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**An Objective Verification of the North American Mesoscale Model for  
Kennedy Space Center and Cape Canaveral Air Force Station**

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The 45th Weather Squadron (45 WS) Launch Weather Officers use the 12-km resolution North American Mesoscale (NAM) model (MesoNAM) text and graphical product forecasts extensively to support launch weather operations. However, the actual performance of the model at Kennedy Space Center (KSC) and Cape Canaveral Air Force Station (CCAFS) has not been measured objectively. In order to have tangible evidence of model performance, the 45 WS tasked the Applied Meteorology Unit to conduct a detailed statistical analysis of model output compared to observed values. The model products are provided to the 45 WS by ACTA, Inc. and include hourly forecasts from 0 to 84 hours based on model initialization times of 00, 06, 12 and 18 UTC. The objective analysis compared the MesoNAM forecast winds, temperature and dew point, as well as the changes in these parameters over time, to the observed values from the sensors in the KSC/CCAFS wind tower network. Objective statistics give the forecasters knowledge of the model's strength and weaknesses, which will result in improved forecasts for operations.

The data sets were stratified by 45°, 90°, 180° and all direction wind sectors as well as by year, warm season (May-Sep), cool season (Oct-Apr), month and model initialization time. Also, the sector directions were oriented to maximize discrimination between on-shore/off-shore flow for each wind tower. The model forecasts were analyzed only for the current operational version of the MesoNAM using the following statistics:

- Bias (mean difference)
- Standard deviation of Bias
- Hypothesis test for Bias = 0
- Root Mean Square Error (RMSE)
- Standard deviation of RMSE
- Hypothesis test for RMSE = 0
- Hypothesis tests to determine if the Bias and RMSE at the same levels of different towers are the same, and
- Hypothesis test to determine if composited Bias and RMSE = 0.

Details of how the MesoNAM performed under the various stratifications at KSC and CCAFS will be presented.

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