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Informational technology for yield forecasting with use of multisource satellite data

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As population on the Earth increases and climate changes likely to impact global crop production, food security become a topic of great importance. This problem is addressed within the Global Agricultural Monitoring System of Systems (GLAM, 2010) that aims to integrate multiple satellite datasets and in situ observations to provide services for monitoring crop production, agro-meteorological parameters, and water resources. The two main components of crop production monitoring are crop yield forecasting and crop area estimation. Therefore, providing accurate crop yield forecasts several months in advance of the harvest is crucial at global, national and region scales.

In this paper informational technology for yield forecasting with use of multisource satellite data, which allows to provide prediction results of winter wheat yield forecasting in a convenient form and in operational mode for the end user 2-3 months before harvest is described. Appropriate informational system's architecture is proposed. Developed information system includes data assimilation subsystem, preprocessing subsystem, specialized processing and visualization subsystems.

Data assimilation subsystem deals with (i) vegetation health index (VHI) at 4 km spatial resolution derived from a series of NOAA satellites; (ii) Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) derived from SPOT-VEGETATION at 1km spatial resolution; (iii) MOD13Q1 product at the 250 m resolution. The main task of this subsystem is downloading, storing and transformation available datasets in convenient time and spatial resolution.

Preprocessing subsystem spatially averages available datasets (NDVI, VHI and FAPAR) over a cropland map that was extracted from the ESA GlobCover map at oblast level [1, 2].

The main function of *specialized processing subsystem* is feature selection for yield prediction and yield prediction per oblast for current year [3].

Visualization subsystem transfers modeling results to end-users in a form of geoportal which is convenient way to provide easy, timely and operational access to data.

Therefore, we can conclude that proposed information system is robust and useful tool for the whole workflow of operations for winter wheat yield prediction from data assimilation to transferring results to end-users.

References

[1] Shelestov, A.Yu. and Kussul, N.N. and Skakun, S.V. Grid technologies in monitoring systems based on satellite data // Journal of Automation and Information Sciences. — 2006. — vol. 38, no. 3. — P. 69-80.

[2] Kussul, N. and Shelestov, A. and Skakun, S. Grid and sensor web technologies for environmental monitoring // Earth Science Informatics. — 2009. — vol. 2, no. 1-2. — P. 37-51.

[3] F. Kogan, N. Kussul, T. Adamenko, S. Skakun, O. Kravchenko, O. Kryvobok, A. Shelestov, A. Kolotii, O. Kussul, and A. Lavrenyuk, "Winter wheat yield forecasting in Ukraine based on Earth observation, meteorological data and biophysical models," *International Journal of Applied Earth Observation and Geoinformation*, vol. 23, pp. 192-203, 2013.