

An investigation on microphysical characteristics of early-, late-, and post-Mei-yu season rainfall over Taiwan

Balaji Kumar Seela¹, Jayalakshmi Janapati¹, Pay-Liam Lin^{1,2,3,*}, Chian-Yi Liu⁴, and Chuan-Chi Tu¹

¹Institute of Atmospheric Physics, Department of Atmospheric Sciences, National Central University, Zhongli District, Taoyuan City 320317, Taiwan

²Earthquake-Disaster and Risk Evaluation and Management Center, National Central University, Zhongli District, Taoyuan City 320317, Taiwan

³Research Center for Hazard Mitigation and Prevention, National Central University, Zhongli District, Taoyuan City 320317, Taiwan

⁴Research Centre for Environmental Changes, Academia Sinica, Taipei, Taiwan

Abstract:

Over Taiwan, Mei-yu season ((May and June), which is primarily linked to frontal systems, is the transition period between winter and summer. Using the Global Precipitation Measurement Mission dual-frequency precipitation radar (GPM DPR), the current study examined the rain and microphysical characteristics of the Mei-yu season in Taiwan. In order to examine the areal and intra-seasonal aspects, May and June months are divided into three sub-seasons: early-Mei-yu, late-Mei-yu, and post-Mei-yu. The three sub-seasons exhibited differences in rainfall and raindrop size distributions, with abundance of large drops in the post-Mei-yu. Additionally, there were noticeable variations in the raindrop size distributions among the south, central, north, and eastern parts of Taiwan, with more large drops in central Taiwan. To comprehend the microphysical progressions causing the regional and intra-seasonal fluctuations, CFADs (contoured frequency by altitude diagrams) of rain parameters are utilized. Compared to other two sub-seasons, the early-Mei-yu season exhibited weaker convection. Dominance of stratiform precipitation in late-Mei-yu season, and convective precipitation in post-Mei-yu season resulted in higher rainfall amounts in these two sub-seasons (more particularly in post-Mei-yu) than the early-Mei-yu season. Examination of warm rain microphysical processes (below 5 km height) among these sub-seasons revealed that the early-Mei-yu season is dominated with break-up process, late-Mei-yu season with breakup and coalescence balance, and post-Mei-yu with coalescence, size-sorting and evaporation processes.

*Correspondence:

Prof. Pay-Liam Lin,

Department of Atmospheric Sciences

National Central University, Zhongli, Taoyuan, Taiwan

Email: tliam@pblap.atm.ncu.edu.tw