An Evaluation of the NSSL Mesoscale Ensemble

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One task of the NOAA Warn-on-Forecast program is the development of realistic mesoscale backgrounds for downscaling to high-resolution (of order 1 km or less) radar data assimilation experiments. Toward this end, the NSSL Mesoscale Ensemble (NME) has been developed using the Weather Research and Forecasting (WRF) model. A variety of quasi-realtime model output from the NME will be examined during this year's NOAA HWT Spring Forecast Experiment, to better understand the impact of conventional observations on mesoscale analyses and forecasts of severe weather events.

The NME will be run daily for period 06 May – 07 June 2013 to produce three-dimensional analyses over a CONUS domain with a horizontal grid spacing of 18 km. The 36-member ensemble is constructed from initial and boundary conditions provided by the Earth System Research Laboratory-Rapid Refresh (RAP-ESRL, i.e., RAPv2) forecast cycle starting 1200 UTC. Initial condition perturbations are used to account for uncertainties in the RAP-ESRL analysis, and the WRF physics options are also varied amongst the ensemble members to address deficiencies in model physics. Routinely available observations of altimeter setting, temperature, dewpoint, and horizontal wind components from land and marine surface stations, rawinsondes, and aircraft—as well as satellite winds—are assimilated using an ensemble Kalman filter (DART software) at hourly intervals from 1300 UTC to 0300 UTC the following day. Mesoscale ensemble forecasts are also launched from the 1400, 1600 and 1800 UTC mesoscale analyses, and all terminate at 0300 UTC the next day.

Experiences with examining and evaluating the environmental characteristics of the NME output will be presented. This will include a comparison of 1-h ensemble-mean forecasts to 1-h RAP-ESRL forecasts, the latter of which serve as a first guess to the Storm Prediction Center's comprehensive surface objective analysis scheme (SFCOA). In addition, a daily realtime WRF run (with 4-km grid) initialized from the 0000 UTC NME analysis is being run in parallel to the established NSSL realtime WRF, which is a "cold start" from the North American Mesoscale model. Guidance from this work will also be shown.