Geophysical Research Abstracts
Vol. 17, EGU2015-8688-1, 2015
EGU General Assembly 2015

Remotely sensed vegetation indices for seasonal crop yields predictions in the Czech Republic

Petr Hlavinka (1,2), Daniela Semerádová (1,2), Jan Balek (1,2), Roman Bohovic (2,3), Zdeněk Žalud (1,2), Miroslav Trnka (1,2)

(1) Institute of Agrosystems and Bioclimatology, Mendel University in Brno, Czech Republic (hlavinka.peta@gmail.com), (2) Global Change Research Centre, Czech Academy of Sciences, Brno, Czech Republic, (3) Institute of Geography, Masaryk University, Brno, Czech Republic (geo.roman@gmail.com)

Remotely sensed vegetation indices by satellites are valuable tool for vegetation conditions assessment also in the case of field crops. This study is based on the use of NDVI (Normalized Difference Vegetation Index) and EVI (Enhanced Vegetation Index) derived from MODIS (Moderate Resolution Imaging Spectroradiometer) aboard Terra satellite. Data available from the year 2000 were analyzed and tested for seasonal yields predictions within selected districts of the Czech Republic (Central Europe). Namely the yields of spring barley, winter wheat and oilseed winter rape during the period from 2000 to 2014 were assessed. Observed yields from 14 districts (NUTS 4) were collected and thus 210 seasons were included. Selected districts differ considerably in their soil fertility and terrain configuration and represent transect across various agroclimatic conditions (from warm and dry to relative cool and wet regions). Two approaches were tested: 1) using of composite remotely sensed data (available in 16 day time step) provided by the USGS (https://lpdaac.usgs.gov/); 2) using daily remotely sensed data in combination with originally developed smoothing method. The yields were successfully predicted based on established regression models (remotely sensed data used as independent parameter). Besides others the impact of severe drought episodes within vegetation were identified and yield reductions at district level predicted (even before harvest). As a result the periods with the best relationship between remotely sensed data and yields were identified.

The impact of drought conditions as well as normal or above normal yields of field crops could be predicted by proposed method within study region up to 30 days prior to the harvest. It could be concluded that remotely sensed vegetation conditions assessment should be important part of early warning systems focused on drought. Such information should be widely available for various users (decision makers, farmers, etc.) in order to improve planning, business strategies but also to target the drought relief in case of major drought event.

This study was funded by project "Building up a multidisciplinary scientific team focused on drought" No. CZ.1.07/2.3.00/20.0248, project supported by Czech National Agency of Agricultural Research No. QJ1310123 “Crop modelling as a tool for increasing the production potential and food security of the Czech Republic under Climate Change”.