



Observations and Analysis of Tornadoes on 15 January 2017 in Dallas-Fort Worth CASA Radar Network

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1. Extended Abstract

Tornadoes are violent storms which cause loss of lives and property. Tornadoes are more common in the U.S. because of the unique climatology and the geography of the continent. The U.S. receives more than 1200 tornadoes, and over 80 deaths and 1500 injuries associated with tornadoes every year [1]. Tornado forecasting is a challenging task and analysis of the tornadic events will aid to improve the forecasting. The National Weather Service (NWS) Weather Surveillance Radar - 1988 Doppler (WSR-88DP) network, also known as Next-Generation Radar (NEXRAD) network, is commonly used for this purpose.

The U.S. National Science Foundation (NSF)'s Engineering Research Center (ERC) for Collaborative Adaptive Sensing of the Atmosphere (CASA) is dedicated to revolutionize our ability to observe, understand, predict and respond to hazardous weather events using a dense network of small, low-power radars that could sense the lower atmosphere [2]. The CASA radar network is located in Dallas-Fort Worth (DFW) area and consists of eight high resolution X-band radars. CASA radar network have good spatial and temporal resolution, utilizing these features improvisation of forecasting as well as tracking of the tornadoes can be achieved.

On 15th January 2017 around 20:15 CST, two tornadoes were observed in cities of Mansfield and Grand Prairie in the Dallas-Fort Worth region. The NWS service confirmed the tornado observations and rated them as EF0 on the enhanced Fujita scale. During this time the radars in the CASA network were operating in the PPI scanning strategy, throughout the duration of the tornado, collecting high spatial and temporal resolution parametric data. In this work, the observations of these tornadoes using the data collected by CASA radar network are discussed. The movement and progress of the tornado is shown and how this information is used to improve the tornado forecasting is discussed. The dual-or multi-Doppler analysis is done for the data to retrieve the wind fields. Comparison with the NEXRAD KFWS radar, which is located in Fort Worth, Texas is also shown.

2. References

1. H. B. Bluestein, "Severe Convective Storms and Tornadoes: Observations and Dynamics", pp. 456, 2013, Praxis/Springer.
2. McLaughlin, D., and Coauthors, "Short-wavelength technology and the potential for distributed networks of small radar systems", Amer. Meteor. Soc., 90, 2009, pp. 1797-1817.