

Radar Catches a Tornado in the Act

While the hit movie *Twister* sucks in viewers by the millions with its computer-drawn tornadoes and caricatures of meteorologists, real-life researchers are quietly unraveling the hidden structure of nature's most violent storms. This week, three Oklahoma tornado chasers report that they have captured the most detailed portrait of a twister yet, thanks to a new mobile radar system.

Capable of "seeing" the winds and debris whipping around in the heart of a storm, the Doppler radar has already confirmed some theories about tornadoes and presented additional puzzles, says Joshua Wurman of the University of Oklahoma in Norman.

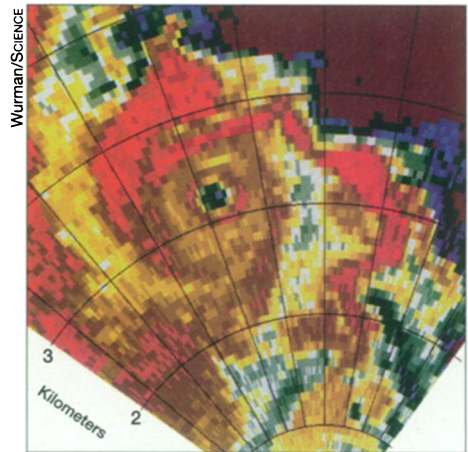
"We're the first ones to have taken three-dimensional images of a tornado structure. We see where the maximum winds are and how strong they are. These things have never been measured before because nobody's been able to get up close to a tornado with a radar before," says Wurman, who collaborated with Jerry M. Straka of the

University of Oklahoma and Erik N. Rasmussen of the National Severe Storms Laboratory in Norman.

Wurman and his colleagues constructed the Doppler on Wheels radar last spring and have caught three tornadoes so far. They describe measurements of one storm in the June 21 SCIENCE. Despite the preliminary nature of their work, it is already garnering accolades from fellow tornado researchers.

"I view this study and this research as worthy of the meteorological equivalent of a Nobel prize. These gentlemen risked life and limb to get this radar within striking distance of a tornado," comments Joseph H. Golden, a research meteorologist with the National Oceanic and Atmospheric Administration (NOAA) in Silver Spring, Md. Golden initiated NOAA's tornado chase project in 1972, when he worked at the agency's severe storms lab.

The scientific descendant of Golden's program was a mission called VORTEX, which ran during 1994 and 1995. Led by Rasmussen, VORTEX drew together more



Radar image of tornado reveals ring of debris and rain surrounding a clear core.

than 100 scientists who pursued tornado-generating thunderstorms in a 17-truck convoy around the middle United States.

Nature was uncooperative during those summers, providing few tornadoes for the researchers to study. But on June 2, 1995, Wurman and his colleagues succeeded in bringing their Doppler radar to within 1.8 miles of a tornado near Dimmitt, Texas, that destroyed a home and sent nearby trucks flying. Unlike the characters in *Twister*, the VORTEX crew kept a safe distance from the storm.

Doppler weather radars—kin to the radar guns used by police—measure wind speeds by bouncing microwaves off rain, dust, and other debris in the air. Objects moving toward or away from the radar shift the frequency of the microwaves, just as a train's whistle sounds higher as it approaches an observer.

By scanning the Dimmitt storm at close range, Wurman and his colleagues determined that the maximum winds exceeded 156 miles per hour and that they occurred close to the ground, within 650 feet of the surface, as predicted by theory. In the past, scientists have made only rough measurements of where the peak speeds occur in a tornado. Such information is essential to designing structures that can better withstand tornadoes, says Golden.

The radar images also show something unexpected—a downdraft plunging through the center of the tornado at more than 55 miles per hour. Though some scientists had suggested that air might sink inside large tornadoes, they did not suspect downdrafts of such force.

The radar observations, combined with other measurements made during VORTEX, are enabling scientists to test theories of how tornadoes form, live, and die. This basic understanding should help improve forecasts, says Wurman. — R. Monastersky

Reproductive equality: A male Pill?

If men got pregnant, stores would be bursting with contraceptives, some women say. Researchers in the United States and Italy would like to turn this witicism in a practical direction. If their experiments succeed, drugstores may one day be stocked with a new birth control pill—for men.

Only two male contraceptives are currently available, vasectomy and the condom. Vasectomy has two drawbacks: The lag between surgery and sperm depletion can result in unintended pregnancy, and the procedure can be reversed only with great difficulty. Also imperfect, condoms can break, men may use them incorrectly, and some men resist using them.

Now, in what he believes is the first clinical trial of an oral contraceptive for men, William J. Bremner of the University of Washington in Seattle and his colleagues in Bologna, Italy, say they have proven such a pill can work.

The research team gave eight Italian men two hormone pills twice daily for 16 weeks. Each pill contained one of two hormones, testosterone undecanoate or cyproterone acetate.

The researchers released preliminary results on four of the men at the 10th International Congress of Endocrinology in San Francisco on June 12. Sperm counts for three of them fell by roughly a factor of 10, to 3 million or fewer sperm per milliliter of seminal fluid. Concentrations this low meet the World Health Organization (WHO) definition of infertility.

In earlier studies, conducted by WHO, weekly injections of hormones were found to lower sperm counts in 65 percent of Caucasian men and more than 90 percent of Asian men. This injectable contraceptive produced a failure rate of just 1 percent in men whose sperm counts were 3 million or less, Bremner says. Men with higher counts had failure rates of 3 to 4 percent—comparable to the rate of the female pill.

Bremner cautions that the male pills didn't work in all eight cases. "There were some men whose sperm counts were not fully suppressed . . . which means that the agents and dosages we administered were not optimal." Yet the study has shown that "it is possible to get sperm suppression with oral agents," Bremner asserts. He says his group plans to try other hormones and dosages to bolster effectiveness.

"If it really works, that's potentially exciting," says Barry Zirkin, head of reproductive biology at the Johns Hopkins School of Hygiene and Public Health in Baltimore.

— S. Sternberg