P13

Use of upper-tropospheric Atmospheric Motion Vectors (AMV) for diagnosing tropical cyclone intensity

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Geostationary satellite imagery at intervals less than about 10 minutes, which is called rapid-scan imagery, enable to derive high-density Atmospheric Motion Vectors (AMV) even in tropical cyclone (TC) where the direction of cloud motion abruptly changes. This study derived upper-tropospheric AMVs over TC areas from MTSAT imagery at 15 minutes intervals by the JMA/MSC algorithm, and investigated the relationship between TC upper-tropospheric cyclonic vortex intensity from the AMVs (referred to as UMaxWind) and TC maximum sustained wind (MSW) of JMA best-track data. The research for 27 TCs in 2011-2014 showed that the correlation between UMaxWind and MSW was 0.74～0.77. It was also found that possible bias and root mean square error of estimated MSW from UMaxWind were -0.05～-1.32 m/s and 6.66～7.66 m/s, respectively. These results suggest that the diagnosis of MSW by using the upper-tropospheric AMVs is promising. We have another interest on how UMaxWind is related to the upper-tropospheric outflow and convection near TC center which possibly reflect the vertical transportation of absolute angular momentum from the surface. Investigations for this interest will be also presented using MTSAT and Himawari-8 AMVs.