NOAA NATIONAL SEVERE STORMS LABORATORY

2024 IN A FLASH

A Year of NSSL Innovation in Severe Storm Science

SCAN TO WATCH THE FULL
2024 NSSL ACCOMPLISHMENTS REPORT

WARN-ON-FORECAST SYSTEM (WOFS)

Completed the WoFS transition plan with the Office of Science and Technology Integration (OSTI) to prepare the system for operations.

Ran forecasts for ~100 domains in collaboration with National Weather Service (NWS), supporting operations for severe weather (ex: Greenfield, Iowa EF4), fire weather (ex: WoFS Smoke during LA fires) and hurricanes (ex: Helene and Milton).

Began design work on an AI-based, a real-time, high-resolution prediction system called WoFSCast. A step toward improving the speed, cost effectiveness and accuracy of WoFS.

Completed a multi-year assessment of a 1-km WoFS prototype, quantifying benefits of higher resolution.

Positive Spring Forecast Experiment (SFE) evaluations demonstrated the benefits of Model for Prediction Across Scale (MPAS) as an experimental, dynamic core for the next generation of WoFS.

THE WARN-ON-FORECAST SYSTEM: A WEATHER FORECASTING MOONSHOT

Scan to watch and learn how the Warn-on-Forecast System is pushing warning lead times for tornadoes and severe weather to up to an hour or more.

PHASED ARRAY RADAR (PAR)

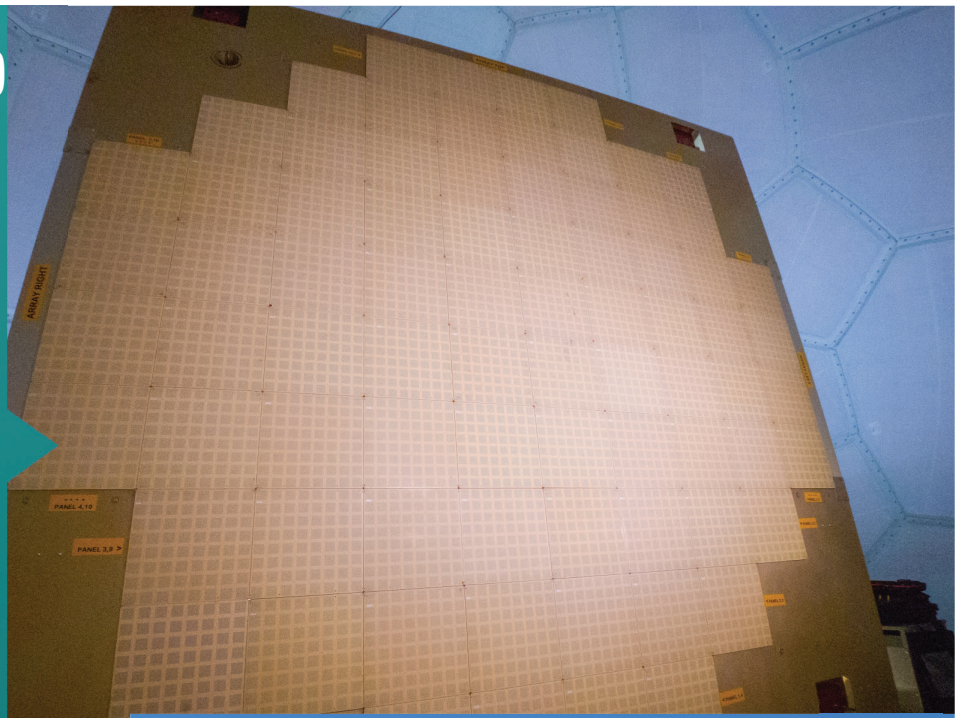
Significant improvements and refreshes to the Advanced Technology Demonstrator (ATD), including replacing the radome and generator along with upgrading servers.

Captured >146 hours of meteorological data on various modes of weather events, giving a robust range of cases for evaluation.

Began initial implementation of adaptive scanning techniques and spoiled beam scans on the ATD.

Released a five-year PAR R&D plan that will be a road map for our research and engineering priorities through 2028.

Sharing PAR R&D information with NWS' Radar Next Program for their Analysis of Alternatives.



A CLEAR VISION: PHASED ARRAY RADAR INNOVATING FOR THE FUTURE

Scan to watch and learn how NSSL is innovating and developing the radar technology of the future.

VORTEX-USA

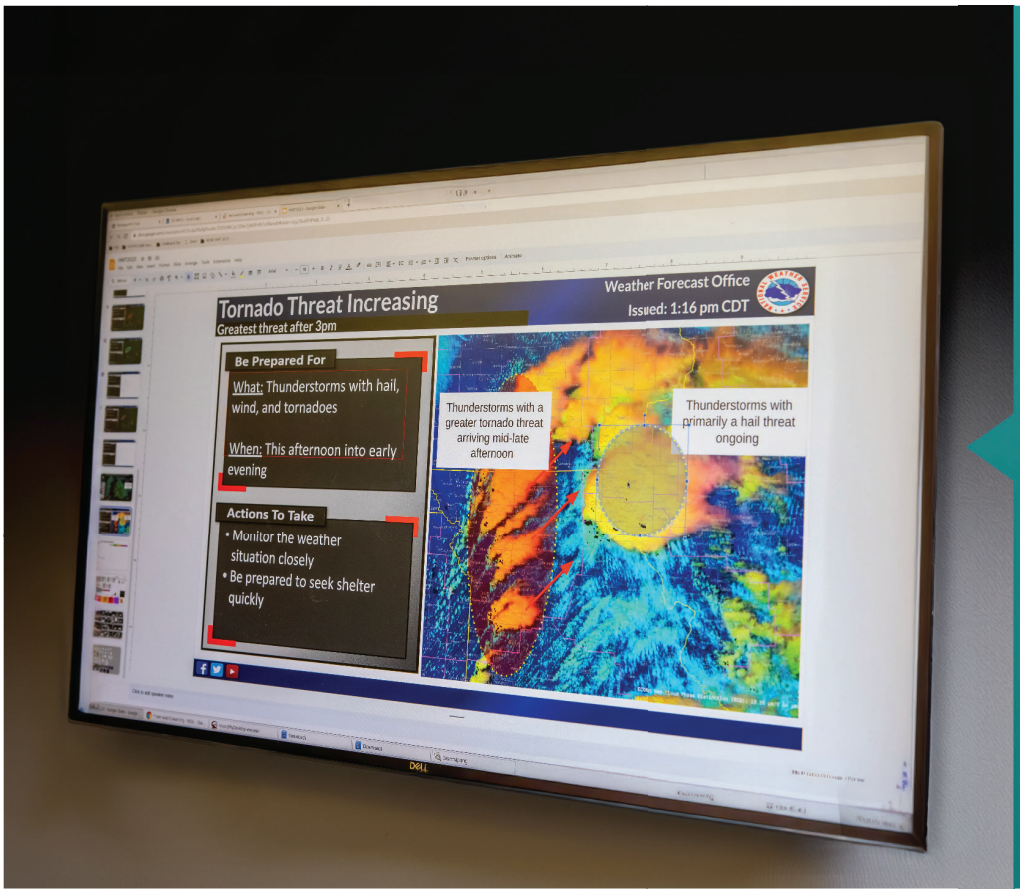
Collected data from 13 severe weather events in the Southeast, Midwest and Great Plains as part of the DELTA and LIFT field experiments.

Analyzed >18 hours of interviews with NWS forecasters, broadcast meteorologists, emergency managers, and members of the public from the devastating Rolling Fork and Amory Mississippi tornadoes.

Supported the Probabilistic Hazard Information (PHI) demonstration project, in which NWS forecast offices used and evaluated real-time, experimental, severe weather probabilistic hazard guidance. Another step towards moving this ground-breaking technology to operations.

FAR AFIELD: RESEARCHERS SEEK OUT AND STUDY TORNADOES

Scan to watch and learn how NSSL researchers take to the field to study tornadoes and severe weather up close and personal.



SOCIAL AND BEHAVIORAL SCIENCE PROGRAM

Submitted 5 publications on topics ranging from interpretation and use of Threats-in-Motion data, to NOAA Hazardous Weather Testbed experiment analysis

Rolled out version 2.0 of our Tornado Tales weather survey, giving citizens the opportunity to report their experience with tornadoes and severe weather.

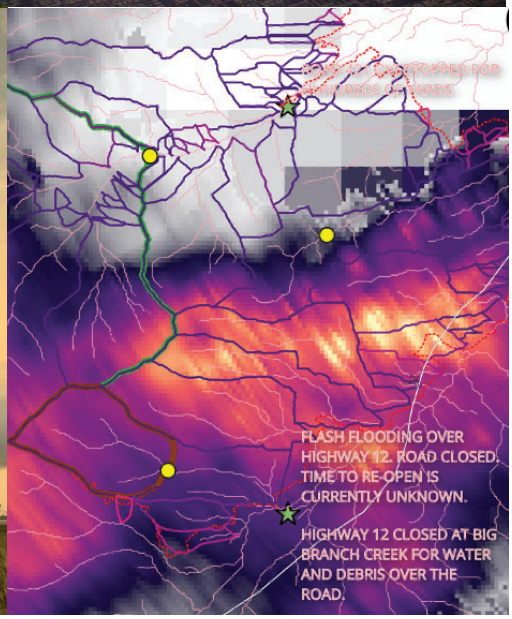
Analyzed >50 hours of interview data from members of the public, emergency managers, and forecasters after extreme weather events.

Collaborated to design and facilitate >10 testbed experiments, workshops, and partner engagement sessions.

SCIENCE ON THE CUTTING EDGE

Even with all the major science accomplishments highlighted so far, we're really just scratching the surface of the cutting edge innovation happening at NSSL, including:

- Using an LED array brighter than the sun, combined with high resolution and super-high frame rate cameras to study falling hail before impact.
- Using uncrewed aerial systems to gather environmental data around storms and conduct damage surveys after tornadoes.
- Utilizing mobile radars to learn how wildfire-impacted landscapes, burn scars, and precipitation can lead to damaging debris flows and flash floods.
- Harnessing artificial intelligence and machine learning to expand our capacity and accelerate the pace of discovery and innovation.
- And we even had a bit of fun this year with the release of Twisters. NSSL researchers were consulted by the film and we even produced our own educational content to highlight the real science of tornado research.



QUICK NUMBERS

31 Exceeded total number of publications submitted goal by 31% in 2024

45 The ATD operated and collected 45 separate case studies in 2024

75 WoFS predicted strong tornado probability up to 75 minutes in advance of Greenfield, Iowa EF4.

16 Field work deployments, covering 6 states and >100 total participants

NOAA HAZARADOUS WEATHER TESTBED **300+** Total participants across **7** experiments over a period of **22** weeks

National Severe Storms Laboratory

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