Revised usage of Atmospheric Motion Vectors (AMV) from all geostationary satellites in the operational global 4D-Var assimilation system

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A pre-processing system for Atmospheric Motion Vector (AMV) in the BUFR encoded dataset (BUFR AMV) generated from all geostationary satellites was revised in the JMA operational global 4D-Var assimilation system on 18 October 2006. Before the revision, BUFR AMVs from only METEOSAT satellites and SATOB AMVs from MTSAT-1R and GOES satellites had been assimilated in the global assimilation system. BUFR AMVs have a great advantage over SATOB AMVs in the high density distribution and the availability of quality information called QI (Quality Indicator). Thus we replaced all SATOB AMVs with corresponding BUFR AMVs in the global assimilation system. Furthermore, in order to use efficiently BUFR AMVs, we made several revisions of the pre-processing system for AMVs. First, the usage of the data is more strictly limited reflecting the error characteristics according to their heights. Secondly, fewer but more reliable data are assimilated by setting more rigorous QI threshold. Lastly, a new, intelligent thinning scheme is introduced to select the data, taking into account the QI and observation location and time, so that they are homogeneously distributed.

To assess the impacts of the new AMV scheme, one-month observation system experiments were performed for January 2006 and September 2005. The experiment for January 2006 demonstrates positive impacts on forecast skills in terms of the 500hPa geopotential height (Fig.1). Impacts of the other experiment are globally neutral for the 500hPa geopotential height, but positive for the surface pressure (not shown). In addition, the typhoon track predictions slightly improve as in Figure 2.

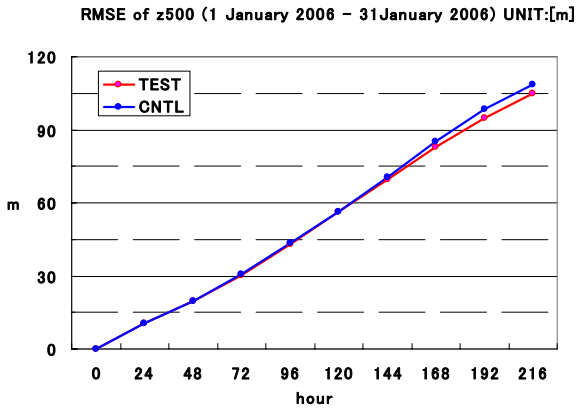

Figure 1 The global root mean square error (RMSE) for the 500hPa geopotential height verified against analysis. They are from 1st through 31st January 2006 for the new QC scheme (TEST) and the former scheme (CNTL).

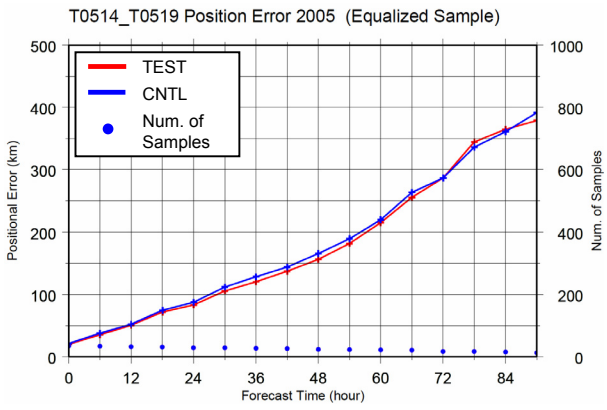

Figure 2 Averaged typhoon track error in September 2005. Blue dots indicate the number of cases used in this statistics.