

## WEATHER FORECASTS

# Tornadoes: Heroic Technology Advances Weather Forecasting

### Impact

### Four-fold increase in tornado warning lead times saves lives

When killer tornadoes tore through Oklahoma and Kansas in May 1999, NOAA's Norman, OK, Weather Forecast Office issued warnings up to one hour in advance of some of the twisters. The office credited the NEXRAD (NEXT generation weather RADar) system and the Advanced Weather Interactive Processing System (AWIPS) for helping the team quickly and accurately assess the weather conditions and get out life-saving warnings. In fact, after this event, national media deemed NEXRAD a "hero." Together, with emergency managers and the media who helped disseminate NOAA warnings, an estimated 600 lives and countless dollars were saved. Both NEXRAD and AWIPS were developed by OAR researchers.

**"Technology has bought a precious 15-20 minutes in life-saving and property-saving time. The hero: a lowly radar called the 88-D .... mark[s] an unambiguous case indeed of government improving lives – by saving them."**

*USA Today, May 6, 1999*

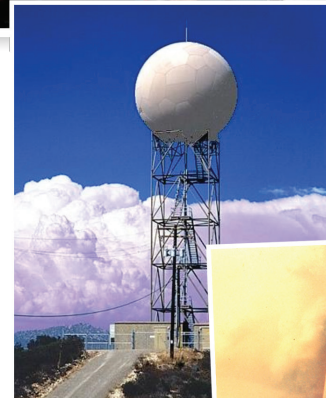
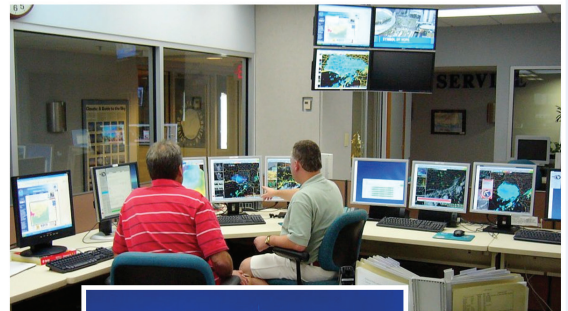
Three decades ago, successful tests of Doppler radar led by OAR's National Severe Storms Laboratory (NSSL), the National Weather Service, the Federal Aviation Administration, and the Air Force's Air Weather Service led to NEXRAD in the 1990s, a national network of 158 Doppler radars.

The AWIPS workstation, developed by a predecessor of OAR's Earth System Research Laboratory (ESRL) with the NWS and contractor PRC, fundamentally changed how NWS forecasters access radar, satellite, model outputs and other weather data streams. Without AWIPS, forecasters accessed radar via one computer, satellite imagery on another, and had no capability to overlay different streams of data on a single visual. With continuous improvements in AWIPS, forecasters have tremendous flexibility to manipulate information, develop a forecast and use automated tools to rapidly communicate warnings to tailored geographic areas.

Looking to improve warning times even further, NSSL and its partners are investigating how the U.S. Navy's AEGIS phased array radar system may be applied to tornado detection, forecasts, and warnings in a multi-use environment. Multi-function Phased Array Radar (MPAR) could extend average warning lead times significantly. A single network of MPAR units could theoretically replace seven single-function conventional radar networks that currently serve aviation, defense, homeland security, and weather forecasting needs.

*Images, top to bottom: Advanced Weather Interactive Processing System; NEXRAD Doppler radar; tornado and tornado damage.*

**A 2005 external evaluation calculated storm-related injuries were down by 40 percent and fatalities by 45 percent after NOAA implemented NEXRAD.**



**Today, tornado warning times average 15 minutes. Only a three-minute warning was possible 20 years ago.**