

## DEVELOPING IN SEASON AND END OF SEASON CROP MAPS WITH MULTI-TEMPORAL OPTICAL AND SAR SATELLITE IMAGERY

M.S. Lavreniuk

Space Research Institute NAS of Ukraine SSA of Ukraine  
*nick.ukr.net@gmail.com*

Along the season crop classification maps based on satellite data is a challenging task for Ukraine because of a large diversity of agricultural crops with different phenology (crop calendars). A wide range of agriculture applications, including crop area estimation, crop yield forecasting, crop state assessment, heavily rely on the use of crop maps [1, 2]. Early season crop mask maps can be used for crop yield prediction and, consequently, crop production forecasting in the operational context which is important for food security [1].

In this study, we investigate feasibility of delivering early and along season crop specific maps based on all available free satellite data. In previous works, we proposed an approach that combines unsupervised and supervised neural networks for missing data restoration and supervised classification, respectively [3, 4]. After obtaining a pixel-based crop classification map, a parcel-based procedure is applied to improve the quality and accuracy of the final map [5]. Two administrative districts in different climatic zones (Bilotserkivskiy in Kyiv region and Snigurivskiy in Mykolaiv region) have been selected for this experiment. Taking into account that in 2013-2015 for Bilotserkivskiy district in Kyiv region we have available satellite data for the whole vegetation period we provided crop classification maps with all classes with high accuracy using the ensemble of neural networks approach. For these years, we obtained reliable results with overall accuracy higher than 85% for 13 classes. Using these maps, we provided a crop rotation violation map for Bilotserkivskiy district. For 2016, we would like to discover the conditions for obtaining early crop classification map (as soon as possible) with high accuracy and improve it during the vegetation period. We showed that required amount of optical data (for sufficient accuracy of more than 85%) for early season classification is not available due to strong cloud cover, and SAR data could help to solve this problem.

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