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

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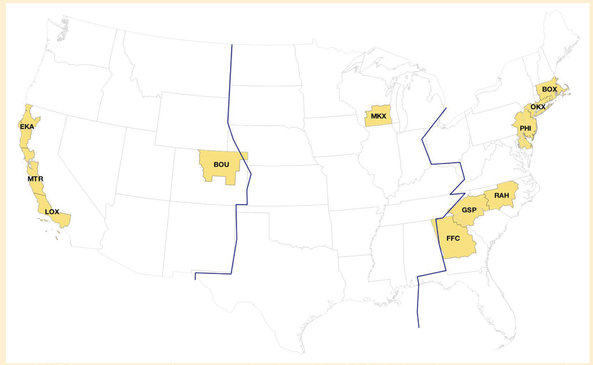
Overview

Two experiments were performed in the Aviation Weather Testbed and Operations Proving Ground in 2017 to build and demonstrate a fully collaborated, real-time efford of 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 simulate both sides of the process.



Map of WFO county warning areas simulated by OPG during the summer experiment. Blue lines demark the three regions edited by AWC, for which grids were combined to create a composite.

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

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

Weather Elements

Sky - total cloud cover (percentage)

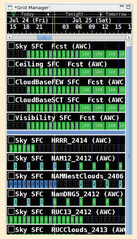
Ceiling - cloud base of BKN or worse (hundreds of ft)

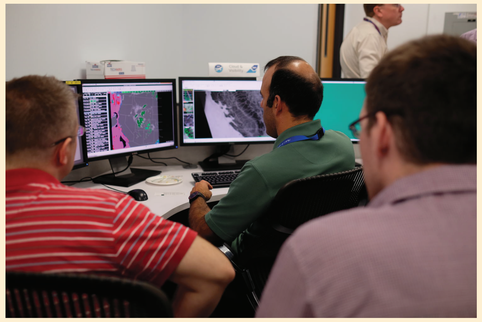
CloudBaseSCT - cloud base of SCT coverage

CloudBaseFEW - cloud base of FEW coverage

Visibility - surface visibility in miles

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

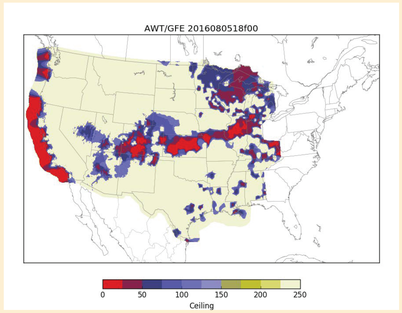




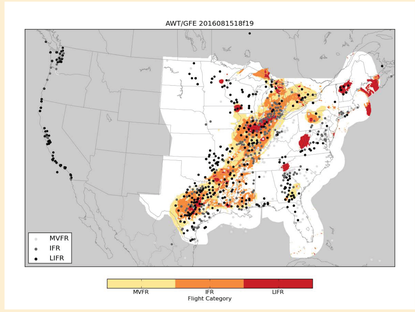
Participants at the Aviation Weather Testbed produced CONUS scale grids (edited in three regions due to computing constraints) that served as a first guess for local editing. Collaboration through NWS Chat simulated potential dialog between the national center and forecast offices.

After spining 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.

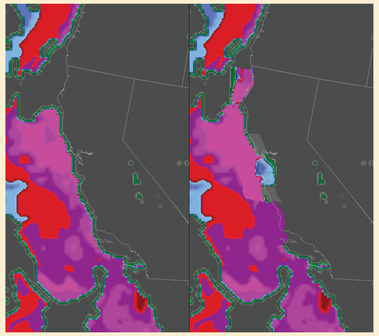
Participants at the FAA Aviation Weather Demonstration and Evaluation Services (AWDE) lab remotely evaluated ceiling and visibility results



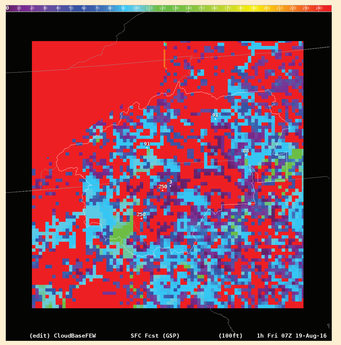
Example of digital aviation forecast of ceiling height on NDFD grid



Qualitiative verification was shown during daily debrief



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



Grids that are somewhat "speckled" at the CONUS scale can produce less than ideal grids at the local

Outcomes

Gridded forecasting is still new to AWC, and graphical ceiling & visibility forecasting is in it's 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 will likely be critical as well.

Forecast areas were generally not the "home" area of the participating forecasters, creating a difficult adjustment during testing 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 protocol 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 AWC in this area is highlighted in ARAM 8.2.

Blended guidance including time lagging was popular to sift 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 such blending. At the present time solutions are minimal in the arena 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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