

SUPPLEMENTARY MATERIAL

Sampling air particles with AE-22 /AE-31

During the measurements of the current study, the aethalometer automatically drew air samples through an inlet port. Each collected air sample was deposited on a standard spot (1.67 cm²) of a quartz filter tape. The light source of arrays of multiple wavelengths arrays (namely, 370 nm and 880 nm for AE–22 instrument; 370, 470, 520, 590, 660, 880 and 950 nm for the AE–31 instrument) was automatically transmitted through a reference spot (without a sample) and also the sample-loaded spot on quartz filter tape. The instrument optically measured the attenuation (ATN) of the beam of light transmitted through a blank reference and a sample-loaded spot which were designated as I₀ and I, respectively. Measurements were done based on Eq. (S1):

$$ATN = 100 \ln\left(\frac{I_0}{I}\right)$$

(S1)

where ATN is the attenuation of light on empty reference spot I₀ and of a sample through a sample-loaded spot I.

The measurements were based on the assumption that light attenuation is related linearly to mass concentrations of BC in a sample. The change of light attenuation by filter loading during the time interval $\Delta t_{(\lambda,t)}$, was defined by an aerosol absorption coefficient (σ). The aethalometer internal software converted the measured absorption coefficient into a corresponding BC mass concentration (M_{bc})¹, defined by Eq.(S2):

$$M_{bc} = \frac{\sigma_{abs}}{E_{abs}}$$

(S2)

where σ is the aerosol absorption coefficient (Mm^{-1}); $E_{(\text{abs})}$ is the mass-absorption efficiency of $14625 / \lambda$ (m^2g^{-1}) (Hansen, 2005).

Measurements of particulate matter $PM_{2.5}$ and PM_{10}

$PM_{2.5}$ mass concentrations were measured by the E-BAM monitor, which takes real-time measurements of fine particles. In this monitor, the $PM_{2.5}$ mass concentrations were computed from the attenuation of beta particles (low-energy electrons), which were emitted constantly by a carbon-14 source. The number of beta particles released was detected and counted by an internal counter. The $PM_{2.5}$ sample deposited onto the filter tape attenuated a certain number of beta particles. The difference in the number of beta particles before and after attenuation was used to estimate mass concentrations of fine particulate matter deposited on a filter tape every minute. PM_{10} levels were taken by the BAM which works as the E-BAM (Schweizer *et al.*, 2016).

Measurements of meteorological parameters

Wind speed and direction was measured by a RM Young 051030. This is a four-blade propeller instrument. As the propeller rotates, the wind strength is signalled as a voltage sent to the data logger. Wind direction was measured by the anemometer, which was computed in a vane within the RM Young instrument (RM Young, 2016).