Center for Interdisciplinary Remotely-Piloted Aircraft Studies (CIRPA

2009

MWR-05XP Mobile Phased Array Weather Radar

Knorr, Jeffery B.

CIRPAS

Deployments

1. 2007 April-June, Severe Storm Tornado Season Oklahoma (NPS/CIRPAS, ProSensing, University of Oklahoma)
2. 2007 June-July Department of Energy Arm Project Experiment CLASIC Northern Oklahoma (NPS/CIRPAS and ProSensing)
3. 2008 April-June, Severe Storm Tornado Season Oklahoma (NPS/CIRPAS, ProSensing, University of Oklahoma)
4. 2009 March, U.S. Army & Missile Defense Command "Integrated Measurements Program (IMP) PAC-3 Flight Test FT 7-2" White Sands Missile Range (WSMR) NM. (NPS/CIRPAS, ProSensing).
5. 2009 April-June VORTEX2 Severe Storm Tornado Season Oklahoma (NPS/CIRPAS, ProSensing, University of Oklahoma)

Publications

1. "Advanced Weather Surveillance Algorithms and Techniques using a Rapid Scanning X-Band Radar - First Results" 2005 (I. PopStefanija, J.B. Knorr P. Buczynski, R. Bluth)
2. "Analysis of Performance Characteristics of the Naval Postgraduate School MWR-05XP-Mobile Weather Radar" Technical Report NPS-EC-05-005 (J.B. Knorr)
3. "Weather Radar Equation Correction for Frequency Agile and Phased Array Radars " IEEE Transaction on Aerospace and Electronic Systems, July 2007 (J.B. Knorr)
4. "Experimental Verification of the Weather Radar Equation for Frequency Agile, Phased Array Radar". Proceedings 54th Tri-Service Radar Symposium 2008(J.B. Knorr, I PopStefanija)
5. "Use of a mobile, phased-array, X-Band Doppler radar to study severe convective storms and tornadoes" Proceedings The Fifth European Conference on Radar in Meteorology and Hydrology 2008 (H.Bluestein, R.Tanamachi, J.Houser I.Popstefanija, B.Seeger, R.Bluth, J.B.Knorr)

CIRPAS

Center for Interdisciplinary Remotely-Piloted Aircraft Studies

Robert Bluth—Director CIRPAS
3200 Imjin Road
Marina California 93933
(831)384-2776 x10
rtbluth@nps.edu

NPS Electrical & Computer Engineering

Monterey, California

Dr. Jeffery B. Knorr - ECE Dept. Chairman
ECE Department—Room 437
833 Dyer Road
Monterey, California 93943
(831)656-2081
jknorr@nps.edu

Paul D. Buczynski - Director Radar/EW Labs
ECE Department—Room 437
833 Dyer Road
Monterey, California 93943
(831)656-2345
pbuczynski@nps.edu

PROSENSING

Dr. Ivan PopStefanija - VP ProSensing
ProSensing Inc.
107 Sunderland Road
Amherst, Massachusetts 01002
(413)549-4402 x15
popstefanija@prosensing.com

NPS PRAESTANTIA PER SCIENTIAM 1909

NAVAL POSTGRADUATE SCHOOL

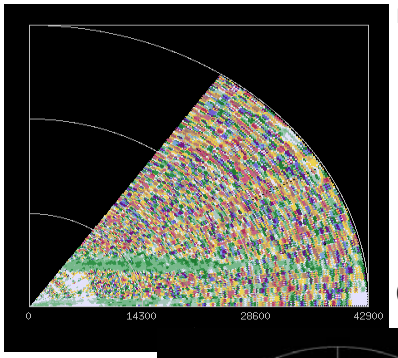
MWR-05XP Mobile Phased Array Weather Radar

mobileweatherradar@nps.edu

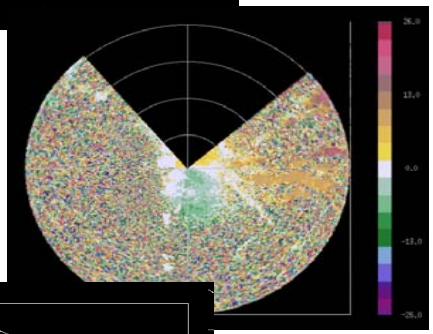
MWR-05XP Mobile Weather Radar

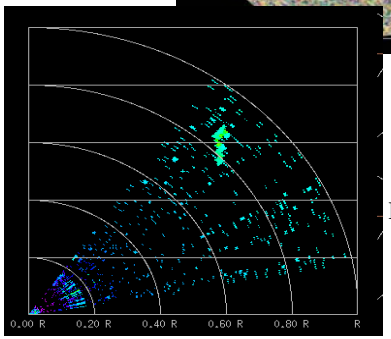
Project Objective

The NPS/CIRPAS Weather Radar Project objective is to develop the technology for adding a parallel weather processor capability to tactical military radars and to develop an advanced scientific instrument for investigation of atmospheric phenomena and other various types of research.



Cloud Detection
(Velocity Display)





DOD Missile

Intercept Experiment

The Naval Postgraduate School and the Navy's Center for Interdisciplinary Remotely Piloted Aircraft Studies (CIRPAS) in collaboration with ProSensing Inc. has modified an X-Band tactical radar system to add a weather observation mode. The new system was named MWR-05XP (**M**obile **W**eather **R**adar, 20**05** **X**-Band, **P**hased Array) and is the first mobile, electronically scanned phased array radar developed for weather sensing applications. Key system parameters of the MWR-05XP rapid scanning radar system are summarized. As part of the modification, ProSensing developed a state-of-the-art PC based weather processor (WRP), which provides radar control, data acquisition, signal processing, real-time data display. Processing algorithms provide estimates of reflectivity, average radial velocity and velocity spread for distributed targets.

Characteristics of the MWR-05XP

Mechanical scan rate	*Up to 30 rpm*
	and sector scanning
Transmitted frequency	*9.37 Ghz*
Maximum power	*~ 16 kW*
Beamwidth	*1.8^0 (azimuth)*
	2^0 (elevation)
Maximum unambiguous velocity	*± 75 m s^{-1}*
Maximum PRF	*10 kHZ max*
Range resolution	*150 m*

Mobile or Ground Power Configuration

Field Mill Weather Instrumentation

Mobile Internet / GPS

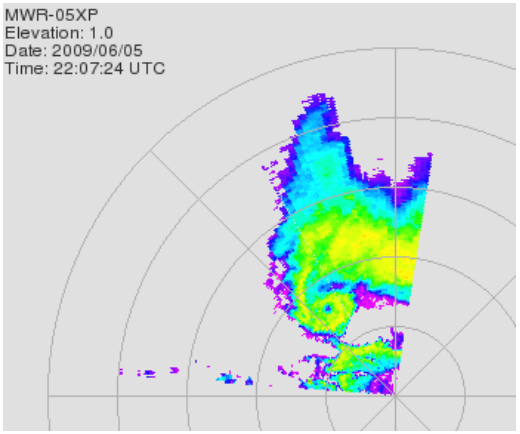
Video Camera System

VHF Communications

LIDAR System—Installation June 09

Operational Payoff

The payoff to the military will be the integration of current weather data into the tactical radar picture. The payoff to the science community will be the availability of an advanced instrument for investigation of atmospheric phenomena.



VORTEX2—2009