

Projected Applications of a “Climate in a Box” Computing System at the
NASA Short-term Prediction Research and Transition (SPoRT) Center

Gary J. Jedlovec¹, Andrew L. Molthan¹, Bradley T. Zavodsky¹, Jonathan L. Case²,
and Frank J. LaFontaine³

¹NASA SPoRT Center/Marshall Space Flight Center, Huntsville, AL

²NASA SPoRT Center/ENSCO, Inc., Huntsville, AL³

NASA SPoRT Center/Raytheon, Inc., Huntsville, AL

The NASA Short-term Prediction Research and Transition (SPoRT) Center focuses on the transition of unique observations and research capabilities to the operational weather community, with a goal of improving short-term forecasts on a regional scale. Advances in research computing have lead to “Climate in a Box” systems, with hardware configurations capable of producing high resolution, near real-time weather forecasts, but with footprints, power, and cooling requirements that are comparable to desktop systems.

The SPoRT Center has developed several capabilities for incorporating unique NASA research capabilities and observations with real-time weather forecasts. Planned utilization includes the development of a fully-cycled data assimilation system used to drive 36-48 hour forecasts produced by the NASA Unified version of the Weather Research and Forecasting (WRF) model (NU-WRF). The horsepower provided by the “Climate in a Box” system is expected to facilitate the assimilation of vertical profiles of temperature and moisture provided by the Atmospheric Infrared Sounder (AIRS) aboard the NASA Aqua satellite. In addition, the Moderate Resolution Imaging Spectroradiometer (MODIS) instruments aboard NASA’s Aqua and Terra satellites provide high-resolution sea surface temperatures and vegetation characteristics. The development of MODIS normalized difference vegetation index (NVDI) composites for use within the NASA Land Information System (LIS) will assist in the characterization of vegetation, and subsequently the surface albedo and processes related to soil moisture. Through application of satellite simulators, NASA satellite instruments can be used to examine forecast model errors in cloud cover and other characteristics. Through the aforementioned application of the “Climate in a Box” system and NU-WRF capabilities, an end goal is the establishment of a real-time forecast system that fully integrates modeling and analysis capabilities developed within the NASA SPoRT Center, with benefits provided to the operational forecasting community.