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The Dallas-Fort Worth (DFW) Urban Radar Network: Enhancing Resilience in the Presence of Floods, Tornadoes, Hail and High Winds

Chandrasekar V. Chandra* and the full DFW team
*Colorado State University, Fort Collins, United States

Currently, the National Weather Service (NWS) Next Generation Weather Radar (NEXRAD) provides observations updated every five-six minutes across the United States. However, at the maximum NEXRAD operating range of 230 km, the 0.5 degree radar beam (lowest tilt) height is about 5.4 km above ground level (AGL) because of the effect of Earth curvature. Consequently, much of the lower atmosphere (1-3 km AGL) cannot be observed by the NEXRAD. To overcome the fundamental coverage limitations of today's weather surveillance radars, and improve the spatial and temporal resolution issues, at urban scale, the National Science Foundation Engineering Research Center (NSF-ERC) for Collaborative Adaptive Sensing of the Atmosphere (CASA) has embarked the development of Dallas-Fort worth (DFW) urban remote sensing network to conduct high-resolution sensing in the lower atmosphere for a metropolitan environment, communicate high resolution observations and nowcasting of severe weather including flash floods, hail storms and high wind events.

Being one of the largest inland metropolitan areas in the U.S., the DFW Metroplex is home to over 6.5 million people by 2012 according to the North Central Texas Council of Governments (NCTCOG). It experiences a wide range of natural weather hazards, including urban flash flood, high wind, tornado, and hail, etc. Successful monitoring of the rapid changing meteorological conditions in such a region is necessary for emergency management and decision making. Therefore, it is an ideal location to investigate the impacts of hazardous weather phenomena, to enhance resilience in an urban setting and demonstrate the CASA concept in a densely populated urban environment. The DFW radar network consists of 8 dual-polarization X-band weather radars and standard NEXRAD S-band radar, covering the greater DFW metropolitan region.

This paper will present high resolution observation of tornado, urban flood, hail storm and damaging wind event all within the city.