4.117 Comprehensive changes of aerosol compositions and reactive gases during south-westerly summer monsoon in a Southeast Asian urban site.

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Abstract:

Southwesterly monsoon is a significant phenomenon on the variation of aerosol compositions, reactive gases and the strength of the sources contributed to aerosol. We have conducted a campaign on $PM_{2.5}$ sampling in Universiti Kebangsaan Malaysia site during from 24 June 2014 to 14 September 2014 using a high volume sampler (HVS). Water-soluble ions (WSI), trace species, rare earth elements (REE) and mean eight thermally-derived carbon fractions, OC1, OC2, OC3, OC4, EC1, EC2, EC3 and OP were analysed using ion chromatography (IC), inductively coupled plasma mass spectroscopy (ICP-MS) and a thermal/optical carbon analyser, respectively. The characterization and data treatment by EPA's Positive Matrix Factorization (PMF) model version 5.0 determined the sources of $PM_{2.5}$. The 24-h mean concentration of $PM_{2.5}$ during the sampling period was 18.3 μg m^{-3}, which is lower than the US EPA National Ambient Air Quality Standard

(NAAQS) and WHO 24-h guideline. Correlation analysis indicated that EC emitted from the biomass burning-prone areas. Morning and evening rush hours coincided with the enhanced levels of CO and NO_2 which implied that traffic emission is a potential contributor to $PM_{2.5}$ and its compositions. PMF 5.0 identified seven sources of $PM_{2.5}$. The identified factors were: i) biomass burning coupled with sea salt [I] (7%); ii) aged sea salt and mixed industrial emissions (5%); iii) road dust and fuel oil combustion (7%); iv) coal-fired combustion (25%); v) mineral dust (8%); vi) secondary inorganic aerosol (SIA) coupled with F^- (15%); and vii) motor vehicle emissions coupled with sea salt [II] (24%). The potential source contribution function (PSCF) and hybrid single particle Lagrangian integrated trajectory (HYSPLIT) suggest that biomass burning from Sumatra, maritime sea salt, local activities, point sources and the emission of traffic from local and transboundary areas were clearly affecting the concentration of $PM_{2.5}$ in the tropical site.