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The CASA Dallas-Fort Worth Urban Remote Sensing Network: Recent Progress

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Since spring 2012, the U.S. National Science Foundation Engineering Research Center (NSF-ERC) for Collaborative Adaptive Sensing of the Atmosphere (CASA) has been transformed from a research to operational demonstration emphasis, and has started the development of Dallas-Fort worth (DFW) urban remote sensing network. The main goal of this network is to demonstrate the operational feasibility of the dense radar network in a metropolitan environment. The DFW network consists of 8 dual-polarization X-band weather radars covering the greater DFW metropolitan area, the 4th largest Metroplex in the nation.

The major issued to be addressed include urban flash flood mitigation, severe weather warning and demonstration of network-of-network concept. It is also expected to be an ideal development platform for multi-Doppler wind retrieval, quantitative precipitation estimation (QPE), quantitative precipitation forecast (QPF), and accurate hydrologic response. The real-time weather information will then be disseminated to public and private stakeholders for decision-making and evaluation as severe weather events occur in the Metroplex. In addition, multi-sensor products will be generated as well from combining the existing remote sensors such as KFWS radar (a WSR-88DP radar), TDWR, and local rainfall gauges.

This paper will first present a brief overview of the current development of CASA DFW urban radar network. Then, the Kdp-based QPE methodology for CASA X-band radars will be described and evaluated in depth. The composite rainfall products produced by combining the S-band WSR-88DP and X-band radar observations will also be presented. To demonstrate and evaluate the QPE products, local rainfall gauges are used for cross comparison between the radar rainfall measurements and gauge observations. In addition, the prototype flash flood forecasting system under development for the City of Fort Worth will also be described in this paper, which utilizes the high spatial and temporal resolution CASA rainfall products as input of the intermediate distributed hydrological models.