Prepared by KMA
Agenda Item: II/6
Discussed in WG-II

CURRENT STATUS OF ATMOSPHERIC MOTION VECTOR AT KMA

This work is to inspect the errors of AMVs estimated by KMA AMV in terms of latitudinal band, AMV heights, assigned methods for AMV height and time etc. These results are able to be very helpful to understand the characteristics of AMV errors as one of observation data used for NWP data assimilation as well as to utilize to improve AMV estimation algorithm, itself.
**AMV: Atmospheric Motion Vector*

KMA has produced AMV operationally by specification shown in below table 1. Especially, in the advent of COMS era, COMS AMV has been estimated from April 1, 2011. KMA has been also tried to utilize COMS AMV as input data for NWP data assimilation. Thus, in order to understand the characteristics of results of KMA AMV, KMA generated and validated MTSAT-1R AMV and MTSAT2 AMV (IR AMV, WV AMV, VIS AMV) using UM wind data for the period from April 1 2010 to March 31, 2011.

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Table 1. The specifications for KMA AMV algorithm

Target size (pixels)	24 X 24 (96 km x 96 km)
Time interval between satellite images	15-minute
Target selection method	Optimal method
Height assignment	EBBT, STC, IR/WV for IR AMV and VIS AMV EBBT, NTC, NTCC for WV AMV
Area of AMV generation	Full Disk

Figure 1 shows annual variation of accuracy of high level IR AMV. Wintertime with strong high level winds over northern hemisphere has slower bias than any other time, while because southern hemisphere is summertime with weak wind, it has relatively less slow bias compared with northern hemisphere. Especially, jet stream area in latitudinal band of 20N~30N shows slow bias of greater than -5m/s while tropical area with low speed has bias close to approximately zero as shown in Figure 2a.

Accuracy of KMA AMV tends to contain statistically the distinct seasonal variation which is dependent on the magnitude of wind speed. Consequently, region with strong wind has slow bias as compared with UM wind. Such a slow bias seems to appear due to difference of wind direction not difference of wind speed between AMV and UM wind.

Figure 2b shows the vertical bias distribution of IR AMV on July 2010 and Feb 2011. Maximum height of AMV is different for latitude and season, which is influenced by tropopause. Tropical area approaches almost zero bias or small positive bias for all levels regardless of season. However, levels above 350 hPa over mid-latitude

area have slower bias for other levels. Signal of bias also changes from negative to positive at around 100 hPa. There are also discontinuities of bias value at level of 650 hPa, which results from applying height correction for winds at surrounding levels of surface inversion layer.

It has been known that wrong height assignment drop accuracy of AMV and several studies have overtaken to solve the problem of disagreement of vector tracking and height in algorithm among AMV producers. KMA AMV also has been tried to reduce bias over region with strong wind and evaluating utilization of improved UM data

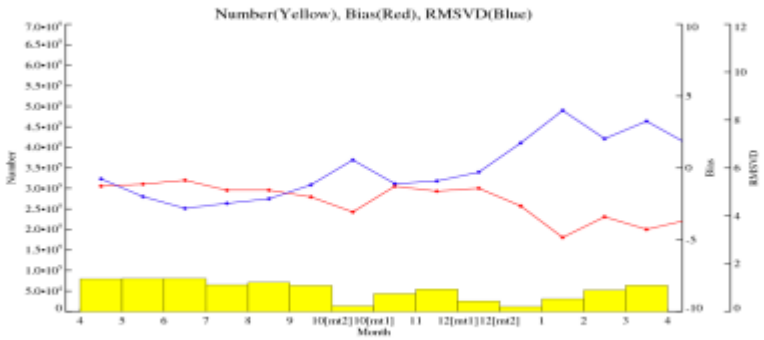
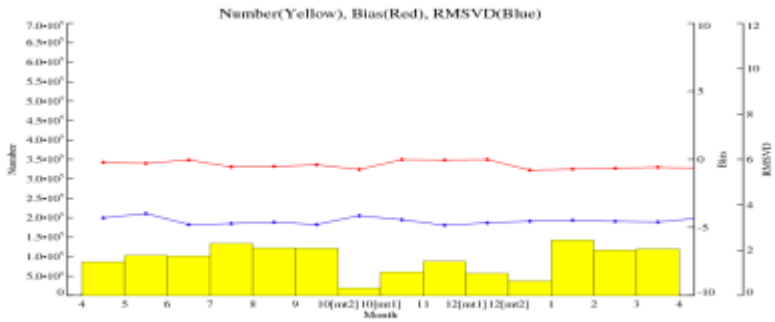
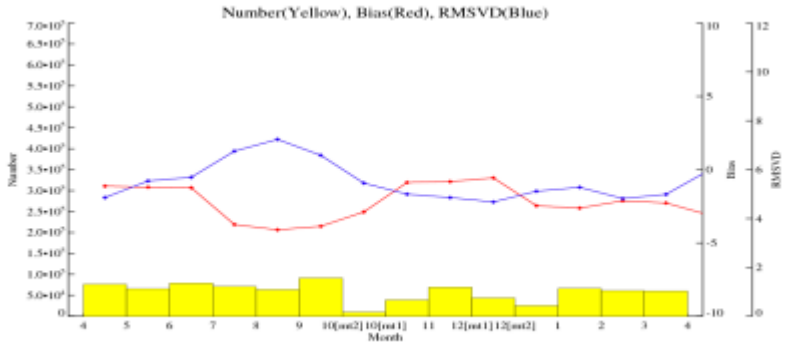
Northern Hemisphere	
Tropical Region	
Sourthern Hemisphere	

Figure 1. Annual variation of bias, RMSVD and number of high level IR AMV.

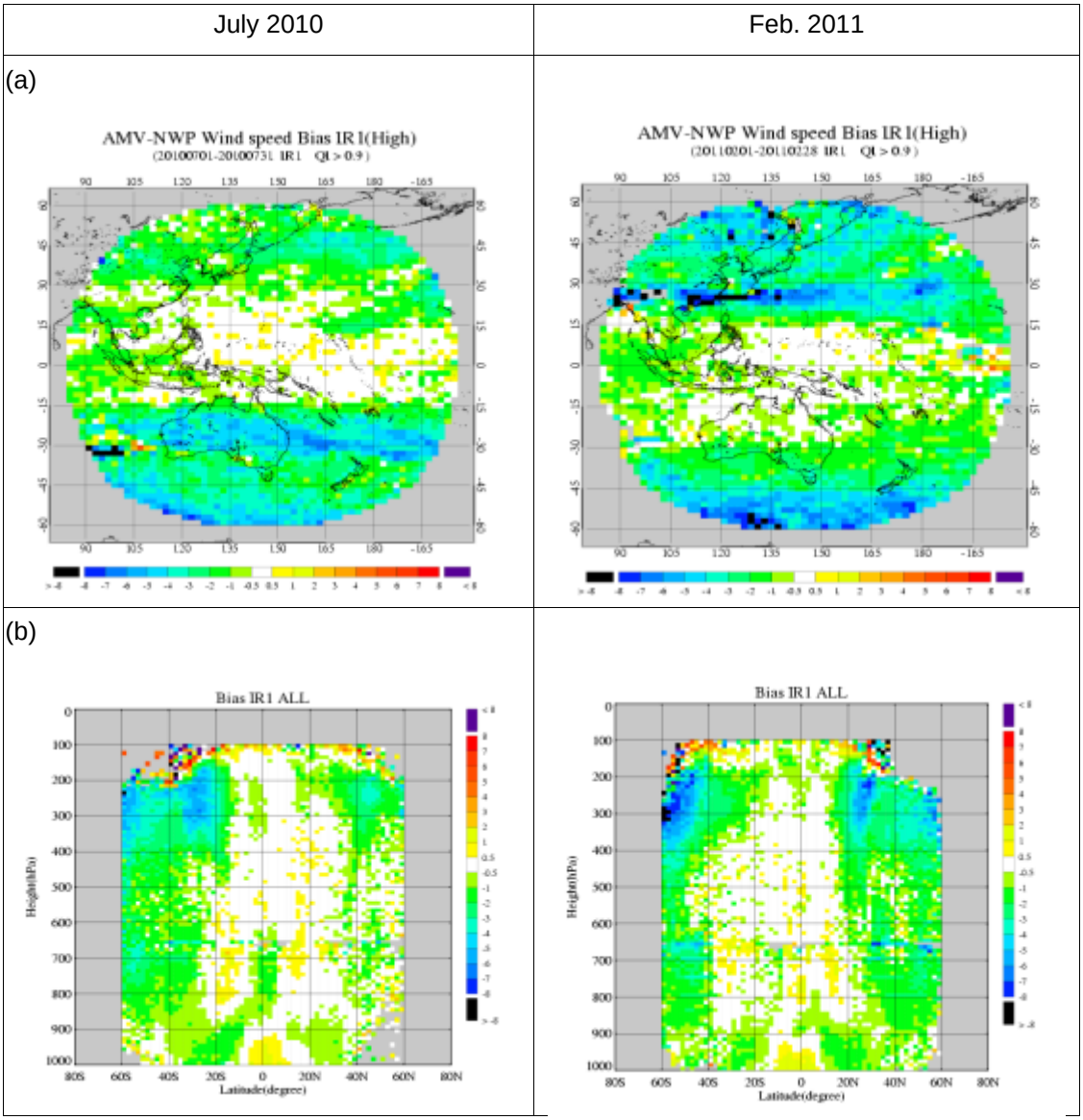


Figure 2. Spatial bias distribution of high-level IR AMV (upper) and Vertical bias distribution of IR AMV (below).