Effects of Real-Time NASA Vegetation Data on Model Forecasts of Severe Weather

Jonathan L. Case, ENSCO Inc/NASA Short-term Prediction Research and Transition (SPoRT) Center
Jordan R. Bell, University of Missouri
Frank J. LaFontaine, Raytheon/NASA SPoRT Center
Christa D. Peters-Lidard, NASA Goddard Space Flight Center

The NASA Short-term Prediction Research and Transition (SPoRT) Center has developed a Greenness Vegetation Fraction (GVF) dataset, which is updated daily using swaths of Normalized Difference Vegetation Index data from the Moderate Resolution Imaging Spectroradiometer (MODIS) data aboard the NASA-EOS Aqua and Terra satellites. NASA SPoRT started generating daily real-time GVF composites at 1-km resolution over the Continental United States beginning 1 June 2010. A companion poster presentation (Bell et al.) primarily focuses on impact results in an offline configuration of the Noah land surface model (LSM) for the 2010 warm season, comparing the SPoRT/MODIS GVF dataset to the current operational monthly climatology GVF available within the National Centers for Environmental Prediction (NCEP) and Weather Research and Forecasting (WRF) models. This paper/presentation primarily focuses on individual case studies of severe weather events to determine the impacts and possible improvements by using the real-time, high-resolution SPoRT-MODIS GVFs in place of the coarser-resolution NCEP climatological GVFs in model simulations.

The NASA-Unified WRF (NU-WRF) modeling system is employed to conduct the sensitivity simulations of individual events. The NU-WRF is an integrated modeling system based on the Advanced Research WRF dynamical core that is designed to represents aerosol, cloud, precipitation, and land processes at satellite-resolved scales in a coupled simulation environment. For this experiment, the coupling between the NASA Land Information System (LIS) and the WRF model is utilized to measure the impacts of the daily SPoRT/MODIS versus the monthly NCEP climatology GVFs. First, a spin-up run of the LIS is integrated for two years using the Noah LSM to ensure that the land surface fields reach an equilibrium state on the 4-km grid mesh used. Next, the spin-up LIS is run in two separate modes beginning on 1 June 2010, one continuing with the climatology GVFs while the other uses the daily SPoRT/MODIS GVFs. Finally, snapshots of the LIS land surface fields are used to initialize two different simulations of the NU-WRF, one running with climatology LIS and GVFs, and the other running with experimental LIS and NASA/SPoRT GVFs. In this paper/presentation, case study results will be highlighted in regions with significant differences in GVF between the NCEP climatology and SPoRT product during severe weather episodes.

Submitted to the 16th Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land Surface, New Orleans, LA,22–26 January 2012