



Lightning climatology over Jakarta, Indonesia, based on long-term surface operational, satellite, and campaign observations

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Lightning frequency over Indonesian Maritime Continent (MC) is quite high (Petersen and Rutledge 2001, Christian et al. 2003, Takayabu 2006, etc). In particular, Bogor (south of Jakarta, west Jawa) had 322 days of lightning in one year (Guinness Book in 1988). Lightning causes serious damage on nature and society over the MC; forest fire, power outage, inrush/surge currents on many kinds of electronics. Lightning climatology and meso-scale characteristics of thunderstorm over the MC, in particular over Jakarta, where social damage is quite serious, were examined.

We made Statistical analysis of lightning and thunderstorm based on TRMM Lightning Image Sensor (LIS) and Global Satellite Mapping of Precipitation (GSMaP) together with long-term operational surface observation data (SYNOP) in terms of diurnal, intraseasonal, monsoonal, and interannual variations. In addition, we carried out a campaign observation in February 2015 in Bogor to obtain meso-scale structure and dynamics of thunderstorm over Jakarta to focus on graupel and other ice phase particles inside by using an X-band dual-polarimetric (DP) radar.

Recently, Virts et al. (2013a, b) showed comprehensive lightning climatology based on the World Wide Lightning Location Network (WWLLN). However, they also reported problems with its detection efficiency (< 10%) and small sampling frequency (< 0.1% of the time fly over tropics) by satellites. Therefore, we firstly examine in situ lightning data based on SYNOP observed by the Indonesian Agency for Meteorology, Climatology, and Geophysics (BMKG) because lightning is quite local and sporadic phenomena. We've started to analyze lightning characteristics over Jakarta region based on SYNOP as the ground truth data and GSMaP. Variability of lightning frequency around Jakarta was affected much by local conditions, e.g., topography (elevation) and proximity to the coastline. We confirmed the lightning frequency and its diurnal variation around Jakarta were much modulated by Cross Equatorial Northerly Surge (CENS), Madden-Julian Oscillation (MJO), El Nino and Indian Ocean Dipole mode events. Some of the results were inconsistent with previous studies over the equatorial ocean because we focused on lightning over land region in west Jawa. Results from the DP radar observation during the campaign around Bogor in February 2015 are also presented.

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