

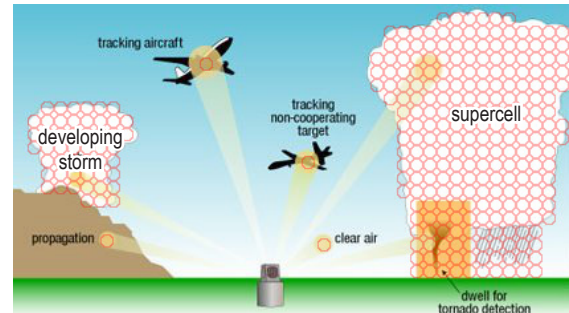
# National Severe Storms Laboratory



NOAA's National Severe Storms Laboratory (NSSL) researches ways to observe and predict severe weather to save lives and reduce economic loss. NSSL scientists and engineers work to understand the causes of severe weather and explore innovative ways to use that knowledge to improve forecasts and warnings. NSSL transfers scientific understanding, applications, and techniques to decision-makers to support a Weather-Ready Nation.

## NWRT/MPAR

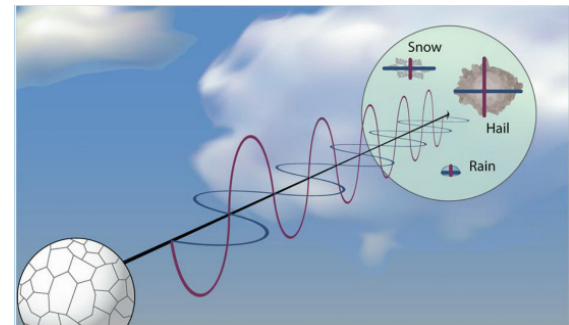
NSSL's National Weather Radar Testbed (NWRT) Multi-function Phased Array Radar (MPAR) studies the impact of rapidly-updating MPAR data on computer model predictions of the path of a potentially tornadic supercell. Current weather radar requires four to five minutes to sample the atmosphere, but a Phased Array Radar (PAR) can scan the sky in seconds. Results have shown that models using MPAR data produce a more accurate tornado path than the model using current National Weather Service (NWS) radar data.



The Multi-function Phased Array Radar program (MPAR) investigates whether a single radar system can perform both aircraft and weather surveillance.

## Dual-polarization radar technology

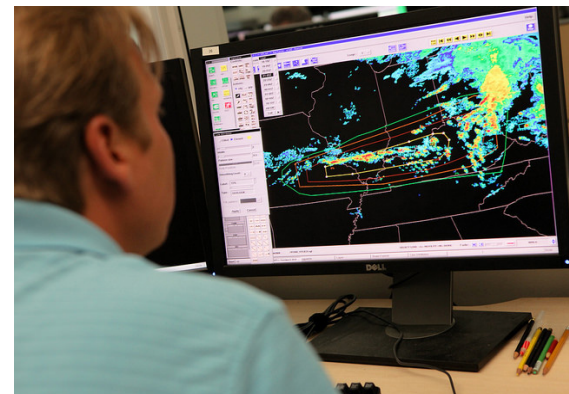
NSSL's developed, tested, and helped implement dual-pol technology, now installed on all NOAA Next Generation Weather Radar (NEXRAD) weather radars. NSSL's dual-pol research spanned more than 30 years, and is an example of a highly successful research to operations project. NSSL is working on a new precipitation classification algorithm that couples weather forecast model information with dual-polarized radar observations. Using known, radar-detected features, the algorithm can identify regions of sleet, freezing rain, wet snow, or ice. Researchers are also adding the ability to classify hail size, and detect tornado debris within the algorithm.



NSSL's dual-polarization research is an example of a revolutionary research-to-operations success.

## NOAA Hazardous Weather Testbed

Researchers and forecasters work side-by-side throughout the year in the NOAA Hazardous Weather Testbed (HWT) to develop, test, and evaluate new forecast and warning strategies. Participants explore innovative radar and satellite technologies, decision support systems, and new weather and water prediction models. This collaborative approach promotes effective transfer of research into forecasting and warning operations.



Researchers and forecasters regularly work together in the NOAA Hazardous Weather Testbed to improve decision-support products.

## MRMS

The Multiple-Radar Multiple Sensor (MRMS) system, developed at NSSL, earned the Department of Commerce Silver Medal in 2015 for successful transfer to NWS operations. MRMS quickly harnesses the tremendous amount of weather data from multiple sources, intelligently integrates the information, and produces a suite of decision-support products every two minutes. Because it provides better depictions of high-impact weather events such as heavy rain, hail, snow, tornadoes and other threats, forecasters can quickly diagnose severe weather and issue more accurate and earlier forecasts and warnings.

## FLASH

The Flooded Locations And Simulated Hydrographs (FLASH) project introduces a new paradigm in flash flood prediction. FLASH uses the MRMS data to produce flash-flooding forecasts up to 6 hours in advance with a 5-min update cycle. The primary goal of the FLASH project is to improve the accuracy, timing, and specificity of flash flood warnings in the US, thus saving lives and protecting infrastructure.

## Warn-on-Forecast

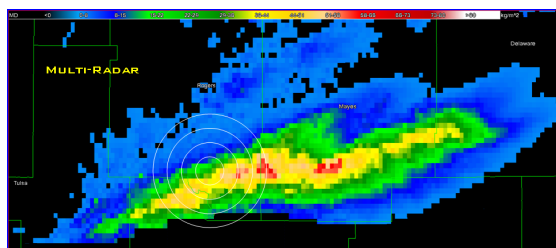
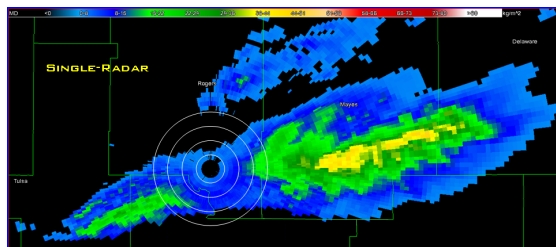
NSSL's Warn-on-Forecast research project is making progress to create weather model predictions of storm-specific hazards such as tornadoes, large hail, and extreme local rainfall up to an hour before they strike. The models will also provide real-time statistical projections of a storm's longevity, intensity and hazards from NSSL's database of climatological storm-scale behavior.

## FACETs

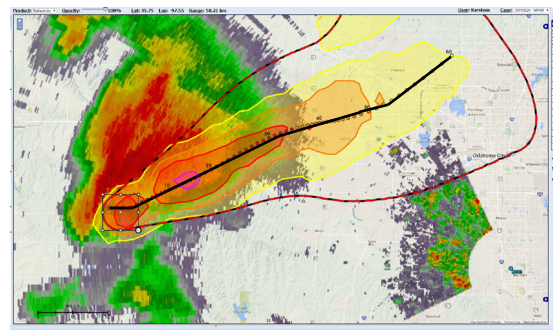
The new Forecasting a Continuum of Environmental Threats (FACETs) project is working to produce rapidly-updating, site-specific weather hazard information that conveys probabilities of a severe weather event occurring. The example to the right shows how a much smaller area would be identified as the tornado threat as compared to the current warning system, thereby reducing false alarms. Social and behavioral science is being applied in this work to ensure the best possible service and response.

## mPING

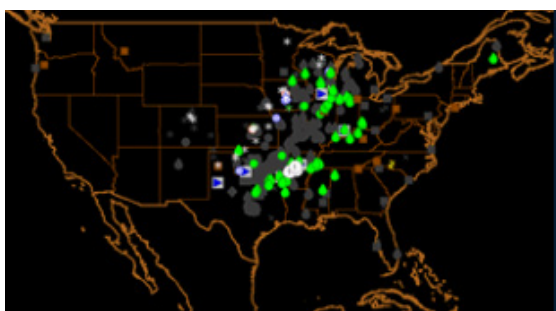
Using the free mPING (meteorological Phenomena Identification Neart the Ground) app on a smartphone, citizen scientists can submit weather observations anonymously. The data immediately goes into a database at NSSL and is displayed on a map that is accessible to everyone. mPING was launched in 2012 and developed through a partnership between NOAA/NSSL, the University of Oklahoma, and the Cooperative Institute for Mesoscale Meteorological Studies. The app can be downloaded from the Apple app store, or from Google Play.



MRMS uses multiple sources of data to support forecaster decision-making.



This FACETs prototype Probabilistic Hazard Information tool uses a scale from yellow to red to identify increased risk. The black line outlines the actual path of the tornado.



Crowdsourced weather reports from NSSL's mPING app are displayed live on a national map.