

Classification of MCSs associated with Typhoon by Radar echo pattern

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Typhoon is the one of major disturbances yielding heavy rain in Japan. Mesoscale convective systems (MCSs) causing such heavy rain, however, are not always rain bands of Typhoon itself. The present study aims to classify MCSs formed associated with Typhoon by Radar echo pattern and to examine the relationship between MCSs and the locations of Typhoon.

We checked radar echo patterns when any rain gauges at 29 Japan Meteorological Agency's observation points in Kochi prefecture in Japan recorded more than 50 mm/h and classified them to five types; spiral rain band, fixed echo, streak on slope, quasi-linear rain band and multi-cell types. The spiral rain band type is the convection system of Typhoon itself. The fixed echo type is quasi-stationary convective system locked at certain area, e.g. around summit of mountains, due to orographic effect. The streak on slope is also a kind of orographic rainfall, in which many narrow quasi-linear rain bands line parallel to the direction of the mean slope of mountains. The multi-cell type is the pattern that many convective cells distribute in wide area. We extracted 196 echo patterns for 27 years from 1986 to 2012. The tracks of tropical storm's eye when the convective system appeared were also checked from the typhoon best track data collected by JMA.

Major MCSs were found to be fixed echo and streak on slope types. The sum of fixed echo and streak on slope types was more than 70 percent of total MCSs. This fact shows that heavy rain is mainly caused by the interaction between the terrain of Kochi and the wet swirling airflow of Typhoon. Though MCSs change with the progress of Typhoon, They clearly depend on the location of Typhoon. Therefore, we can almost predict the risk of heavy rain with the location of Typhoon.