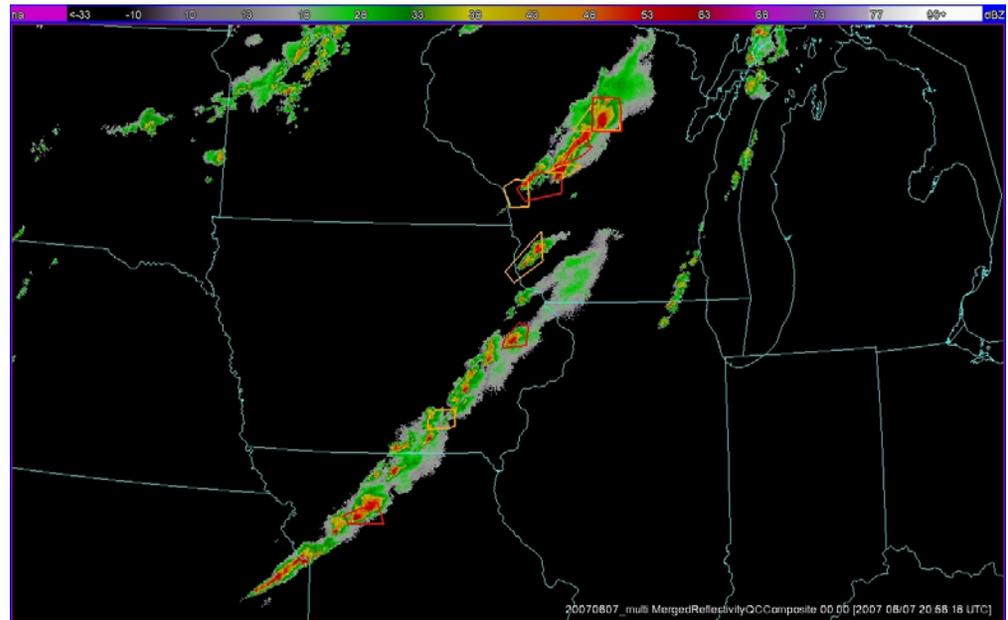
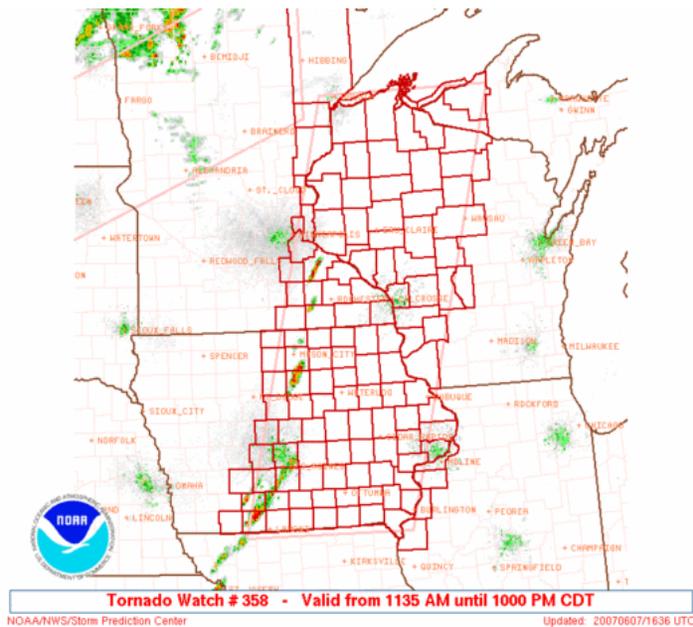
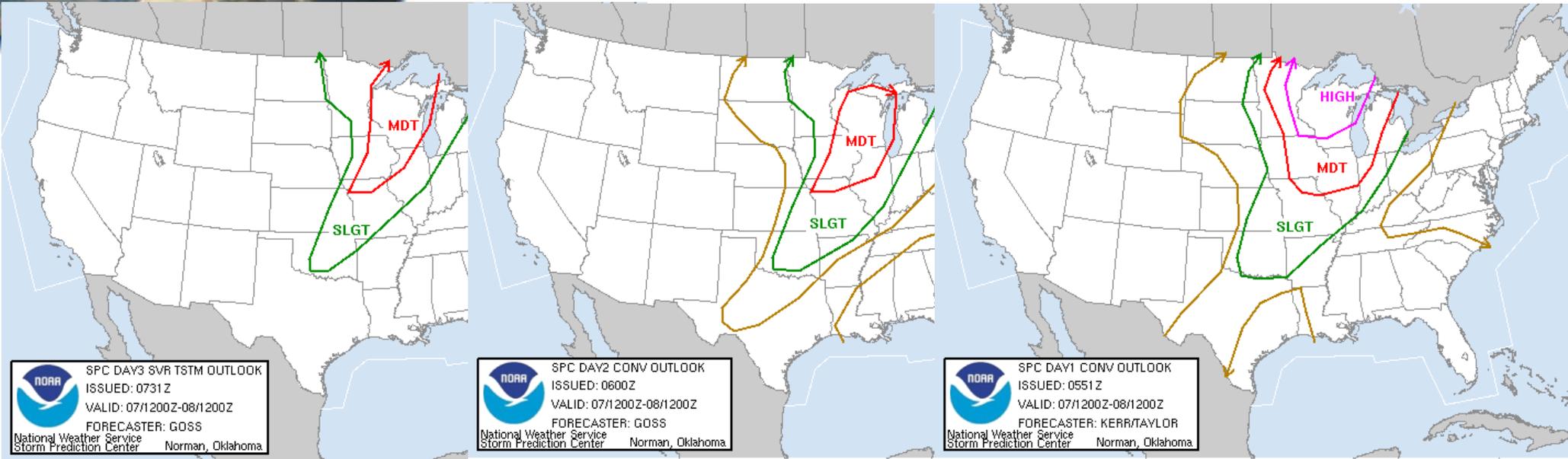


Hazardous Weather Forecasts and Warnings

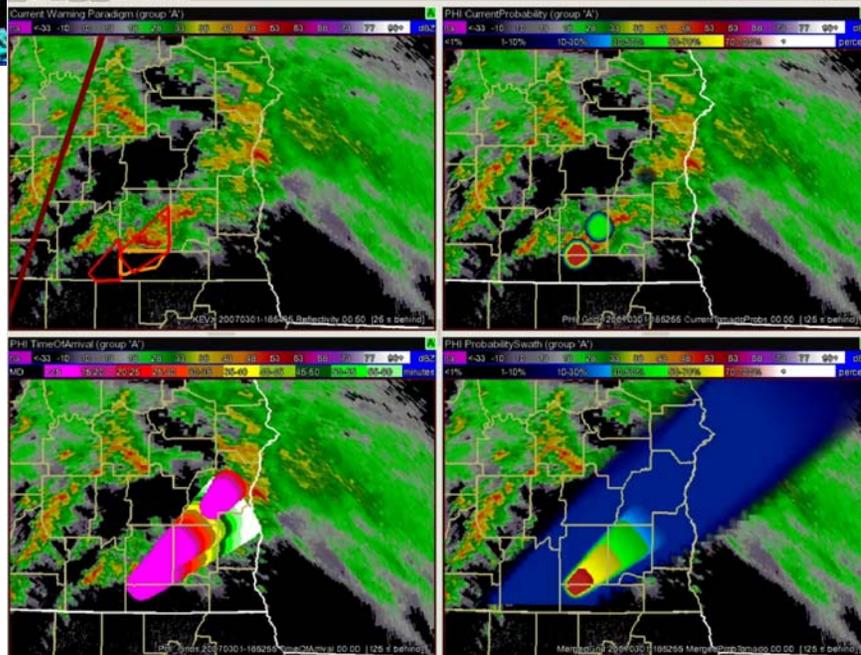
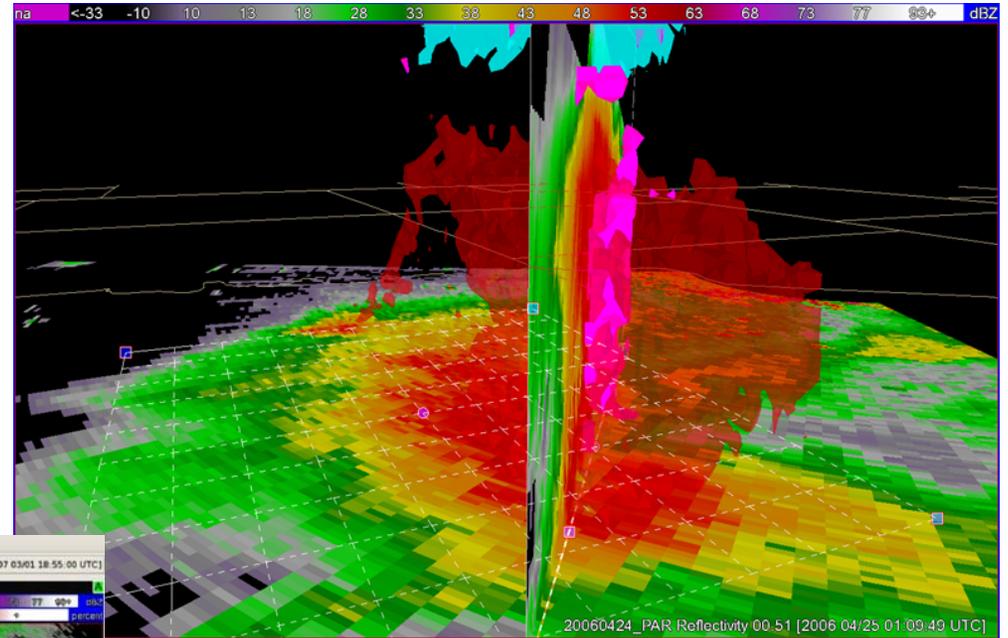
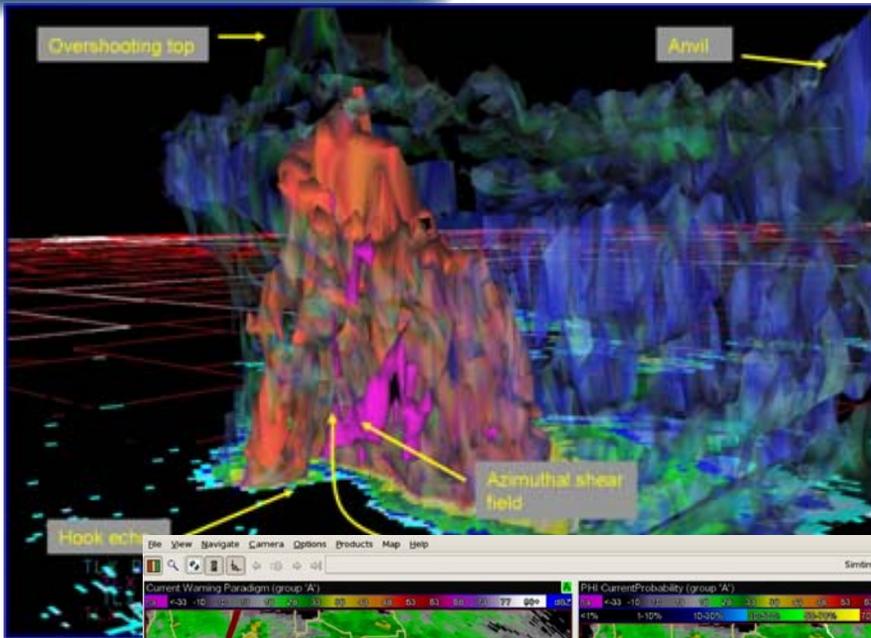
David J. Stensrud
Hazardous Weather Forecasts
& Warnings



NWS Forecast-Warning Continuum

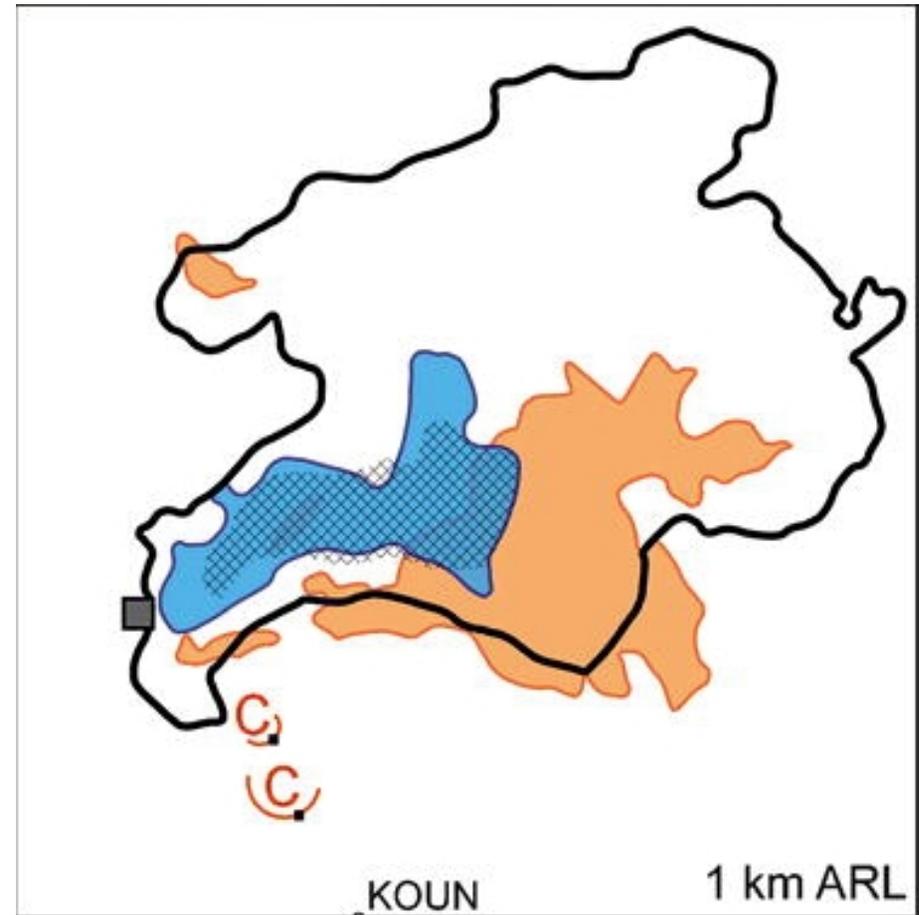
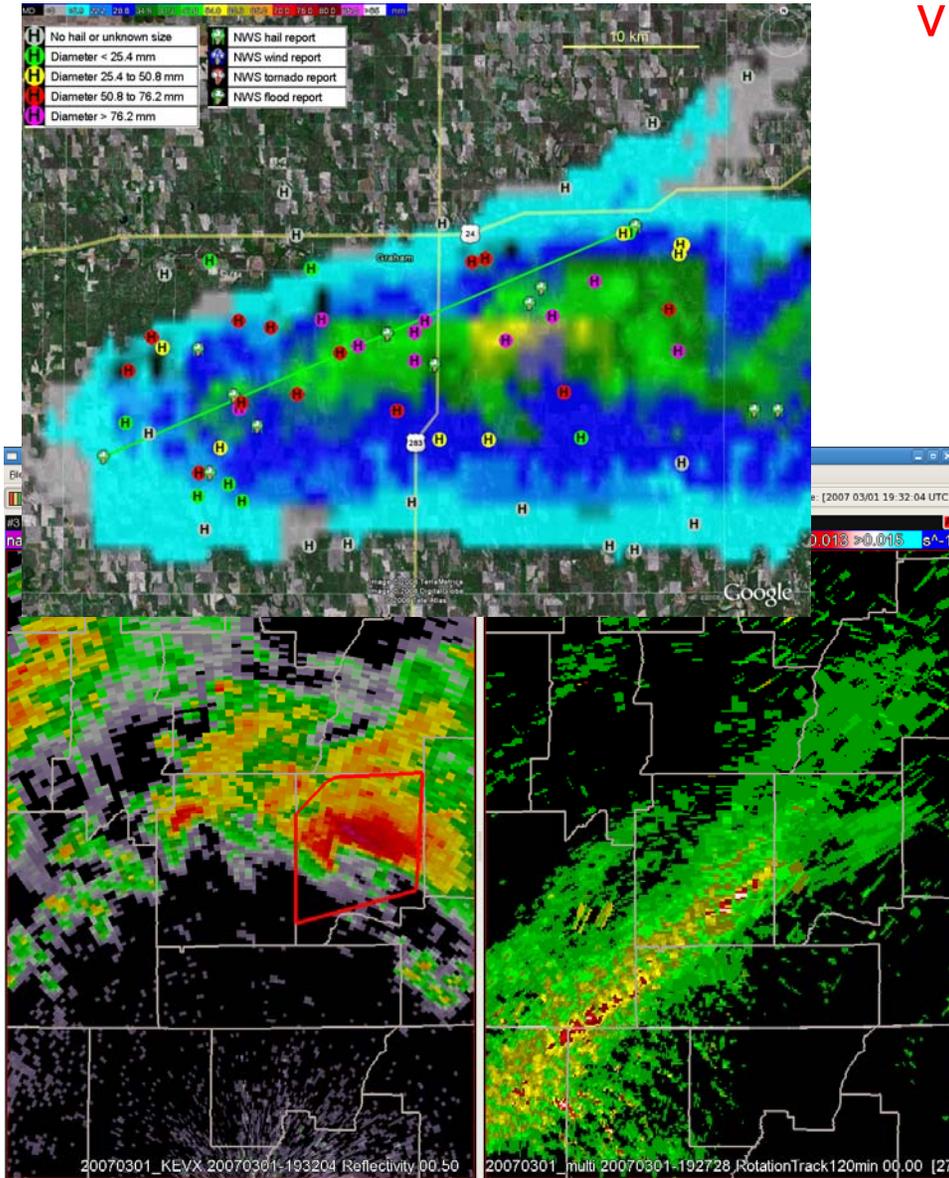


Visualization and algorithms assist in the warning decision process

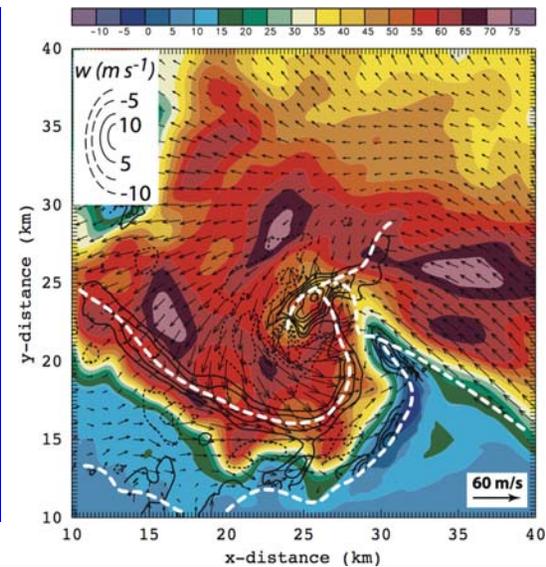
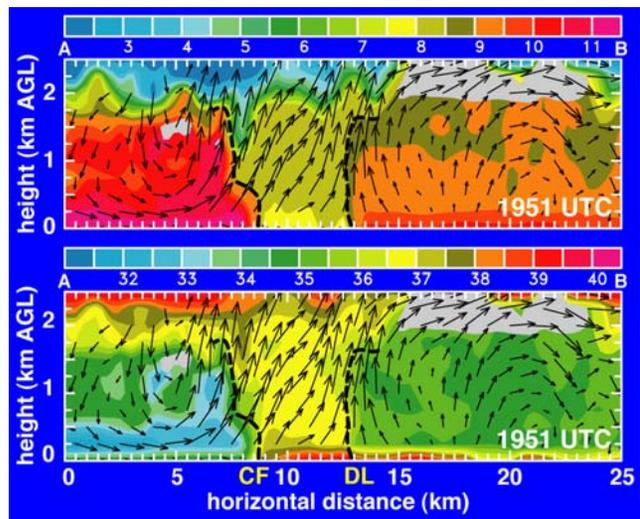
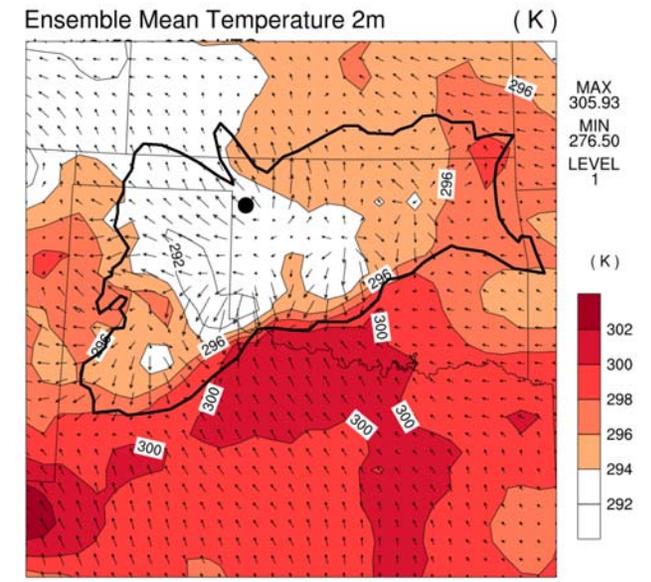
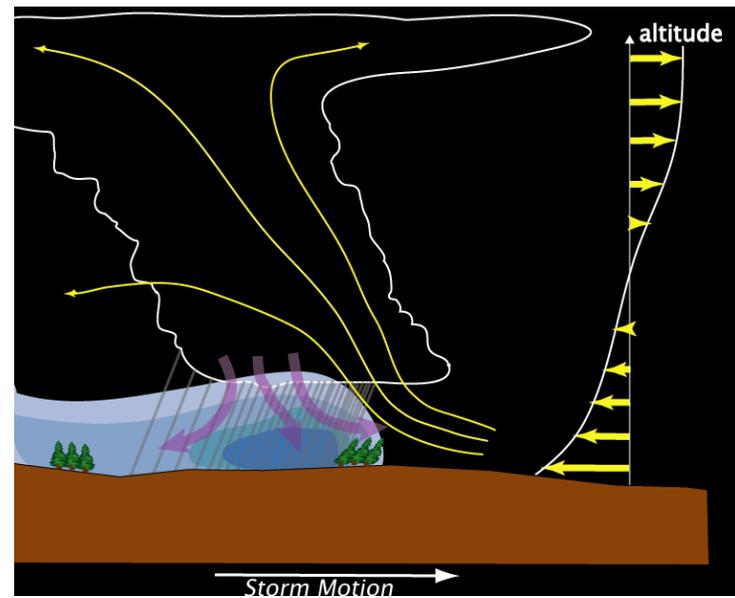




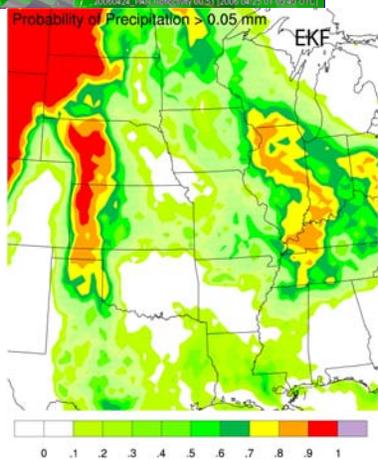
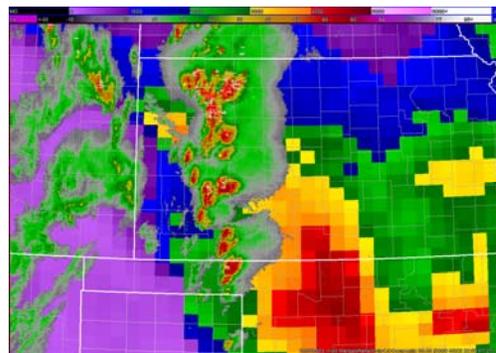
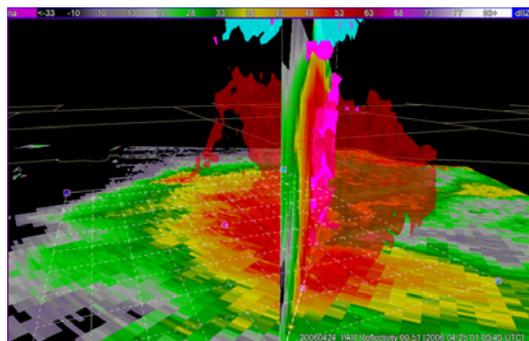
Warning decision process improved due to new observations, integration of new science into algorithms, improved training, and new visualization methods that integrate social science knowledge



Forecast guidance improved due to scientific understanding, data assimilation, ensembles, and interaction with forecasters

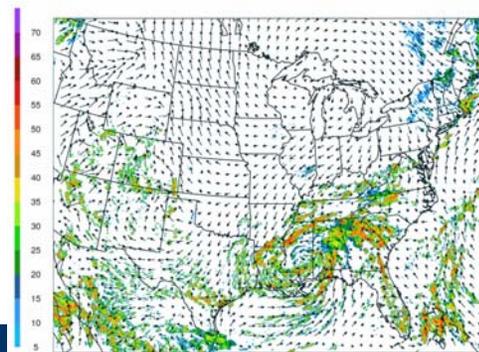


An Exciting Future!



MaxRefll, 10m WIND
VALID 22Z 25 AUG 08

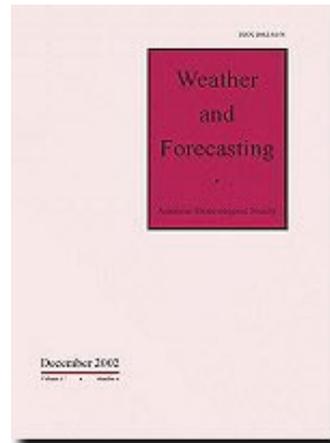
NSSL Realtime WRF
22-H FCST
4.0 KM LMB CON GRD



Quality

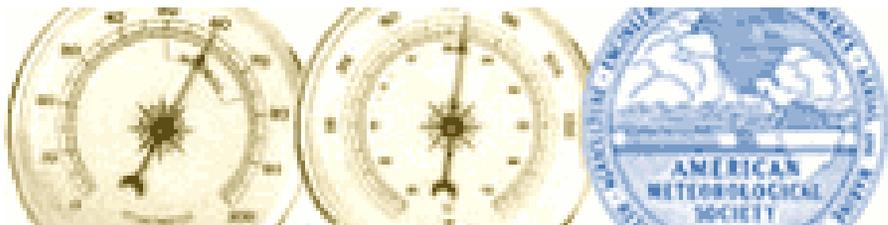
>120 peer-reviewed publications
in last 5 years

Mean H-index of 11 for scientists



Numerous awards:

- Dept. of Commerce Medals (2 Gold, 2 Silver, 2 Bronze)
- 7 Outstanding Paper Awards
- 2 Research Achievement Awards
- NOAA Administrator's Award
- NOAA Technology Transfer Award
- White House Presidential Early Career Award
- American Meteorological Society Awards
- Contributions to 2007 Nobel Prize (IPCC)



Service:

- 2 Editors of *Weather and Forecasting*
- 5 Associate Editors
- Service on various NOAA, community, and international boards

Quality

Collaborations



NOAA/ESRL



NCAR The Earth & Sun Systems Laboratory

Earth Observing Laboratory





Relevance

NOAA Mission Goal

Weather and Water

“Serve society’s needs for weather and water information”

Objectives:

- Increase lead-time and accuracy for weather and water warnings and forecasts
- Increase development, application, and transition of advanced science and technology to operations and services
- Improve predictability of the onset, duration, and impact of hazardous and severe weather and water events
- Understand and predict climate variability and change from weeks to decades to a century (Climate Mission Goal)



Relevance

5-year Research Plan

Weather and Water

Milestones:

- Improve the forecast and warning verification system to relate more directly to user impact and to enable more rapid feedback loop for service improvement.
- Deploy NEXRAD systems with dual polarization capability to improve the detection of storm characteristics critical to severe storm warnings.
- Using the testbeds, transfer up to six research results into operations per year.
- Determine viability of different data assimilation approaches (e.g., 3-D Var, ENKF, 4-D Var).
- Evaluate the utility of probabilistic forecasts for hazardous weather and explore “warn on forecast” concepts.



Relevance 20-year Research Vision

“Severe storm and event warnings will save more lives and property”

- Severe thunderstorm and tornado track forecasts at the sub-county level with one hour or more lead time
- Work with partners to provide neighborhood-level weather forecasts and 10-14 day forecasts as accurate as current 7-10 day forecasts
- Seasonal to decadal climate predictions with clearly stated levels of uncertainty.

Performance



National (NOAA and non-NOAA) and international participants in the Hazardous Weather Testbed highlight the effectiveness of this Testbed



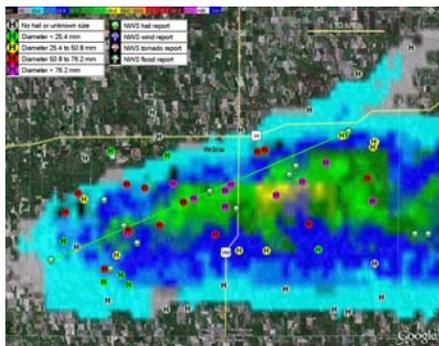
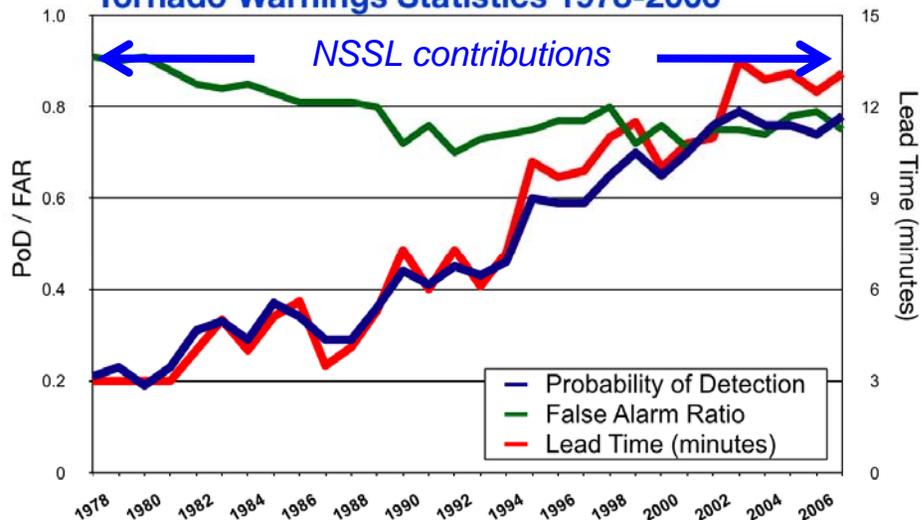
External funding from NOAA units to support research and technology Transfer (> \$1M/year)



Planning done through the NOAA Planning, Programming, and Budgeting Execution System (PPBES)

Performance: Impact on NWS Operations

Tornado Warnings Statistics 1978-2006



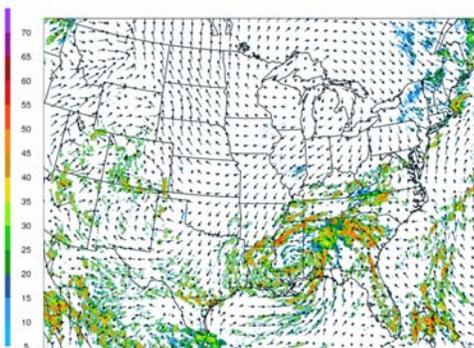
Warning Verification



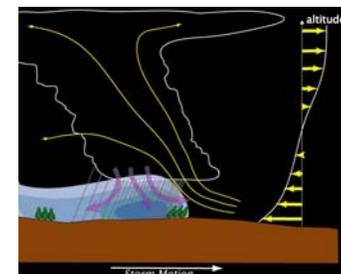
Operational model improvements

MaxRefll, 10m WIND
VALID 22Z 25 AUG 08

NSSL Realtime WRF
22-H FCST
4.0 KM LMB CON GRD

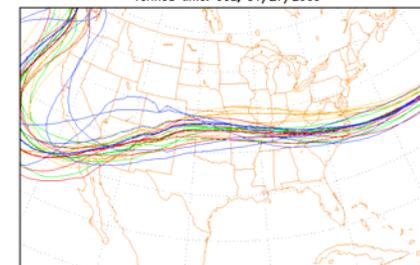


Visualization



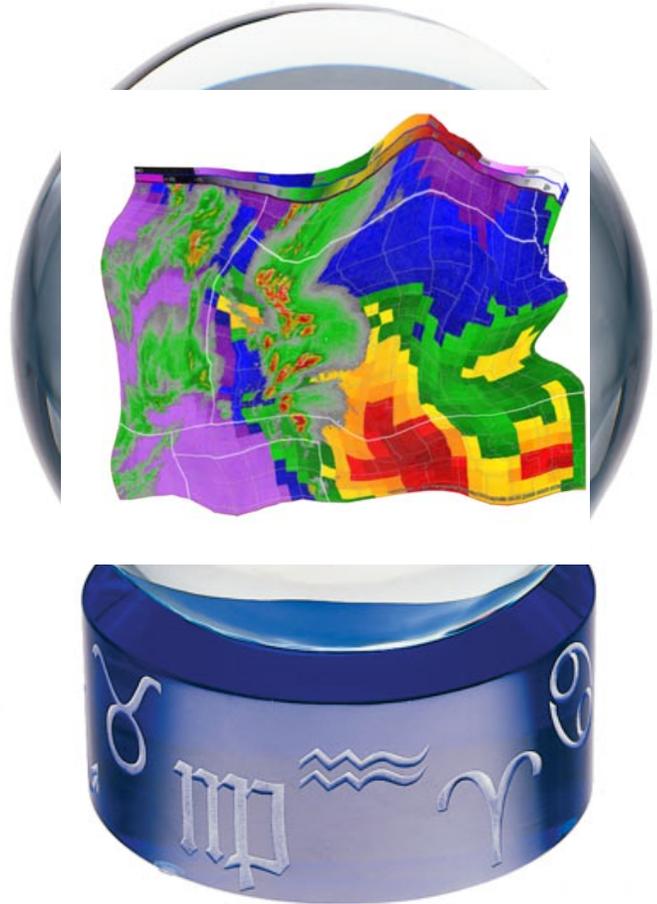
Convective system longevity

COM_US 500mb ht(m) 5640m Spgt 87H fcst from 09Z 23 JAN 2009
verified time: 00z, 01/27/2009



Produced by JUN DU, EMC/NCEP/NOAA

Short-Range Ensemble Forecasting (SREF) system



VISION

