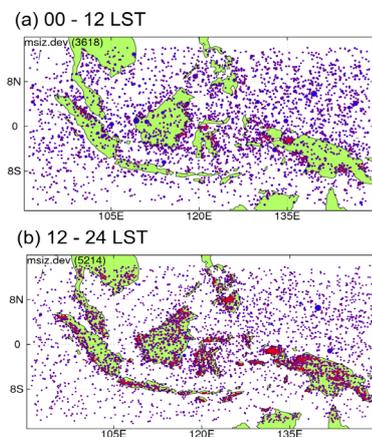
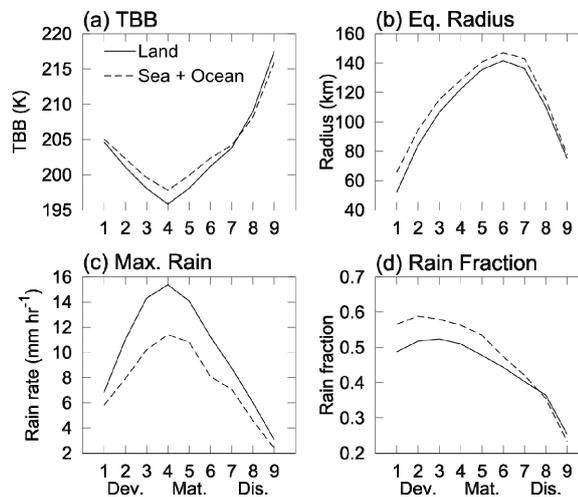


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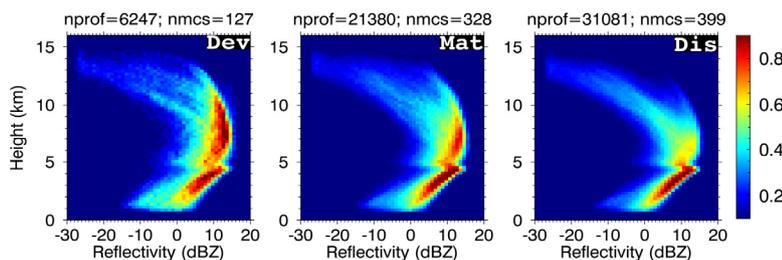
<https://doi.org/10.2151/jmsj.2017-026>



↑ Figure 1. Distribution of MCSs in Indonesia divided in (a) 0000–1200 LST and (b) 1200–2400 LST.



← Figure 2. The composite evolution of MCS properties, normalized into 9 time steps: (a) min. TBB (K), (b) equivalent radius (km), (c) max. rain rate (mm h^{-1}), and (d) the fraction of area with rain rate at least 1 mm h^{-1} . Solid and dashed lines correspond to land and oceanic MCSs, respectively.



← Figure 3. Normalized contoured frequency by altitude diagram of radar reflectivity factor for the raining region within the MCS. The frequency is normalized by maximum value of frequency bin at each stage.

- The “Grab 'em Tag 'em Graph 'em” (GTG) tracking algorithm is applied to the hourly MTSAT-1R infrared data to study the properties of mesoscale convective systems (MCSs) over Indonesian region, including their distribution and how their properties change from developing (Dev), mature (Mat), to dissipating (Dis) stages. The CloudSat data products are also used to obtain an insight to the microphysical properties of the MCSs at these different stages.
- The distribution of MCSs over Indonesia has a seasonal variation and a distinct diurnal pattern: large formation of MCSs over land (resp. sea and ocean) during the day (resp. night) (Fig. 1). Compared to the oceanic (sea+ocean) MCS, the land MCS exhibits colder min. brightness temperature (TBB), smaller size, larger max. rain rate, and smaller rain fraction (Fig. 2). The differences of these two MCS types are particularly visible in the developing and mature stages.
- The MCSs have distinct cloud microphysics at different stages. At the developing stage, the raining region shows large occurrence of radar reflectivity $\geq 10 \text{ dBZ}$ extending from 6 to 11 km, suggesting the presence of precipitating ice particles at these altitudes (Fig. 3). This mode becomes weaker in mature stage and the weakest in dissipating stage, indicating large hydrometeors no longer exist at the upper part of the raining region in dissipating stage. Within the MCS anvils, the dissipating stage shows a more uniform distribution of ice-particle effective radius compared to that shown by the developing and mature stages (figure not shown).