A Multi-Season Study of the Effects of MODIS Sea-Surface Temperatures on Operational WRF Forecasts at NWS Miami, FL

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Studies at the Short-term Prediction Research and Transition (SPoRT) Center have suggested that the use of Moderate Resolution Imaging Spectroradiometer (MODIS) sea-surface temperature (SST) composites in regional weather forecast models can have a significant positive impact on short-term numerical weather prediction in coastal regions. Recent work by LaCasse *et al.* (2007, *Monthly Weather Review*) highlights lower atmospheric differences in regional numerical simulations over the Florida offshore waters using 2-km SST composites derived from the MODIS instrument aboard the polar-orbiting Aqua and Terra Earth Observing System satellites. To help quantify the value of this impact on NWS Weather Forecast Offices (WFOs), the SPoRT Center and the NWS WFO at Miami, FL (MIA) are collaborating on a project to investigate the impact of using the high-resolution MODIS SST fields within the Weather Research and Forecasting (WRF) prediction system. The project's goal is to determine whether more accurate specification of the lower-boundary forcing within WRF will result in improved land/sea fluxes and hence, more accurate evolution of coastal mesoscale circulations and the associated sensible weather elements.

The NWS MIA is currently running WRF in real-time to support daily forecast operations, using the National Centers for Environmental Prediction Nonhydrostatic Mesoscale Model dynamical core within the NWS Science and Training Resource Center's Environmental Modeling System (EMS) software. Twenty-seven hour forecasts are run daily initialized at 0300, 0900, 1500, and 2100 UTC on a domain with 4-km grid spacing covering the southern half of Florida and adjacent waters of the Gulf of Mexico and Atlantic Ocean. Each model run is initialized using the Local Analysis and Prediction System (LAPS) analyses available in AWIPS. The SSTs are initialized with the NCEP Real-Time Global (RTG) analyses at 1/12° resolution (~9 km); however, the RTG product does not exhibit fine-scale details consistent with its grid resolution.

SPoRT is conducting parallel WRF EMS runs identical to the operational runs at NWS MIA except for the use of MODIS SST composites in place of the RTG product as the initial and boundary conditions over water. The MODIS SST composites for initializing the SPoRT WRF runs are generated on a 2-km grid four times daily at 0400, 0700, 1600, and 1900 UTC, based on the times of the overhead passes of the Aqua and Terra satellites. The incorporation of the MODIS SST data into the SPoRT WRF runs is staggered such that SSTs are updated with a new composite every six hours in each of the WRF runs. From mid-February to July, over 500 parallel WRF simulations have been collected for analysis and verification. This paper will present verification results comparing the NWS MIA operational WRF runs to the SPoRT experimental runs, and highlight any substantial differences noted in the predicted mesoscale phenomena for specific cases.

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