Impact of ATMS Radiance Data Assimilation on Hurricane Track and Intensity Forecasts Using HWRF

Xiaolei Zou[a], Fuzhong Weng[b], Banglin Zhang[c,d], Lin Lin[c,d] and Zhengkun Qin[a]

[a] *Department of Earth, Ocean and Atmospheric Sciences, Florida State University, USA, xzou@fsu.edu,*
[b] *National Environmental Satellite, Data & Information Service, National Oceanic and Atmospheric Administration, USA,* [c] *Earth Resources Technology, Inc., USA,* [d] *Joint Center for Satellite Data Assimilation, USA*

The Advanced Technology Microwave Sounder (ATMS) onboard the Suomi National Polar-orbiting Partnership (NPP) satellite provides atmospheric temperature- and water vapor-sensitive multi-channel radiance data to support a continuing advance in numerical weather prediction (NWP) for hurricanes and other weather events. The benefits of assimilating ATMS radiances along with conventional and other satellite data streams for improved hurricane forecasts are examined for four landfall hurricane cases that occurred in 2012 Atlantic Ocean. The Hurricane Weather Research and Forecasting (HWRF) system, which employs the National Centers for Environmental Prediction (NCEP) Gridpoint Statistical Interpolation (GSI) data assimilation system, is used. Firstly, two modifications are made to the HWRF modeling system. The first modification is on the HWRF model top, which is raised to ~0.5 hPa. The second modification concerns the cold start embedded in the HWRF system, which is changed to a warm start for the cycling of data assimilation cycle. Secondly, the ATMS data quality control procedure and bias correction methods employed in the GSI system are carefully documented. Thirdly, two pairs of hurricane data assimilation/forecasting experiments are carried out to demonstrate the potential impacts of ATMS radiance data assimilation on hurricane track and intensity forecasts. It is found that the ATMS radiance data assimilation adds significant values to improved hurricane track and intensity forecasts when compared with the parallel runs without ATMS data.