national severe storms laboratory

NSSL's Collaboration with the National Weather Service's Storm Prediction Center

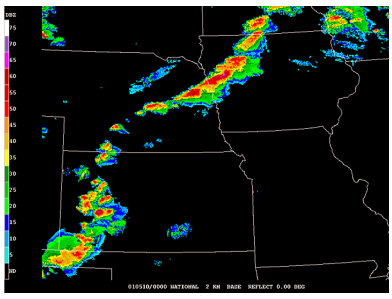
Synergy between research and operations

Productive interactions between meteorologists from the forecasting and research communities have historically been difficult to establish and even more challenging to sustain. However, research scientists and forecasters at NSSL and the National Weather Service's Storm Prediction Center (SPC) are beating the odds. Their ongoing collaborations continue to gain momentum and the spirit of their interactions is emerging as a model for the rest of NOAA.

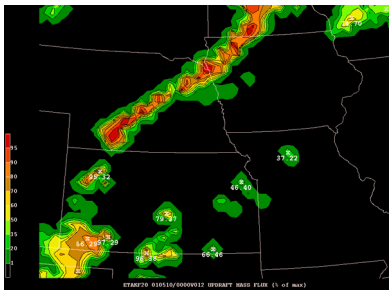
Since the SPC began full-time operations within NSSL's Norman, Oklahoma facilities in early 1997, a variety of collaborative programs have been conducted at the NSSL/SPC facility. These programs have helped provide forecasting support for field research, establish new SPC forecast products, evaluate operational and experimental numerical model guidance, and integrate new observational data, objective analyses, and display tools into forecast operations.

The most recent formal collaboration, the 2001 Spring Program, was particularly successful. Some highlights:

A successful experimental model forecast from the NSSL/SPC 2001 Spring Program. Both images are valid 0000 UTC 10 May 2001.



(a) Observed hourly maximum base-reflectivity



(b) Predicted hourly maximum parameterized updraft mass flux, a unique field produced in experimental model forecasts at NSSL and SPC

- **Forecast Model Evaluations**

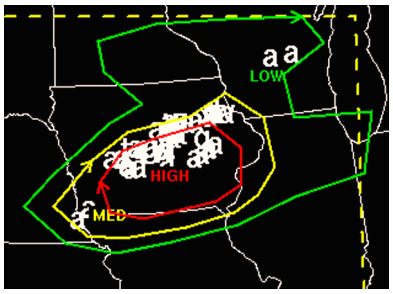
  Numerous operational and experimental forecast models were evaluated for their efficacy in predicting convective initiation during the springtime severe weather season. Evaluations were done in a quantitative format, but the specific assessments were *subjective*, *i.e.*, based on forecaster judgments of accuracy and value. The idea of subjective verification is not unique, but the richness and diversity of the model evaluation dataset collected in this experiment is unprecedented.

  PAYOFF: Numerical forecast model developers are utilizing this unique dataset as guidance for designing improvements to their models. Forecasters are using this dataset for its documentation of the relative biases of different models.

- **Probabilistic Forecast Teams**

  Probabilistic forecasts for initiation of thunderstorms and severe thunderstorms were issued with up to four hour lead time. These forecasts were prepared using an experimental paradigm for personnel interaction, wherein forecast teams consisted of an SPC forecaster, a numerical modeling expert from NSSL, and an external visitor with expertise in either forecasting or numerical modeling. This framework was designed to allow forecast teams to enhance the utilization of model data over that of normal SPC forecast operations, while not diminishing the important role of observational analyses.

  PAYOFF: This dataset is providing SPC forecasters with insight into the optimal utilization of numerical models in forecasting severe weather. It is expected to provide them with guidance for identifying conditions under which severe thunderstorm and tornado watches can be issued with a high degree of confidence of convection well in advance.



An accurate probabilistic forecast for severe weather issued on 10 May 2001. Probabilities are expressed in terms of forecast-team confidence levels of Low, Medium, and High. Severe weather reports of hail (a), high wind (w), and tornado (t) are overlaid.

The forecast team evaluates numerical model output during simulated operational forecasting exercises in the 2001 NSSL/SPC Spring Program.

An SPC forecaster shares his perspective at an NSSL/SPC map discussion.

- **Interactions with the Broader Community**

  This program was invigorated by active participation from several agencies, including NOAA's Forecast Systems Laboratory, NCEP's Environmental Modeling Center, the National Weather Service Norman Forecast Office, Iowa State University, and the University of Oklahoma. Model developers from diverse backgrounds had a rare opportunity to work side-by-side with the end users of their product. Likewise, forecasters were provided the chance to discuss various applications and interpretations of numerical forecast models with the model developers within the context of a simulated forecasting environment.

  PAYOFF: The direct benefit of these interactions is intangible but significant. These programs cultivate solid working relationships between the operational and research communities that will provide the foundation for expanding collaborative efforts in coming years.

  MORE INFORMATION:
  http://www.spc.noaa.gov/exper/Spring_2001/

- **Other Collaborations**

  While group activities such as the 2001 Spring Program have provided an organized forum for NSSL/SPC interactions, the activity doesn't stop when these programs end. Daily map discussions are more than simple briefings as forecasters, dynamicists, modelers, and others frequently share their own unique perspective on the current day's weather or on a historical weather event.

  The combination of these scheduled events, mutual interest, and close proximity has spawned a number of individual collaborative research projects between NSSL and SPC on diverse topics. For example, formal research projects on shear and buoyancy profiles associated with damaging wind events, winter-time precipitation type forecasting, the use of ensembles for severe-weather forecasting, inter-mountain precipitation events, the role of moisture flux convergence in convective initiation, and interpretation of model output soundings have all been inspired by informal interactions. The value of collaboration between operations and research is truly realized daily at NSSL and SPC.

- **What's Next?**

  NSSL's Mesoscale Applications Group and the SPC will be executing the 2002 Spring Program in conjunction with this year's International H2O Program (IHOP) field campaign. The program will provide detailed forecasts of convection initiation and evolution for IHOP field crews. Forecast teams will use operational and experimental numerical forecasts, including numerous products from the emerging Weather Research and Forecasting (WRF) model. Forecast products and numerical guidance will once again be carefully evaluated by a diverse group of forecast teams.

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