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An Observing System Simulation Experiment of assimilating leaf area index and soil moisture over cropland

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A Land Data Assimilation System (LDAS) is an off-line data assimilation system featuring uncoupled land surface model which is driven by observation-based atmospheric forcing. In this study the experiments were conducted with a surface externalized (SURFEX) modelling platform developed at Météo-France. It encompasses the land surface model ISBA-A-gs that simulates photosynthesis and plant growth. The photosynthetic activity depends on the vegetation types. The input soil and vegetation parameters are provided by the ECOCLIMAP II global database which assigns the ecosystem classes in several plant functional types as grassland, crops, deciduous forest and coniferous forest. New versions of the model have been recently developed in order to better describe the agricultural plant functional types.
We present a set of observing system simulation experiments (OSSE) which asses leaf area index (LAI) and soil moisture assimilation for improving the land surface estimates in a controlled synthetic
environment. Synthetic data were assimilated into ISBA-A-gs using an Extended Kalman Filter (EKF). This allows for an understanding of model responses to an augmentation of the number of crop types and different parameters associated to this modification. In addition, the interactions between uncertainties in the model and in the observations were investigated.
This study represents the first step of a process that envisages the extension of LDAS to the new versions of the ISBA-A-gs model in order to assimilate remote sensing observations.