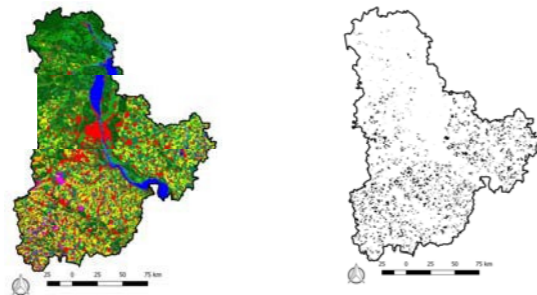# Food Security Risk Assessment – Crop Production Estimation and Risk of Droughts

Priority for Actions 1 and 4 - Crop State Monitoring

Winter wheat mask based on 10 m land cover (Kiev region, 2016, ESA Sen2-Agri)

Application field: Estimating crop production is one of the key components of ensuring food security. To improve risk assessment in the domain of food security risk assessment, activities on crop mapping and crop yield forecasting - with use of vegetation indexes - were implemented. In addition to this, corresponding automated information technologies were also developed.

Methodology available / workflow: Crop production risk assessment technology applies several Earth observation vegetation indices (NDVI), drought parameters (VHI), and biophysical parameters (LAI, FAPAR); for crop yield forecasting. Crop area estimation is performed with the use of deep learning and machine learning algorithms (supervised). Crop yield forecasting technology has been operational since 2012, with regional crop maps being accessible since 2013.

Key results: Crop yield forecasting technology, based on satellite vegetation indexes, biophysical parameters and crop type maps, allow for the estimation of total crop production. They also highlight the potential risks linked to crop production loss, as a result of droughts.

Innovative impact: Availability, simplicity, free of charge data, and minimum requirements of inputs, are deemed to be the main criteria. Sustainability is also guaranteed by the automatization of analysis. Further adaptation for use of hi-res biophysical parameters (namely LAI) from ESA's Sen2-Agri system is planned.

GP-STAR Factsheet

Information technology for crop production estimation taking into account risk of droughts

Application status: Pilot/pre-operational

Area of Application: Implemented for the territory of Ukraine (NUTS-2 level)
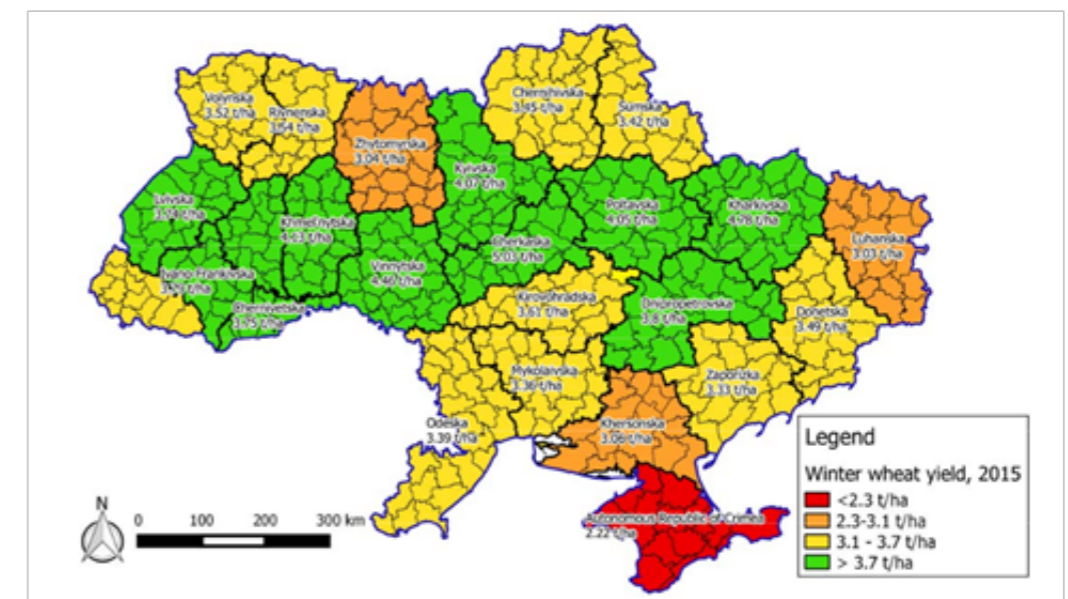
- Time series of Sentinel-2 data;
- Time series of crop state estimates (Vegetation Indices, VI - LAI, NDVI, VHI);
- In-situ data (crop type dataset);
- Official winter wheat yield statistics (NUTS-2 level)

Kogan, F., Kussul, N., Adamenko, T., Skakun, S., Kravchenko, O., Kryvobok, O., ... & Lavrenyuk, A. (2013). Winter wheat yield forecasting in Ukraine based on Earth observation, meteorological data and biophysical models. International Journal of Applied Earth Observation and Geoinformation, 23,192-203.

Skakun, S., Kussul, N., Shelestov, A., & Kussul, O. (2016). The use of satellite data for agriculture drought risk quantification in Ukraine. Geomatics, Natural Hazards and Risk, 7(3), 901-917.

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