A new thinning scheme based on one-hour time slots in 4D-Var for ATOVS assimilation

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A thinning scheme based on one-hour time slots in the JMA operational global 4D-Var assimilation system was newly introduced into ATOVS radiance assimilation on 2 August 2005. Because the former thinning scheme suited for 3D-Var system was performed in the whole assimilation window of six hours, some overlapping data from multiple satellites were removed when their observation times differ by more than one hour. The new thinning scheme increases the number of ATOVS data used in the 4D-Var analysis by a factor of 1.5 in the polar regions. For AMSU-A from Aqua satellite whose orbit is mostly overlapped with NOAA-16, more data become to be used at low and mid-latitudes. To assess the impacts of the new scheme, one-month observation system experiments were performed for each of August 2004 and January 2005. The experiment for August 2004 demonstrated positive impacts on forecast skills as shown in Figure 1. In addition the quality of the typhoon track predictions was improved as in Figure 2. From the experiment for January 2005 impacts of the new scheme were globally neutral for the 500hPa geopotential height, but positive for the surface pressure (not shown).

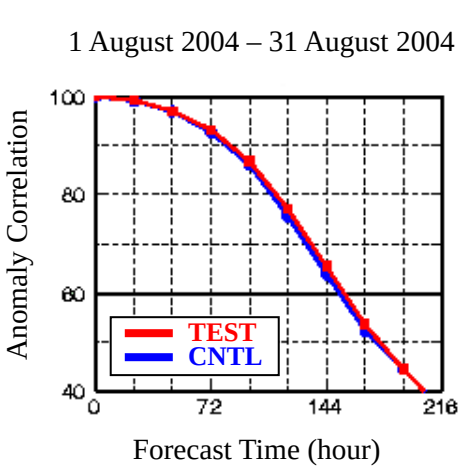

Figure 1 The global anomaly correlation for the 500hPa geopotential height verified against analysis. They are from 1st through 31st August 2004 for the new ATOVS thinning scheme (TEST) and the former scheme (CNTL).

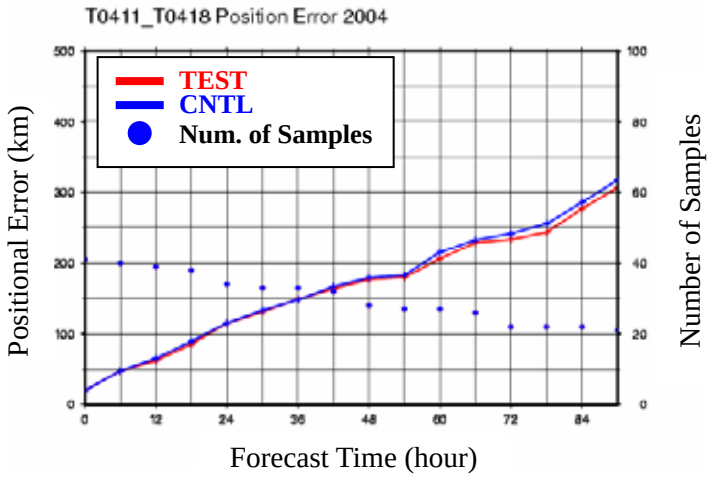

Figure 2 Averaged typhoon track error in August 2004. Blue dots indicate the number of cases used in this statistics.