

# **Spring Experiment 2006 – Operations Plan**

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## **1. Introduction**

The SPC/NSSL Spring Experiment for 2006 will focus on the pre-implementation evaluation of the WRF-NMM to replace the current Eta model that is running in the North American Mesoscale (NAM) slot. New plans developed by EMC/NCO indicate the evaluation period will run from March 6-May 19, with a final review meeting on May 25. If the consensus review provided by NCEP Centers and NWS Regions is favorable, the NAM-WRF (hereafter WRF) will replace the NAM-Eta (hereafter Eta) in mid June.

Given the planned move of NSSL to the new National Weather Center facility in the May-June time frame, an expansive Spring Experiment that includes numerous outside participants is not planned for this year. Rather, efforts will be devoted to provide a thorough evaluation of the WRF parallel runs and compare its performance to that of the operational Eta on severe weather days during the evaluation period. Since the emphasis of the evaluation is to determine if the WRF provides similar, better, or worse guidance than the Eta to SPC forecasters during severe weather episodes, the activities will focus on evaluation of the two models in a post-event manner. A guiding principle of the evaluation will be to determine if the WRF guidance would result in SPC severe weather outlooks being substantially different severe weather outlooks based on Eta guidance. Although some differences between the two model forecasts are likely to occur, the differences will not be considered significant unless they would result in the issuance of different severe weather forecasts.

Unlike previous years, there will not be a daily forecast component to the experiment. SPC forecasters are welcome to participate in any evaluation activities that occur while they are on K shift, as their insights will provide valuable input to the evaluation process. In addition, several NSSL scientists will participate in the evaluation on selected days. The parallel WRF products will also be available in operational N-AWIPS workstations, so SPC forecasters will have an additional way to explore the WRF comparative performance prior to the planned operational implementation. Since the evaluation period is starting approximately 5 weeks earlier than previous Spring Experiments, the frequency of severe weather episodes will likely be less than later in the Spring, and there will be days during some of the period when severe weather activity or potential is minimal. Thus, evaluation activities may not take place on a daily basis, but they will be dictated by severe weather occurrence and/or potential.

Here are some data for the number of days by month the 1630z outlook contained at least a slight risk for the period 2000-2005:

<b>Month</b>	<b>Avg # Slgt Risk Days</b>	<b>Max (Year)</b>	<b>Min (Year)</b>
March	19 (61% of days)	25 (2000)	15 (2004)
April	24 (81% of days)	26 (2000, 2003)	21 (2005)
May	29 (92% of days)	31 (2000)	28 (4 years)

Here are additional data specifying the number of days each month when 10 or more severe reports occurred anywhere in the CONUS. These data cover the period 2000-2004.

Month	Avg # Days with $\geq 10$ Svr Rpts	Max (Year)	Min (Year)
March	15.6 (50% of days)	21 (2000)	12 (2004)
April	22.2 (74% of days)	25 (2004)	20 (2001)
May	30 (97% of days)	31 (2000, 2001)	29 (2003, 2004)

These tables indicate that severe potential/occurrence sufficient for model evaluation activities will increase from around half the days in March to more than three-fourths of the days in April to nearly every day in May.

## 2. Data and Methodology

The primary data used in the evaluation will be identical GEMPAK files from the Eta and parallel WRF, with the files obtained via dbnet alerts from NCO. The primary WRF parallel grids will be at 40 km grid spacing, identical to the current NAM40 (Eta), although a selected number of surface and precipitation grids will be available at 12 km resolution. In addition, PFC soundings from both models will be available for direct comparison in NSHARP.

Unlike the Eta, the WRF will be using a new 3DVAR data assimilation system (Gridpoint Statistical Interpolation, or GSI). It may be important to compare 00hr fields and soundings from each model to see if the two initial conditions are noticeably different because of the impact of the GSI.

We also will create several web-based displays and information pages that will serve most of the evaluation activities.

a) One is a 4-panel display of forecasts of basic model fields used in severe weather forecasting, (see [http://www.spc.noaa.gov/exper/Spring\\_2006/archive/calendar.html](http://www.spc.noaa.gov/exper/Spring_2006/archive/calendar.html) ). The displays will focus on a fixed map domain covering regions east of the Rockies, showing time-matched forecasts from the Eta, WRF, RUC/SFCOA (to serve as verifying “truth”), and an [Eta minus WRF] difference field to immediately highlight major discrepancies between the two model forecasts. The eight fields selected are a small subset of parameters available, and they provide a look at basic fields used in severe forecasting. They represent the upper and low level jets, mid level flow pattern and key features (troughs, lows, etc.), surface pattern and boundaries, surface moisture, instability, deep layer shear, and precipitation.

Since it is important to compare the two models through the day 3 outlook period, and assuming that differences between the Eta and WRF may be most evident in the longer forecast projection times, the web page will display most model forecasts at 6 hour

intervals through 84 hours. The exception will be forecasts of 3-hr precipitation which will be displayed at 3 hour intervals. This is a compromise between higher temporal resolution and concerns about limits in web page storage capacity, but it should be more than adequate to conduct the evaluation.

Fields to be displayed include:

250 mb height and isotachs (color fill)	Difference field: 250 mb isotachs (color fill)
500 mb height and vorticity (color fill)	Difference field: 500 mb height (color fill)
850 mb height and isotachs (color fill)	Difference field: 850 mb isotachs (color fill)
PMSL, barbs, thickness	Difference field: PMSL
2m dew point (color fill)	Difference field: 2m dew point (color fill)
MUCAPE (color fill)	Difference field: MUCAPE (color fill)
0-6 km shear vectors (barbs)	Difference field: shear (color fill)
3-hr total precipitation (color fill)	Difference field: precipitation (color fill)

b) The second web display is a comparison between the two model forecasts of soundings, collected only at radiosonde sites every 12 hours. This web page is [http://www.spc.noaa.gov/exper/Spring\\_2006/sndgcomp/](http://www.spc.noaa.gov/exper/Spring_2006/sndgcomp/). The web page will overlay model soundings (in red-green) and observed soundings (purple), display vertical profiles of differences in temperature, dew point, wind vector magnitude, and wind speed, and provide tables of selected convective parameter values. To compare the WRF and Eta soundings directly, there will be an additional overlay section with difference fields and convective parameter tables created for the WRF (red-green) and Eta (purple). The vertical extent of the soundings will be capped at 300 mb in order to better visualize the low level structure of the soundings.

c) The final web page will consist of evaluation forms used to document and archive the model comparison findings as part of the daily activities by the experiment participants. This page has restricted access.

### **3. Acknowledgements**

The 2006 Spring Experiment is highly dependent on the talents and skills of many people at the SPC, especially Greg Carbin, John Hart, and Jason Levit for their expert web page designs, and Gregg Grosshans, David Bright, and Jay Liang for assisting with data flow and processing issues.