Agricultural monitoring from Optical and SAR data

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Vegetation indices derived from optical remote sensing data are a valuable source of information for agricultural monitoring. However, cloud cover over some areas reduces the number of valid observations, which can difficult the detection of changes in crop condition. In this context, synthetic aperture radar (SAR) systems are an interesting alternative due to their low sensitivity to clouds. In this work, we analyze the relationship between SAR backscatter from Sentinel-1 and vegetation indices derived from the Harmonized Landsat-8 Sentinel-2 (HLS) product with data from the year 2017 over 6 land cover classes in Ukraine: Winter crops, summer crops, bare land, grasslands, forest, and water. Results show that SAR data from Sentinel-1 could be used to complement optical indices for certain land covers. In the case of winter crops (rapeseed and wheat), the ratio between Sigma-0 VV and VH polarization showed the highest relationship with the Normalized Difference Vegetation Index (NDVI) while for summer crops (maize, sugar beet, sunflower, and soybean) the highest relationship was shown by the Sigma-0 VH polarization and NDVI. Further work is being developed to exploit more complex SAR models which account for other variables that affect the backscatter signal such as soil moisture.

Keywords: agricultural monitoring, crop condition, synthetic aperture radar, HLS, normalized difference vegetation index

