Initial Performance and Verification Results of a Cycled WRF/DART Multiscale Ensemble System at Texas Tech University

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A real-time 50 member EnKF cycling system using DART/WRF has been in production at Texas Tech University (TTU) for several months. The system uses a nested domain configuration with an outer 36-km grid over most of the U.S. and North Pacific Ocean, and smaller 12-km (Western U.S.) and 4-km (Texas, Oklahoma, and a portion of New Mexico) nests. The system cycles every 6 hours, producing extended forecasts on the two finer nests (48-hr at 12km, 36-hr at 4km) twice daily from the 0000 and 1200 UTC analyses. Standard cloud-track wind, aircraft, radiosonde, and METAR observations are assimilated onto the 36-km and 12-km grids, with additional mesonet surface observations assimilated onto the fine-scale 4-km domain.

The performance of the ensemble system will be presented here. The ensemble was initially calibrated over a limited period to possess appropriate localization and inflation over a 24-hr forecast window to produce optimal mean forecasts. Spread/skill metrics and rank histograms are evaluated here to reveal whether desirable ensemble behavior, particularly with regard to spread and bias, is maintained throughout the extended forecasts. Ensemble mean forecasts are verified against hourly surface temperature, moisture, wind, and precipitation observations, as well as temperature, pressure, moisture, and wind observations aloft every 6 hours. In addition to comparisons to observations, ensemble performance is compared to several other numerical weather prediction (NWP) models and configurations. In particular, this comparison will include a TTU 12-km/3-km real time WRF deterministic simulation initialized from the GFS, as well as the U.S. operational NAM, GFS, and RAP models. Plans for future system improvement will be discussed based on these results.