

# Western Pacific tropical cyclones' raindrop size distributions and their implications using machine learning approaches

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## Abstract:

In this study, long-term raindrop size distribution (RSDs) measurements of tropical cyclones from the Western Pacific (WP TCs) from the ground-based disdrometers over North Taiwan are used to investigate the improved estimations of rainfall rate and slope parameter of the gamma distribution. When compared with the other oceanic TCs, the radar reflectivity and rainfall ( $Z-R$ ) relations evaluated for the WP TCs revealed unique characteristics. The  $Z-R$  relations of WP TCs demonstrated a definite dependence on mass-weighted mean diameter and total number concentration. Furthermore, moments methods is adopted to estimate the three (slope, shape, and intercept) parameters of the gamma distribution and the raindrop size distribution parameters of the WP TCs. The relationships among three parameters of gamma distribution demonstrates the reasonable predictability for the slope and intercept parameter relation. Further, we show that while estimating the rainfall rate and slope parameter, machine learning methods perform superior than linear regression.

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