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CONTACT: David McLaughlin # 180-06
413-545-2725, mclaughlin@ecs.umass.edu,
Brenda Philips, 413-478-4460, bphilips@ecs.umass.edu

TEST UNIT OF NEW WEATHER-TRACKING RADAR SYSTEM TO BE UNVEILED THURSDAY, MARCH 9 IN CHICKASHA, OKLAHOMA

AMHERST, Mass. – A complete test unit of an innovative radar network that could transform how the country monitors weather and tracks storms will be unveiled today at the University of Science and Arts campus in Chickasha, Oklahoma. The radar network promises to detect and map storms, airborne hazards and other thermodynamic conditions with unprecedented precision. Ultimately, the network could save property and lives by improving weather forecasting across the country.

The Oklahoma test unit comprises four radars that can beam into the blind spot of conventional radar systems—the lowest mile and a half of the atmosphere, which is where most storms actually form. It is the brainchild of the Engineering Research Center for Collaborative Adaptive Sensing of the Atmosphere or CASA, a National Science Foundation-funded partnership among 19 institutions including the University of Massachusetts Amherst, University of Oklahoma, Colorado State University, and University of Puerto Rico Mayaguez.

"This test is the result of an extraordinary effort by our students, faculty, staff and practitioners from a partnership that spans more than a dozen different intellectual disciplines," said David McLaughlin, CASA director and professor of electrical and computer engineering at UMass Amherst.

Current measurements of the lower three kilometers of atmospheric soup are severely limited by existing technology, which uses long-range high-power radars that scan a 200-kilometer radius above cloud level. Because the curvature of the planet prevents these units from sensing the lower atmosphere, the current technology is also relatively insensitive to storms, such as tornadoes, after they fall to earth.

But the four-radar system located in and around Chickasha will be part of a network that uses short beams that overcome the earth's curvature. Known as DCAS, or Distributed Collaborative Adaptive Sensing radar network, the test unit uses large numbers of low-power *Distributed* nodes. These tiny DCAS radars are *Collaborative*— they can cooperate to target their beams on one weather pattern—a tornado, for instance—thus triangulating on it and following its course with the precision of storm chasers in mobile units. The DCAS nodes are also *Adaptive* because they're engineered to be rapidly reconfigured in response to quickly changing weather.

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The radars making up the new test bed will communicate with one another and adjust their sensing strategies in direct response to the evolving weather and changing user needs—a dramatic change from current technology. They can map winds in fine detail and pinpoint the location of tornadoes within storms, thereby benefiting the general public, weather forecasters, farmers, and researchers. In addition, DCAS radar networks will provide emergency managers with an invaluable new tool to save lives, carry out evacuations, and direct the emergency flow of traffic.

"Perhaps the greatest contribution of CASA may come in the reduction of the tornado False Alarm Rate, which now stands at about 75 percent," says Kelvin Droegemeier, deputy director of CASA and professor of meteorology at OU. "Currently, three out of four tornado warnings are never verified, and this leads to public apathy and greater danger when tornadoes do strike."

Collaborators on the project also include outreach partners University of Delaware, University of Virginia, and Rice University. CASA's industrial collaborators are Raytheon, IBM, Vaisala, Vieux and Associates, the Texas Medical Center, Micro-Ant and NEWS 9 from Oklahoma City. Government collaborators include the Oklahoma State Regents for Higher Education, and the National Oceanic and Atmospheric Administration. Counting all its academic, industrial and government partners, CASA now represents more than $40 million in funding.

The new system will have four radars operating atop towers at Chickasha, Rush Springs, Lawton, and Cyril, Oklahoma. The radars will send real-time data over the OneNet data/ISP infrastructure to a Systems Operation Control Center on the OU campus in Norman.

"By taking some of the guesswork out of the radar interpretation and being able to focus the system on specific areas of a storm, this radar system should increase the warning time given to our citizens," says Steve Chapman, the emergency manager for the town of Chickasha, one of several such managers to help design the system. "This will allow more citizens to reach shelter before a severe storm strikes, thus saving lives."

Brenda Philips, CASA's director of industry, government and end-user partnerships, notes, "We've been working with emergency managers, forecasters at the National Weather Service, private meteorology companies and academic researchers since day one in the design of this system, and we've built mechanisms right into the design that support their needs."

The DCAS test site sets the stage for a significant improvement in weather monitoring. The spacing and size of the CASA radars offer superior detection and prediction capabilities. They are spaced 30 km from each other—versus the 230 km average spacing of the NEXRAD radars in use today, and are one-fiftieth the size of a NEXRAD radar. Each radar unit transmits an average power of 12 watts.

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"That's a fifth the power of a light bulb," says Mike Zink of UMass Amherst, a CASA senior research fellow and leader of the test bed implementation team. "One radar will operate in conjunction with several other radars so that together they achieve the kind of intensity that the current NEXRAD technology has."

Ultimately, the team expects to see the CASA network and the existing NEXRAD network meshed together to provide a complementary, complete view of both the upper and lower atmosphere.

The DCAS network should also improve weather monitoring in terms of information technology infrastructure. The system has many different users with competing demands, and the DCAS network must move the data from the right places to the right people at the right time. The CASA system processes millions of pieces of data, steering and juggling input from the network of radars, feeding forecast and prediction models, converting the raw data into three-dimensional displays of atmospheric activity and supplying feedback in real time to forecasters, emergency responders and other system users.

Following deployment of the four radars in the Chickasha test unit, the researchers will spend the next six months fine-tuning the test unit. This will involve repeated meetings with emergency planners, weather forecasters and other users to ensure the gathered data is being collected, organized, and displayed for maximum usefulness.

"We'll be able to optimize the scanning strategy of each radar to provide the most comprehensive real-time analysis," says Jerry Brotzge, director of NetRad Operations.

The CASA team has also drawn on the disciplines of sociology and decision sciences to improve its utility. "Hurricane Katrina showed us all in a terribly unfortunate way how an effective response to hazardous weather requires an approach that addresses the detection, forecasting, warning, and response aspects of the end-to-end problem." says Havidan Rodriguez, professor of sociology and director of the Disaster Research Center at the University of Delaware.