Sensitivity to Data in High Resolution Data Assimilation For the Dallas Urban Testbed

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Background

As part of the NSF Engineering Research Center for Collaborative Adaptive Sensing of the Atmosphere (CASA), the Center for Analysis and Prediction of Storms (CAPS) developed a 1-km resolution real-time nowcasting and numerical weather prediction (NWP) system and a 400-m real-time analysis system for a domain covering central and southwest Oklahoma. In 2012 an urban observational testbed was established in the Dallas/Fort Worth area of North Texas corresponding with the plan to move the CASA X-band radars from Oklahoma to this area. The area is covered by several NEXRAD radars, two TDWR radars, multiple ASOS and AWOS sites, and GOES satellites.

Current plans for the D/FW Urban Testbed include additional observations in the 2013-2014 timeframe:

- 4 X-band radars from UMass moved from the Oklahoma CASA network
- 4 Additional X-band radars from Colorado State University, EWR Systems, Enterprise Electronics (EEC), and/or Univ. of Oklahoma ARRC
- Mobile surface data from GST, Inc
- Surface data from EarthNetworks
- Radiometers from Radiometrics/EarthNetworks

Other novel observing systems are being sought.

Radar Planning for Dallas Urban Testbed

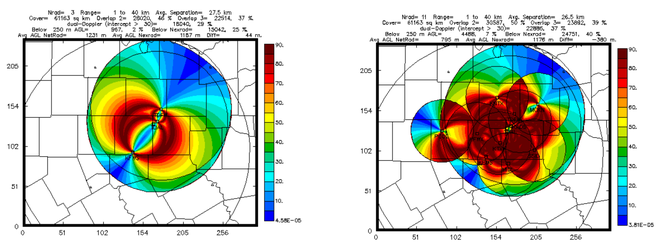
2012 Operations

NEXRAD: KFWS
TDWR: TDAL, TDFW

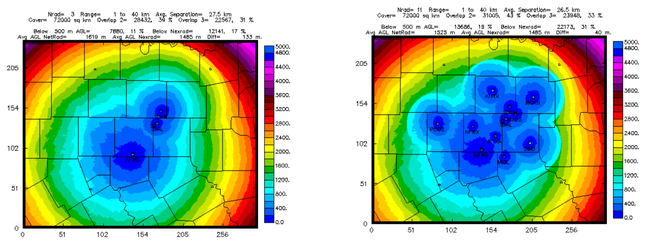
Proposed Radar Network

NEXRAD: KFWS
TDWR: TDAL, TDFW
X-Band Network: 8 Radars

Dual-Doppler Beam Crossing Angles



Beam Height Above Terrain

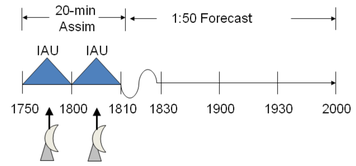


Real-Time Analyses, Assimilation and Forecast System DFW Testbed

3DVAR Analyses
32 Processors MPI
5-minute Interval
400-m grid spacing
Wind and Reflectivity
Run continuously

Assimilation/Forecasts
3DVAR and ARPS
160 processors MPI
10 minute interval
1-km grid spacing
Wind and Reflectivity Assim
2-hour Forward Forecast

Assimilation-Forecast Strategy

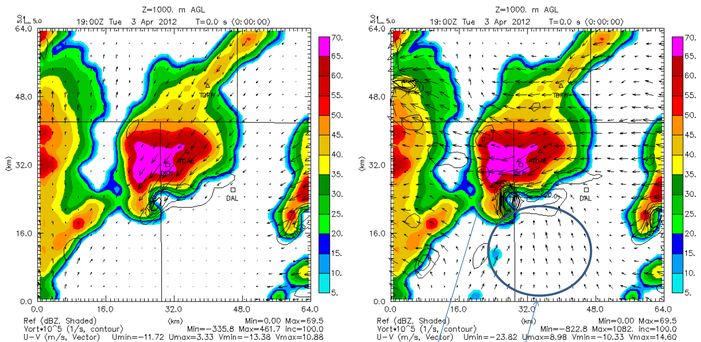


Dallas Love Field and DFW International TDWR Radar (Reflectivity & Velocity) Impact on Analysis

Test Analysis at 1900 UTC 3 April 2012
1-km AGL Reflectivity, Wind Increments and Vorticity

KFWS NEXRAD Only

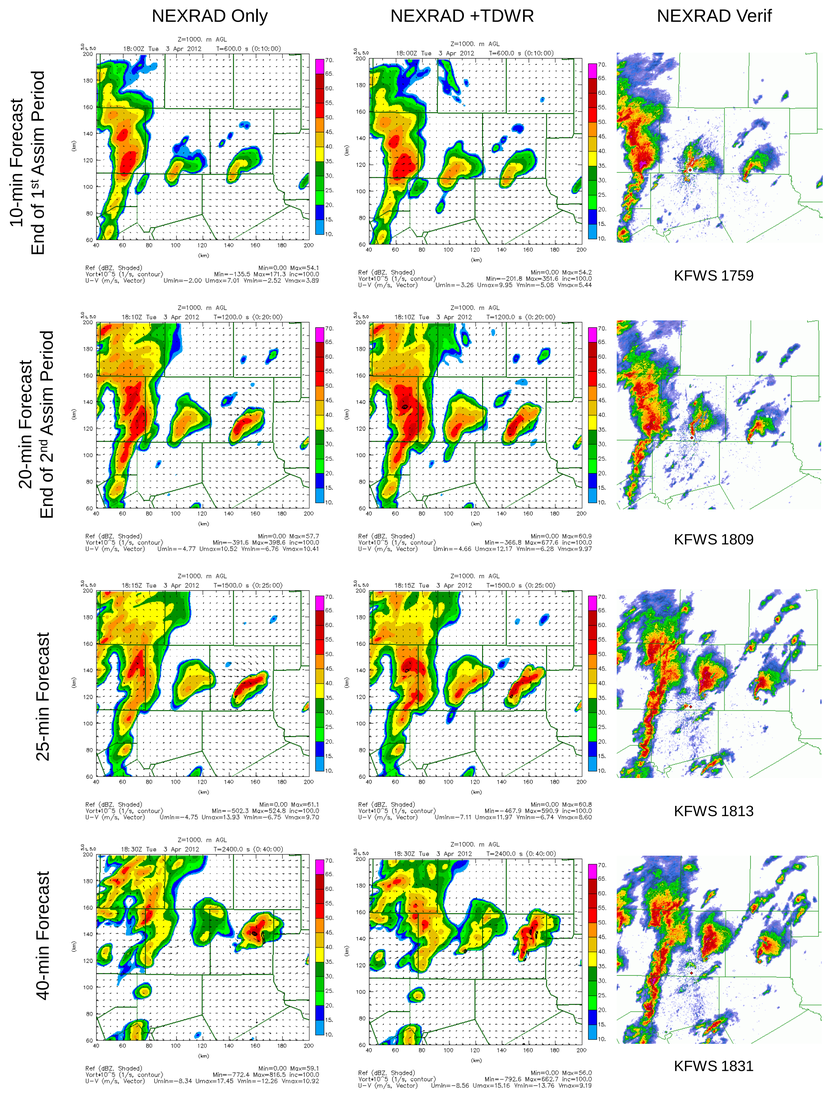
KFWS, TDFW (TDWR) & TDAL (TWDR)



Rotation increased in mesocyclone.

Improved resolution of winds in “clear air”.

April 3, 2012
Sample NEXRAD+TDWR Forecast at 1800 UTC
(CASA Radars net yet deployed)



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