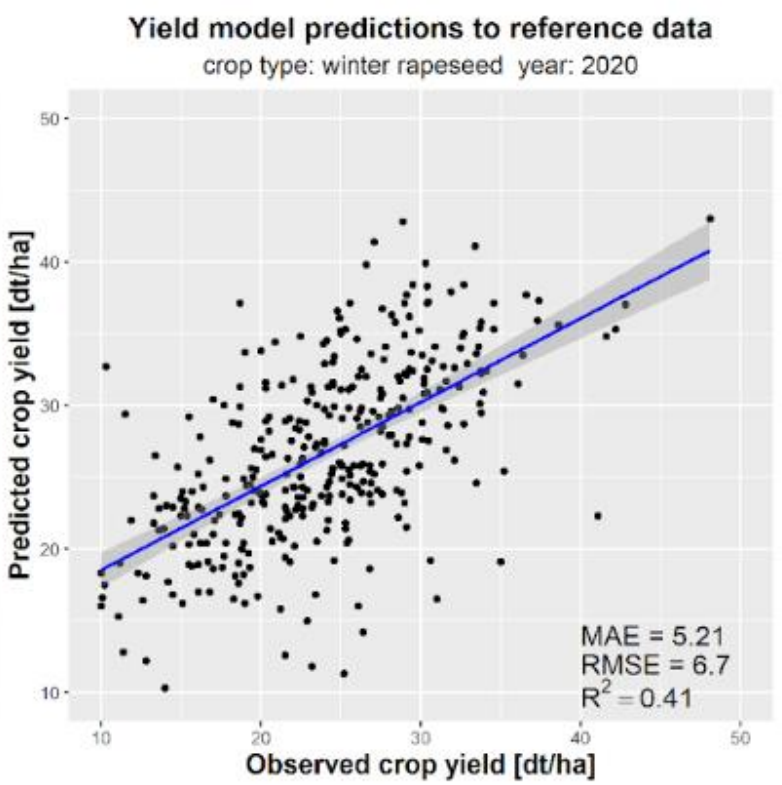
Yield reduction comparing to 2021

Yield reduction comparing to the 5-year average

Comparison of model prediction results with reference data for raions of winter rapeseed for the 2018-2020 years

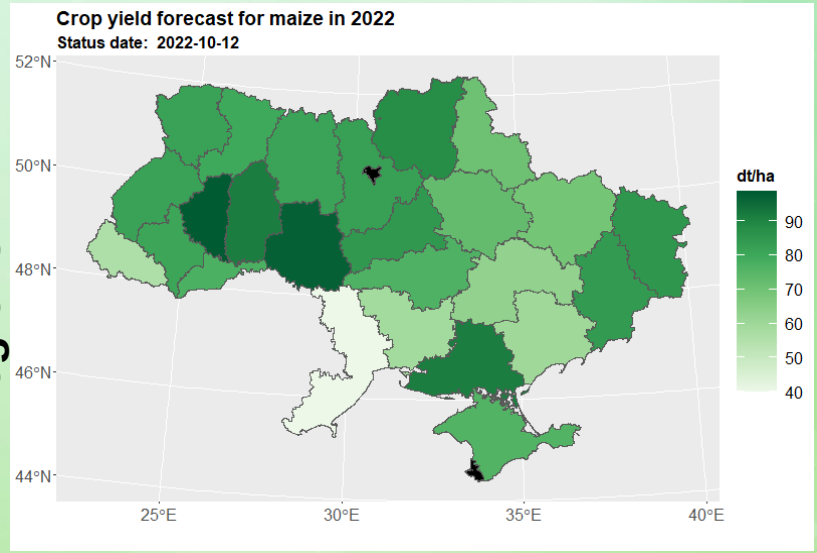


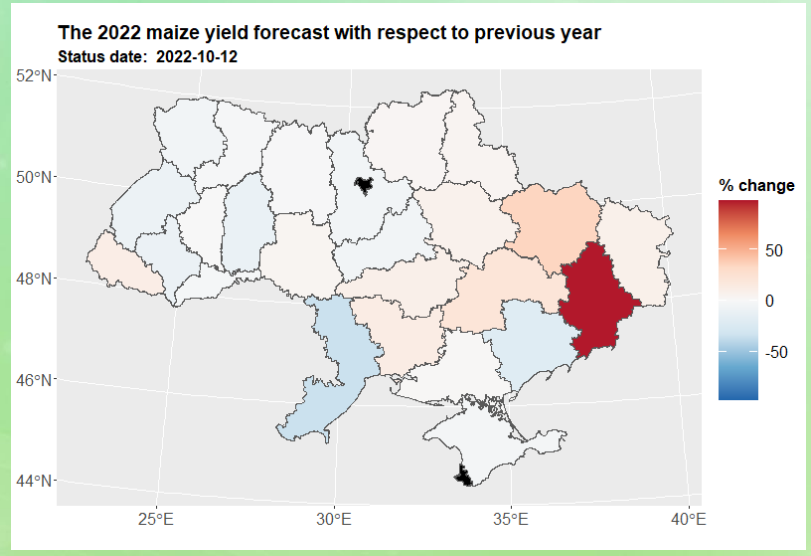


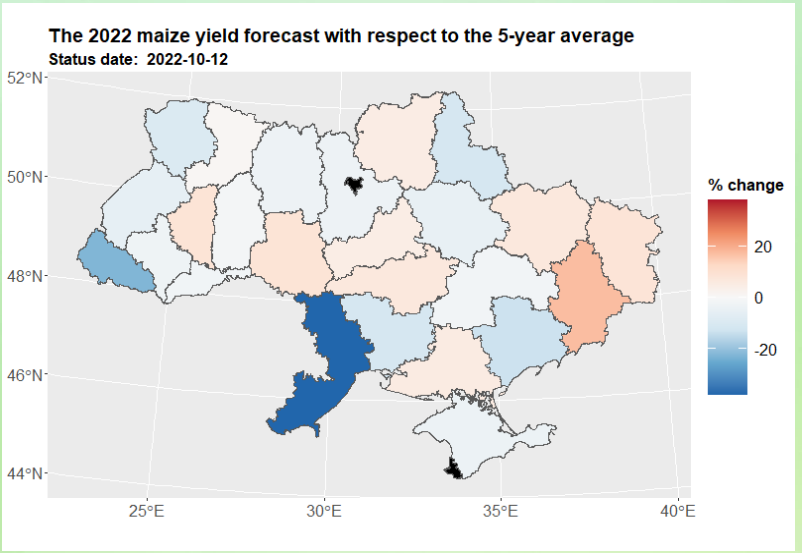


Maize yields

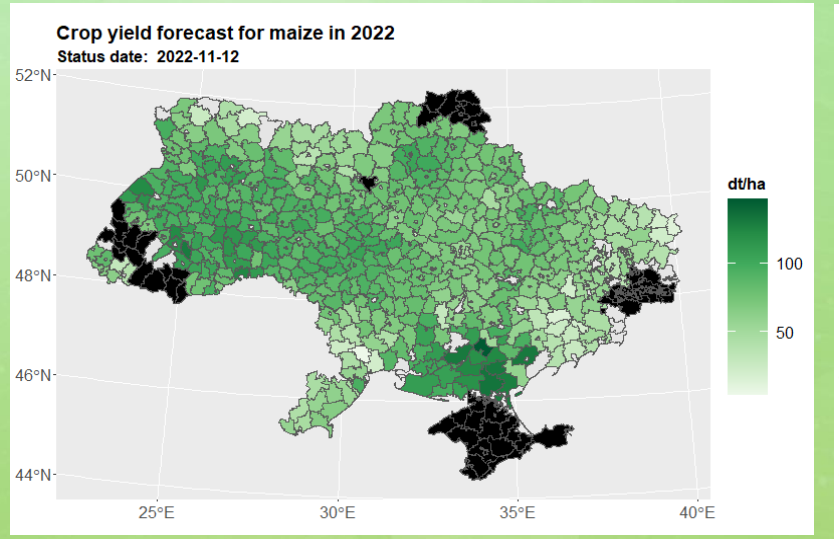
Regions

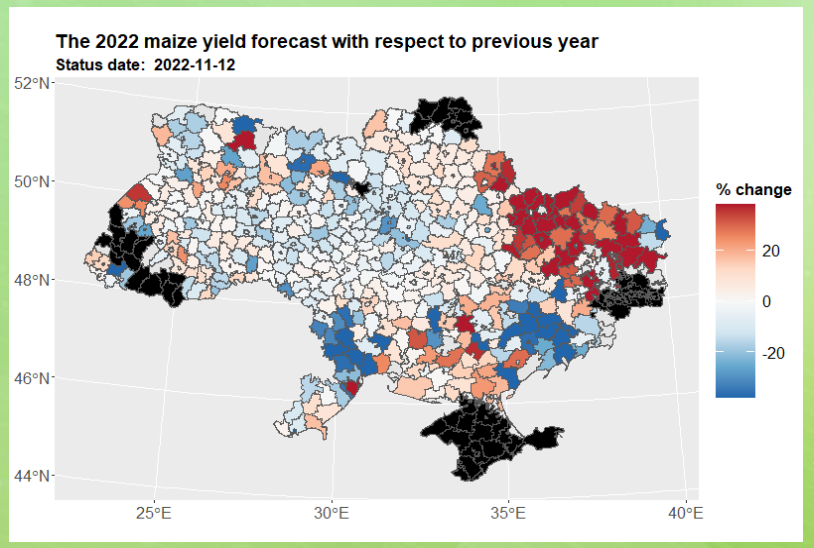


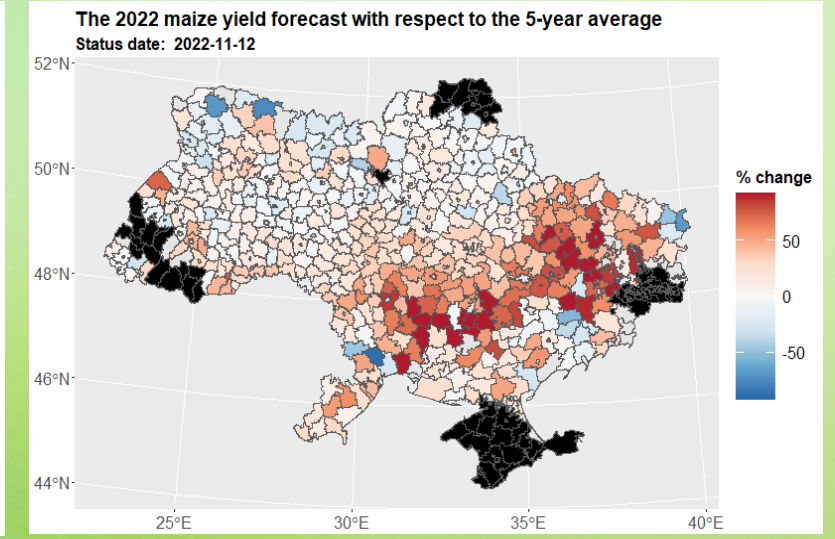




Raions





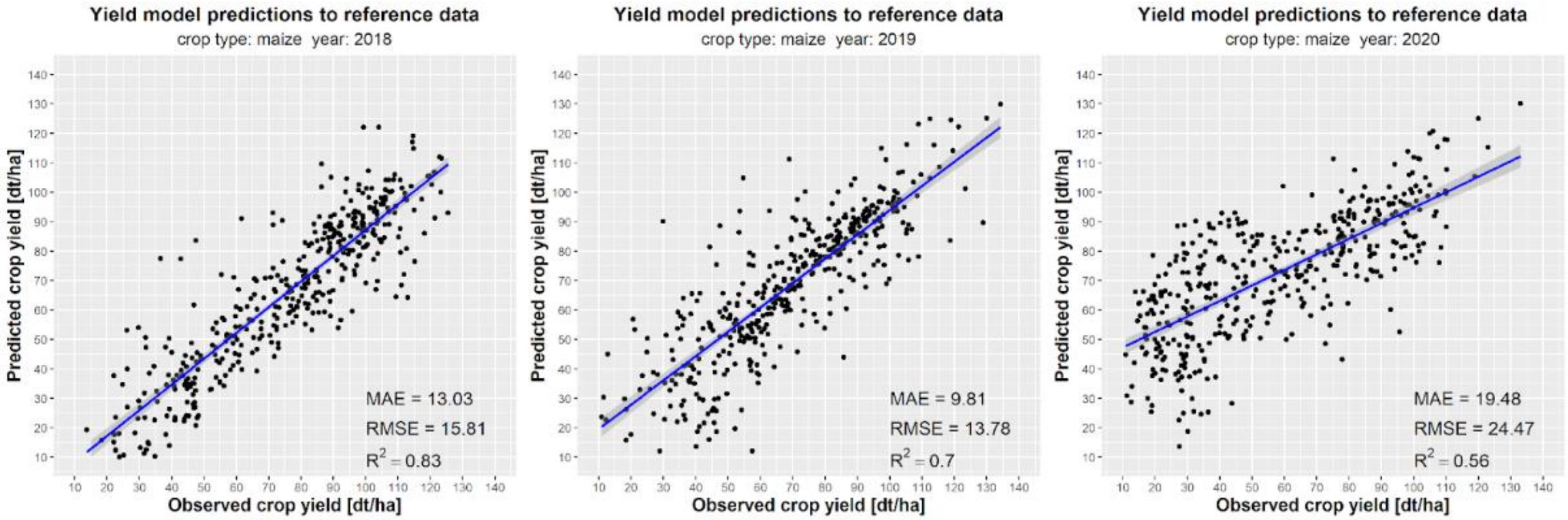


Crop yields in 2022

Yield reduction comparing to 2021

Yield reduction comparing to the 5-year average

Comparison of model prediction results with reference data for raions of maize for the 2018-2020 years



Summary

- The results from the EOStat system revealed the fusion of satellite and climatological data is crucial for modelling crop yields in Ukraine.
- The ESA project makes possible to better calculate the volume of the crop production in Ukraine and significantly improve the existing national statistical approaches to the process of producing information on crop production which is of great economic importance.
- Using administrative and alternative sources of information in agricultural statistics, especially in the current situation, will make it possible to obtain objective and complete statistical data while reducing the number of reports and interviews, the burden on respondents.
- The results for all administrative units i.e., regions and raions developed within the Project will be implemented and integrated in the Ukrainian Statistical Service.
- The State Statistics Service of Ukraine was very interested in the data that can be obtained thanks to the using predictive models created in the EOStat project on the territory of Ukraine, in particular, regarding the determination of sown areas and yield of agricultural crops.

Acknowledgments

esa
European Space Agency

Statistics Poland

State Statistics Service of Ukraine

CBK PAN