


NSSL Briefings

Fall 2008

<http://www.nssl.noaa.gov>

 **Number 28** 

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VORTEX-2 on track for 2009-2010

NSSL is gearing up for the largest ever field program to study tornadoes: VORTEX-2 (Verification of the Origins of Rotation in Tornadoes Experiment-2, or V2). V2 is set to run from May 10 - June 15 of 2009 and 2010, and is a follow-on to the VORTEX project of the mid 1990's designed to study how tornadoes form and dissipate.

V2 will target potentially tornadic storms in the central plains and canvass the area with an armada of instruments including radars, mobile vehicles equipped with instruments, instrumented weather balloons, and unmanned aerial vehicles.

The project will focus on gaining new insight about how, when, and why tornadoes form, why some thunderstorms produce tornadoes and others do not, the structure of tornadoes, and the relationship of tornadic winds to damage. Answers to these questions will help improve forecasts and warnings of tornadoes.

NSSL organized field testing of V2 communications and data sharing technologies during Spring 2008 in V2RAMP, the V2-Risk Analysis and Mitigation Program. During V2RAMP operations, real-time Shared Mobile Atmospheric Research and

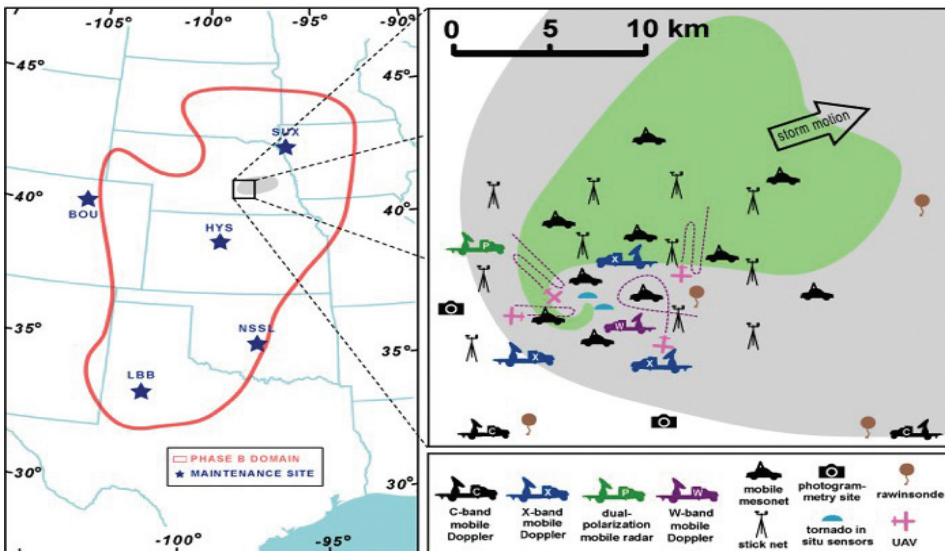
Teaching Radar (SMART-R) volumetric data were observed in real-time in the Hazardous Weather Testbed (HWT) in Norman, OK, and the mobile mesonet vehicles collected data on a storm in southern Kansas. Field testing was an important step to assure quality data will be collected during the field phase of V2 next spring.

"V2 has an even greater opportunity to help increase warning lead times, as we will have ten times as many instruments observing the storm than the original VORTEX program, which should enable us to greatly further our understanding of tornadic storms," says NSSL researcher Lou Wicker.

Norman National Weather Service (NWS) Meteorologist-In-Charge Mike Foster confirms "VORTEX has positively impacted forecast operations."

For more than 30 years, researchers at NSSL and their colleagues have been working to unravel the mysteries of tornado formation. V2 will provide valuable data to help complete the picture started with the original VORTEX project in 1994 and 1995.

V2 is receiving significant funding from the National Science Foundation and NOAA. ♦



(Left) V2 target areas for 2008-2009.
(Below) V2 technologies were tested in the field during V2RAMP this past spring. Photo below taken by NSSL student Terra Thompson.



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NSSL scientists shadow NOAA Storm Prediction Center forecasters

NSSL scientists shadowed NOAA Storm Prediction Center (SPC) operational forecasters this spring to immerse themselves in the front-line operational and scientific challenges associated with forecasting hazardous convective weather.

The program enabled NSSL scientists to observe and interact with SPC forecasters at various forecast desks during a variety of operational forecasting scenarios. These scenarios ranged from quieter convective days when there was more opportunity for in-depth discussion, to more active severe

weather days when direct interaction might be minimized but valuable insights could still be gained through observation of the operational decision-making processes.

Shadow shift participants examined SPC forecasting responsibilities, division of duties among various forecast desks and the SPC's team-oriented forecasting strategy. They also studied forecaster preparation of specific SPC products, focusing on forecaster use of scientific knowledge, multiple datasets, and technological tools contributing to the generation and issuance of SPC forecasts.

The shadow shift program is just one reflection of a culture of collaboration that has existed for many years in the Norman meteorological community. This productive relationship between research and operations has been a key ingredient in improving severe weather forecasts and warnings. NSSL researchers will use knowledge gained from the shadow shift initiative to optimize the operational relevance of future research efforts. ♦

NOAA Hazardous Weather Testbed 2008 Spring Experiment

Each spring during the most climatologically active severe weather periods, multi-agency experiments occur at the National Weather Center in Norman, Oklahoma. This past spring, scientists from NSSL and the Cooperative Institute of Mesoscale Meteorological Studies (CIMMS) organized and conducted the eighth annual NOAA Hazardous Weather Testbed (HWT) Spring Experiment from mid April through early June. As in the past, this year's experiment attracted participants from a broad cross section of the meteorological community, including numerous government research centers, forecasting offices, universities, and private companies. Participants travelled from near and far to attend the experiment, with several international visitors (see image lower left). The HWT has

two separate components, the Experimental Warning Program (EWP) and the Experiment Forecast Program (EFP), each of which conducted independent activities during the Spring Experiment.

Experimental Warning Program

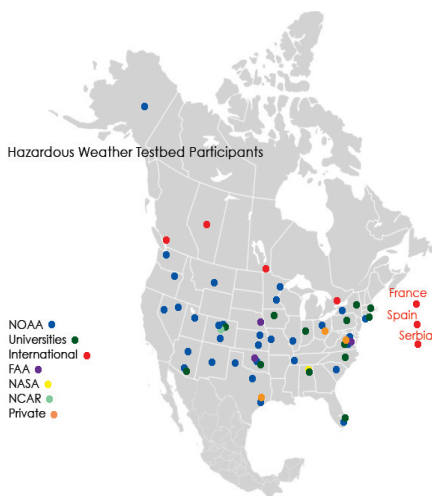
During the 2008 EWP activities, three primary projects were geared toward NWS forecast office severe weather warning operations: 1) evaluation of the phased array radar (PAR) in Norman, 2) evaluation of networked 3-cm radars (CASA) in Central Oklahoma, and 3) evaluation of experimental high temporal and spatial resolution gridded probabilistic hazard information that could form the basis for future severe weather warning products.

Experimental Forecast Program

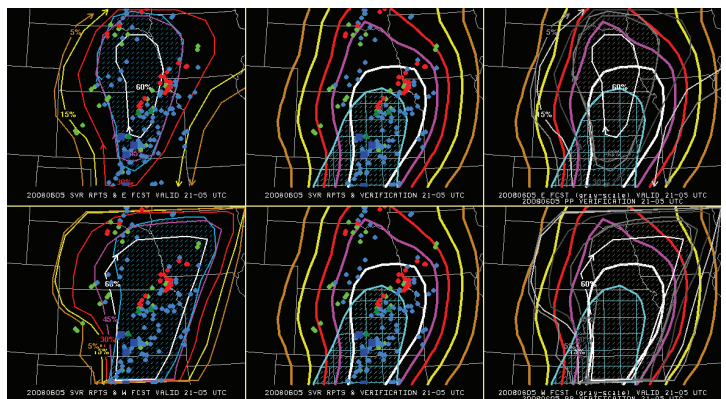
EFP activities focused on the use of numerical models to improve predictions of hazardous

convective weather phenomena, exploring innovative applications of convection-allowing configurations of the Weather research and Forecasting (WRF) model. For example, the utility of the emerging WRF-3DVAR data assimilation system was assessed, as well as a 10 member convection-allowing WRF ensemble. Researchers anticipate the results will provide valuable guidance for developers and users of the WRF model in addition to practitioners in the operational forecasting community.

NOAA's Hazardous Weather Testbed is a joint facility managed by NSSL, the Storm Prediction Center, and the NWS Oklahoma City/Norman Weather Forecast Office. ♦



Right: Sample forecasts produced by the Hazardous Weather Testbed teams.



NSSL's SMART-R aids California forecasters during record storm

The Oxnard, CA NWS used Shared Mobile Atmospheric and Teaching Radar (SMART-R) data in their decision to issue a flash flood warning during the significant storm of January 5-7, 2008 in southern California. NSSL's SMART-R crew provided low-level reflectivity images every five minutes and transmitted the data to the National Weather Service Forecast Office (NWSFO) via a new satellite internet system. The data was used to supplement local NWS radar coverage where the beam is blocked by mountainous terrain.

Last winter's storms brought record rainfall and caused an estimated 3,000 Southern California residents to evacuate their homes in four canyons previously scarred by wildfires and prone to mudslides. Gages near the Canyon burn area in Malibu received between 2.16 and 6.6 inches of rain with the storm. The NWS used SMART-R data in their decisions to issue or not issue flash flood warnings. Minor mudslides were reported in Malibu canyon but well away from any dwellings.

The SMART-R is part of a fleet of high-tech equipment used in the USGS/NOAA Demonstration Flash Flood and Debris Flow Early Warning System project to determine how more detailed measurements aid forecasters in issuing flash flood and debris flow warnings.

The Canyon Fire burn area near Malibu, CA was the site chosen for intensive research this year, and the surrounding hills were canvassed with streamgauge sensors, real-time webcams and the NSSL-operated SMART-R1 from December 7, 2007 through February 25, 2008.

NSSL's Dave Jorgensen has deployed the SMART-R for the last three winter seasons near a burn area to provide real-time close-up radar data during rain events. The radar delivers reflectivity and estimated one-hour rainfall at the ridgetops of the "research" fire area. The WSR-88D radars in this area are located at mountain sites and precipitation occurring below 10,000 feet remains undetected.

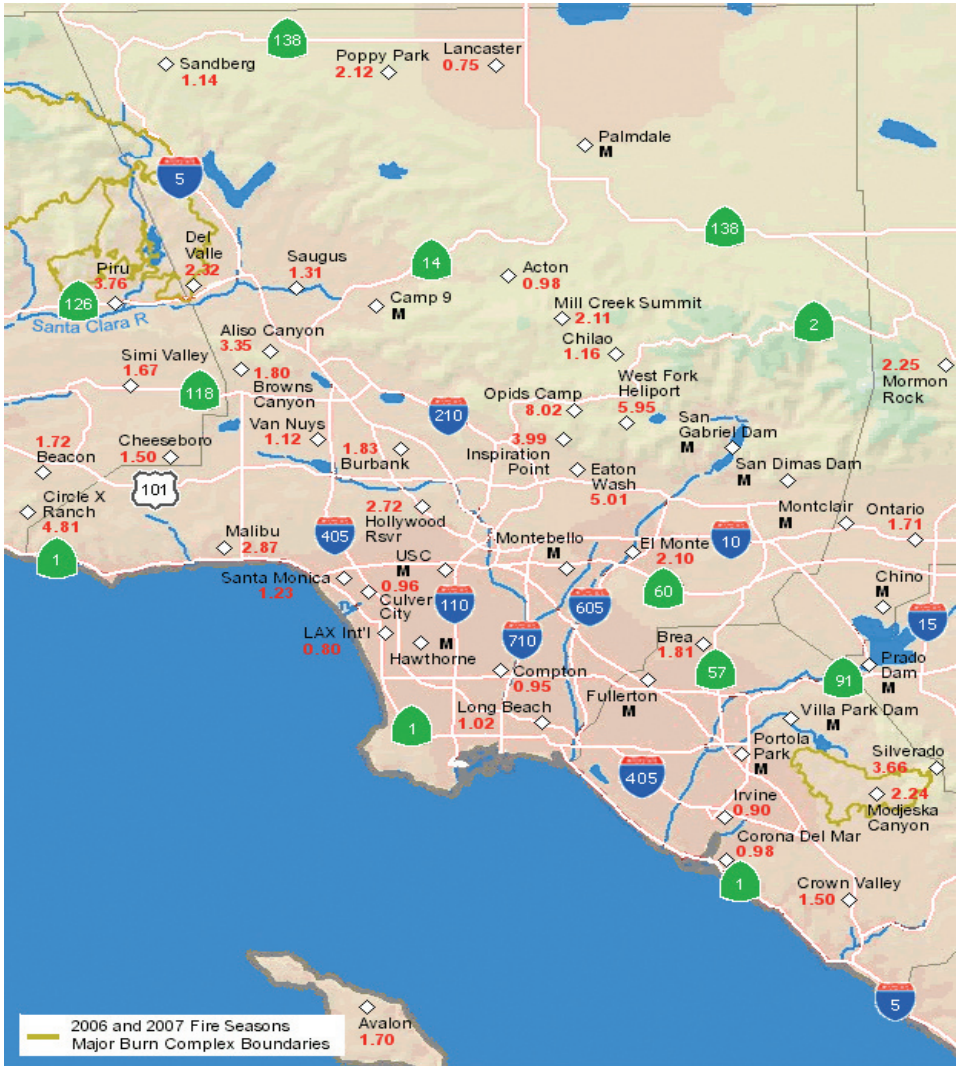
Results from the Flash Flood and Debris Flow Project will help public and emergency responders determine flash flood and debris

flow hazards in the post-wildfire environment and better serve society's need for weather and water information, to protect lives and property. ♦



Left: The NSSL-operated SMART-R on location in California.

Below: Map of observed rainfall during the record storm.



24 Hour Synoptic Precipitation (Inches) Ending Sat Jan 05 2008 at 12 UTC
NOAA / NWS / California Nevada River Forecast Center



2008 Spring Real-Time Phased Array Radar Demonstration

The six week 2008 Spring Real-Time Phased Array Radar Demonstration in Norman, OK gave visiting NWS forecasters from across the nation an opportunity to evaluate phased array radar (PAR) data in real-time to investigate the potential operational benefits of PAR technology.

Forecasters evaluated the PAR data for threats of large hail, high winds, and tornadoes, and provided feedback on the operational utility of these high-temporal resolution data (1-minute volumetric scans; 24-second 0.5 degree updates).

Evaluating the potential operational utility of PAR is crucial to determining its suitability as a replacement technology for the WSR-88D. NSSL's Pam Heinselman leads this effort. ♦

PAR tutorial

PAR - acronym for phased array radar and refers to phased array radar technology: <http://www.nssl.noaa.gov/research/radar/phasedarray.php>

NWRT - acronym for the National Weather Radar Testbed phased array radar located in Norman, OK. The NWRT is the proof-of-concept phased array radar: <http://www.nssl.noaa.gov/research/radar/nwrt.php>

MPAR is a possible future multi-mission phased array radar specifically tailored for monitoring weather, serving aviation needs and tracking non-cooperative aircraft. This radar does not yet exist. <http://www.nssl.noaa.gov/divisions/radar/par/mpar.php>

NSSL adds mobile X-band dual-polarized radar to armada

NSSL and the University of Oklahoma have built a mobile X-band dual-polarimetric radar, dubbed the NO-XP. The NO-XP is now operational and most recently collected data on Hurricane Ike as it made landfall.

Mobile radars provide an observing advantage because they can be placed in position as a storm is developing rather than waiting for storms to occur within the range of stationary radar systems. The dual-polarization capability on the NO-XP will provide



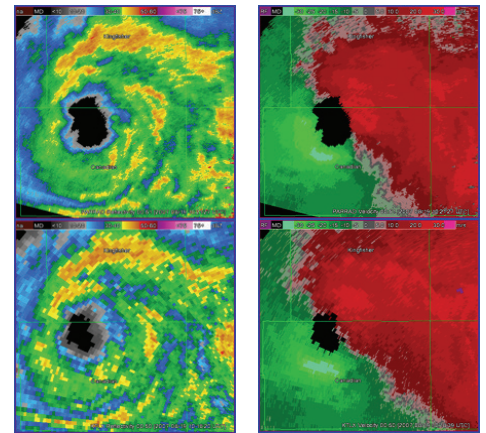
additional details on the microphysics of storms leading to improved forecasts of precipitation amounts and numerical weather prediction of convective storm events. Researchers will also compare NO-XP polarimetric data with data from WSR-88D radars in the area. ♦

The National Weather Radar Testbed PAR captures a tropical storm

NSSL scientists Doug Forsyth and Pam Heinselman recently reported on the unusual opportunity to scan a tropical cyclone with an experimental radar located far from the coast. Using the National Weather Radar Testbed Phased Array Radar (NWRT PAR) in Norman, OK, scientists captured images of Tropical Storm Erin last fall as the unusual weather event re-intensified over the state near the NWRT and produced 8 inches of rain.

The NWRT completed full volume scans of T.S. Erin at rates between 30-43 seconds, compared to the WSR-88D radar's 4.1 minutes.

Scientists reported a potential benefit of PAR in scanning land-falling tropical cyclones is the ability to focus data collection



T.S. Erin rain bands and "eye" as captured by PAR.

on weather features with greatest capability to be hazardous. Scanning time can be used judiciously rather than using scanning time to collect data where no echo exists. This creates higher user confidence in location, intensity and movement of circulations. Another benefit is the potential for increased lead-time for tornado warnings.

Earlier detection of hazardous severe weather using PAR has strong potential to aid forecasters in providing more accurate and timely warnings of high-impact weather events that disrupt economic productivity and cause loss of life and property. ♦

SMART-Radar team wins NSF Award

The University of Oklahoma and NSSL SMART-Radar team received the National Science Foundation Major Research Instrumentation Award to upgrade one of the mobile C-band Doppler radars to dual-polarimetric capability. During Fall-Winter 2008, SR-2 will be rebuilt with the ability to perform simultaneous transmit/receive dual-polarization measurements. Radars with dual polarization capabilities (radio waves that are sent out both horizontally and vertically) can more accurately determine precipitation types and amounts (<http://www.nssl.noaa.gov/research/radar/dualpol.php>).

The radar is expected to be fully functional again in time for the VORTEX-2 project beginning in May 2009. ♦



Spotlight: Doug Forsyth

Changes in latitudes...Jimmy Buffett goes south, but Doug Forsyth goes north. Lake Cochrane in South Dakota is a long way from Margaritaville, or a "Salty Piece of Land," but it's all the same attitude to Doug. For a couple of weeks each summer, his lake cabin is little bit of boating, a little bit of golf, some trapshooting, playing his guitar, stargazing, and the annual puzzle that gets hung on the wall. A little bit of everything but not too much of anything.

It's a little bit like Doug's work history: tree trimmer, meat cutter, bartender, grain bin builder, Air Force...and when the Air Force needed meteorologists - they sent him to Penn State to earn a degree in meteorology. He always went where he was needed - to work on data models and flight simulators at Air Force Global Weather Central in Nebraska, then to work on the first Solar Optical Observation network at the Palehua Solar Observatory in Hawaii, next to the Pentagon and then to a 10cm radar at the Air Force Geophysics Lab in Sudbury, Massachusetts. His experiences made him an expert in radar, algorithm development, and automation.

It was also during this time Doug was sent to Oklahoma. He first came as an Air Force representative as part of the Joint Doppler Operational Project (JDOP) to prove to the National Weather Service and the public that Doppler radar really had an advantage. Working on JDOP also gave Doug the opportunity to earn his Master's degree at the University of Oklahoma. He came back to Oklahoma again, courtesy of the Air Force, as part of the NEXRAD Interim Operational Test Facility (the beginning of the Radar Operations Center) in 1982. It was then

he decided he really loved radar work and chose to stay in Oklahoma. Doug officially came on board at NSSL in 1985 as a special projects manager. Since then he's filled many roles including division director, manager, deputy director and acting director of NSSL. His current role is Chief of Radar Research and Development, and he and his team are now exploring phased array technology and its rapid-scan capabilities. "We're seeing things we've never seen before," Doug said. "It's a better radar. NSSL is state of the art - pushing the envelope of new horizons of knowledge - it is fun to be a part of something that benefits the nation." Doug thinks he has the best job in the world, and NSSL is the ideal place to work: "You have the freedom to do what you think needs to be done."



Doug has always had a passion to make things better and seized an opportunity to make a unique working environment for the weather community in Norman. He worked tirelessly as the program manager on behalf of NOAA during the planning, design, and construction of the National Weather Center (NWC). He now has a tremendous sense of satisfaction sitting in his new office on the fourth floor of the NWC, surrounded by a dozen prestigious weather organizations. "It's serene, amazing, wonderful." He had

Notables:

Born: South Dakota

Specialty: Radar, algorithms, and big projects

Current position: Chief of Radar Research and Development

Hobbies: Sudoku, Automatic Position Reporting Systems, amateur radio, guitar, and music.



the honor of "topping out" the building with co-worker Bob Staples by planting the American flag on top of the NWC. "It was a once in a lifetime experience."

"My dad, the greatest man I know." A strong endorsement from Doug's daughter, Rachel, a former intern at NSSL and a student at the University of Oklahoma along with her twin brother, Ross. "I hear all the time when I'm introduced around the Weather Center about what a great guy my father is." Doug and his wife, Ann, still have Holly (a 9th grader) at home. "My dad is the greatest listener, supporter, and the greatest role model when it comes to living each day with a passion for life. He only lifts me up and is the calmer of all storms (no pun intended! ha!)." Doug is active in his church and community working towards helping the chronically homeless. He also enjoys hi-tech adventure movies and talking to other folks around the U.S. on amateur radio. What continues to tug though, is that lake in South Dakota. For him, it's "where the song of the ocean meets the salty piece of land." ♦



NSSL brings home part of the Nobel Prize



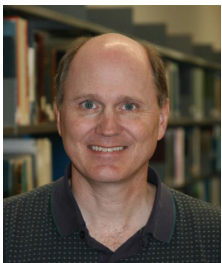
Harold Brooks

The Norwegian Nobel Committee divided the 2007 Nobel Peace Prize equally between the Intergovernmental Panel on Climate Change (the global body responsible for scientific assessment of climate change), and Albert Arnold (Al) Gore.

Harold Brooks and Dave Stensrud, both NSSL scientists, serve on the Scientific Basis Working Group of the International Panel on Climate Change (IPCC). There are currently three working groups, focusing on the science, impact and mitigation of climate change, and developing greenhouse gas inventories.

The IPCC was established by the United Nations Environmental Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide policy makers with neutral summaries of the latest information related to human-induced (or anthropogenic) climate change. Brooks was a contributing author to the Observed Climate Variability and Change section, and Stensrud was a contributing author to the Model Evaluation chapter of "Climate Change 2001: The Scientific Basis" published by the Intergovernmental Panel on Climate Change.

The Norwegian Nobel Committee honored both the IPCC and Gore to highlight the link they see between the risk of accelerating climate change and the risk of violent conflict and wars. ♦



Dave Stensrud

NSSL's Kurt Hondl and team receive NOAA Tech Transfer Award

Kurt Hondl will receive the NOAA Technology Transfer Award "for team leadership during the development of the Warning Decision Support System - Integrated Information and for fostering its adopted use in the private sector." Hondl is the team leader for the group of software engineers and computer scientists that research and develop applications and displays that improve the warning decision-making process. Team members that are



CIMMS employees and deserve recognition are: Valliappa Lakshmanan, Travis Smith, Greg Stumpf, Jeff Brogden, Charles Kerr, Robert Toomey, Kevin Manross, Kiel Ortega and Karen Cooper (SAIC). ♦

Harold Brooks honored with NOAA Administrator Award

Harold Brooks will be honored with the NOAA Administrators Award "for outstanding leadership in and dedication to developing U.S. CCSP (Climate Change Science Program) Synthesis & Assessment Products integrating climate research for decision support." Brooks is the leader of the group of meteorologists focused on severe weather climatology, weather processes, forecast applications, and impacts and evaluation. ♦

More awards and honors

Carl Hane, retired NSSL scientist, was honored by NOAA with a Distinguished Career Award for scientific achievement in the application of Doppler weather radar to the understanding of the dynamics of convective storms. The Distinguished Career Award is designed to recognize long-term achievement in advancing the goals and mission of NOAA.

Rodger Brown, NSSL scientist, received the "T. Theodore Fujita Research Achievement Award" from the National Weather Association. The award recognizes more than 30 years of applied research and development activities that have led to improved WSR-88D detection of tornadoes and other hazardous weather events and that have resulted in forecasters issuing warnings that have increased lead times. Rodger received his M.S. degree from the University of Chicago under Dr. Fujita, and was the first of his graduate students to receive a degree.

Kevin Manross, CIMMS/University of Oklahoma and NOAA/NSSL scientist, received the "Best Poster" award at the 2008 American Meteorological Society meeting in New Orleans, LA. His poster was titled, "An on-demand user interface for requesting multi-radar, multi-sensor time accumulated products to support severe weather verification."

Bob Staples, CIMMS, was selected NOAA Team Member of the Month for February 2008. Bob was honored for his expertise in project management as he oversaw construction of the National Weather Radar Testbed. He has proven invaluable to NSSL over the past few years.

Scholastic News spotlights NSSL meteorologist



March 2008 Scholastic News featured NSSL meteorologist and Educational Outreach Coordinator Daphne Thompson in an article called "Storm Chaser!" Scholastic News is a kid-focused, curriculum-connected current events newsweekly for elementary students and their teachers. Studies show classroom magazines motivate students to read and learn.

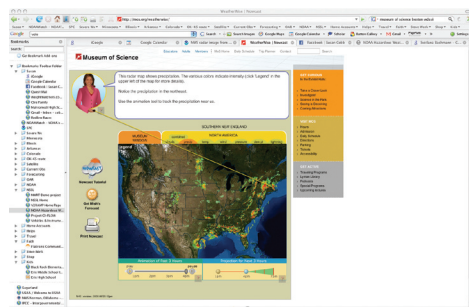
Second graders (ages 7-8) were treated to an interview with Daphne about what it is like to be a storm chaser. Children were encouraged to study a map of the U.S. and use their geography skills to identify states in "Tornado Alley." ♦

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Boston's Museum of Science uses WDSS-II exhibit

A new exhibit at the Museum of Science in Boston called "WeatherWise" makes use of NSSL's Warning Decision Support System (WDSS-II), coordinated by NSSL's Valliappa Lakshmanan. WeatherWise, funded by a grant from the National Science Foundation, focuses on short-term forecasting-or nowcasting-and is expected to reach over 1.5 million visitors per year.

The WDSS-II, a suite of severe weather analysis and detection algorithms developed



Weatherwise display featuring NSSL's WDSS at the Boston Museum of Science

by NSSL has been set up to identify the strongest storm cell in the vicinity of the museum. An animated image of a local TV meteorologist automatically points to the display. A public version of the nowcasting tool is available at <http://www.mos.org/weatherwise> to "extend the power of the exhibit by providing the public with live weather data and background information to make their own nowcasts." The exhibit is built around the static electricity generator that was used by Robert Van de Graaff as a particle accelerator in his famous experiments of the 1930's. ♦

National Weather Festival 11/8/08

NSSL is preparing for the fourth annual National Weather Festival to be held at the National Weather Center in Norman, Oklahoma on Saturday, November 8, 2008.

The festival aims to reach out to the community by providing an opportunity to learn about operational weather activities, current research activities and promote interest in weather to people of all ages. ♦

AMS WeatherFest impacts future meteorologists



Thousands of people crowded the New Orleans Convention Center for the American Meteorological Society's "WeatherFest" - a giant science fair focused on weather.

Susan Cobb hosted NSSL's booth and spoke with visitors

of all ages including children, students, adults, grandparents and scout troops. The photo above shows Boy Scouts who stopped to ask questions for their merit badge.

Common subjects were Hurricane Katrina and how it affected them, tornado safety tips, radar technology and how to become a meteorologist. ♦

NSSL inspires future workforce

Undergraduate students from around the U.S. visited NSSL this summer, working on research projects as part of the NOAA Hollings Scholars program and the National Weather Center Research Experience for Undergraduates (NWC REU). These programs are designed to help encourage students to pursue a future career in atmospheric science research and supports NOAA Education goals to develop a future workforce skilled in disciplines critical to NOAA's mission.

Hollings Students research:

Environmental Conditions Associated with Severe Thunderstorms and Tornadoes in the United States - Jace Bauer, Purdue University, mentored by Harold Brooks.

Investigating Severe Storms Attributes in NWS Tornado Warnings Using WDSS-II Radar-Derived Products - John Cintineo, Cornell University, mentored by Travis Smith.

Climatological Analysis of the Water Budget and Soil Infiltration Characteristics Throughout the State of Oklahoma - David Cook, SUNY Albany, mentored by J.J. Gourley.

Composite RUC Analyses of Weakly-Forced Mesoscale Convective Systems - Jason Hwang, Miami University, mentored by Dave Stensrud and Mike Coniglio.

An Analysis of the Accuracy of Wind Measurements Taken on a Mobile Mesonet Vehicle - Sean Waugh, University of Oklahoma, mentored by Dave Rust and Don MacGorman.

Evolution of a Tornadoic Supercell Thunderstorm. Part I: Preparation of One-Minute Phased Array Radar Measurements for Analysis - James Kurdzo, Millersville University, mentored by Rodger Brown and Pam Heinselman.

NWC REU research:

Evaluating Multi-Radar, Multi-Sensor Hail Diagnosis with High Resolution Hail Reports - Christopher Wilson, Valparaiso University, mentored by Kiel Ortega and Valliappa Lakshmanan

Microphysics Complexity Effects on Storm Evolution and Electrification, Blake Allen, Pittsburg State University, mentored by Ted Mansell.

Evaluation of NWS Watch and Warning Performance Related to Tornadoic Events - Kelly Keene, University of Georgia at Athens, mentored by Harold Brooks and Jack Hales (SPC) and Paul Schlatter (WDTB).

Identifying Critical Strengths and Limitations of Current Radar Systems - Jennifer Newman, Cornell University, mentored by Pam Heinselman (CIMMS) and Daphne LaDue, (OU CAPS). ♦

