

The CASA Dallas Fort Worth Remote Sensing Network ICT for Urban **Disaster Mitigation**

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OVERVIEW

The U.S. National Science Foundation Engineering Research Center (NSF-ERC) for Collaborative Adaptive Sensing of the Atmosphere (CASA) is dedicated to revolutionizing our ability to observe, understand, predict, and respond to hazardous weather events using a dense network of small, low-power, and low-cost X-band radars that can collaboratively and adaptively sense the lower atmosphere. The network is working through a scanning methodology called DCAS, distributed collaborative adaptive sensing.

After successfully operating 4 X-band dualpolarization radars in rural Oklahoma in past 5 years (2007-2011), CASA has been collaborating with the North Central Texas Council of Governments (NCTCOG), the National Weather Service (NWS) and some other establish the urban stakeholders to weather demonstration network in the Dallas-Fort Worth (DFW) metropolitan area. Totally, 8 dual-polarization X-band radars will be deployed in this urban network covering 12 out of the 16 counties in the DFW area, and providing coverage to most of the 6.5 million people in this region.

This poster will describe the research conducted by CASA, and the information & communication technologies (ICT) in the development of Dallas Fort Worth remote sensing network. In addition, sample observations from the CASA radar network will also be presented.

CASA TEST-BED

In fall 2006, the first test bed of CASA, also known as Integrative Project (IP1), was deployed in Oklahoma to demonstrate the DCAS concepts for high temporal and spatial resolution weather sensing.

shows the Fig. 1 layout of 4 IP1 radars, namely, KCYR, KLWE, KRSP, and KSAO.

- The coverage circle of IP1 radar is in radius of 40 km. Each radar node is about 30 km away from the next
- Each radar node operated with a maximum elevation angle of 30°.
- radars are located under NEXRAD coverage of KFDR and KTLX radars.



Fig. 1: CASA IP1 Testbed in Southwestern Oklahoma, USA

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The centerpiece of the Dallas Fort Worth urban remote sensing network is an 8-node, boundary-layer, dualpolarization, multi-Doppler X-band radar network. Fig. 2 is an example of the 8-radar layout.

In addition, the existing in situ and remote sensors, such as WSR-88D, TDWR, and rain gauge, will be used for data fusion and validation purposes.

GOALS and RESEARCH

The main goals to develop the Dallas Fort Worth urban remote sensing network include:

- To develop high-resolution, three-dimensional mapping of the atmospheric conditions, focusing on the boundary layer, to detect and forecast severe wind, tornado, hail, ice, and flash flood hazards
- To create impacts-based, neighborhood-scale warnings and forecasts for a range of public and private decision makers that result in measureable benefit for public safety and the economy
- To demonstrate the value of collaborative, adaptive X-band radar networks to existing and future National Weather Service sensors, products, performance metrics, and decision-making; and assess optimal combinations of observing systems
- To develop models for federal/municipal/private partnerships to introduce new observation technologies for on-going operational and interdisciplinary weather system research

The broad research aspects to be addressed are:

- Quantitative Precipitation Estimation and Forecasts
- Urban Flooding and Hydrology Sensing
- Hydrometeor Identification
- Vector Doppler Wind Retrieval and Tornado Tracking
- Network of Networks Demonstration
- Warn-on-forecast Research



Fig. 4: UTA Installation

Fig. 5: KFWS, XUTA, XUNT Radar Layout.







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