



Influence of Biomass Burning Aerosols on Southeast Asia Air Quality

Hsiang-He Lee (1), Rotem Bar-Or (2), and Chien Wang (2)

(1) Center for Environmental Sensing and Modeling (CENSAM), Singapore-MIT Alliance for Research and Technology (SMART), Singapore (hsiang-he@smart.mit.edu), (2) Department of Earth, Atmosphere and Planetary Science, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

Biomass burning activities in Southeast Asia have become a major concern of general public as well as governments in the region. This is because that aerosols emitted from such fires can cause long-lasting haze events under favorite weather conditions in downwind locations such as Singapore, degrading air quality and causing human health issues. In order to improve our understanding of the spatiotemporal coverage and influence of biomass burning aerosols in Southeast Asia, we have used the Weather Research and Forecasting (WRF) model with a smoke aerosol module to conduct multi-year simulations covering the period from 2002 to 2014, driven by the biomass burning emissions from the Fire INventory from NCAR (FINN) version 1.5. To attribute the aerosol influences over various target regions to specific fire locations, we have also partitioned aerosols emitted from five major fire regions of Southeast Asia in the simulations. Based on the simulation results, we have examined the influences of various meteorological regimes on the aerosol transport and wet removal. We find that the transport and scavenging of biomass burning aerosols are strongly modulated by the Southeast Asian monsoon wind field and precipitation. We also identified that in the past decade, smoke aerosols are responsible for a substantial fraction of low visibility events in the major metropolitan areas of the region: 35% in Bangkok, 25% in Kuala Lumpur, 16% in Singapore, and 22% in Jakarta. The fires in the Indochina peninsula account for the largest percentage of the total fire enhancement to PM_{2.5} in Bangkok (98.9%), and fires in Sumatra were the major contributor in Kuala Lumpur (49%), Singapore (39%), and Jakarta (48%).