Variability of the PM10 concentration in the urban atmosphere of Sabah and its responses to diurnal and weekly changes of CO, NO2, SO2 and Ozone

ABSTRACT

This paper presents seasonal variation of PM10 over five urban sites in Sabah, Malaysia for the period of January through December 2012. The variability of PM10 along with the diurnal and weekly cycles of CO, NO2, SO2, and O3 at Kota Kinabalu site were also discussed to investigate the possible sources for increased PM10 concentration at the site. This work is crucial to understand the behaviour and possible sources of PM10 in the urban atmosphere of Sabah region. In Malaysia, many air pollution studies in the past focused in west Peninsular, but very few local studies were dedicated for Sabah region. This work aims to fill the gap by presenting the descriptive statistics on the variability of PM10 concentration in the urban atmosphere of Sabah. To further examine its diurnal and weekly cycle pattern, its responses towards the variations of CO, NO2, SO2, and ozone were also investigated. The highest mean value of PM10 for the whole study period is seen from Tawau (35.7±17.8 μg m-3), while the lowest is from Keningau (31.9± 18.6 μg m-3). The concentrations of PM10 in all cities exhibited seasonal variations with the peak values occurred during the south-west monsoons. The PM10 data consistently exhibited strong correlations with traffic related gaseous pollutants (NO2, and CO), except for SO2 and O3. The analysis of diurnal cycles of PM10 levels indicated that two peaks were associated during the morning and evening rush hours. The bimodal distribution of PM10, CO, and NO2 in the front and at the back of ozone peak is a representation of urban air pollution pattern. In the weekly cycle, higher PM10, CO, and NO2 concentrations were observed during the weekday when compared to weekend. The characteristics of NO2 concentration rationed to CO and SO2 suggests that mobile sources is the dominant factor for the air pollution in Kota Kinabalu; particularly during weekdays.