

## Variation of Major Air Pollutants in Different Seasonal Conditions in an Urban Environment in Malaysia

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Urban air quality has been deteriorating over time. Pollutant distribution levels in the urban environment may be associated with anthropogenic sources and meteorological conditions. The aim of this study is to determine the variation in concentrations of major air pollutants: carbon monoxide (CO), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>) and particulate matter (PM<sub>10</sub>), with corresponding seasonal variation in a Malaysian urban environment. Eleven years of data from four selected stations, namely Klang (S1), Petaling Jaya (S2), Shah Alam (S3) and Cheras (S4), were analyzed for temporal trend variations (yearly and monthly). Statistical analysis using openair, an R package open source software, has been conducted to assess pollutants in relation to meteorological conditions. Gas concentrations showed little variation between the study sites apart from NO<sub>2</sub>, which recorded its highest concentrations at an industrial site, between 20 and 40 ppb, and is associated with industrial and vehicle emissions. Pollutants that show seasonal variations and frequently exceed the Malaysia Ambient Air Quality Standard (MAAQS) and the National Ambient Air Quality Standard (NAAQS) are O<sub>3</sub> and PM<sub>10</sub>, predominantly related to regional tropical factors. Precursors of O<sub>3</sub> are associated with high levels of O<sub>3</sub> during the north-east monsoon (January to March). The concentration of PM<sub>10</sub> associated with tropical biomass burning during southwest monsoon. Shipping emissions and power stations are main contributors for higher level of SO<sub>2</sub>. This study shows regional and local factors contribute to the different type of air pollutants concentration in urban environment.

Keywords: major air pollutants, urban environment, air quality trends, seasonal variations