

Mesoscale Convective Complex Activities over Indian Ocean and Their Effects on Convections Over Sumatera Island

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Effects of Mesoscale Convective Complexes (MCC) over Indian Ocean on convections over Sumatera Island have been investigated using Multi-functional Transport SATellite (MTSAT) infrared (IR1) imageries, Tropical Rainfall Measuring Mission (TRMM) rainfall data and Cross-Calibrated Multi-Platform (CCMP) surface wind data of 10-year period (2000-2009). Occurrences of MCC were identified using an algorithm that combines criteria of cloud coverage, eccentricity, and cloud lifetime. This study begins with a case study on 16 to 17 August 2005 and 27 to 28 October 2007 to show the evolution of MCC, we found the development phase of MCC was accompanied by surface wind convergence, while wind divergence was clearly seen below decaying MCC. Following the decay of MCC, convective activities were observed in the surrounding regions by the presence of a new convective cell around the MCC, indicating the role of cold pool mechanism. The new convective cell was generated from cold pool affect convective clouds in the surrounding area and propagate to over Sumatera Island so causing extreme rainfall over Sumatra.

The correlation between MCC and convection over Sumatera was further investigated by performing composite analysis using more samples of MCC events. During the 10-year period, about a number of 553 MCC events have been identified over Indian Ocean. However, it is of interest to that MCC events tend to occur with significantly higher frequency during the monsoon transition season of March- April-May (MAM) period. Available data suggest that the life cycle of MCC over Indian Ocean is about 12 to 15 hours. Results of composite analyses confirmed that the MCC have significant influence on the development of cloud convection over Sumatera Island by means of cold pool propagation mechanism. This seems to imply that weather observations over the western Indian Ocean are crucial for rainfall prediction in Sumatera regions.

Keywords: Cold Pool, MCC, Convection, Rainfall