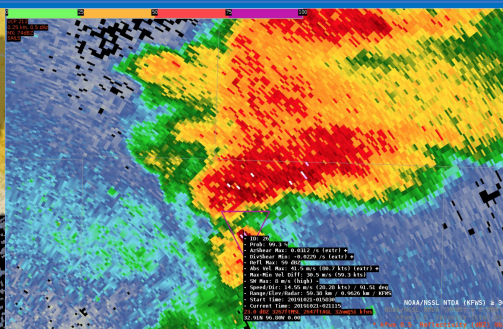
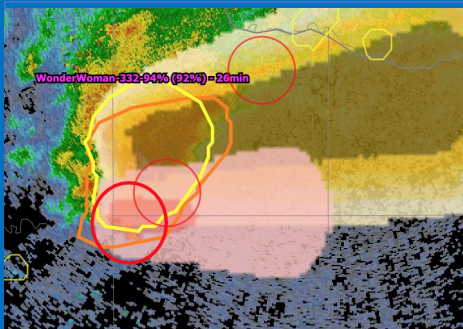




Better Forecast/Warning Tools and Techniques

Observation-based Severe Convective Tools Overview

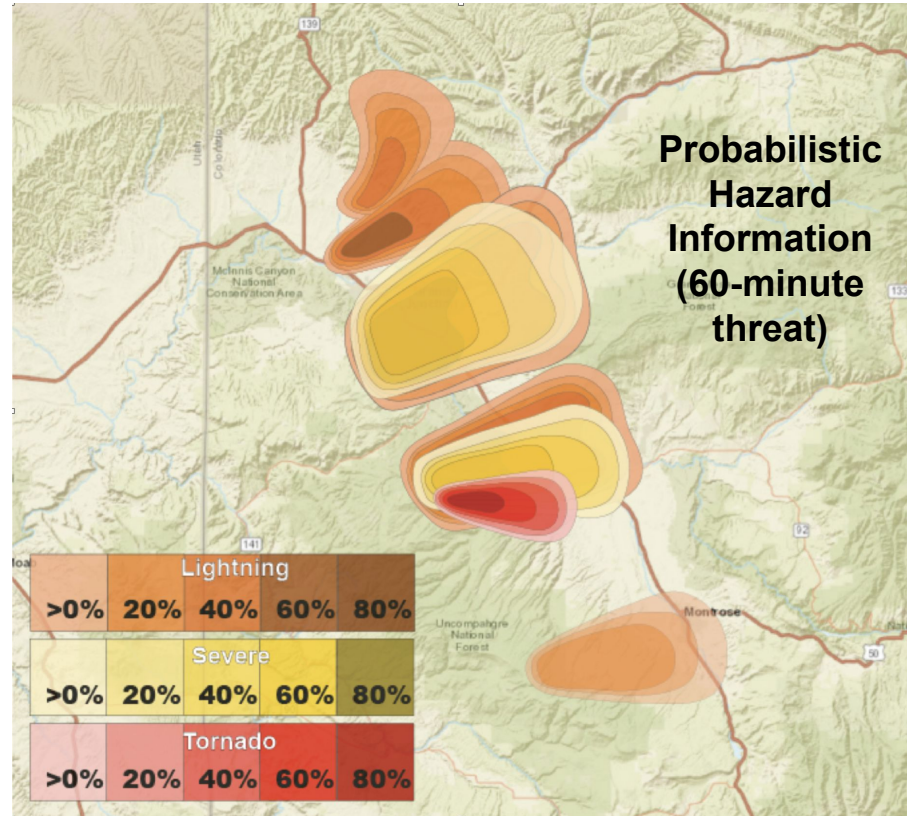
Travis Smith; CIWRO Senior Research Associate; WRDD CIWRO Lead





NOAA long-term goal: Weather Ready Nation

“Essential components of a weather-ready nation are integrated, impact-based information and decision-support services so that citizens, businesses, communities, governments, and first responders are prepared, ready to act, and able to minimize risk. Impact-based information means NOAA understands the information needed, how it will be used to make decisions, and the value such information brings to minimizing risk and impact.”





OAR Goal 3: make forecasts/predictions better

OAR Goal 4: drive innovative science

Machine learning - detection and short-term prediction of:

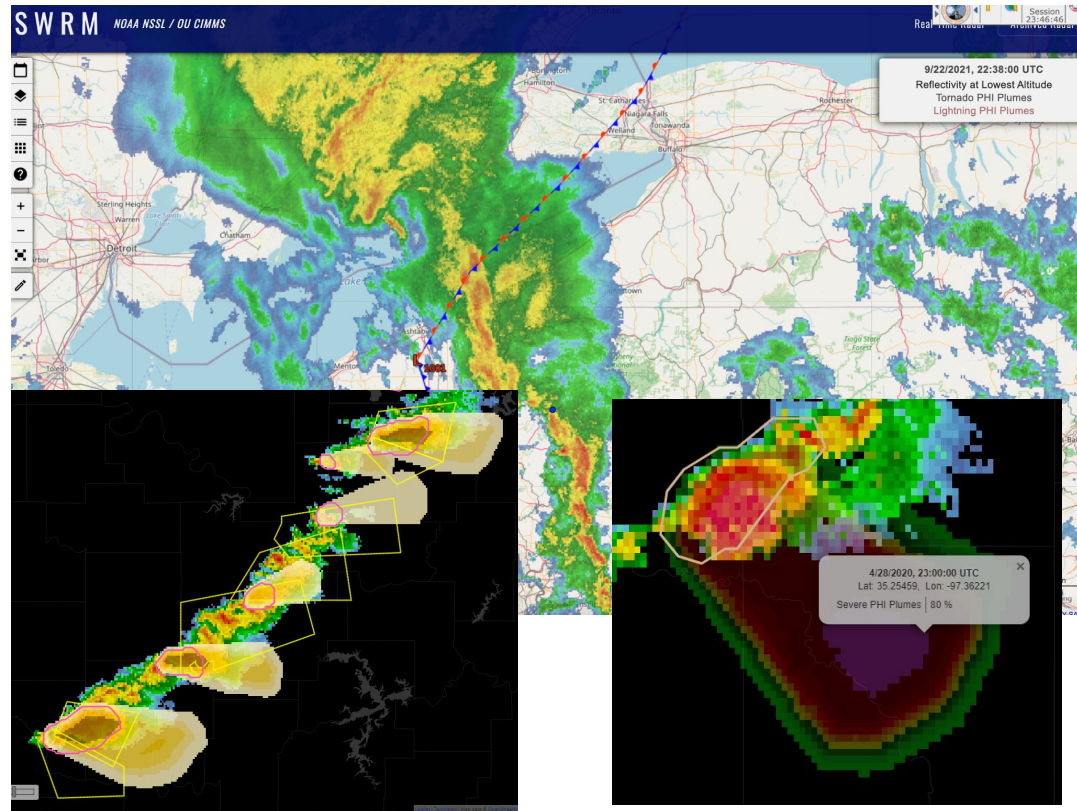
- Tornadoes
- Hail
- Damaging Convective Wind
- Flash Flooding

How do humans use these tools?

Newer web technologies

- Georeferenced data
- Modern databases

Quantifying and managing uncertainty at 0-60 minute scale



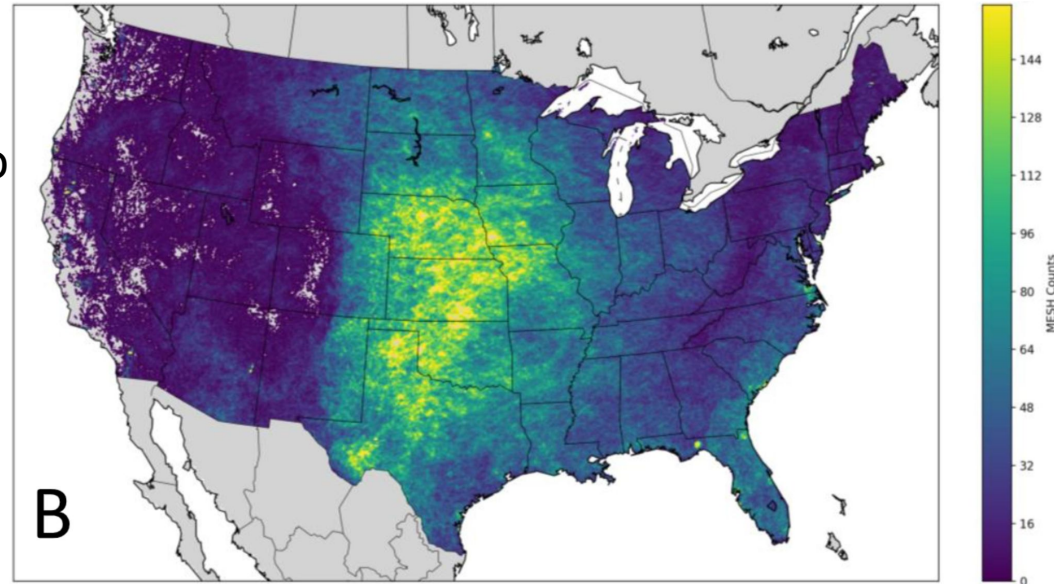


Large Radar Datasets, Machine Learning, and Storm-scale probabilistic hazard guidance

Over 2 decades worth of WSR-88D data covering the CONUS

Quality controlled CONUS data from 1998-2011 (more to come)

- Range of storm behaviors
- Climatology
- Training machine learning applications
- Validation of NWP models
- Guidance for “strike” probabilities



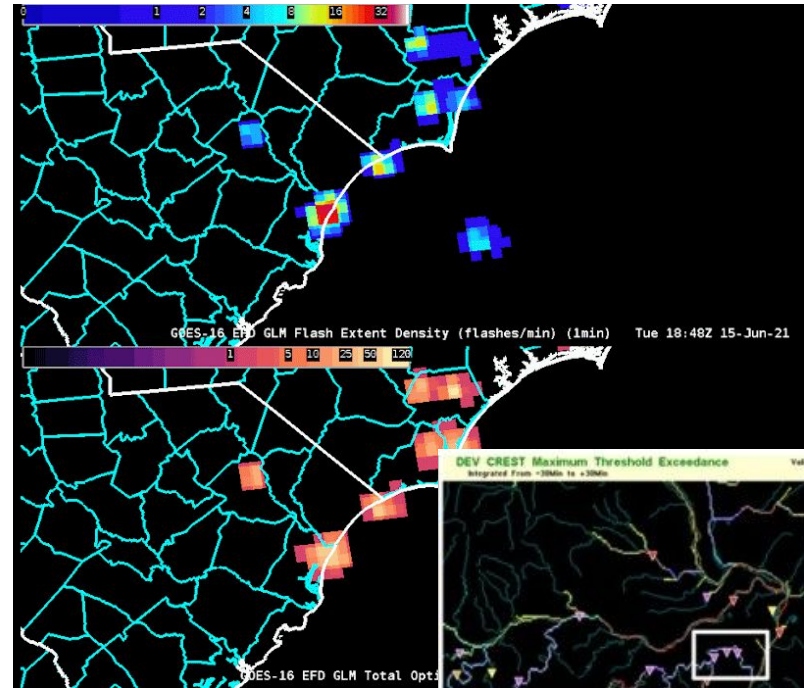
MYRORSS hail occurrence 1998-2011





Satellite, Lightning and Flash Flood Research

- Satellite R&D has greatly expanded with the new applicability to severe weather following the launch of the GOES-R series of satellites.
 - New products and algorithms
 - Data assimilation & machine learning
 - No longer dependent on radar data alone.
- Flash flood guidance change the paradigm of how flood threats are evaluated.
 - very high resolution terrain
 - vegetation
 - MRMS precipitation estimates



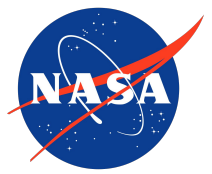


Working with partners

Forecasters, Emergency Managers, Broadcasters, Weather Enterprise



Collaborators



MRMS



Weather Enterprise



Willis Towers Watson



Broadcast Meteorologists

Research

Operations & Users





Tornado Warning Improvement and Extension Program (TWIEP) Goals

3. “Implement a next-generation NWS warning paradigm to include probabilistic hazard information with extended lead times that empower effective decision-making.”

5. “Define and implement optimal predictive information content and lead time for decision makers tailored to diverse user groups, with an overall focus on effective communication and response using social and behavioral science studies.”





Quality & Performance

2016 & 2018 National Weather Association Larry R. Johnson Special Award - for the successful transition to operations of applications that assist forecasters with warning operations and observations (MRMS-Severe and mPING).

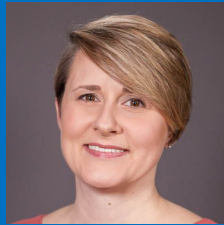
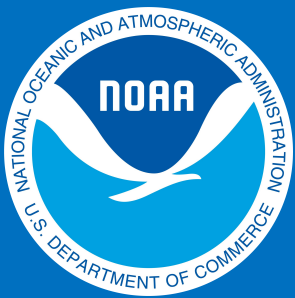
Over 70 refereed publications since 2015

Students mentored / degrees granted:

- Ph.D: 7
- MS: 8
- Undergraduates: 19 UGRAs, 5 REU, 11 OU Meteorology Capstone

24 Hazardous Weather Testbed experiments
led since 2015





Kodi Berry



Kristin Calhoun



Adrian Campbell



J.J. Gourley



Kim Klockow-McClain



Holly Obermeier



Kiel Ortega



Anthony Reinhart



Thea Sandmæl



Rebecca Steeves



Travis Smith

Questions for the Observation-based Severe Convective Tools panel?

