

Radar research to operations



For almost 50 years, NSSL has led the nation with ingenuity and creativity to push weather radar technology to the edge. From the original Weather Surveillance Radar - 1957 to Doppler radar, NEXRAD, and now dual-polarized radars, NSSL's radar research has been revolutionary and life-saving.

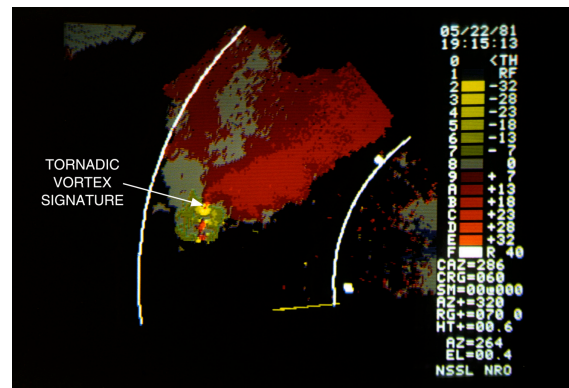
1970's

- Experimental Doppler radar is now operational at NSSL
- NSSL engineers create a contoured black and white display, a vast improvement from the grid of numbers currently in use
- NSSL researchers discover the Tornado Vortex Signature (TVS), an early signal that a tornado may form
- NSSL engineers develop a color display for Doppler radar data
- NWS and FAA decide to include Doppler technology in future radars



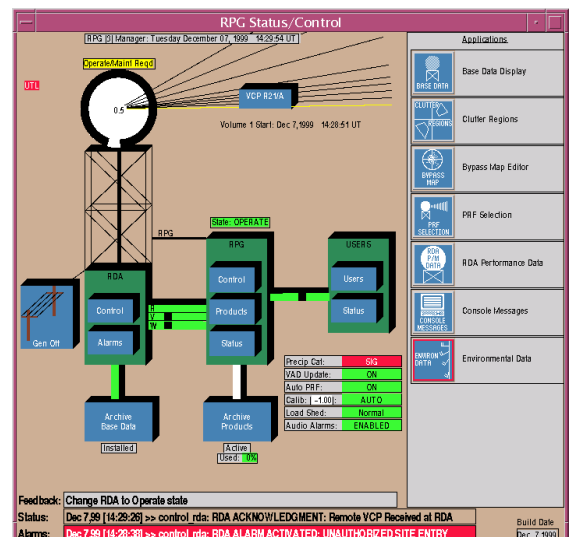
1980's

- NSSL begins research on dual-polarization technology
- NSSL provides engineering and meteorological expertise to the NEXRAD program
- NSSL develops prototype meteorological algorithms and products for NEXRAD



1990's

- The national network of Weather Surveillance Radar-88 Doppler (WSR-88D/ NEXRAD) becomes operational
- Tornado warning lead-times jump from 0-13 minutes
- NEXRAD prevents more than 300 fatalities and 7800 injuries from tornadoes
- Socioeconomic benefit of more than \$3B (vs \$1.78B NEXRAD costs)



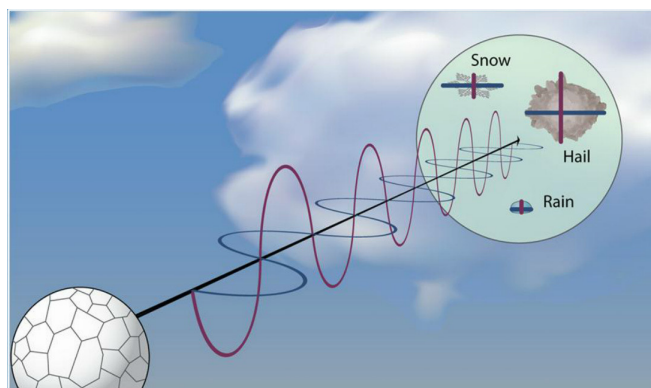
2000's

- NSSL designed and implemented new open systems software for WSR-88D



2000's, continued

- The redesign allows new science and technology to be transferred to NWS operations more quickly, and lowers maintenance and upgrade costs.
- NSSL demonstrates dual-polarization technology capabilities to operational hydrologists, meteorologists, and aviation users
- NEXRAD Program Management Committee approves taking first steps towards upgrading the national operational WSR-88D network to include dual-polarimetric capabilities
- NSSL seamlessly mosaics all 130 NWS and Department of Defense weather radars across the U.S. to provide the first high-resolution depiction of storms and quantitative precipitation estimation products from coast-to-coast in real-time.



BULLETIN - EAS ACTIVATION REQUESTED
 TORNADO WARNING
 NATIONAL WEATHER SERVICE PEACHTREE CITY GA
 814 PM EST FRI MAR 2 2012

THE NATIONAL WEATHER SERVICE IN PEACHTREE CITY HAS ISSUED A

* TORNADO WARNING FOR...
 NORTHERN HARALSON COUNTY IN NORTHWEST GEORGIA
 NORTHWESTERN PAULDING COUNTY IN NORTHWEST GEORGIA
 SOUTHERN POLK COUNTY IN NORTHWEST GEORGIA

* UNTIL 900 PM EST

* AT 809 PM EST...**DOPPLER RADAR CONFIRMED** A TORNADO 17 MILES SOUTHWEST OF ROCKMART...MOVING EAST AT 40 MPH

2010's

- National dual-pol upgrade to all NWS radars began in 2010, completed in 2013
- Most significant radar science upgrade since fielding of NEXRAD
- Able to distinguish precipitation (rain, hail, snow) and non-precipitation types (tornado debris, birds, buildings, terrain) to provide higher quality precipitation estimates
- Able to remove non-weather signals and retrieve weak weather signals to improve data quality
- Able to detect debris lofted by a tornado
- Continued dual polarization research and development leading to new discoveries about winter weather, severe storm morphology
- NSSL begins research to use dual-pol data in weather models to improve performance

Now that all NWS radars have been upgraded with dual-pol technology, the NWS has found the Tornado Debris Signature especially helpful at night or if the tornado is wrapped in rain and difficult to see. The image below shows a debris ball from a tornado on March 2, 2012 in Peachtree City, Ga. As you can see above, the information influenced their tornado warning.

