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Tropical Cyclone Intensity Estimation by TRMM Microwave Data

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Dvorak technique is commonly used in many operational warning centers world wide to estimate tropical cyclone intensity. The method is based on the statistical image recognition using the visible and infrared image.

Recently there are many microwave data available, such as SSM/I on DMSP, TRMM TMI and PR, AMSR, AMSR-E, QuikSCAT, SeaWinds and AMSU, etc. Microwave is very sensitive to hydrometeors. Thus we hope we can estimate tropical cyclone intensity more directly than the conventional Dvorak technique.

To check the usefulness of the microwave satellite data to estimate tropical cyclone intensity, we performed a feasibility study using TRMM TMI and PR data. We used the best track data issued by the JMA, JTWC and NHC and the maximum wind speed of the QuikSCAT as a truth.

The data we used are the version 5, 2A21(TMI) and 2A25(PR) data. For 2A21 we have used 19, 37 and 85 GHz brightness temperature and for PR we used rainfall intensity at 2 km.

We calculated several parameters from the above data in different area size. The parameters are the mean, maximum and minimum of the brightness temperature of the TMI and rainfall intensity at 2 km.

The result shows that the correlation is high between TMI 19 and 37 GHz mean TB within 1 degree radius from the cyclone center and the best track data. However the rmse is 8 – 10 m/s. This value is rather large and we need to improve the method.

Keywords: Tropical cyclone, Microwave, TRMM TMI/PR.