Four-times-daily runs of the AVN model

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1. INTRODUCTION

Beginning in June 1997, NCEP's AVN model will be run four times a day instead of twice a day as is now done. This Bulletin describes the results of tests with the new system and the details of implementation.

2. EXISTING SYSTEM

In NCEP's current operating system, the global spectral model (T126L28) is run in two modes. In the MRF mode, it is run once daily out to 15 days from 00Z data, with a data cutoff time of about 0600Z. In the AVN mode there are now two daily runs out to 72 h, the 00Z run (at 0245Z) and the 12Z run (at 1445Z). These results are made available to the field as soon as the forecast is complete.

3. TESTS OF NEW SYSTEM

In addition to its regularly-scheduled runs, the AVN has over the past two years been run at "off" times - 06Z and 18Z - for in-house evaluation. The results have been excellent. In the Northern Hemisphere, the 06Z and 18Z forecasts were only slightly worse in their overall skill than their 00Z and 12Z counterparts, in spite of the absence of current rawinsonde data at these hours. The error growths of the 00Z and 06Z forecasts are compared in Fig. 1, which shows the 250-mb RMS vector wind error verified against over 250000 Northern Hemisphere aircraft reports over a year, for three forecast lengths - 12, 18, and 24 h. The points indicate the RMS error of the forecasts from the on-time runs originating at 00Z (thick line) and the off-time runs originating at 06Z (thin line). Although the errors are slightly higher for the off-time for any given forecast length due to the lack of rawinsonde data, nevertheless the "younger"off-time forecasts are much more useful at any given real time. For instance, at about 21Z the error of the on-time forecast has reached about 8.8 m sec^{-1} while that of the off-time is only 8.4 m sec^{-1} . Another way of seeing this is to estimate the horizontal distance between the curves; this indicates that the

4. IMPLEMENTATION DETAILS

The off-time AVN forecasts are identical to the on-time forecasts except for their release time. Like the on-time forecasts, the initial processing time (or "dump time") is 2:45 hours past the initial hour in order to wait for late-arriving observations. That is, the 06Z run is initiated at 0845Z and the 18Z run is initiated at 2045Z. The 24-hour forecast should be available sometime after 3:45 hours past the initial hour. Both the on-time and off-time forecasts will be extended to 78 hours for use in hurricane forecasting.

5. CONCLUSIONS

The 06Z (and 18Z) off-time forecasts are generally 4 to 6 hours more skillful *for the same valid time* compared to the previous 00Z (and 12Z) on-time forecasts that were distributed 6 hours earlier. That is, the implementation of the four-times-per-day AVN forecasts will give the model guidance users 4 to 6 hours more skill in the two 6-hour periods of the day when the most recent AVN forecast available is an off-time forecast (but of course will give no change in skill when the youngest forecast is an on-time forecast). Therefore, the operational implementation of the off-time global AVN forecasts increases the daily *mean* skill of the total forecast products by 2 to 3 hours. This represents an outstanding increase in skill for those model guidance users who can take advantage of it. In addition improving the aviation products, these extra forecast should be of great benefit in supporting other other NCEP acitivities, including hurricane, mesoscale, and marine forecasting.

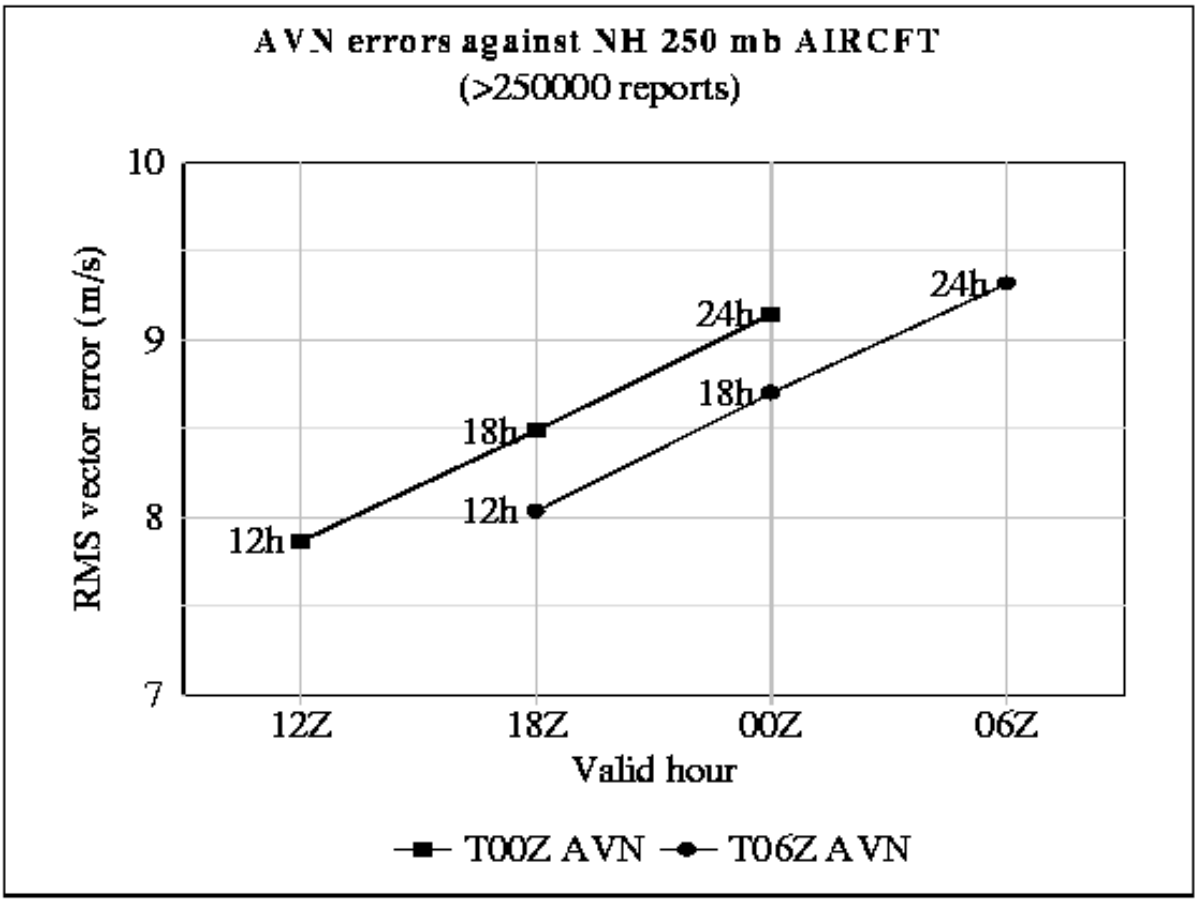

Figure 1. Root-mean square vector errors of AVN 250-mb wind 12-hour, 18-hour and 24-hour forecasts verified against aircraft obervations in the Northern Hemisphere over the course of one year. The dark line shows on-time (00Z) forecast errors for the 3 forecast lengths; light line shows off-time (06Z) forecast errors for the same 3 forecast lengths. Similar results were obtained for the 12Z vs. 18Z comparison.