Assimilation of SMOS Soil Moisture Retrievals in the Land Information System

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Soil moisture is a crucial variable for weather prediction because of its influence on evaporation. It is of critical importance for drought and flood monitoring and prediction and for public health applications. The NASA Short-term Prediction Research and Transition Center (SPoRT) has implemented a new module in the NASA Land Information System (LIS) to assimilate observations from the ESA's Soil Moisture and Ocean Salinity (SMOS) satellite. SMOS Level 2 retrievals from the Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) instrument are assimilated into the Noah LSM within LIS via an Ensemble Kalman Filter. The retrievals have a target volumetric accuracy of 4% at a resolution of 35-50 km. Parallel runs with and without SMOS assimilation are performed with precipitation forcing from intentionally degraded observations, and then validated against a model run using the best available precipitation data, as well as against selected station observations. The goal is to demonstrate how SMOS data assimilation can improve modeled soil states in the absence of dense rain gauge and radar networks.

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