Collaborative Digital Aviation Grid Process at the Aviation Weather Testbed and Operations Proving Ground

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Overview
Two experiments were performed in the Aviation Weather Testbed and Operations Proving Ground. In 2017 to build and demonstrate a fully integrated, real-time collaborative Digital Aviation Services (DAS) involving a two-way forecast information exchange between a national center and local forecast offices.

Digital Aviation Services is designed to replace current insular, manually intensive aviation forecast creation with a more consistent approach drawn from model guidance. This year the Aviation Weather Testbed did work to develop a collaborative approach to the process in order to gain a nationally consistent picture that serves products and services both from the Aviation Weather Center and from local forecast offices.

Aviation Weather Testbed partnered with the Operations Proving Ground in carrying out this effort to stimulate both sides of the process.

Participants at the Aviation Weather Testbed produced CONUS scale grids (edited in three regions due to computing constraints) that served as a first guess for local editing. Collaboration through WMS Chat simulated potential dialogue between the national center and forecast offices.

After editing-up using other data, participants at the Operations Proving Ground used the testbed grids as a starting point to create a local forecast, ultimately generating TAF text forecasts.

Participants at the NAA Aviation Weather Demonstration and Evaluation Services (AWDES) lab remotely evaluated ceiling and visibility results.

Outcomes
Gridded forecasting is still new to NWC, and graphical ceiling & visibility forecasting is in its early stages, creating a significant learning curve for participants. Despite this, within a short period of time most were able to quickly learn the process and establish their own editing techniques.

Grids that are representative of the initial conditions continue to be an issue. Observations from satellite appear to be key here with the simulated GOES-R Flight category products showing promise. The increased data from GOES-16 as it becomes operational likely will be critical as well.

Forecast areas were generally not the “true” area of the participating forecasters, creating a difficult adjustment during editing of an already new paradigm. That the areas used varied according to weather situations and other factors also caused difficulty.

Collaboration was kept mostly electronic, mimicking the typical interaction between national centers and the field. Some increased communication was desired to ease the transition into a new paradigm for all involved, but it was generally agreed that in an operational context, attempting to individually consider the needs of 122 offices would prove difficult. Communication protocols and expectations will need to be developed.

Future Work
More verification is needed to determine what guidance is most skillful and what forecast techniques lead to improved skill. Traditional measures may have significant challenges including the binary nature of cloud presence in addition to cloud height.

Model guidance needs significant improvement in the area of cloud and visibility. Work by NWC in this area is highlighted in ARM 8.2.6.

Blended guidance including time lagging was popular to sort out noise and otherwise unpredictable small scale features in high resolution models. More work needs to be done in this area to find optimal techniques for each blending. At the present time solutions are minimal in the area of blending multiple discontinuous gridded fields such as clouds.

Better editing tools are needed at both the national and local levels. Edit areas for different types of terrain have the potential to increase editing efficiency.

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Experiment Design
An experiment was run during June to test out of the concepts, having Aviation Support Branch staff create the first guess forecast and passing those grids to simulated WFOs in the Operations Proving Ground. WFO participants had previous experience with Digital Aviation gridded forecasting concepts, though the specific elements being edited were new.

At the 2017 Summer Experiment in August, meteorologists with a wide range of experience with aviation forecast participated in a two-way collaborative test.

The WAT and OPG are co-located at the federal facility in the Kansas City in different parts of the building. Collaboration was primarily through WMS Chat, serving as a substitute for the AWIPS II Collaboration Tool.

A remote video connection was established with the Federal Aviation Administration’s (FAA) Aviation Weather Demonstration and Evaluation Services (AWDES) lab in Atlantic City, NJ where pilots and flight briefs evaluated presentations of experimental guidance.

Weather Elements

Sky: total cloud cover (percentage)

CloudBaseSCT - cloud base of SCT coverage
CloudBaseFEW - cloud base of FEW coverage
Visibility - surface visibility in miles

Right: grid manager in GFS showing editable forecast grids and a few of the available guidance grids.

Before and after showing the effect of local editing on the composited national grid

Grids that are somewhat “specialized” at the CONUS scale can produce less than ideal grids at the local.