What is the Hazardous Weather Testbed?

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SPC

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HWT-DTC Collaboration Meeting
Boulder, CO
September 25, 2009

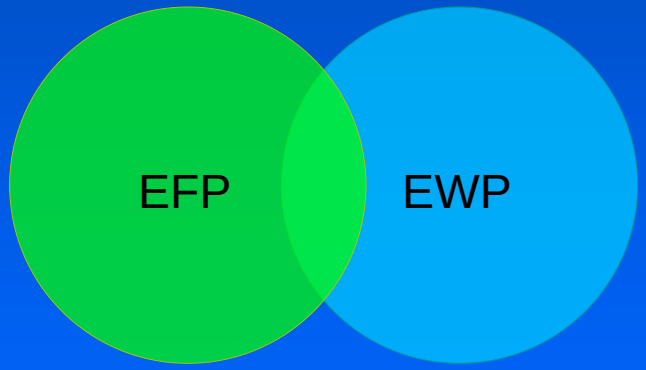
Storm Prediction Center
Norman, Oklahoma

NOAA Hazardous Weather Testbed

• *An **organization** that supports and promotes collaborative research activities between NSSL, SPC, WFO OUN, and the broader national and international meteorological community of research scientists, academia, and forecasters.*

Two Main Program Areas…

Experimental
Forecast
Program



Experimental
Warning
Program

*Prediction of hazardous mesoscale and stormscale events from **a few hours to a week in advance***

*Detection and prediction of hazardous mesoscale and stormscale events **up to several hours in advance***

What inspired the current HWT framework?

Spring Experiments…

SPC Arrives…Spring Expts. Begin… 1997

2000 - 2001: Winter Weather Experiment

2000 - 2001: Convective Parameterization

SE 2002: IHOP Forecasting Support

SE 2003: Mesoscale Ensembles

SE 2004 - 2005: Convection-Allowing WRF Model Forecasts

SE 2006:

SE 2007 - 2009: Convection-Allowing Ensembles

The Annual Spring Forecasting Experiment

A 6-8 week experiment conducted each spring to evaluate emerging scientific concepts and tools in a simulated operational forecasting environment

…Scenes from SE2008…

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SPC/NSSL Spring Experiments

- **Key Partnerships**
  - Convection-allowing WRF forecasts provided by EMC, NCAR, OU/CAPS, GSD, and AFWA (in addition to NSSL)
  - Objective verification from DTC
- **Applied Science**
  - In what ways can high resolution models help NWS improve forecasting of severe convection and other impact weather?
  - How can experimental forecasting and evaluation activities be designed to enhance feedback to model developers?
- **Operational Forecasting**
  - How can we use convection-allowing WRF models in conjunction with operational deterministic and ensemble model output?
  - Do forecast benefits from hi-res WRF models justify larger computational, bandwidth, and workstation requirements?

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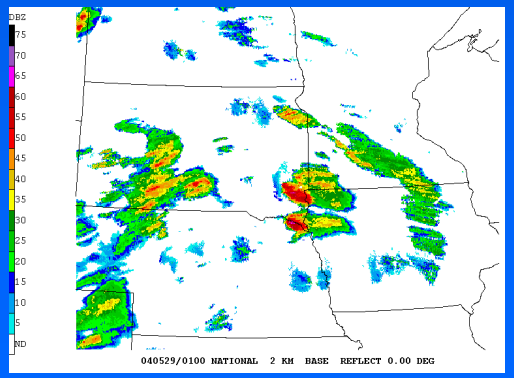
As an example, consider Spring Experiments '04-'05:

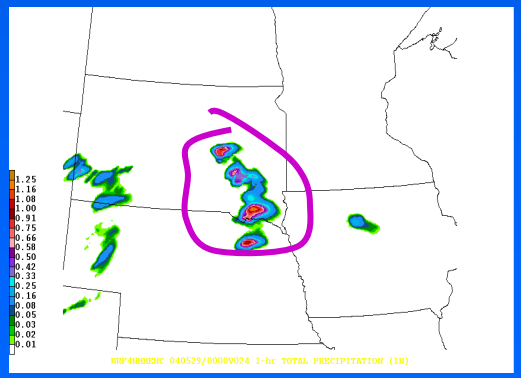
Convection-allowing model forecasts

-50+ Participants from a broad range of research, forecasting, and academic organizations.

-Topics of investigation:

- *Convection-allowing model forecasts (CAMs) from WRF-ARW and WRF-NMM dynamic/physics cores.*



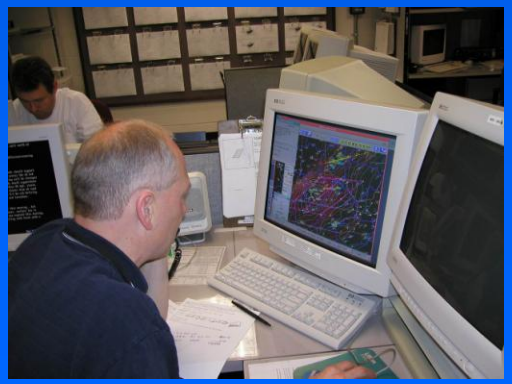


NCEP

NCAR

Hazardous Weather Testbed Unique Benefits

- The close working relationship between operational and research meteorologists has fostered
  - *Increased appreciation by **Research Scientists** of forecaster insights, and operational constraints and requirements*
  - *Education of **Operational Forecasters** about cutting-edge NWP models and science concepts for application to severe weather forecasting*
  - ***Accelerated Transfer** of useful new science and technology from research to operations*



Some Payoffs…

- Research:
  - Multiple publications
  - New insight into design and applications of CAMs and CAM-based ensembles
    - Extraction of explicit “surrogate” severe storm reports
    - Radar assimilation
    - Object-based verification techniques
  - Strengths and weaknesses of various WRF configurations identified, communicated to EMC, GSD and NCAR scientists
- Operations:
  - Broad enthusiasm for “simulated reflectivity” product
    - Use of explicit storm attribute products (e.g., updraft helicity)
  - How to use these models in an operational sense at SPC
    - ***“Storms not necessarily in right place but we can get useful information from these models [mode and evolution]”***
    - ***“A turning point in the use of model output”***
  - NCEP/EMC vision for operational production suite began to include convection-allowing configurations
    - CAMs now in operational High-Res Window run slot

HWT – New Opportunities

- Addition of GOES-R Proving Ground in 2009
  - Testing of synthetic GOES-R products prior to launch
    - Examples: Cloud-top Cooling Rate and CI product
    - R2O and O2R two-way feedback
- Utilization of HWT for diverse convective weather impacts and in experiments/workshops
  - Warm season thunderstorms and aviation (2010)
  - Dry lightning and fire weather
  - Cool season Southeast US tornadoes
  - Heavy rain and flash flooding (QPF and RFC)
    - Transition from severe weather to heavy rain

What is the Hazardous Weather Testbed?

A vehicle for effective collaboration between forecasters and researchers…