

VALIDATION OF THE EO-LDAS PROTOTYPE – A DATA ASSIMILATION TOOL FOR CROP MONITORING

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ABSTRACT:

The Earth Observation Land Data Assimilation System (EO-LDAS) is a new tool designed to gather information about phenologic states and growing conditions on arable land. It integrates radiative transfer models (for atmosphere, soil, leaves) and a dynamic process model simulating the phenological evolution of plants throughout the growing season. A number of state variables (e.g., leaf water content, chlorophyll concentrations, soil moisture) can be derived from spectral data with spectral and spatial resolutions ranging from 400 to 2500 nm and 10 to 500 m, respectively. Likewise, it is possible to simulate satellite data meeting these requirements for a set of given state variables.

Within our project, we are working towards a thorough validation of the EO-LDAS prototype. In situ data were collected on a weekly basis for selected crop types (e.g., winter barley, winter wheat, rape, potatoes) on an agricultural test-site in the Thuringian Basin (Gebesee, Germany) during the growing seasons of 2010, 2013 and 2014. Especially during the latter two years field measurements were scheduled according to satellite overflights. State variables derived from satellite images of RapidEye, SPOT-5, Landsat-7 and -8, among others, will be compared with in situ field measurements. Effects of different spectral and spatial sensor resolutions as well as varying data availability over time will be investigated. In addition, spectra of Sentinel-2 MSI and other sensors will be simulated using in situ measured, hyperspectral and space-borne input data.

Here we present basic operational principles of the EO-LDAS prototype. Moreover, we will show results from the field campaigns for selected crop types. The impact of interannual weather variability and the influence of different soil types on the phenological plant evolution (represented by the dynamic process model) will be demonstrated.

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