

An insight into the microphysical attributes of northwest Pacific tropical cyclones

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Northwestern Pacific (NWP) tropical cyclones (TCs) impose a severe threat to the life and economy of people living in East Asian countries. The microphysical features, mainly the raindrop size distributions (RSD) of TCs that improve the modeling simulation and rainfall estimation algorithms, are limited to case studies, and an extensive understanding of TCs RSD is still scarce over the northwest Pacific. Here, we examine a comprehensive outlook on disparities in microphysical attributes of NWP TCs with radial distance and storm type, using long-term disdrometer, ground-based radar, and reanalysis datasets in north Taiwan. We find that the decrease in mass-weighted mean diameters and rainfall rates with radial distance is associated with a decrease in convection for various circumstances in stratiform precipitation with opposite characteristics in the convective, and this association is deceptive in intense storms. Our findings give an insight into crucial processes governing microphysical inequalities in different regions of NWP TCs, with implications for the ground-based and remote-sensing rainfall estimation algorithms.

Keywords: Tropical cyclones, Raindrop size distribution, rain bands