



**WESTERN REGION TECHNICAL ATTACHMENT
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**REVIEW OF THE NMC NUMERICAL GUIDANCE SUITE IN
1987
AND A PREVIEW OF CHANGES IN 1988
PART VII**

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8. A Preview of MRFS Changes, 1988: Masao Kanamitsu

In the global system, just as in the regional system, changes are anticipated in the analysis, initialization, and prediction. The global analysis will benefit from the unified optimum interpolation effort mentioned earlier. In addition, we are currently testing in our parallel experimental system a different method developed by NESDIS and NASA of treating radiance data from satellites. We expect this will improve analysis over the oceans. Tropical analysis will be further improved through the incorporation of Outgoing Longwave Radiation (OLR) data, which will improve the representation of divergent circulations.

With respect to initialization, experiments are being conducted with performing the adjustments only on the difference between the analysis and the first guess, rather than on the analysis itself. This "incremental" initialization is less heavy-handed, and should result in smaller differences effected by the initialization.

In the prediction model, a number of changes are being tested.

These include:

- o interactive clouds in the radiation calculations, and replacing zonal-mean climatological clouds;
- o semi-implicit time differencing in the advection terms, allowing a longer-time step and thus greater computational efficiency;
- o rearrangement of the vertical levels, to yield closer spacing in jet levels;
- o use of observed snow and ice cover, rather than climatology;
- o improvements in the model's hydrologic cycle;



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- o improvements in orography, reflecting recent changes in resolution and the addition of gravity-wave drag; and
- o further unification of the physics used in MRFS and RAFS.

9. Conclusion: Editor's Comment

The preceding summary represents the first in an annual series of year-end reviews of the NMC production suite. It is hoped that both the review and the summary will prove useful to NMC personnel, to NWS field forecasters and to others, in understanding, using, and improving guidance products.

The global analysis will benefit from the unified optimum interpolation method. In addition, we are currently testing in our polarized experiment a different method developed by WRF and ARAM of creating radar data from satellite observations over the oceans. We expect this will improve analysis over the tropics. Tropical analysis will be further improved through the incorporation of outgoing longwave radiation (OLR) data, which will improve the representation of air-sea interactions.

With respect to initialization, experiments are being conducted with reinitializing the adjustments only on the differences between the analysis and the first guess, rather than on the analysis itself. This "incremental" initialization is less heavy-handed and should result in smaller differences between the analysis and the first guess.

In the polarized model, a number of changes are being tested.

These include:

- o interactive clouds in the radiation calculations, and separating semi-transparent clouds;
- o semi-transparent cloud handling in the advection terms, allowing a larger time step and thus greater computational efficiency;
- o reassignment of the vertical levels, to yield closer spacing in the troposphere;
- o use of observed snow and ice cover, rather than climatological values;
- o improvements in the model's hydrologic cycle;