Digital Forecast Process

ER Discrepancy Reduction Team

Q2 What is the best way to minimize discrepancies and produce a near-seamless NDFD without sacrificing accuracy or consistency?

Answer: The forecast process must be improved. Two of the primary components of the digital forecast process are collaboration and grid editing techniques.

1. Collaboration

When the National Weather Service entered the digital forecast era, forecasters were expected to "collaborate", but very little guidance or instruction on how to perform effective collaboration was provided. Many offices have independently developed digital forecast strategies, philosophies, and priorities. This has resulted in a situation in which neighboring WFOs have such different approaches to grid creation that incompatibility in collaborating creates inefficiencies in the forecast process. For example, forecasters in adjacent offices can be preparing a forecast for the same weather system, yet they are involved in different parts of the process at the same time. Working together on a common problem cannot be done efficiently in this circumstance. The National Weather Service has recently promoted teambuilding within offices, which is commendable. The effort should be expanded to include teambuilding among offices that share County Warning and Forecast Area (CWFA) boundaries.

Strict regimentation is not desirable, but some structure should be applied to the process. Successful collaboration planning meetings involving small numbers of WFOs have been held (e.g., 2nd New England Collaboration Meeting). These meetings have been productive and have yielded valuable operational guidelines. While some Regions have articulated expectations of forecasters with regard to collaboration, it is clear that some recommendations have yet to be fully embraced by all. There has not been an effective national effort to develop, promote, and implement a unified concept of collaborative forecasting. There needs to be an acceptance in the field of a fundamental set of principles by which the NWS guides its operations in support of national objectives. Such a set of expectations should be authoritative, yet allow for judgment in its application.

The current collaboration tool, 12Planet, offers a reasonably efficient way to exchange information with neighboring offices. However, the one dimensional aspect of this means of communication sometimes has unintended consequences - not the least of which is simply misinterpreting a string of words quickly typed by another person in another location. Communication between people has many facets. For example, tone of voice and visual cues such as body language and facial expressions accentuate what is spoken. Also, much of the information shared in chat messages applies to the forecast and guidance graphics which cannot be exchanged. Improved collaboration software should at least include the means to exchange graphical products and annotated images.

Even without enhancements to our collaboration software, improvements in the exchange of information are possible. Of course, chatting takes time away from working on grids and examining observations and model data. However, it is necessary to share thoughts and information with neighboring offices. Forecasters must strike a balance between too much or too little time spent on any of the tasks.

2. Grid Editing

Proper grid editing is the foundation for optimizing accuracy and reducing discrepancies. This encompasses using tools that are compatible with the meteorological situation and employing consistent grid editing methodologies that are meteorologically sound. Populating with the same model source, which can be determined through effective collaboration, and using similar tools and procedures will likely result in a more efficient forecast process and a more consistent NDFD.

The importance of editing in ISC (Intersite Coordination) mode and routinely exchanging grids with neighboring offices cannot be overstated. The sharing of forecast grids through ISC in a timely manner is the linchpin of the collaborative forecast process.

Using effective grid editing techniques is partially a training issue that can be addressed by creating a "Best Practices Grid Editing" document that the SOO and IFPS focal point can use as a basis for training the rest of the staff. However, management must embrace this idea and ensure all staff follows the recommendations.

Employing proper grid editing techniques is also partially an accountability issue. The results of questionable editing in the database are seen in grids that are meteorologically impossible or "just don't make sense" (e.g., a uniform dew point across an entire CWFA; using a diurnal temperature tool when a strong cold front is moving through the area). There is a reluctance to bring these issues and suggestions for improvement to the attention of the forecaster. One of the key reasons for the lack of action is due to the fact that techniques have been constantly evolving as everyone becomes more familiar with GFE. Enough experience has now accumulated in Forecast Offices so that everyone is beginning to get a feel for what makes sense and what doesn't. SOOs and IFPS focal points can make a major contribution to the improvement of the collaborative forecast process by focusing on their local database and joining with the forecast staff to eliminate bad practices. Eastern Region is doing a good job in this regard by emphasizing the application of scientifically sound Smart Tools and by providing an organized list of recommended tools and procedures for each weather element.

The software used to create the NDFD continues to improve. Forecasters are gradually acquiring more sophisticated tools that provide more skillful ways of creating a digital forecast – particularly in the short range. Consideration should be given to providing the field with HPC guidance grids for the medium range (Days 4-7). The guidance grids would be a seamless field of all forecast elements that could be modified appropriately by

the WFO. By having a seamless forecast as a starting point, the local adjustments would more than likely lead to a national forecast that has fewer and smaller discrepancies than the current system. Medium range digital forecast guidance would also provide forecasters more time to analyze the weather, review near term guidance, and collaborate grids.

An idea that is worthy of consideration is whether or not multiple digital forecast databases could be produced with differing horizontal resolutions. If this were the case, then local offices could concentrate their efforts on producing a high quality, high resolution local data base. Collaboration and coordination with other offices would still be required, however the collaboration effort would not need to be as time consuming as current practice requires. A lower resolution national data base could then be constructed by combining the local data bases. The data along and near the boundaries of the data bases could be smoothed either by the use of an algorithm or manually by a small number of dedicated meteorologists (a concept similar to HAS forecasters at RFCs combining QPFs from several offices). A survey could be performed to test how receptive users would be to this idea.

3. Additional Comments

Development of a forecast grid verification scheme should be top priority, for the full potential of the NDFD cannot be realized without it. Even though adequate verification of forecast grids is not yet available, point verification data can provide useful information regarding systematic errors and biases. These data can be used to adjust forecasts toward a more accurate solution.

Consistency would also be aided by a situation in which forecasters started the process from the same point, such as populating with the same model guidance. However, with the variety of numerical models available and with the realization that various models are perhaps performing better in different parts of the country at the same time, this is not an easy task. The problem is not a simple one to solve, but an awareness of the issue does promote consideration of techniques such as applying model blends, ensemble guidance, or some form of a MatchMOS tool.

4. Closing Comments

A more efficient forecast process consisting of generally accepted principles and best practices will minimize discrepancies in the digital forecast database. Key elements of the process are sound meteorological analysis, effective grid editing techniques, and productive collaboration. Collaboration should be viewed as a tool that contributes to forecast accuracy rather than a way of eliminating differences at CWFA borders. Guidance, structure, and encouragement for improving the forecast process should come from all levels of National Weather Service management, which includes NWS Headquarters, the Regions, and the management team in each office.