

PAR

PHASED ARRAY RADAR



National Weather Center
University of Oklahoma



The PAR (Phased Array Radar) Project at CIWRO is helping shape the future of weather radar in the United States. The current weather radar network was deployed in the 1990s and has exceeded its original design life. To improve how we detect and monitor hazardous weather, NOAA is exploring next-generation technologies, and phased array radar is a promising candidate.

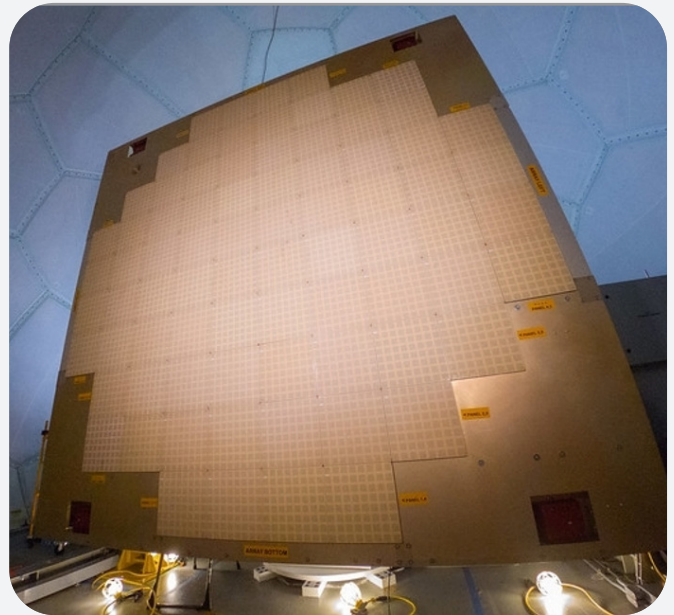
Phased array radar offers unique capabilities that could make a real difference for public safety. Unlike traditional radar, PAR

can steer its beam electronically, allowing it to scan the atmosphere much faster. It can also focus on specific areas of interest and adapt to changing weather in real time. This means faster, more detailed updates during severe storms, which could lead to better warnings and more time for people to take action.

In collaboration with our federal partners, CIWRO researchers are leading the way in testing and evaluating these advanced radar features to understand how they can improve forecasts and help protect lives and property.

ENGINEERING THE FUTURE

CIWRO engineers are driving innovation in radar technology through their work on the Advanced Technology Demonstrator (ATD), a key platform in NOAA's phased array radar research. Phased array radar systems are highly advanced, requiring precise coordination of thousands of electronic components to steer beams and process data in real time. CIWRO develops sophisticated software that enables agile scanning and high-speed data processing — capabilities essential for observing rapidly evolving weather. These engineering breakthroughs are helping define the next-generation nationwide weather radar network.



300+

hours of PAR data
collected since 2021

44

conference
presentations given
since 2021

2

testbeds conducted
with forecasters

5

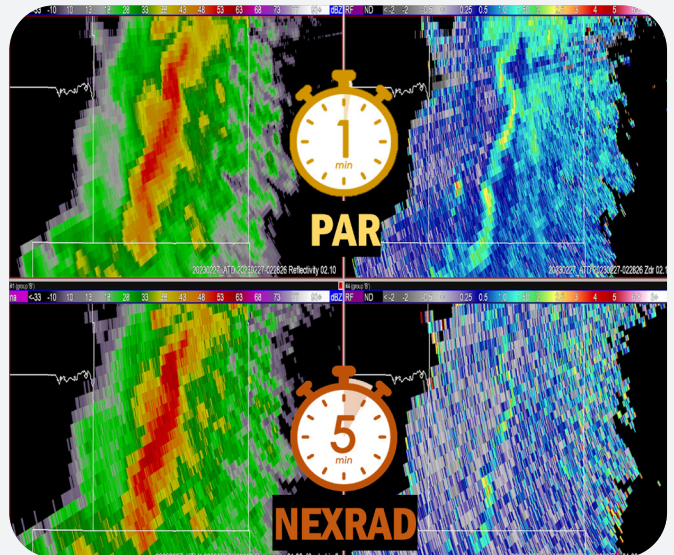
graduate students
advised/mentored
since 2021

11

journal articles
published since 2021

PROVEN RADAR SUCCESS

Leveraging the ATD, CIWRO is leading research to demonstrate how adaptive scanning with PAR can transform severe weather observation and forecasting. Unlike traditional radar like NEXRAD, which produces data every 5 minutes, PAR can deliver updates every minute during rapidly evolving storms. Adaptive scanning allows the system to respond in real time to changing atmospheric conditions, delivering high-quality data exactly when and where it's needed. Over the past two years, the ATD has collected more than 300 hours of data from hazardous events, including tornadic supercells, flash flooding, and giant hail. Observations are shared with forecasters through the Hazardous Weather Testbed (HWT), where feedback is essential for evaluating PAR's operational value. Early HWT experiments in 2024 and 2025 confirm that rapid-update radar data holds promise for improving forecasts and public safety through a more responsive, next-generation radar network.



The UNIVERSITY of OKLAHOMA