Assessment and Evaluation from the AWC Summer Experiment

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INTRODUCTION

A variety of activities takes place during the summer experiment as part of the Aviation Weather Center's Aviation Weather Testbed including subjective and objective assessments for both experimental forecast products and the forecasting process. The primary goal of the summer experiment is to expose forecasters and industry representatives to experimental forecast products and procedures aiding in aviation forecasting and decision making. Providing participants with the performance of experimental products and, in turn, acquiring user feedback of those products from a forecasting perspective add valuable information to the experiment. The assessment portion of the experiment includes a variety of quantitative and qualitative verification activities as well as the interpretation of user survey responses. The combination of product verification and user feedback is critical in determining the potential success of operational transition. A forecast may have high quality but may not add value to the forecast process. Quantitative evaluations consist of a variety of standard verification sets such as: reliability of probabilistic forecasts, categorical skill scores for high resolution forecasts, and some neighborhood approaches for a comparison of both probabilistic and deterministic forecasts. Diagnostic climatologies were also used to qualitatively assess some of the experimental forecasts. Further, numerous observations sets were used as 'truth' depending on the variable of interest, for example multiple ground-sensed lightning datasets were used for decision support in concert with experimental radar and satellite products.

EXPERIMENT FEEDBACK

A summary of the 2013 Aviation Weather Center Testbed Summer Experiment is available from Lack et al (2014; ARAM Poster 744) At the endeach day during the experiment, participants were asked to fill out a survey regarding experimental techniques and products. These surveys were divided up by each operational desk simulated and scaled 0-4, 0 being worse and 4 being best.

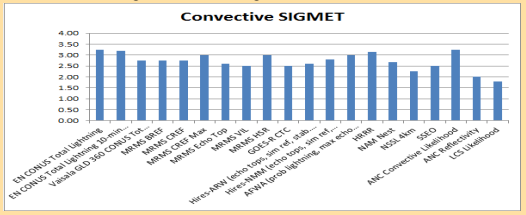
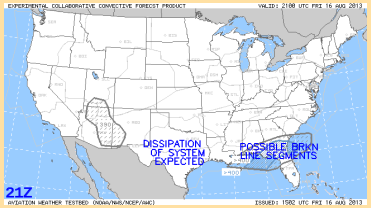
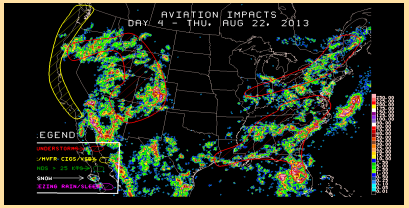


Figure 1. Survey results of experimental hi-res forecast and observations for the Aviation Weather Center Testbed Summer Experiment in 2013..

Overall, participants of the experiment tended to use radar, lightning, and satellite information, especially for the issuance of SIGMETs. Of the hi-res forecast products for the issuance of a 2h outlook, the AutoNowCaster Convective Likelihood appeared to add value in the process.





Part of the experiment was also experimenting with products created. For the CCFP, in addition to the 4-,6-, and 8-h forecast polygons, text annotations were placed as well. Feedback from this was positive, especially from industry, as it provided users additional information that they may not see in the intervening CCFP chat between forecasters. In terms of experimental forecast products, hi-res simulated reflectivity and echo top information from the HRRR and WRF-ARW were favored. AFWA ensemble products were also favored. The figure to the left is a CCFP issued during the experiment valid at 2100 UTC on 16 Aug. 2013.

Product creation was a primary focus at the desk supporting the National Aviation Meteorologists (NAM) located at the FAA Command Center. The experiment allowed them to create visual products from automated GUIs that allowed them to focus more on the impending weather and possible impacts to the national airspace instead of a tedious product generation. The figure to the left was an actual long range planning forecast for the FAA Command Center issued from the experiment for operational use. It is overlaid with gridded lightning data to show in a qualitative way how valuable and accurate the forecast was even 4 days out.

Figure 2. Sample products issued during the AWC Testbed Summer Experiment. Above is an experimental CCFP forecast valid at 2100 UTC 16 Aug.2013 with added text annotations to provide additional information to flight planners. Below is an official long range planning forecast for the FAA Command Center issued by the NAM participating in the experiment. Overlaid is gridded lightning density showing how well the forecast turned out.

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QUALITATIVE AND QUANTITATIVE EXPERIMENT VERIFICATION

Both quantitative and qualitative verification were used during the experiment for both experimental product creation and the underlying forecast guidance tools that were used.

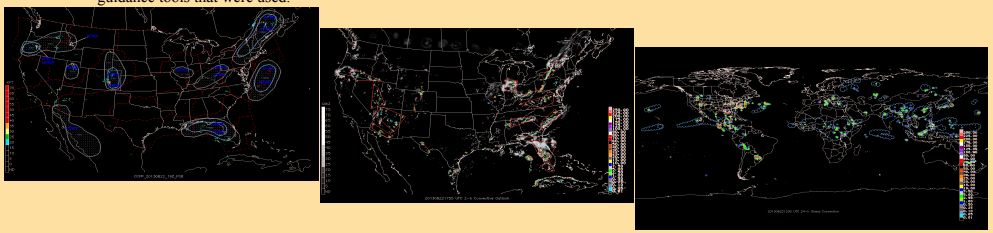

Figure 3. Qualitative verification of experimental aviation forecasts. Left image is 8-h CCFP polygons from 22 Aug. 2013 Valid at 1900 UTC overlaid with echo top from the NSSL composite. Center is the experimental 2-h Outlook from the Convective SIGMET desk valid at the same time as CCFP. The outlooks are overlaid with grayscaled composite reflectivity and gridded lightning density using experimental ENTLN. Right, the 1200 UTC forecast valid for 23 Aug. 2013 overlaid with gridded lightning density using experimental ENTLN.

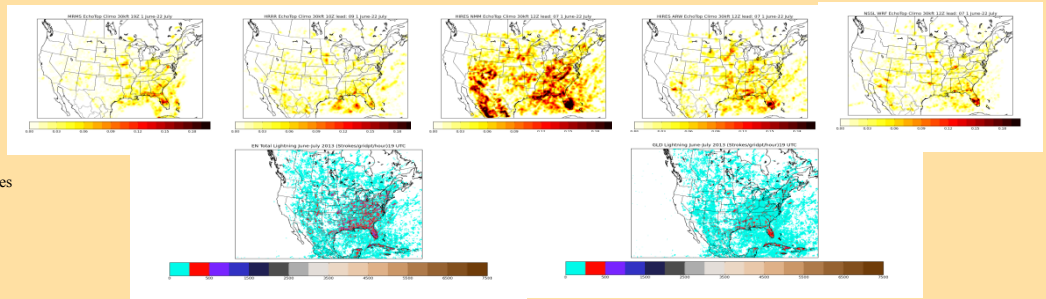

Figure 4. Qualitative verification of hi-res forecast products using climatologies. Top left is climatology of MRMS echo top data for 1900 UTC June-July 2013 greater than 30kft. In order along top row are hi-res echo top forecast climatologies from HRRR, WRF-NMM, WRF-ARW, and NSSL-WRF. The bottom row, from left to right, are gridded lightning climatologies valid for the same time in strokes/grid point/hour. The left is from Earth Networks Total Lightning Network and the right is from Vaisala's GLD360 total lightning.

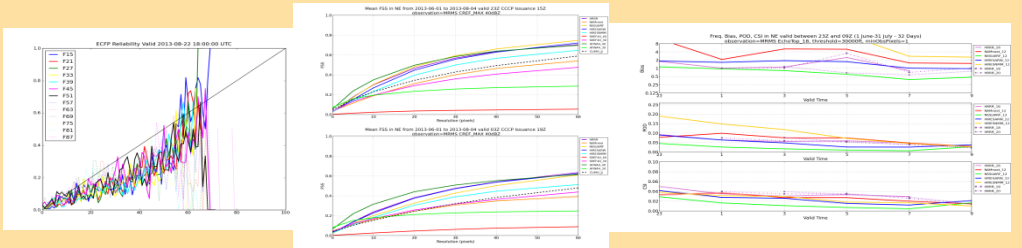

Figure 5. Quantitative verification of the extended convective forecast product (ECFP) is on the left. The ECFP reliability is a stand-in for 1-h Probability of Thunder in the SREF. This reliability plot of the ECFP product is valid for 22 Aug. 2013 at 1800 UTC. The ECFP reliability was measured against Earth Networks Total Lightning data as opposed to usual echo top data. The middle graphics are Fractional Skill Scores (FSS) for the NE US for Hi-Res convective forecasts using MRMS data 40dBz and above valid for 2300 UTC and 0300 UTC. Little variance is noticed between models, however performance is poorer for models valid at 0300 UTC by underforecasting. The right side is traditional scores (Bias, POD, CSI) for convective forecasts in the NE US between 1900-0500 UTC, again using MRMS.

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