



An Analysis of the Modulation of Rainfall Diurnal Cycle by the MJO and ENSO over Western Maritime Continent

Chung-Wei Lee, Chung-Hsiung Sui, and Chih-Pei Chang

Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan (r05229029@ntu.edu.tw)

The diurnal rainfall cycle in the Western Maritime Continent (WMC) during austral summer concentrates over the major islands (Sumatra, Java, Borneo, Sulawesi) during 16-24 LST, and over the coastal ocean during 04-12 LST. The amplitude of diurnal rainfall cycle of 12.0 mm per day is stronger than that of the seasonal cycle (4.8 mm per day), the Madden-Julian Oscillation (MJO; 4.2 mm per day), and the El Niño-Southern Oscillation (ENSO; 0.6 mm per day). About 40 (10) percent of the daily total rainfall occurs within the six-hour wet (dry) phase of the diurnal cycle. Also, the daily mean moisture flux convergence (MFC) into WMC is mostly consumed during the wet phase of the diurnal cycle. By converging the mean moisture with anomalous winds, the MJO and ENSO evidently modulate the amplitude of the rainfall diurnal cycle.

The MFC associated with the MJO is dominated by the zonal component, which is offset by the smaller meridional component. However, the off-equator heating and the meridional wind anomalies are relatively stronger in ENSO than in MJO, so the meridional and zonal components largely cancel out each other in ENSO scenarios. Hence, the strength of MFC is weaker during ENSO events than during MJO events, and so is the modulation of the rainfall diurnal cycle and the associated daily mean precipitation anomaly.