

Seasonal Variation of Black Carbon in Fine Particulate Matter in Semi rural areas of Thailand

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ABSTRACT

Black carbon (BC) is one of absorbing capacities of solar radiation and acts as a crucial factor that alters air quality and climate change. BC mass concentrations, associated with fine particulate matter (PM_{2.5}), were monitored for a year at semi rural areas in Phitsanulok to study the seasonal variations and its contribution to fine particulate matter. The measurements were based on sampling using two simultaneously operating samplers and an optical transmissometer. PM_{2.5} varied from 60.7 - 80.3 $\mu\text{g m}^{-3}$ and 36.6 - 48.4 $\mu\text{g m}^{-3}$ for the city and rural sites, respectively. PM_{2.5} showed similar trends with high values during dry season and low values during wet season. The BC levels during dry season ranged from 15.6 - 29.0 $\mu\text{g m}^{-3}$ compared to 14.5 - 23.8 $\mu\text{g m}^{-3}$ in wet season in an city site whereas a rural site ranged from 11.1 - 15.4 $\mu\text{g m}^{-3}$ and 6.8 - 13.5 $\mu\text{g m}^{-3}$ for dry and wet season, respectively. The annual BC accounted for 22-38% and 19-36% in PM_{2.5} at the city and rural sites, respectively. Based on backward trajectory analysis, it can be concluded that both local and regional sources of BC are important. The local sources are traffic and biomass burning. Distant sources include areas where there is extensive agricultural burning. The model indicated the contribution of BC from the northern part of Thailand and Cambodia during days of high BC levels.

Keywords: Biomass burning, Traffic emission, Long range transport, Backward trajectory