Impact of Observations on High-Resolution Analyses and Forecasts over the Dallas-Fort Worth Testbed

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In a recent report, the National Research Council (NRC) noted that the current state of mesoscale observations in the U.S. are inadequate to satisfy the needs for producing high-resolution analyses and forecasts of high-impact weather events (National Academy of Sciences 2009). The report recommended the development of a distributed adaptive "Network of Networks" (NoN) in which data from the nation's observing systems, run by a consortium of government and private sector data providers, are partially centralized to form a single, multi-purpose, nationwide mesoscale observing network. To better understand the contribution and impact of each new observing system on weather analysis and prediction, the NRC report also recommended the development of research testbeds. The research testbed provides a platform to test and optimize when and how data from each system can best be used for improved weather operations.

By December 2013, the Center for Collaborative Adaptive Sensing of the Atmosphere (CASA) will have installed an 8-radar, NoN testbed across the Dallas – Fort Worth (DFW) Metroplex. Known as the DFW Urban Demonstration Network, data will be collected in real-time from a consortium of local data providers, and a suite of value-added products, including analyses and forecasts, will be generated and disseminated to end-users.

In this study, the authors examine the impact of assimilating observations from the DFW Network for producing high-resolution (400-m) analyses and forecasts. Using the Center for Analysis and Prediction of Storms' (CAPS) Advanced Regional Prediction System (ARPS) and its three-dimensional Variational Analysis package (3DVAR), a series of experiments were performed in which data sources were withheld from initial analyses. In particular, the relative impacts of assimilating observations collected from Global Science and Technology, Inc. (GST), which has mounted atmospheric sensors on transportation fleets around the country, and Earth Networks, which deploys atmospheric sensors at schools and public venues, are investigated. Primary verification of near-surface weather is performed against an independent subset of nine ASOS stations and the National Mosaic and Multi-Sensor Quantitative Precipitation Estimate (NMQ) dataset.

[#] National Academy of Sciences, 2009: *Observing Weather and Climate from the Ground Up: A Nationwide Network of Networks*. National Academy Press, 234 pp. *Available at:* <http://www.nap.edu/catalog.php?record_id=12540>