

水雲特性の違いに伴う 94GHz レーダ反射率の頻度分布の対応
Distributional correspondence of 94-GHz radar reflectivity with the variation in water cloud properties

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This paper studied the behavior of 94-GHz radar reflectivity (Z_e) with variation in the properties of low-level water clouds, such as the effective droplet radius (r_e), geometrical thickness (D_{cld}), and liquid water path (LWP), over the northwest Pacific and China. The changes in the distribution of $\max Z_e$ (the largest Z_e within a cloud layer) were examined in terms of variation in the cloud parameters such as small, mid and large categories. While $\max Z_e$ had monomodal distributions regarding variation in r_e and D_{cld} , that appeared bimodal in the small category of LWP. It was confirmed that the small category of LWP contained both non-precipitating clouds in the incipient stage and raining clouds in the dissipating stage. Next, optically-measured particle size was combined with LWP derived from the microwave measurement to classify the precipitation type. Applying $\max Z_e$ and D_{cld} to the analysis of classified precipitation types corroborated the importance of D_{cld} for examining the occurrence of precipitation. Finally, the position of $\max Z_e$ relative to the cloud top was investigated using a measure of the probability of precipitation (POP) according to variation in r_e . The results showed that the Pacific and China had 'bow' and 'funnel' shapes, respectively. The emergence of these shapes according to the variation in r_e was interpreted as the enhancement of Z_e due to droplet collisional growth and the attenuation of Z_e by the presence of large particles. Furthermore, a detailed analysis of smaller particles (<10 micron in radius) reinforced the idea of rapid, efficient particle growth in the lower part of the cloud.

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