Improving the Assimilation of High-Resolution GOES-16 Water Vapor Variables and Atmospheric Motion Vectors in the HWRF Model

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Abstract

Reliable forecasts of landfalling tropical cyclones (TCs) such as Hurricane Sandy (2012) and Hurricane Matthew (2016) are critical for decision making and better preparation. Obtaining good TC intensity forecasts remains one of the most challenging aspects in NOAA operations. Observations of atmospheric water vapor variables and winds in the TC environment as well as in the inner core at high spatiotemporal resolution are very important to the prediction of the storm evolution and landfall impacts. Optimizing the assimilation of that information into the operational Hurricane WRF (HWRF) model is a vital step towards improving TC forecasts. To help address this need, the Advanced Baseline Imager (ABI) (Schmit et al. 2005; 2007) onboard NOAA's next generation of geostationary weather satellites (GOES-R series), beginning with GOES-16 launched on 19 November 2016, will routinely provide high temporal (every 5 minutes) and spatial (2 km) resolution moisture variables and atmospheric motion vector (AMV) information not previously available. We propose to optimize the impact of the high spatiotemporal resolution GOES-R series water vapor information and AMVs to improve TC analyses and forecasts in HWRF. In particular, our study will focus on using GOES-16 observations in the analysis-sensitive regions associated with the TC near-environment, exploring and optimizing the effective assimilation of these data into HWRF for improving TC moisture, wind, track, and intensity forecasts.