Ensemble-based land surface data assimilation with TERRA

Julian Toedter and Bodo Ahrens

University of Frankfurt, Institute for Atmospheric and Environmental Sciences, Frankfurt am Main, Germany
(bodo.ahrens@iau.uni-frankfurt.de)

The soil initial state (temperature and moisture) and poorly known parameters related to the soil parameterization strongly influence the simulation of screen-level variables. Both weather and climate prediction can benefit from an optimization of the initial state (and potentially also parameters), as offered by data assimilation methods. This work presents the prototype version of a joint state and parameter land surface data assimilation system. It implements an offline version of COSMO's TERRA into the Parallel Data Assimilation Framework (PDAF), which allows to apply state-of-the-art ensemble data assimilation algorithms. We discuss implications drawn from observation simulation experiments concerning algorithmic and observational properties. Then, we show first results from the assimilation of satellite soil moisture products in European and African regions using a localized ensemble transform Kalman filter. An envisaged application is the generation of an initial soil state ensemble for Africa and Europe within the MiKliP project.