



# Re-appropriation of DOD Radar Technology

## Objectives

To transition various DOD radar systems technology to develop an advanced, mobile scientific instrument for atmospheric research



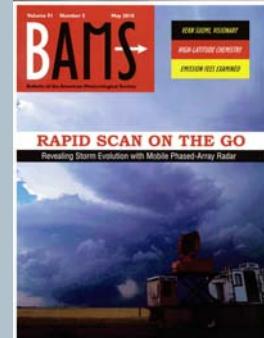
MWR-05XP Deployed on the Goshen WY Tornado during Vortex 2

## NPS Project Contributions

- **System Hardware and Maintenance:** NPS integrated system components onto the mobile platform and performs ongoing system maintenance.
- **Theoretical Analysis:** NPS derived and will experimentally verify calibration and parameter estimation algorithms for frequency agile, phased array radars.
- **System Calibration:** NPS is calibrating the radar.
- **System Operation, Test and Evaluation:** NPS operates the radar, uses the radar in on-going experiments and evaluates results to identify new research problems.

**Technical Challenges:** High-speed digital processing and real-time display of weather data; calibration of frequency agile, phased array radars; weather signal parameter estimation algorithms for frequency agile, phased array weather radars; data quality control; rapid volumetric update rate for observation of short (seconds) time scale atmospheric phenomena.

- [1] "A Mobile, Phased-Array Doppler Radar for the study of Severe Convective Storms – The MWR-05XP. *Bulletin of the American Meteorological Society BAMS* May 2010 Volume 91 Number 5. Howard B. Bluestein, Michael M. French, Ivan PopStefanija, Robert T. Bluth and Jeffrey B. Knorr.
- [2] Bluestein, et al., "Preliminary Results from the Fielding of a Disparate Triad of Mobile Doppler Radars to Study Severe Convective Storms", *33rd International Conf. on Radar Meteorology*, Cairns, Australia, August 6-10,2007. [http://ams.confex.com/ams/33Radar/techprogram/paper\\_122770.htm](http://ams.confex.com/ams/33Radar/techprogram/paper_122770.htm).
- [3] J. B. Knorr, "Weather Radar Equation Correction for Frequency Agile and Phased Array Radars", *IEEE Transactions on Aerospace and Electronic Systems*, July 2007.



## Publication in Review

"Reexamining the descending midlevel tornadic vortex signature in supercells" *Mon. Wea. Rev. (in review)* M.M. French, H.B. Bluestein, I. PopStefanija, C.A. Baldi, and R.T. Bluth, 2013

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## Full Systems



TPQ-37 in the process of being transferred from the US Army to CIRPAS  
S-Band System Full Phased Array



SPY-1 S-Band System – Antenna being removed from a ship. These systems or subsystems are available to DOD through a transfer process.



MPQ-53  
C-Band System



AWACS C-130 Version



A10 currently being modified to support the research community

## System Components

### Transmitters

### Support Subsystems

### Engineering Development and Data

### Aviation Applications