A new twist on tornado study

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Funny thing about tornadoes. When they ought to drop out of the sky, they usually don't. Despite all the radar looking for them, no one quite knows when or where they'll appear.

Researchers are out to change that beginning this week; the largest tornado research project in history hit the road Monday. More than 100 meteorologists and students in more than 40 vehicles will roam the Great Plains for the next five weeks, bringing a panoply of storm-detecting devices to bear on one of the most elusive, dreaded and least understood weather phenomena.

The ultimate aim is to extend the average warning time for tornadoes, now at about 13 minutes in the United States.

"The toll tornadoes take on an annual basis on life and property in the U.S. is considerable," said Brad Smull, an associate program director with the National Science Foundation, the lead funding agency for the VORTEX2 project. "The fact that we still are unable to accurately warn on the timing and location and intensity of tornadoes reaching the ground is a frustration to the scientists, and we know it's a frustration to the public. So in our belief, it merits some special attention."

The $11 million project, which will include another five-week field deployment in 2010, involves most of the major atmospheric agencies in the United States, Canada, Finland and Australia and 10 colleges and universities. Researchers hope to tangle with tornadoes from Texas northward into southern Minnesota.

But don't call it tornado-chasing.

"Chasing can occur without a single instrument," said Roger Wakimoto, director of the National Center for Atmospheric Research Earth Observing Laboratory and a principal investigator for VORTEX2. "We're interested in collecting data, whereas the majority of storm chasers are just there to get the adrenaline rush and take a few movies and still pictures. There's a huge difference."

VORTEX2 is the younger but bigger brother of VORTEX1. That effort, in 1994 and 1995, determined that downdrafts trailing a supercell thunderstorm and even air circulation close to the ground may be critical factors in tornado formation. But it didn't reveal why less than 20 percent of supercell thunderstorms, which generate tornadoes, actually do.

"Why aren't there zillions of tornadoes?" wondered Todd Krause, warning coordination meteorologist for the Twin Cities office of the National Weather Service. "There are times when you've got two thunderstorms that look identical on radar, but one produces a tornado and the other one doesn't. Why is that?"

VORTEX1 (which stands for Verification of the Origins of Rotation in Tornadoes Experiment) saw the first use of a truck-mounted radar, the so-called "Doppler on Wheels." But there was only one such unit and the researchers were based in Norman, Okla. The "fully nomadic" VORTEX2 will employ 14 radar-equipped vehicles along with mobile and stationary weather sensors, weather balloons and photographers.

"We don't know in the morning where we're going to be staying at night," Wakimoto said. "Hopefully we'll know where all the Laundromats are."

The mobile research teams will avoid major cities because of traffic congestion and visual obstructions.

The key, Smull said, will be collection of both broad and fine-scale views of tornadoes, in addition to data on temperature changes and close-to-the-ground wind speeds near the funnels. Ground-level wind speeds of tornadoes remain only estimates based on damage, because wind instruments have usually been destroyed by the storms.

One idea about tornadoes could be turned upside down. Wakimoto hopes to investigate more deeply the notion that tornadoes may actually form from the bottom up, much like dust devils or water spouts.

Daily updates on the field project will be posted on the blog of one of the lead researchers at tornadoscientists.blogspot.com .

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