

Meteorological influence on Biomass Burning in Maritime Continent from 2012 to 2021

ABSTRACT

Biomass burning (BB) greatly impacts the Maritime Continent through various mechanisms including agricultural burning, land clearing and natural response to drought. The dynamic characteristics of BB in terms of its spatiotemporal distribution, seasonality, transport mechanism, and aerosol properties have prompted numerous research efforts including field campaigns, in-situ measurements, remote sensing, and modelling. Although the differing perspectives of these studies have offered insights on understanding the regional BB issues, it is challenging to compare and resolve the wider picture because of the diversity of approaches. Human-induced global warming has certainly caused multiple observed changes in the regional meteorological characteristics. These characteristics are dynamic and evolving fast, which motivates us to examine how the regional climate change that occurred in the last decade has changed the occurrence of BB in the Maritime Continent. In this study, we investigate BB events in the Maritime Continent from 2012 to 2021, focusing on the meteorological influence. Unlike other studies, we investigate the occurrence of BB events using synergistic application of ground-based measurement, global reanalysis model and satellite product, which allows us to examine the anomalies for comparison with other studies and identify the unique features of the event. We identified four dominant roles responsible for the occurrence of large-scale BB in the Maritime Continent: (1) El Niño Southern Oscillations (ENSO), (2) extreme positive-Indian Ocean Dipole (pIOD), (3) tropical cyclone (TC) activity, and (4) Madden-Julian Oscillations (MJO).