**16 August 2004**

# A Brief Report to the IFPS Science Steering Team (ISST) on Comments Regarding How NCEP Centers Should Support WFOs in the Digital Forecast Process

**Task:** A short-term focus group of National Weather Service (NWS) Southern Region (SR) Science & Operations Officers (SOOs) was to respond to the following question:

*"How should each NCEP center support WFOs contribution to the digital forecast process?"*

The solicited response will be sent to the NWS SR and eventually the National ISST Representatives for review.

**Response:**

## A) Gridded Format & Probabilistic Guidance (NCEP)

- NCEP should provide **all forecast/guidance information in gridded format** for potential ingest into the WFO's GFE. This would support many forecast functions, development functions, smart tools, etc., and improve WFO efficiency by giving forecasters more time to incorporate their value-added contribution.

- NCEP should provide **probability grids** that indicate the probability of exceeding important critical thresholds (i.e., ffg/qpf, freezing temperature, RH below 35%, 34/50/64/100 knot wind, etc.). This would be a great complement to the deterministic forecasts. As with impact weather and extreme events, it is becoming obvious that deterministic-only information is insufficient for decision-makers. Severe storm hazard probabilities should be delivered in gridded form, and include thunderstorm/lightning.

## B) Model Guidance (EMC)

- NCEP should provide **all model guidance in its native resolution.** Although WFOs are closest to local customers and charged with delivering the highest resolution forecasts, valuable resources (e.g. time, expertise, etc.) are wasted putting back information that was simply removed due to limited bandwidth considerations. Providing model guidance of degraded resolution decreases the potential effectiveness of the WFO forecaster who must perform redundant work just to get started; from a business-sense, this is an unwise long-term condition.

- NCEP should provide **ensemble mean grids**, especially to support medium range forecasts by the WFOs.

- NCEP should produce an **Analysis of Record grids** using all available, quality observational data sets. These could be used for historical purposes and judiciously used for NDFD verification. Analyses should be performed with the same spatial and temporal resolution as the NDFD, according to evolving national verification requirements.
    - Subsequently, **verification grids, delta grids, and bias grids** could then be made available.

- NCEP should support WFOs in the local production of an **Analysis of the Moment** set of grids. These grids would be used to continually update and validate the first period of the forecast (through local delta grids automatically/routinely checking against established "update thresholds". Analysis of the Moment grids should be retained for potential use as **persistence grids** too.
    - For example, LAPS is supposed to be our local high resolution diagnostic tool. This is a very good software package. However, options that include sophisticated input quality control routines like the Kalman Filter, as well as diabatic packages, are all "turned-off" in AWIPS due to hardware limitations. Not to mention, the LAPS grid resolution in AWIPS is currently 10 km (analyses should be performed at the same scale as forecast). This software package should be set up on a workstation of its own, run as frequently as possible (sub-1 hour) to take advantage of all local mesonets, with all its options "turned-on" for the best quality analyses possible. These would become excellent **initialization grids for GFE (00-hour forecast)**, and an excellent persistence tool for which smart tools could further be developed (e.g. the Diurnal from Obs tool developed by Stephen Baker). Perhaps, these grids might also be made available to EMC, mosaic'd as a first-guess analysis toward their Analysis of Record.

- NCEP should <u>support the WFOs</u> in **running local mesoscale models** focused on the 00-24 hour time frame. This could be done utilizing WRF or ARPS (or another model). The emphasis here is to have a high-resolution output for Day-1 that is hot started off of a fully configured LAPS or ADAS system (as WFO JAX or WFO MLB currently do). The intent is to make the Day-1 forecast the best that it can possibly be and to keep it well-maintained (especially for impact weather or extreme event situations). This would have a big impact on the quality of local convective outlooks, on hazardous threat assessments, on fire weather spot forecasts, on TAFs, etc. Additionally, this could also be utilized as a local research and/or training tool. Currently, when WFOs run local models, they have to compete with external users to get the data from NCEP; WFOs should always be considered as primary customers. Indeed, there is a legitimate role for local modeling, and a role for NCEP in support of such an initiative.

**C) Medium & Extended Range Guidance Grids (HPC)**

- NCEP should provide synoptic **extended-range background grids (days 6-8)**, but at the space and time resolution WFOs are required to forecast. These would be used as the starting point for WFOs regarding the day 6-8 forecast. Only in cases of locally known biases and/or effects (local knowledge and/or mesoscale expertise), persistence, or situational climatology under a particular weather regime, should a WFO forecaster spend a disproportionate amount of valuable time adding great detail in the extended grids. In other words, at the extended-range…for routine weather it should be of lower operational priority to the WFO grid editor; for forecast extreme events, NCEP should already be taking the lead.
    - An example of when the WFO forecaster could add value to the NCEP day 6-8 forecast…Consider south Florida during the summer, with the low-level high pressure ridge axis across central Florida and an easterly wind regime across south Florida. Under these circumstances the WFO can add details to the extended grids beyond the basic NCEP guidance by providing temporal detail in the temperature and precipitation grids based on known local tendencies.

- NCEP should provide synoptic **medium-range background grids (days 4-5).** These grids would be made available for <u>optional</u> use by WFOs, allowing forecasters the opportunity to concentrate on mesoscale adjustments more efficiently, as synoptic scale features are more readily collaborated between adjacent WFOs.

**D) Libraries of Climatology & Standard Deviation Grids (CPC)**

- NCEP should facilitate the creation of a library of **climatology grids** (at the highest possible temporal and spatial resolution nationally).
    - Climatology grids for each verification element should be become part of the baseline GFE software, with a periodic update strategy established.
    - Development should also include supporting the WFOs in the growth and maturation of additional local/regional libraries of **climatology grids**. As gridded databases accumulate with past events and local mesonets improve the quality of gridded analyses, the local production of situational climatologies (e.g. for El Nino years, La Nina years, dryer/wetter than normal situations, hotter/colder than normal situations, varying wind flow regimes, etc.) for respective forecast areas should be pursued.

- Along with climatology grids, NCEP should deliver/maintain a companion set of **standard deviation grids** within GFE. This would help WFO forecasters focus their valued expertise on identified elements at certain periods within the forecast window which particularly need their attention (through smart consideration of synoptic, mesoscale, and convective scale processes affecting the forecast). Current or proposed element forecasts that exceed the standard deviation can be scrutinized as weather of potential impact to users, thus requiring the necessary mesoscale detail, while addressing particular uncertainties.

**E) Marine/Tropical Cyclone (OPC/TPC)**

- NCEP should provide **wind and wave height guidance grids** for coordination purposes in the offshore waters. NCEP should consider supporting a regional version of NOAA Wave Watch in a domain that covers those WFOs along the SE where the Gulf Stream is a critical factor in their marine forecasts and then include the current in the model. A grid version of that model at a resolution comparable to the grids should then be distributed to the pertinent WFOs. This is critical if we are ever to go official with wave height grids. If they cannot do this in a timely manner, then support should be provided to have it run locally at respective WFOs. NCEP's role in this case would be to provide the needed data to make this a success (see section B. for discussion on local modeling).

- NCEP should provide **a full 7-day forecast of tropical cyclone positions** with 34kt wind radii supplied throughout the forecast period. Efforts should be made for a 100kt wind radii through 36 hours, a 64kt wind radii through 72 hours, and a 50kt wind radii through 5 days.

- Again, NCEP should provide **probabilistic forecast guidance** (in gridded form) of exceeding critical thresholds with respect to **wind, wave height, and surge**. WFOs would be able to fine-tune local forecasts based on this knowledge.