HWT Spring Forecasting Experiment: History and Success

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# Essentials of the Spring Forecasting Experiment

What is it?

- 5-week forecasting experiment organized by NSSL and SPC.
- Emerging concepts and new technologies for improving severe weather prediction are tested.
- Useful tools implemented at SPC and beyond (e.g., WFOs, other national centers).

Keys to success

- Sense of realism and operational urgency
- Diverse participants
- R2O⟷O2R pathways
- 49 peer-reviewed publications since 2010

Academic

Federal Scientist

SPC

SPC
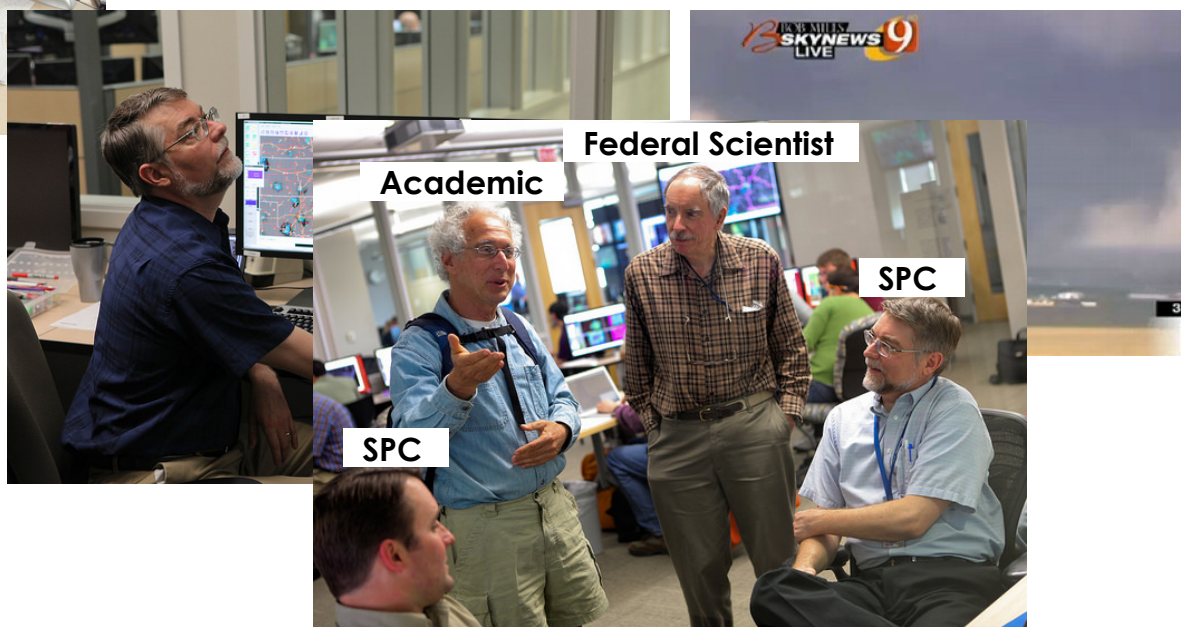
History Timeline – Selected Milestones

1997: SPC moves from Kansas City to Norman.

2000-01: Spring Program formalized.
- Decision made to focus on SPC-specific forecast problems.
- Visiting scientist from EMC co-funded by NSSL and SPC helped jump-start inter-agency working relationships

2006: NSSL and SPC move to the NWC and the HWT is created.

1970s – 1990s: *Culture of Collaboration* established between NSSL and the local WFO.
- Doppler radar demonstrations, data collection/forecasting for field programs, experimental modeling.
- Experimental Forecasting Facility

2003-04: Initial testing of "storm-scale models"
- Models with high enough resolution to explicitly depict storms.
- Forecasters excited: **"A turning point in the use of model output"**
- EMC starts year-round runs for SPC and includes storm-scale models in 5-10 year production-suite plans.

2007-present: Focus on using storm-scale ensembles.
- Innovative data mining and visualization techniques.
- Numerous R2O and O2R successes.

External Collaborations

Visitors since 2010

International Collaborators:
- Spain, Germany, Argentina, Canada, England, Finland, Australia

The HWT is a facilitator of R2O and O2R across the larger community

(3) Many Others:
- NCAR, Met Office (UK), ESRL/GSD, AFWA, Academia (ISU, OU, CSU, U. of Albany, U. of Wisconsin, and others…)
- **People want to be here, have had to turn some away.**

Important Collaborative Efforts:

(1) OU/Center for Analysis and Prediction of Storms
- Formal partners through series of NOAA-funded proposals.
- Work since 2007 on high-resolution ensembles has made NSSL world-wide leaders in their development (~10 years ahead of operations).

(2) Aviation Weather Center (Kansas City) and Weather Prediction Center (Washington, DC)
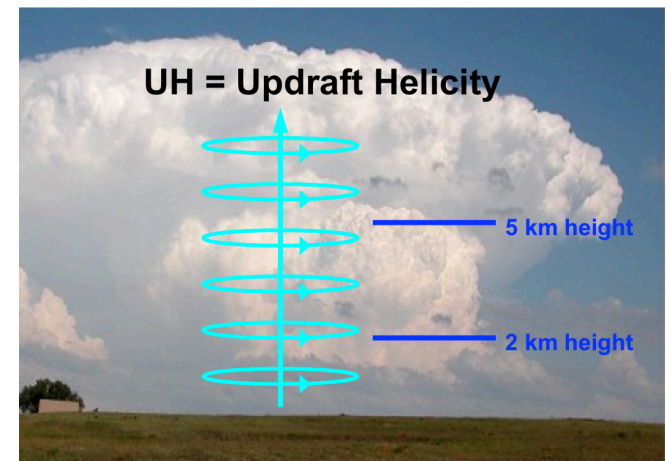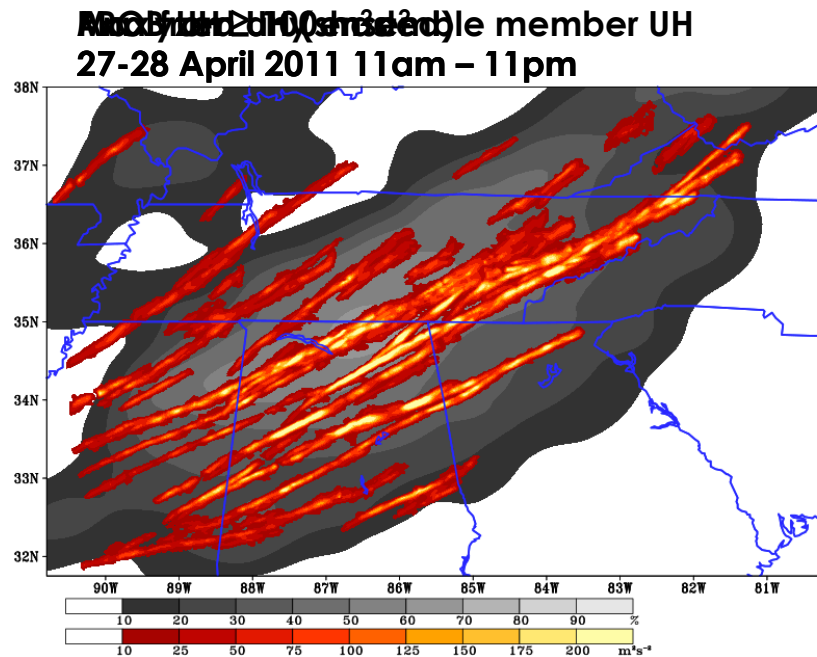- Inspired by their experiences in Norman, these NOAA agencies have modeled their own testbeds after the HWT.
- Even the ESSL created their own severe weather testbed.

How the R2O process works: Updraft Helicity (UH)

- Before 2004 SFE, SPC consulted with NSSL for suggestions on formulating forecasting tools from storm-scale models.
- After several iterations, the concept of updraft helicity (UH) emerged.
- Since 2005, different ways of displaying, computing, and verifying UH forecasts have been tested.
- **R2O process continuous**, with several O2R "loops" resulting in numerous publications.
- Example:

Prob of UH>100 m²s⁻²
Max by ens member UH (shaded)
27-28 April 2011 11am – 11pm

UH = Updraft Helicity

5 km height

2 km height

*Strength of updraft times spin integrated over 2 to 5 km above ground layer

Summary

- Future:

- Proving ground for Warn-on-Forecast: learn to provide and communicate warning uncertainty for high impact events.

- Formalized proposal process and increased support to result in accelerated R2O and further broaden interactions

- Lead development of next-generation high-resolution ensembles to produce accurate/reliable probabilistic severe weather guidance.

- **Don't forget our roots! Interaction with SPC at grass roots levels on topics of mutual interest.**