1.039 Seasonal Variability and Source Apportionment of Fine Particulate Matter in the Klang Valley Urban-Industrial Environment.

Early Career Scientist

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Abstract:

This study comprehensively explores the characterization and source apportionment of fine particulate matter ($PM_{2.5}$) in the Klang Valley urban-industrial environment for a complete Malaysia's four seasonal perspectives. Two methods were employed: 1) gravimetric method using high volume sampler for $PM_{2.5}$ mass and chemical composition; and 2) continuous monitoring on particle number concentration (PNC) using environmental dust monitor (GRIMM 365) covering particle diameter (Dp) between 0.265 and 34 µm. The results reveal that $PM_{2.5}$ mass concentration for all seasons except north-east monsoon showed more than 50% exceedance of the international standards. Chemical compositions exposed that both primary and secondary pollutants of $PM_{2.5}$ are equally important, albeit with seasonal variability. Four factors were identified from source apportionment analysis with varies relative contribution for different season. In particular, the $PM_{2.5}$ was dominantly sourced from Indonesian peatland fire (IPF) during the south-west monsoon. Hotspot count and backward trajectory further support that transboundary sources could be crucial contributor during certain period. In relation to meteorological-gaseous parameters, $PM_{2.5}$ at site was influenced by different parameters during different seasons. The PNC distribution showed that particles with Dp< 1µm dominated the particle number count, mass and semi-volatile compound (SVC) fraction at the site. The PNC source apportionment resulted with four factors, with biggest factor on particles with Dp range between 0.265 and 1.45 µm. Both daily and diurnal correlations

matrix showed that meteorological-gaseous influence significantly ($p<0.05$) particles with $Dp<1.45$ µm. Diurnal distribution strongly suggests an influence of traffic (motor vehicle emission). Size–segregated source apportionment discloses that particles with $Dp<0.5$ µm covers 95% or more of particle number for all factors. Overall, this study reveals that changes in the environmental conditions have been reflected sensitively in fine particles aerosol distribution patterns of the Klang Valley urban-industrial environment.