



**PHASED ARRAY RADAR R&D PLAN  
AND TESTING UPDATES**

Jeff Kimpel and Pamela Heinselman  
NEXRAD TAC Meeting  
November 1, 2006  
Norman, Oklahoma

# OFCM Activities

- Report I briefed you on at an earlier meeting has now been completed:
  - *Federal Research and Development Needs for Phased Array Radar (June, 2006)*
- New Working Group has been formed to carry forward the recommendations, approved by ICMSSR, contained in the above listed report.



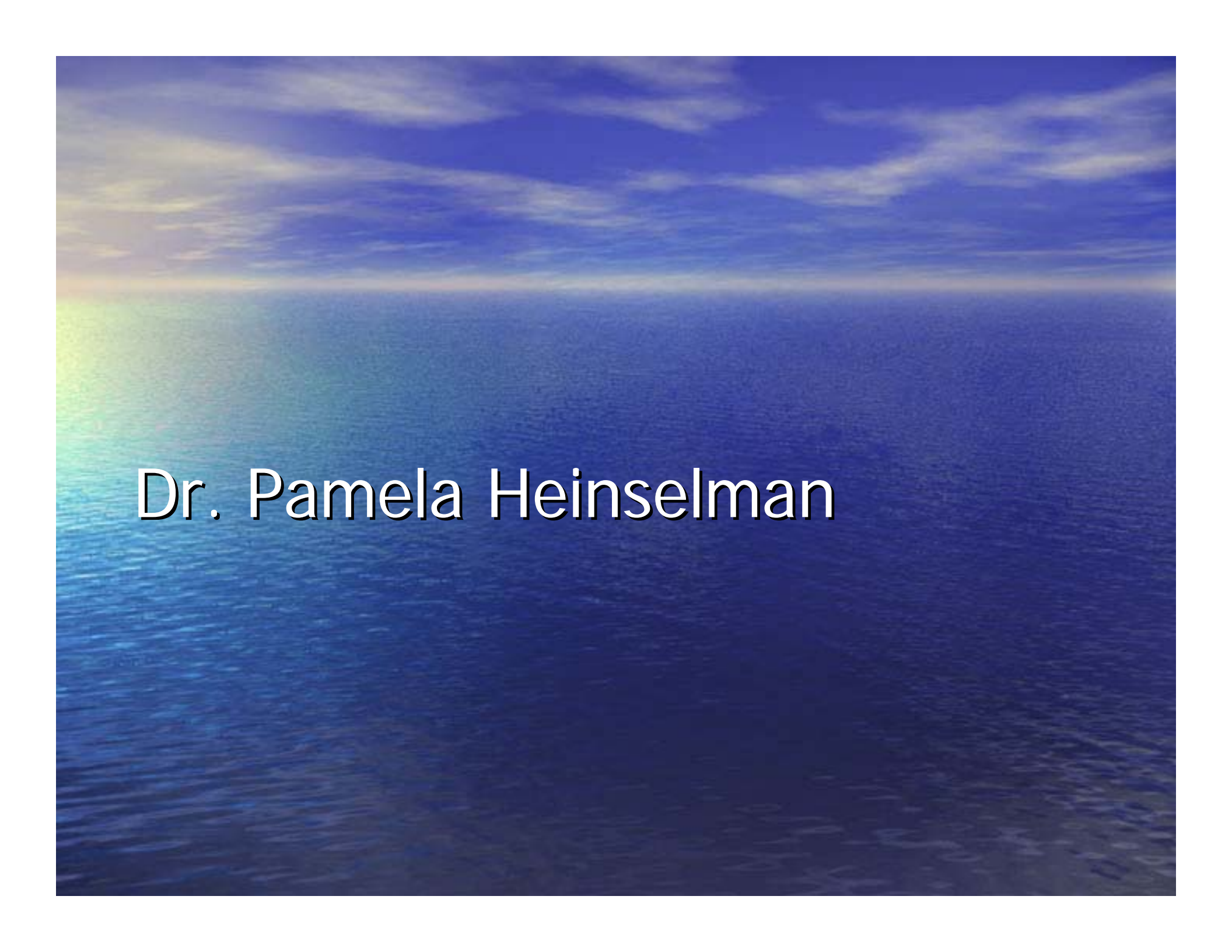
# Working Group Membership

- Dr. James F. Kimpel, NOAA/NSSL (Cochair) [james.kimpel@noaa.gov]
- Col Michael Babcock, USAF (Cochair) [michael.babcock@noaa.gov]
- Mr. James H. Williams, FAA (Cochair) [james.h.williams@faa.gov]
  
- Mr. James B. Harrison, OFCM (Acting Executive Secretary) [james.harrison@noaa.gov]
- Mr. Paul Pisano, FHWA (Member) [paul.pisano@fhwa.dot.gov]
- Mr. Eric Luebehusen, USDA (Member) [eluebehusen@oce.usda.gov]
- Lt Col Ricky Love, USAF, NORAD (Member) [ricky.love@northcom.mil]
- LTC Lou Burton, USA, NORAD (Member) [lou.burton@northcom.mil]
- Dr. Daniel Melendez, NOAA/NWS (Member) [daniel.melendez@noaa.gov]
- Dr. Tim Crum, NOAA/NWS (Member) [tim.d.crum@noaa.gov]
- Michael Pollock, USN/ONR (Member) – *not available until October-need title and email*
- Mr. Rick Petty, DOE (Member) [rick.petty@science.doe.gov] – *placeholder-may change*
- Dr. Ramesh Kakar, NASA (Member TBD) [ramesh.k.kakar@nasa.gov]
- Dr. Jarvis Moyers, NSF (Member TBD) [jmoyers@nsf.gov]
- Mr. John Gambel, FEMA (Member TBD) [john.gambel@dhs.gov]
- Mr. John Vimont, DOI (Member TBD) [john\_vimont@nps.gov]
  
- An additional FAA member will be appointed and several Subject Matter Experts are expected to join the group



# Draft Charge to the Working Group

- a. A detailed analysis of the life expectancy of existing legacy radars (i.e., WSR-88D; TDWR; ARSR-1, 2, 3, and 4; ASR-9) and the critical programmatic replacement decision timeframes for each type of legacy radar. This analysis should be compared to the timelines of the MPAR risk-reduction R&D program schedule with the goal of optimizing the MPAR risk-reduction strategies with the critical programmatic replacement decision timeframes.
- b. Performance of a cost-benefit analysis to establish MPAR's cost effectiveness against alternative domestic radar options, considering both acquisition and total life-cycle costs.
- c. Further defining mission requirements, the initial operational system requirements, specifications and functional configuration, estimation of costs, preparation of documentation to support agency programmatic and budgetary processes, acquisition strategy, and timelines to program funds for both the risk-reduction and follow-on acquisition.
- d. Agency representatives working within their respective agencies to obtain resources to achieve the priorities of the risk-reduction program and working to achieve an affordable MPAR system.
- e. Development of metrics to objectively assess the annual progress of the MPAR risk-reduction R&D program. Validate and quantify operational impacts and benefits.
- f. Publication of an annual statement of next-year research priorities and objectives and previous-year accomplishments. Conduct a periodic review of research results.
- g. Coordination of education and outreach efforts to build understanding of MPAR within the scientific community and the general public. This may include, for example, newsletters, status reports, media advisories, professional papers, workshops, and symposiums.
- h. Exploration of organizational infrastructures to support and manage the MPAR risk-reduction R&D program and follow-on efforts, including establishing a program council and a joint multiagency center for risk-reduction and follow-on acquisition.

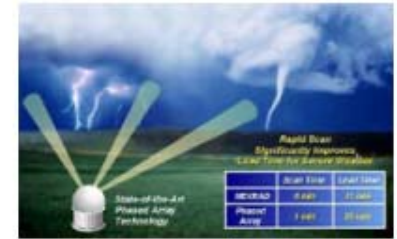


Dr. Pamela Heinselman





# Examples of 2006 rapid-scan PAR data



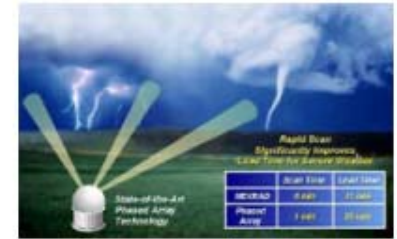
- ▶ 24 April 2006: Supercell
- ▶ 30 April 2006: Multicell with mergers
- ▶ 15 August 2006: Hail storm

Other contributors:  
David Priegnitz, Kevin Manross, Rick Adams





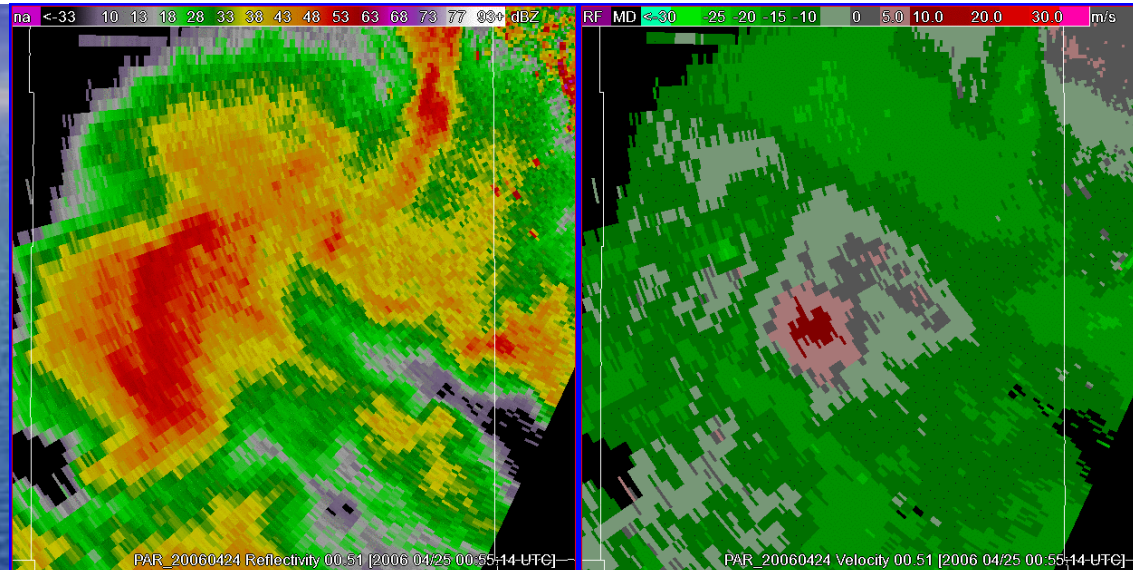
# Earlier detection of velocity signatures



24 April 2006

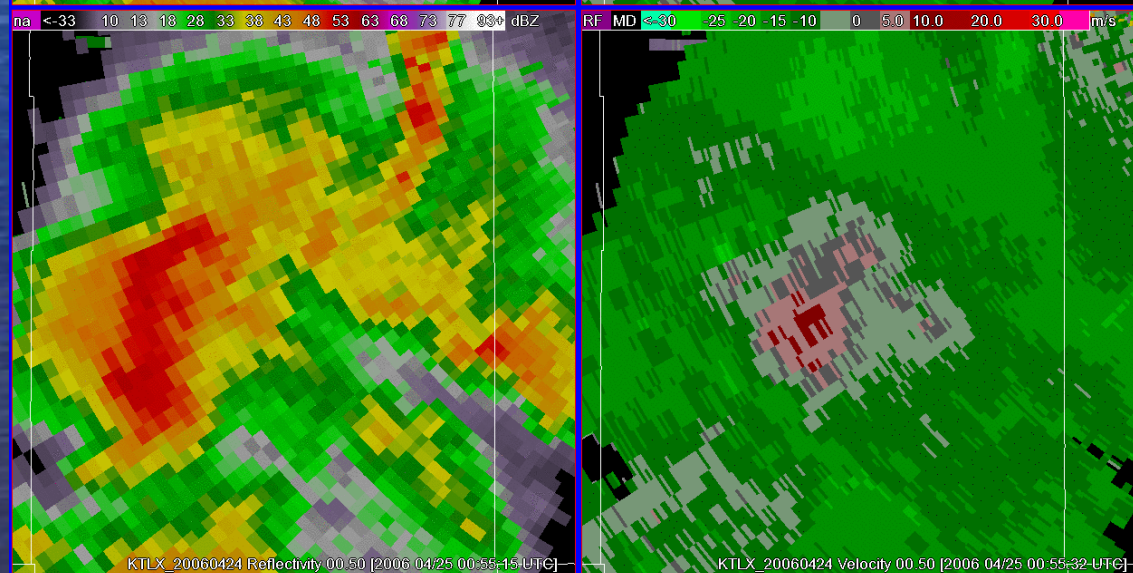
PAR Reflectivity & Velocity 0.5° PPI

Images ~ 58 s



KTLX Reflectivity & Velocity 0.5° PPI

Images ~ 4 min





# Earlier detection of cell mergers & other processes



30 May 2006

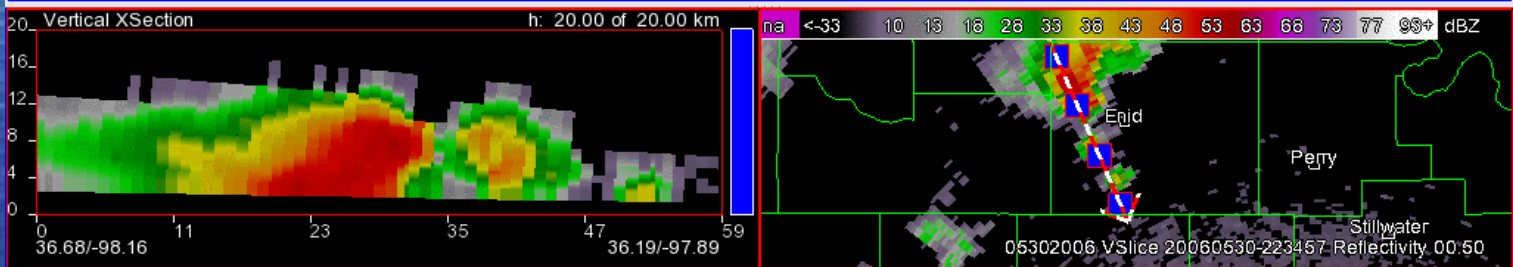
PAR Reflectivity cross-section & 0.5° PPI

Images ~ 36 s



WSR-88D Reflectivity cross-section & 0.5° PPI

Images ~ 4 min

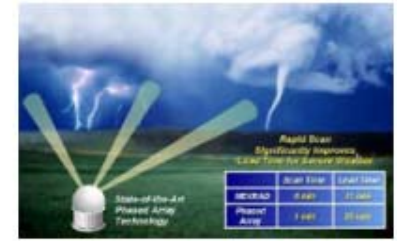


Note: Images pause when sampling time is similar.





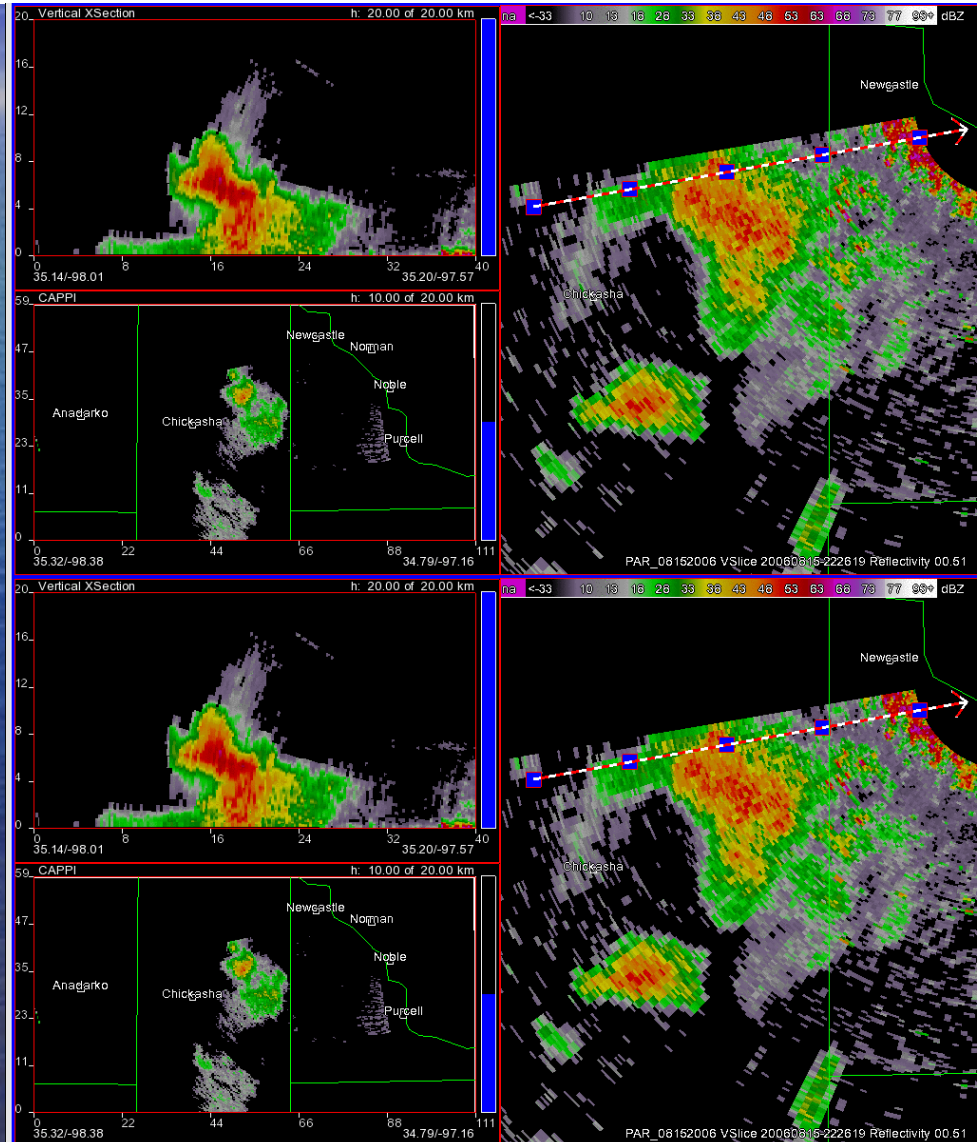
# Earlier detection of large hail aloft



15 August 2006

PAR Reflectivity cross-section, cappi (10 km), and 0.5° PPI Images ~ 26 s

Simulated WSR-88D Reflectivity cross-section, cappi (10 km), and 0.5° PPI Images ~ 5 min



# Current Work

- ▶ Continue to learn and test operational capabilities (i.e. scan strategies, various processing modes, etc.)
- ▶ Collect data for comparisons with WSR-88D and TDWR during storm season
- ▶ Integrate with WDSS-II algorithms and 3-D displays
  
- ▶ Use for various Research Projects
  - Transverse winds (NSSL/OU)
  - Refractive Index (OU)
  - Spectral Signatures of Tornadoes (OU/NSSL)
  - Clutter Canceling (NSSL/OU)
  - Scan Strategies – Beam Multiplexing, Staggered PRT, Oversampling and Whitening (NSSL/OU)



# Current Work

- ▶ Add Remote Operations (completed, fine tuning)
- ▶ Replace EP (completed, along with I/Q recording)
- ▶ Test Multi-use (FAA/BCI – aircraft tracking)
- ▶ Start design of dual-polarized sub-array