MRMS

MULTI-RADAR MULTI-SENSOR SYSTEM

The Multi-Radar Multi-Sensor (MRMS) system combines various weather data sources into relevant products and visualizations to help with the prediction, communication, and warning of weather hazards. The MRMS system is jointly developed and maintained by CIWRO and NSSL.
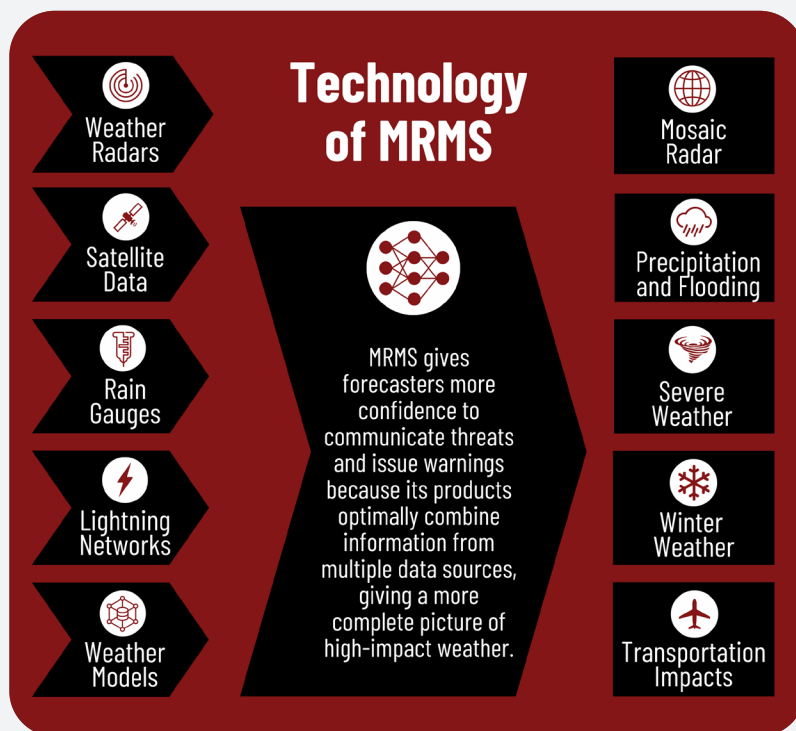
CIWRO scientists and software engineers developed and maintain products designed for the analysis of severe weather events, precipitation estimates, flash flooding, winter weather, and transportation impacts that cover all 50 states, Puerto Rico, and Guam.

An operational version of the MRMS system has been available at the National Weather Service since 2014, while CIWRO and NSSL maintain a parallel system to support ongoing research and development activities.

Collaborations with public and private sector partners, including the U.S. Air Force, have led to the development of specialized MRMS domains, products, and techniques designed to better serve stakeholders and end-users. MRMS has helped correctly predict tornadoes and hurricanes, life-threatening floods, and treacherous travel conditions.

FUSION MEETS PRECISION

The foundation of MRMS is the ability to "mosaic" radar data, or combine data from multiple radar sources to create a single, unified view of an area. Advanced quality controls developed by CIWRO remove non-meteorological artifacts, mitigate beam blockage and wind farm impacts, and resolve hardware issues. Radar data are then paired with other observations from rain gauges, model data, satellites, and lightning detection networks to derive the different weather hazard products. CIWRO built flexibility into MRMS to support the next generation of observing platforms, including phased array radars and privately owned satellite and radar networks.

Technology of MRMS

Weather Radars

Satellite Data

Rain Gauges

Lightning Networks

Weather Models

MRMS gives forecasters more confidence to communicate threats and issue warnings because its products optimally combine information from multiple data sources, giving a more complete picture of high-impact weather.

Mosaic Radar

Precipitation and Flooding

Severe Weather

Winter Weather

Transportation Impacts

BEDROCK OF OPERATIONS

7,000,000
lines of code developed, maintained, and enhanced

40+
web pages hosted and maintained

58
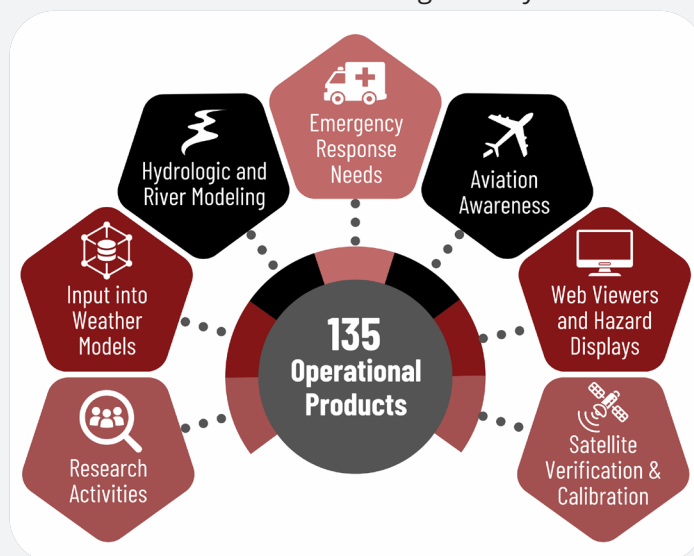conference presentations given since 2021

Silver Medal awarded from U.S. Dept. of Commerce

The National Weather Service uses MRMS applications for warning operations and public messaging of weather hazards daily. MRMS storm rotation tracks are used to determine emergency response locations and tornado damage surveys. MRMS radar reflectivity mosaics are ingested into various models and decision-support applications for the USAF, the Federal Aviation Administration, NOAA, NASA, and the U.S. Geological Survey. MRMS precipitation estimates are used in the National Water Model and by NWS River Forecast Centers to better predict river flooding. MRMS infrastructure is key to supporting CIWRO and NSSL's research enterprises, including NOAA Hazardous Weather Testbed activities, the Warn on Forecast System, field campaigns, and AI/machine learning studies.

135 Operational Products

- Hydrologic and River Modeling
- Emergency Response Needs
- Aviation Awareness
- Web Viewers and Hazard Displays
- Satellite Verification & Calibration
- Research Activities
- Input into Weather Models

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