

3.063 Multi-component observations of biomass burning plumes by MAX-DOAS and sky radiometer at Phimai, Thailand in the dry season of 2016.

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Abstract:

The first intensive multi-component ground-based observations by multi-axis differential optical absorption spectroscopy (MAX-DOAS) and sky radiometer were performed at the SKYNET/Phimai site located around central Thailand (15.18°N, 102.56°E) from January to April 2016. The period corresponds to the dry season of 2016 associated with the intense biomass burning activity around the site. For the period, the ratio of glyoxal to formaldehyde concentrations (R_{GF}) near the surface was estimated from MAX-DOAS observations to be about 0.028, which was lower than that of wet seasons. In wet seasons, the volatile organic compound (VOC) emission was dominated by biogenic activities. This response of R_{GF} to VOC sources was found to be consistent with results from satellite observations reported in literatures. On the other hand, the sky radiometer observation with UV-VIS-NIR channels allowed us to retrieve wavelength (λ) dependent aerosol optical properties, including the absorption aerosol optical depth (AAOD). Strongly enhanced UV absorption (e.g., the mean AAOD of ~ 0.06 at 380 nm) as an approximate function of λ^{-2} over UV-VIS-NIR was observed, while most of current chemistry-transport models assume that organic carbon (OC) aerosols from biomass burning were purely scattering aerosols. Thus, our multi-component observations characterize intense biomass burning plumes around central Thailand, providing unique constrains of VOC-OC chemistry.