

### **3.6 THE CASA DALLAS-FORT WORTH URBAN DEMONSTRATION NETWORK AFTER 5 YEARS OPERATION: ACCOMPLISHMENTS AND CHALLENGES FROM A UNIQUE PLATFORM OF COLLABORATIVE PARTNERSHIP BETWEEN LOCAL, REGIONAL AND NATIONAL ENTITIES**

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Since the establishment of the center for Collaborative Adaptive Sensing of the Atmosphere (CASA) dedicated to innovative sensing of the lower atmosphere, the X-band radar system has been an emerging tool for severe weather warning and decision making. Typical examples include the dense X-band radar networks planned or already deployed in big cities such as Dallas-Fort Worth (DFW), Beijing, Tokyo, and the RainGain project in Leuven-London-Paris-Rotterdam. These X band radar networks are developing their own operational domain for urban weather disaster detection and mitigation. CASA has been operating a Research-to-Operations (R2O) radar network in DFW metroplex for over five years. During the five years operation, CASA has developed a real-time end-to-end weather warning system that includes sensors, software architecture, products, data dissemination and visualization, and user decision making. This innovative system is a partnership of academic institutions, National Weather Service, local government agencies, and business user community.

A number of real-time product sub-systems have been developed for severe weather detection and quantification in a live environment for DFW area. Over 1000 public safety officials and 300 residents are using the CASA mobile app for receiving context-aware alerts derived from these products. The local Weather Forecast Office is using the real-time data and products operationally when issuing weather watches and warnings. At the same time, local stakeholders and weather stations are also providing live data into the network to demonstrate how a regional approach to a heterogeneous Network of Networks can help provide a more complete picture of the lowest parts of the atmosphere. For example, in-situ measurements of hail and wind by Understroys network of over 140 sensors in the DFW area are ingested into the CASA data stream in real-time, which can be used to combine with radar data and alert users in emergency management to dangerous wind and hail conditions in their area. Customers from across economic sectors are partnering with CASA to evaluate how high resolution radar data can help with improved decision making when bad weather occurs.

This paper presents the accomplishments and lessons learned from the five years operation of the CASA DFW dense urban radar network. Various application products in the presence of hails, tornadoes, floods, and high-winds will be detailed. The product performance is demonstrated through cross-comparison with ground weather reports and in-situ observations. This paper will also discuss our findings

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related to user needs for weather information, challenges in creating and delivering products, and user feedback on the value proposition from both scientific, engineering and economic perspectives.