CGMS-37 KMA-WP-10

Prepared by KMA
Agenda Item: II/5
Discussed in WG II

Current Status of Atmospheric Motion Vector at KMA

This paper introduces the current status of KMA AMV and recent monitoring results on the quality of the AMV. The AMV has uncertainties due to the algorithm itself as well as NWP profiles applied for height assignment. Therefore, it is difficult to identify its causes that produce abnormal vectors. Additionally, the AMV accuracy results in seasonal variation in the monitoring.
*AMV: Atmospheric Motion Vector

1. Accuracy of KMA AMV

KMA has been developing Communication Ocean Meteorological Satellite (COMS) Data Processing System (CMDPS) to prepare operational meteorological products after launch COMS.

In June 2008, KMA AMV algorithm was updated and a validation module was added to AMV processing system which made it possible to get monthly statistics and monitor the quality of the AMV.

In this report, we will introduce the current status of KMA AMV and some results of the AMV quality. KMA has written monthly reports on AMV accuracy using statistical methods recommended by CGMS since July of 2008. The monthly report includes the accuracy analysis of KMA AMV as the followings;

- The number of collocated dataset between AMV and radiosonde wind data has seasonal variation. (Fig. 1)
- Bias of high level (above 400hPa) IR AMV in winter (summer) increase in northern (southern) hemisphere (Fig. 2)
  - In winter, it is strong wind shear in the high level. It induces AMV accuracy to depend on AMV height much more in winter than in any other seasons.
- There is large bias of wind speed when that is greater than about 40 m/s (Fig. 3)

2. ERRORs OF KMA AMV

The uncertainties of AMV result from the height assignment and vector tracking of KMA AMV algorithm. So it is very difficult to identify clearly its causes to decrease the accuracy. Until now, it is widely understood that AMV height assignment mainly effects AMV accuracy. However, there is no physical relation between vector tracking and height assignment of AMV in the current algorithm.

KMA has analyzed AMV results to improve the algorithm. The results show that there were obvious errors of vector in KMA AMV as followings.

- Strong winds were found at low level (below 700hPa, Fig. 4a). It could be due to wrong AMV height assignment.
- Wind speeds of KMA AMV are much smaller than those of JMA AMV at high level (Fig. 4b). It might result in large negative bias at high level.

3. Future Plans

We are going to analyze what scheme make these abnormal vectors in the algorithm and develop the analysis system for effective AMV monitoring.

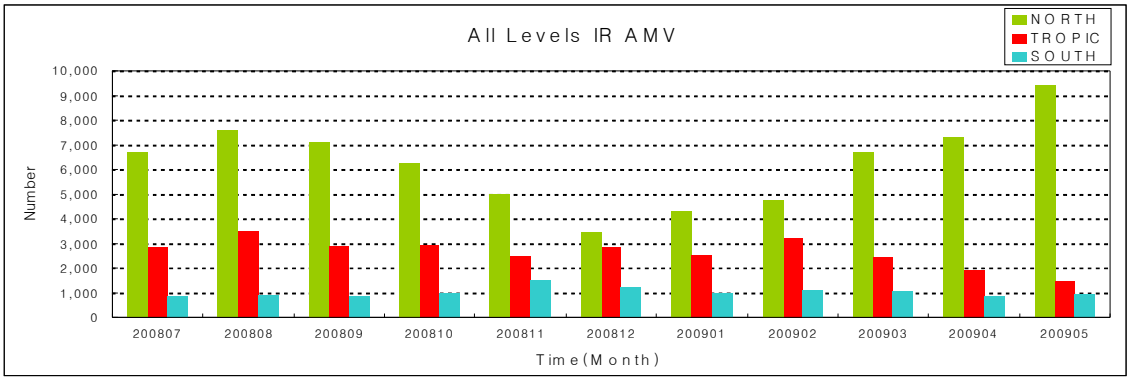

Fig. 1. Number of collocated dataset with AMV and radiosonde wind data from July of 2008 to May of 2009. Most of radiosonde observations are located in northern hemisphere. The number decreases in wintertime.

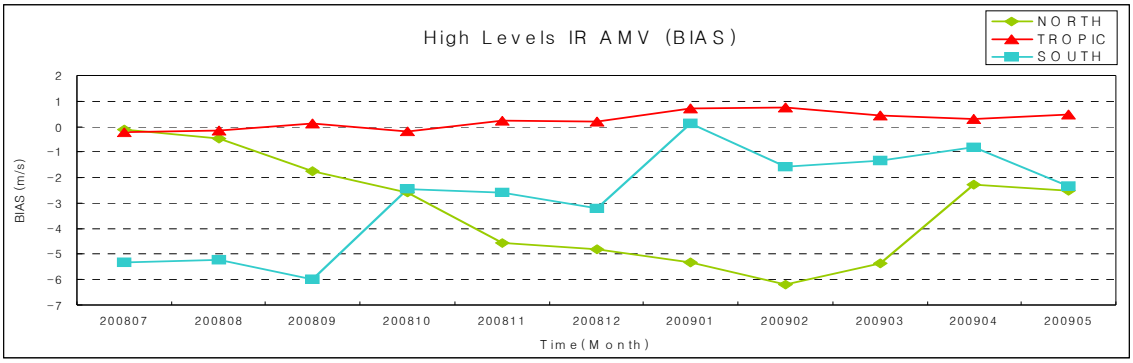

Fig. 2. Bias of high-level IR AMV from July of 2008 to May of 2009. It shows that the bias has seasonal characteristics.

(a) (b)

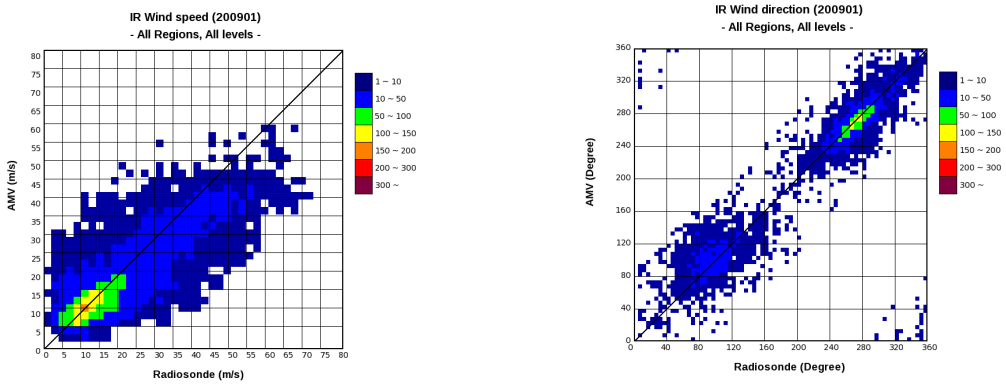

Fig. 3. Scatter plots of number density between AMV and radiosonde wind data in terms of wind speed (a) and wind direction (b).

(a) (b)

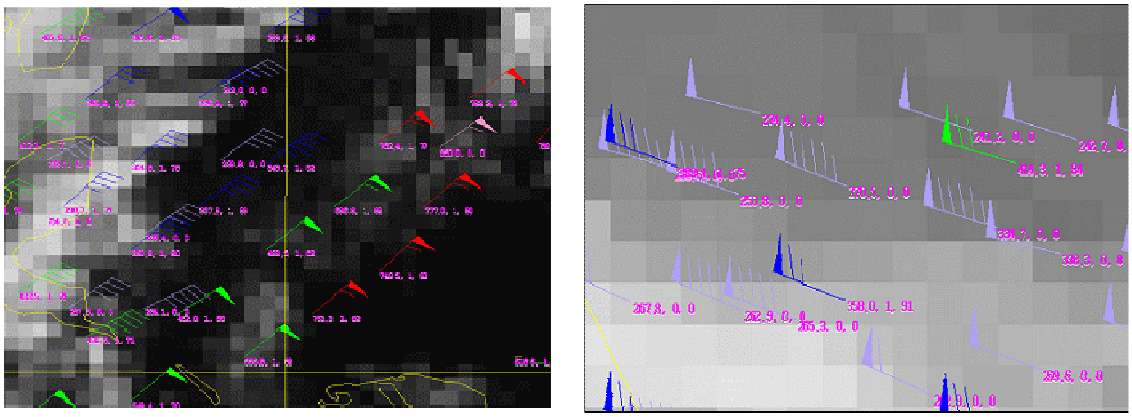

Fig. 4. (a) Green (red) colored wind bars represent middle(low)-level vectors. However there is no discrepancy of wind speed in winds at two levels. (b) Blue (violet) colored wind bars represent KMA (JMA) high-level IR AMVs. JMA winds have much larger speed than KMA winds at high-level.