Variability of Vertical Structure of Precipitation over Sumatra and Adjoining Oceans from Long-Term Measurements of TRMM PR

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This study is a follow-up of a previous study on the vertical structure of precipitation over Sumatra [1]. Spatial, seasonal and diurnal variabilities of the vertical structure of precipitation have been studied using 17 years of Tropical Rainfall Measuring Mission' s Precipitation Radar (TRMM PR) version 7 data over Sumatra and adjoining oceans. Special emphasis has been put on six different climatic rain regimes, namely, Indian ocean (2 locations), coastal (1 location) and inland (3 locations). The data are classified into different types of precipitation (stratifrom, deep and shallow) including the virga rain. The vertical structure of precipitation over the inland area is compared with long-term measurement of 1.3 GHz Boundary Layer Radar at Kototabang, west Sumatra. The latest TRMM 2A-23 and 2A-25 products (version 7) have been statistically analyzed. First, the spatial, seasonal, and diurnal variations of storm height and freezing level have been investigated. It is found that tall storm is more dominant over the inland than coastal and ocean. Same trend is also observed for melting level height. However, the coastal area has lower percentage of tall melting layer than inland and the ocean. Second, mean vertical profile of radar reflectivity (VPR) has been studied for the stratiform and convective precipitation. The VPR variability has been analyzed for different seasons and diurnal cycles as well as rain intensities. Third, the characteristics of rain intensification and weakening in the vertical direction have been examined by the statistical analysis of VPR gradient (VPRG) above and below the melting layer. Detailed information about the result will be presented during the meeting.

[1] Marzuki, Hashiguchi, H., Kozu, T., Shimomai, T., Shibagaki, Y., Takahashi, Y., 2016, Precipitation Microstructure in Different Madden–Julian Oscillation Phases over Sumatra, Atmospheric Research, Vol. 168, pp. 121-138.

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