Outdoor-indoor concentration of black carbon during high pollution events in urban environment

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Biomass burning, transport, wildfires are a significant sources of fine airborne particulate matter ($PM_{2.5}$) which was linked to various health issues [1]. Its component **aerosol black carbon** (BC) is widely known for its negative effect on human health. Due to its small size (less than 2.5 μm), large specific surface area, and irregular morphology, BC can simply adsorb carcinogenic/mutagenic pollutants like polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) and can penetrate deep into the bronchial tree [2]. Studies demonstrated consistent evidence of the link between fine aerosol particles and BC exposure with respiratory health effects such as asthma and chronic obstructive pulmonary disease [3]. Lack of testing of filtering systems under high pollution levels associated with BC mass concentration rises a doubt over indoor air quality during high pollution event days.

For this aim, eBC were measured in a modern office with a mechanical ventilation system. Measurements took place from during cold season in 2021 in the FTMC campus located in the urban background environment in Lithuania. Aethalometer used in this study were connected to the sampling system which automatically switches sampling from outdoor to indoor every 30 minutes.

During measurement campaign an intensive pollution episodes related to biomass burning, traffic and long range transport of wildfire smoke were observed. During high pollution event observed outdoor and indoor BC levels were approximately twice higher. A strong correlation between eBC in indoor and outdoor air was observed. Air filtering efficiency was found to be highly dependent on particles size. Ambient concentrations of BC can be used as a good approximation of indoor concentrations in the absence of indoor particle sources in office buildings.

This research was funded by a grant (No. S-MIP-20-28) from the Research Council of Lithuania.

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