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Abstract: **Enhancing Weather Forecasts via Assimilating Soil Moisture from Soil Moisture Active Passive (SMAP) satellite and Real-time Green Vegetation Fraction**

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Accurate forecasts of temperature and precipitation from numerical weather prediction (NWP) models rely on the quality of the initialization of land surface state variables (e.g. soil moisture(SM)) and the representativeness of parameters that describe the current land surface (e.g. green vegetation fraction (GVF)). Recent research has shown the unique value of satellite-based SM and vegetation cover information and the feasibility of assimilating SM retrievals into the land surface models (LSMs) to improve the land-atmosphere water and energy exchange. While most current studies have focused on the assimilation of SM products into uncoupled LSMs, the potential impact of satellite SM products and real time surface vegetation cover information through coupled NWP-LSM modeling system could potentially lead to significant forecast improvements. This study aims at building a semi-coupled NASA Land Information System (LIS) and WRF system to assess the impact of assimilating SM product from the Soil Moisture Active Passive (SMAP) satellite and near real time green vegetation fraction from MODIS on the weather forecasts. The study focuses on CONUS domain over the period of Sept. 27th to Oct. 10th, 2015. The effectiveness and efficiency of SMAP SM assimilation on weather forecasts will be evaluated using NCEP ADP global upper air and surface observations and the National StageIV precipitation analysis.