Cloud Propagation over Sumatera during Coupling Processes in the Equatorial Atmosphere Campaign I and II

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Cloud propagation determines the distribution of precipitation. Previous studies on cloud propagation over Sumatera are mostly focused on mean propagation. Marzuki et al. [1] investigated the propagation of individual cloud cluster using Hovmoller diagram of 10 years of brightness temperature data. However, cloud tracking through Hovmoller diagram has some disadvantages: 1) result significantly depends on the averaging window, 2) two or more cloud can be assumed as a single cloud if they lie at the same longitude at the same time, and 3) only possible to get one direction of propagation. Therefore, objectively identifying and tracking the cloud in latitude-longitude space is necessary. In this study, we present the result of cloud tracking based on three-dimensional brightness temperature (T_b) data during Coupling Processes in the Equatorial Atmosphere (CPEA) campaign I and II. The two campaigns have a different Madden-Julian Oscillation (MJO) phase in which active MJO was observed during the CPEA-I in contrast to the CPEA-II. Although during the CPEA-II strong actively convective due to the MJO was not observed, Sumatra received high daily rainfall during this period. Although mean outgoing longwave radiation (OLR) is much lower during CPEA-II than CPEA-I, the cloud size during the CPEA-I is larger than during CPEA-II. It was also found that the ratio of westward to eastward moving cloud during CPEA-I (II) is 7:1 (6:1). Both during CPEA-I and II, westward moving streaks generally have a longer span and faster speed than those of eastward-moving system.
[1] Marzuki, Hashiguchi, H., Yamamoto, M. K., Yamamoto, M., Mori, S., Yamanaka, M. D., Carbone, R. E., and Tuttle, J. D.: Cloud episode propagation over the Indonesian Maritime Continent from 10 years of infrared brightness temperature observations, Atmos. Res., 120–121, 268–286, 2013.

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