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Precipitation microphysics in Tropical cyclone eyewalls and rainbands observed from GPM DPR and GMI

Fengjiao Chen (1,2) and Hao Huang (3)

(1) Anhui Meteorological Information Centre, Anhui Meteorological Bureau, Hefei, China, (2) Anhui Institute of Meteorological Sciences, Anhui Meteorological Bureau, Hefei, China, (3) School of Atmospheric Sciences, Nanjing University, Nanjing, China

Based on the merged datasets of Global Precipitation Measurement mission (GPM) Dual-frequency Precipitation Radar (DPR) and Microwave Imager (GMI), the microphysical characteristics of convective and stratiform precipitating clouds in tropical cyclones (TCs) are analyzed over the Northwest Pacific (NWP), considering the eyewall (EW), inner rainband (IB) and outer rainband (OB) regions. The radial distribution shows that the stratiform and convective precipitation near the TC center have characteristics of more intense rainfall, deeper clouds, and larger amounts of ice hydrometers. The Dm at 2 km in altitude of convective precipitation in the OB region has much larger fractions of large Dm than in the other two regions. Whereas, the stratiform precipitation has more fractions of large Dm in the EW region than in the IB and OB regions. The convective precipitation shows a general pattern of large amounts of relatively small raindrops (larger Nw and smaller Dm) in the EW region, compared to that in the OB region; while the EW stratiform precipitation is centered concentrated at larger values of Dm and Nw (at 2 km in altitude), compared to that for OB stratiform precipitation. The vertical profiles show that Ze and Dm values in the EW region increase from the melting level to the ground, while show a sharp decrease in the OB region, stays almost constant for OB convective precipitation. Generally, the coalescence of precipitation hydrometers is predominant in EW, IB and OB regions. However, negligible samples of convective and stratiform precipitation in the OB region exhibit a feature of breakup of hydrometers, especially for large raindrops.