

Assimilation of Satellite Soil Moisture Data Products from SMOPS in NCEP Global Forecast System

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Global soil moisture data products have been continuously generated from existing and planned satellite microwave sensors. They could be used for initialization of soil moisture state variables in numerical weather, climate and hydrological forecast models. A global Soil Moisture Operational Product System (SMOPS) has been developed at NOAA/NESDIS to continuously provide global soil moisture data products to meet NOAA/NCEP's soil moisture data needs. To assimilate the soil moisture data products in improving forecasts of the NCEP Global Forecast System (GFS), the Ensemble Kalman Filter (EnKF) data assimilation algorithm has been implemented in the GFS. In this study, the quality of the soil moisture data products from SMOPS is examined against in situ measurements. The biases of the soil moisture retrievals from the Noah land surface model simulations in GFS are corrected before assimilating the retrievals into the model. Experiments with full cycle runs of the EnKF/GFS and NCEP Gridpoint Statistical Interpolation (GSI) analysis system were performed for different seasons including seasons with potential freeze/thaw soil state transitions. The impacts of the soil moisture data assimilation on GFS estimates of soils moisture and energy fluxes, 2 meter surface air temperature and humidity, and on GFS precipitation forecasts were investigated. Results from this investigation together with the SMOPS data products and EnKF/GFS systems will be presented.