High-resolution land surface modeling and data assimilation for the contiguous U.S. for improved monitoring and prediction of hydrology and water resources variables

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In this poster, we describe a recently started NCEP-OHD joint project to develop a high-resolution hydrologic modeling and data assimilation capability for the contiguous U.S. (CONUS) and for selected regional-scale catchments therein. A part of the Hydrology Test Bed, the system is to expedite improvement of model physics and data assimilators, and hydrologic evaluation of forcing ensembles from weather to climate scales. The models used in this work are the NCEP's Noah land surface model and OHD's SAC-HT and SNOW17. For NIDIS, the system will produce a 30-yr model climatology and a suite of guidance products in support of monitoring and prediction of drought and other hydrologic variables. These products will also support a number of RFC pilot projects in the Upper Colorado and elsewhere.

Space-borne sensors offer a complementary capability to monitor snow and surface soil moisture, providing one- to three-day repeat measurements at approximately 500 m to 25 km resolutions. Such sensors include the Advanced Microwave Scanning Radiometer for the Earth observing system (AMSR-E) for surface soil moisture and snow water equivalent (SWE) at 12.5km resolution, and the Moderate Resolution Imaging Spectroradiometer (MODIS) for snow cover area at 500m resolution. We plan to assimilate these satellite observations into the above land surface models to attain optimal soil moisture and snow state estimates over CONUS. As an example, we present results from preliminary numerical experiments in which remotely sensed snow cover estimates are assimilated into SNOW-17 operating at a 4.8 km resolution to update snow cover fraction and SWE over the Carson River Basin on the California-Nevada border.