

# New radar provides the lowdown on Dallas-Fort Worth weather



Kelley Chinn/Special Contributor

Arezoo Rafieeiniasab, a Ph.D. student in water resources at the University of Texas at Arlington, stands on the rooftop of Carlisle Hall next to the new CASA radar unit.

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As North Texas nudges into severe storm season, forecasters, researchers and emergency management will have a new tool keeping an incredibly detailed watch on low levels of the atmosphere, where tornadoes spin up and gentle rains morph into pounding downpours.

The first of four CASA radar installations — for Collaborative Adaptive Sensing of the Atmosphere — was installed last fall on the roof of Carlisle Hall at the University of Texas at Arlington. The next will be installed at the University of North Texas in Denton this month, with two more to follow this year, perhaps by midsummer, officials said.

Smaller and less expensive than the NEXRAD radar already in use by the National Weather Service, these R2-D2 look-alikes focus on the parts of the atmosphere that the long-range NEXRAD radar often overlooks. And the CASA units update every minute, compared with four or more minutes for the NEXRAD radar.

During last year's tornado outbreak in Arlington and southern Dallas County, "there were tornadoes that spun up and were gone that [NEXRAD] never saw on radar," said Amanda Everly, project manager for CASA with the North Central Texas Council of Governments, which is overseeing the project in Dallas-Fort Worth.

"And [the CASA data] is higher resolution, and it shows what's going on down low, where the real weather is happening," she said.

While NEXRAD can monitor weather conditions more than 200 miles out, the CASAs are limited to about 25 miles in any direction, so an area like Dallas-Fort Worth needs multiple radar installations. The first four will cover the most densely settled portions of the region, but to cover all 16 counties within the Council of Governments' area will require 16 to 20 or more CASA units, Everly said.

But four is a great start, said Greg Patrick, a meteorologist with the National Weather Service in Fort Worth.

"You get optimal use with three or four of them and hopefully someday eight," Patrick said. "They're really designed to operate as a network. They focus their scanning on low levels, and all the weather where we live is near the surface — rain, hail, snow, tornadoes, damaging winds, flooding rains."

That's a weak point for the NEXRAD units. With the radar set to scan as low as possible, it's still slightly elevated, roughly 0.5 degrees, Patrick said. At 100 miles, that modest scanning angle and the curvature of the earth means "we're automatically looking at 10,000-12,000 feet above the ground," roughly two miles.

#### Real-time with CASA

It takes the NEXRAD radar longer to scan across 360 degrees because it scans at multiple levels. With its more limited focus, the CASA units offer a much better real-time view. And what a view it is.

On May 24, 2011, near the end of a multiyear CASA radar test in southwestern Oklahoma, a severe thunderstorm rolled toward the town of Chickasha. The NEXRAD radar shows a broad

patch of rain. The CASA radar depicts a much more detailed storm with a finger of rain stretching out toward the northeast, with the tip coiling back.

“If you’ve ever heard of ‘a hook,’ or ‘a hook echo,’ this shows the hook,” Patrick said.

It is, unmistakably, a tornado.

But the ability to do a 360-degree scan in a minute also enabled the emergency manager in New Castle, Okla., to see that the tornado was turning to the north, where he’d stationed his first responders, said Brenda Phillips, deputy director of the CASA project.

“So we’re already seeing that kind of response benefit,” she said. “The idea is all of this will be much more amplified if we’re able to be in an urban area.”

1 up, more to come

When the radar units were moved from Oklahoma to Dallas-Fort Worth for “an urban test-bed,” they were repaired and refurbished. But hopes that all four would be installed by the beginning of the spring storm season couldn’t be met because of funding.

“There have been some delays,” Patrick said. But the leaders of the project, particularly the NCTCOG, are “trying to be as creative as they can to find the funding to get the radars up.”

The CASA consortium, which includes the University of Massachusetts at Amherst, the University of Oklahoma and Colorado State University, is providing the first eight CASA radar units. But others needed to cover the region would cost about \$500,000 each, Phillips said.

“Different communities are sponsoring the [first] radars — they’re paying for the installation costs and ongoing operating costs,” she said. “We continue looking for sponsoring communities, and we have one for the fifth unit in Midlothian.

“The other aspect is to see if we can actually pilot a new way of installing and maintaining radars. If everyone shares the cost, it’s not overwhelming. We estimate the 16-county COG area would need something like 20-22 units, so that’s \$10 million. It’s not unreasonable to come up with that kind of money from the region.”

Dr. D.J. Seo, an associate professor of civil engineering at UT Arlington and a specialist in radar hydrology, said he already sees the potential from the first CASA unit in forecasting and responding to the very heavy rains that can cause significant flooding.

“In heavy to extreme rain, raindrops grow in size very fast toward the surface,” he said. “D-FW is heavily urbanized — we have many impervious surfaces — so we really need to know the rain rates here to provide location-specific warnings.

Flood warnings

Tornadoes get the attention, but in North Texas, flooding is at least as significant in property damage and loss of life, Seo said.

“I have a research group in hydrometeorology and [CASA] is going to be a very valuable tool for research and education,” Seo said.

He already gets live data feeds from the first CASA unit but looks forward to the day when the first four will provide a broader look at the region.

That seems likely to happen fairly quickly.

“We hope to have the first four up by summer, June or July,” said Everly, of the NCTCOG, “and all eight of them up by the end of the year.”

“Sometimes we have lofty goals,” she said, “but we’re hoping.”