Mesoscale Precipitation Features Associated with Landfall Typhoons in the Taiwan Area

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ABSTRACT

Radar reflectivity data of QPESUMS system of Taiwan CWB is used to analyze changes in the rainfall structure of typhoons before and after landfall. This study covers 13 typhoons which made landfall on Taiwan from 2004 to 2007. Radar reflectivity data is averaged with axial symmetric and non-axial symmetric calculation. And changes in the rainfall structure of typhoon are discussed when typhoons were under different tracks, environmental vertical shear, translational speed, and seasons.

The results indicate: (1) If the track of typhoon made loop before landfall, the rainfall rate in inner core (r<100km) of typhoon increases to maximum before making loop, and then decreases sharply. However, if the track of typhoon didn’t make loop before landfall, the rainfall rate increases to maximum at landfall. The rainfall structures of Typhoon Bilis and Wutip are scrappy and are the exceptions. (2) When the environmental vertical shear is strong (i.e., 850-200hPa ≥ 7.5ms⁻¹), the larger radar reflectivity will be found out the left-hand side of the vertical shear vector. When the shear is weak, the rainfall distribution is more symmetric. However, some typhoons when vertical shear is weak, there is larger radar reflectivity in left side of vertical shear vector in some typhoons. This result is rather similar with results compiled by using lightening and satellite data. (3) All the 13 cases, the translational speed is larger than 5 ms⁻¹. However, there is not larger radar reflectivity in the front and right of motion vector. (4) Typhoon Nanmadol made landfall on Taiwan on December. The outer rainband of typhoon combining with northeasterly monsoon induced strong...
reflectivity. When Typhoon Nanmadol left Taiwan, reflectivity dissipated rapidly because of incursion of drier and colder air.