Warm Cloud Microphysical Properties and their Associated Raindrop Size Distributions over Northern Taiwan

Christin Afrin Matondang\textsuperscript{1,2} and Chian-Yi Liu\textsuperscript{1}
\textsuperscript{1}Center for Space and Remote Sensing Research (CSRSR), National Central University, Taoyuan City, Taiwan (matondang.ca@gmail.com)
\textsuperscript{2}Agency for Meteorology, Climatology, and Geophysics of the Republic of Indonesia (BMKG), Medan, Indonesia

Warm clouds have a huge impact on radiative forcing and also precipitation properties. Knowledge about their raindrop size distribution (RSDs) is useful in realizing rain integral parameter and in the understanding of precipitation microphysics. Unfortunately, as a result of the discontinuity of spatiotemporal observation, obtaining a detailed process that occurs in warm clouds is still challenging. In this study, we try to identify the characteristics of cloud microphysical processes in warm rain formation over Northern Taiwan. The detailed analysis is conducted by using a combination of Joss-Waldvogel Disdrometer (JWD) and Himawari-8 in North Taiwan from December 2017 to January 2018.

The preliminary result shows that different rainfall intensity can build different kinds of RSDs. In Taiwan winter season, warm rain has a lower concentration of midsize and large raindrops as compared to mixed and cold rain. However, small raindrops are more dominant than middle and large drops for warm rain. It is found that both microphysical properties (Cloud Optical Thickness/COT, Cloud Liquid Water Path/CLWP, and Cloud Effective Radius/CER) and Gamma parameter distribution are varied as the rain rate varied. A lower rain rate (e.g., drizzle) has resulted from a wider range of cloud microphysical properties while a higher rain rate (e.g., stronger rain rate) has resulted from certain ranges of cloud microphysical properties. The Gamma parameter distribution shows more homogenous distribution as the rain rate increase.