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NMC VISIT--A REPORT

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Introduction

I had an opportunity to spend a few days at the National Meteorological Center (NMC) last January as part of their visiting forecaster program. This program has been in place for about four years and was established to familiarize field forecasters with NMC operations and to enhance working relationships between the field and NMC. The National Severe Storm Forecast Center plans on starting a similar program. My visit was very interesting and informative. Given the large scope of their mission, there is always something interesting going on and from what I saw, there is also more time to devote to "doing meteorology" than is typical at a WSFO.

A number of people went out of their way to point out that NMC does not ignore the West, and I am convinced that they do put considerable effort into this part of the country. Unfortunately, a large ridge dominated the western U.S. during my stay, so there was little opportunity for them to demonstrate this.

NMC asked me to provide them with a report on my visit. Those parts of it that might be of general interest to people in the Western Region are presented below.

Forecast Branch

Bias-Corrected MRF - Most of the MRF prog charts on the large briefing wall at the Forecast Branch had a footnote indicating that they had been corrected for model biases. Averaged model errors and biases of the past several days are used to "correct" the model output fields. I never got a chance to compare these to the "biased" version of the MRF that we see on AFOS.

ETA Model - A version of the ETA model is regularly available to the NMC Meteorology Operations Division (MOD) forecasters. This is the 80km version with 16 levels in the vertical. A much-discussed problem with this version was that it picks up too much moisture and heat over warm water sources, i.e., the Great Lakes in winter, resulting in convective feedback. The person who works on the ETA model later said they had alleviated this problem by adding a very thin layer on the bottom. The ETA model has proven to be very good in forecasting precipitation amounts over complex terrain, such as we have in the West.

3-5 Day Forecasts - There is much more manual input into the AFOS 9(3,4,5)P charts than I had realized. I discussed the similarity between the PMDEPD and the PMDHMD. The HMD came about at least partially as a result of the demise of the old Western Region discussion (since restarted). A good deal of discussion goes on between the two forecasters

who write these messages (QPF and Medium Range) and the scope of the messages is similar.

Monitoring and Aviation Branch (MAB)

Quality Control of Data and Model Runs The Senior Duty Meteorologist (SDM) spends a lot of time doing quality control of RAOB data for the model runs. Any one of several computer programs can flag data as being out of line with the first guess; the SDM and his staff then examine it. Their goal is to salvage as much data as possible rather than just deleting it. The SDM also does a good deal of coordination between various agencies and communications centers.

Aviation/Significant Weather - The tasks of the aviation portion of this branch include the production of the high level significant weather progs for much of the Pacific and Atlantic Oceans. This includes jet stream positions, areas of turbulence, and thunderstorms. They have model input as a start for these progs but each receives considerable manual input. They also do the low-level significant weather progs (L2P, L4P) after they get the forecast frontal positions and precipitation forecast from the Forecast Branch.

Marine and Satellite Operations - MAB also produces surface and 500 mb prog charts for large portions of the north Pacific and Atlantic Oceans. These are sent by fax to marine interests. They use input from several progs to forecast wave heights. Their satellite operations section is responsible for convective sigmets over the oceans and also the satellite interpretation messages (SIMPSM).

Development Division

Short-Range Models - I talked with Dr. Tom Black who works on the development of the ETA model. The 80km 16 layer version is run routinely and is made available to the Forecast Branch. Its terrain includes an approximation of the features in and around Nevada that looks a little more realistic than the LFM/NGM/AVN terrain but still lacks many obvious features. The Sierra west slopes are there but there is no real east side gradient; it looks more like a broad flat table. Unfortunately, there were no significant weather systems over the western U.S. during my stay so I could not get a real handle on how the ETA model compares with the other models.

Two other versions are under development, a 30km and a 15km version. The 30km ETA has much more realistic terrain. Dr. Black says the model was designed from the ground up to handle such terrain. It is currently experimental. Unfortunately, the current version's western grid boundary extends just off the west coast so boundary problems are possible in the western-most states. The 80km version only takes about 8 minutes to run on the Cray, while the 30km version takes 75 minutes, even with its smaller domain. Dr. Black showed me two case studies that demonstrated the strengths of the 30km ETA very well. In one, it was able to resolve separate precipitation bands from a mid-western system that had a well-defined squall line in advance of a weaker frontal band. Other forecast models and the 80km ETA version showed only one broad band. In another case, it was able to produce realistic precipitation distribution in an area of varied terrain over the Dakotas.

The grid of the 15km version covers only a portion of the U.S. (<$^1/_2$). The next generation computer is needed before the domain can be expanded in this version.

Longer-Range Models - I talked with Dr. Peter Caplan about the MRF. No major changes are in the offing, just refinements. He asked if we see the MRF QPF forecasts, and I told him that they were not available on AFOS. He suggested we might want to request its output as a part of a case study in order to compare it with the NGM. He also talked about the difficulty in getting good verification data for model QPF forecasts. I told him about some of the many smaller scale precipitation networks in the Sierra, but he did not think even these were fully satisfactory. Instead, he mentioned techniques under development that measure average area precipitation (like the models forecast) from satellite data.

Climate Analysis Center

I spent most of my time with James Wagner discussing the production of the 6-10 day outlooks. The forecaster has access to a wide variety of tools we don't have in the field. Among these are two barotropic extensions to the MRF, one initialized by the 5-day MRF, and the other by a 5-day mean chart (so none of the shorter waves are included). Other models included a regression corrected MRF, a double regression corrected MRF, and mean charts from the ECMWF and JATO (Japanese) models.

Techniques Development Laboratory (TDL)

I talked with John Jensenius whose specialty is the perfect prog guidance being developed for the MRF. This is no longer a pure perfect prog setup; it has been modified to allow it to trend back towards climatology with time. This gives it better skill in the longer projections. There is some skill in the temperature and POP forecasts out to seven days, although its advantage over climatology is very small beyond about five days. TDL hopes to send this guidance out to the field in bulletin form within a year.

NESDIS

The NESDIS office at NMC performs a wide variety of tasks that are worldwide in scope. They use imagery from all the geostationary satellites except the one from India (for political reasons). Limited polar orbiter data are also available. Their satellite Quantitative Precipitation Estimates (QPEs) are produced in graphic form and are then manually converted to the AFOS text bulletin form (CCCSPENES). They would like to send their QPEs out in the original graphic form on AFOS since this would be easier for them and would provide more information to the field. Unfortunately, they have not been able to get AFOS programmer support and the AFOS data flow bottleneck stands in the way. They may experiment with faxing the graphics directly to affected WSFOs and WSOs.