

## **Gridded Biomass Burning Emission Inventory in Equatorial Southeast Asia (ESEA)**

### **ABSTRACT**

Equatorial Southeast Asia (ESEA) is especially pivotal in the context of global climate dynamics and is susceptible to the influences of the El Niño-Southern Oscillation (ENSO) phenomenon. The occurrence of biomass burning (BB) is greatly exacerbated during El Niño events, leading to pronounced air quality deterioration. Despite its significance, comprehensive records of BB emissions within ESEA regions are still lacking and needed. Hence, this study aims to estimate BB emission in ESEA using bottom-up method. Based on the findings, BB emissions in 2021 reduced greatly compared to 2013. CO<sub>2</sub> was the most dominant species emitted, followed by CO and NMVOC. The burning of shrubland and evergreen forest was identified as the primary cause of BB in ESEA. Despite having a significant burned area, the contribution of savannah burning to BB emissions was relatively small. The results also suggested forest fires were the primary contributors of BB emissions and mainly originated from Indonesia. Sumatra and Kalimantan, were the major ESEA BB emissions region in 2013 and 2021. Indonesia's high deforestation rate increases forest's vulnerability to fires, Sumatra and Kalimantan constituted the major burned areas in the ESEA for 2013 and 2021, especially during the typical burning season (June to October), although with different severity. Consequently, these regions exhibited the densest BB emissions spots in ESEA.