BAMS
Meeting Summary

A Real-Time, Simulated Forecasting Experiment for Advancing the Prediction of Hazardous Convective Weather

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The 2019 NOAA Hazardous Weather Testbed Spring Forecasting Experiment

What: Severe weather research and forecasting experts from around the world convened to test emerging concepts and technologies for improving the prediction of hazardous convective weather within a simulated, real-time forecasting environment.

When: 29 April–31 May 2019

Where: Norman, Oklahoma

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The 2019 NOAA Hazardous Weather Testbed Spring Forecasting Experiment (2019 SFE)—led by the NWS/Storm Prediction Center (SPC) and OAR/National Severe Storms Laboratory (NSSL)—was conducted 29 April–31 May. SFEs test emerging concepts and new technologies for improving severe weather prediction and accelerating new tools into operations. By bringing different parts of the community together in a pseudo-operational environment, the SFEs provide an opportunity for forecasters to gain knowledge about state-of-the-art developments in the science and for researchers to better understand operational requirements and challenges so their work can optimally address forecaster needs. SFE participants in 2019 included about 100 forecasters, researchers, and students from around the world.

In addition to activities geared toward SPC operational product and service improvements, recent SFEs have emphasized documenting performance characteristics of convection-allowing models and ensembles. Through NOAA-funded projects, collaborators contribute experimental guidance, which is evaluated and used in real-time forecasting activities. Since 2016, the design and output of these contributions has been coordinated into the Community Leveraged Unified Ensemble (CLUE; Clark et al. 2018), which facilitates controlled experiments that are increasingly important for evidence-based decision-making as NOAA moves toward the Unified Forecast System (https://ufscommunity.org). The 2019 CLUE included 104 members from eight different agencies facilitating six unique experiments, which included examining different data assimilation approaches, analyzing stochastic methods for depicting model error, and diagnosing forecast skill and physics sensitivities in the newly developed stand-alone-regional version of the Finite-Volume Cubed Sphere (FV3) Model, among others.

Some highlights of the 2019 SFE

The 2019 SFE was the third consecutive year that a prototype Warn-on-Forecast System (WoFS; Lawson et al. 2018) was tested. The WoFS is an on-demand, rapid-update, high-resolution ensemble data assimilation and forecast system for providing 0–6-h forecast guidance to help fill the gap in probabilistic information between the NWS watch and warning time scales. A new WoFS activity during SFE 2019 involved two NWS forecasters issuing experimental severe weather outlooks from 1600 to 2000 local time. Issuing products late into the evening allowed a more comprehensive examination of forecast evolution, with new WoFS initializations produced every 30 min.

For the first time in the SFE, forecasts were issued providing enhanced information on the conditional intensity of severe weather by delineating areas expected to follow "normal,"

"hatched," or "double-hatched" distributions, which correspond to significant severe weather being unlikely, possible, and expected, respectively, to supplement current, coverage-based severe weather probabilities. For example, a wind event expected to generate many reports but few significant ones could have high coverage probabilities but lower conditional intensities. Conversely, an event where only a couple high-end storms are anticipated could have low coverage probabilities but higher conditional intensities, suggesting that these storms would cause significant severe weather.

To explore methods including more detailed timing information within day 1 and 2 severe weather outlooks, potential severe timing areas (PSTs) were issued, which are enclosed areas valid for 4-h periods highlighting the time window when the majority of severe weather is expected. The PSTs were aimed toward the emergency-management community and were issued by a lead SFE facilitator and five groups of participants that each used unique sets of CLUE-derived model guidance.

More information on the 2019 SFE

The 2019 SFE successfully tested new forecast products and convection-allowing modeling systems addressing relevant issues for the prediction of hazardous convective weather. The findings and new questions emanating from the experiment will promote continued progress to improve forecasting of severe weather in support of a Weather-Ready Nation. A comprehensive summary of the 2019 SFE activities and results can be found at https://hwt.nssl.noaa.gov/sfe/2019/docs/HWT_SFE_2019_Prelim_Findings_FINAL.pdf.

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