Abstract

Leveraging the COVID-19 India-wide lockdown situation, the present study attempts to quantify the reduction in the ambient fine particulate matter concentrations during the lockdown (compared with that of the pre-lockdown period), owing to the highly reduced specific anthropogenic activities and thereby pollutant emissions. The study was conducted over Bengaluru (India), using $PM_{2.5}$ (mass concentration of particulate matter having size less than or equal to 2.5 μm) and Black Carbon mass concentration (BC) data. Open-access datasets from pollution control board (PCB) were also utilised to understand the spatial variability and region-specific reduction in $PM_{2.5}$ across the city. The highest percentage reduction was observed in BC_{ff} (black carbon attributable to fossil fuel combustion), followed by total BC and $PM_{2.5}$. No decrease in BC_{bb} (black carbon attributable to wood/biomass burning) was observed, suggesting unaltered wood-based cooking activities and biomass-burning (local/regional) throughout the study period. Results support the general understanding of multi-source (natural and anthropogenic) nature of $PM_{2.5}$ in contrast to limited-source (combustion based) nature of BC. The diurnal amplitudes in BC and BC_{ff} were reduced, while they remained almost the same for $PM_{2.5}$ and BC_{bb}. Analysis of PCB data reveal the highest reduction in $PM_{2.5}$ in an industrial cluster area. The current lockdown situation acted as a natural model to understand the role of a few major anthropogenic activities (viz., traffic, construction, industries related to non-essential goods, etc.) in enhancing the background fine particulate matter levels. Contemporary studies reporting reduction in surface fine particulate matter and satellite retrieved columnar Aerosol Optical Depth (AOD) during COVID-19 lockdown period are discussed.

Keywords

$PM_{2.5}$

Black carbon

Beta Attenuation Monitor