

Regional discrepancies in the microphysical attributes of summer season rainfall over Taiwan using GPM DPR

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Abstract

Taiwan, an island located in the northwest Pacific region, is influenced by heavy rainfall events during warm seasons, particularly from June to August. Interaction of precipitating clouds with the complex topography results in inhomogeneous and intense rainfall over Taiwan. Hence, the present study investigates the regional discrepancies in the microphysical characteristics of summer season rainfall over (north, south, east, and central) Taiwan using 9 years (2014–2022) of GPM DPR measurements. The results showed clear distinctions in the precipitation and raindrop size distributions over the north, south, east, and central Taiwan. The contoured frequency by altitude diagrams (CFADs) of radar reflectivity, rainfall rate, drop diameter, and concentration clearly infer the dominance of large-size super cooled liquid and ice particles above the melting layer and rain particles below the melting layers in the south and central Taiwan. Central (north) Taiwan is dominated by large-size (small) drops among four regions. Higher concentrations of large drops over central Taiwan (principally from convective precipitation) and south Taiwan (primarily from stratiform precipitation) is attributed to higher rainfall amounts over these two regions than the north and east Taiwan. Furthermore, irrespective of precipitation type and geographic region, summer monsoon rainfall over Taiwan is dominated by coalescence and breakup processes. The microphysical characteristics of summer season rainfall addressed in this study could assist in refining the cloud modeling simulations over complex topography in Taiwan

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