

4.121 Effect of Diwali festival and stubble burning activities on the formation of Secondary Organic Carbon (SOC) in Delhi, India.

Early Career Scientist

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Abstract:

Delhi is one of the most polluted megacities with respect to particulate pollution. Particulate matter levels in the ambient atmosphere exhibit seasonal variation. During post monsoon season, severe atmospheric pollution episodes were observed due to Diwali festival. Moreover, the existing pollution levels were accentuated by the crop residue burning practices in the adjacent states of Delhi, Punjab and Haryana during the post monsoon period. Ambient fine particulate matter (PM_{2.5}) was collected during post monsoon (October-November) period in two consecutive years 2015 and 2016. PM_{2.5} samples were chemically characterised for organic carbon (OC) and elemental carbon (EC). PM_{2.5} concentrations were higher than the prescribed NAAQS during the study period: $168.7 \pm 65.1 \mu\text{g m}^{-3}$ (2015) and $245.1 \pm 34.7 \mu\text{g m}^{-3}$ (2016). The westerly winds from adjacent states of Delhi carried smoke released from stubble burning towards Delhi during post monsoon season. Higher OC/EC ratios indicated the formation of secondary organic carbon during the study period. SOC was calculated and found higher during the Diwali period for both the years. This study concludes that the high PM_{2.5} levels during post monsoon season were due to contribution from fireworks, trans-regional movement of pollutants due to crop residue burning, low wind speed and high humidity. 5-day backward air mass trajectories revealed that pollutants were carried from the area of Indo-Gangetic plains (Uttar Pradesh, Punjab and Haryana and surrounding areas) towards Delhi during the post monsoon season.

The festival adds significantly to the existing air pollution problem in Delhi for a short period of time. The study highlighted the negative impact of these activities on environment. Therefore, there is a need to replace the firecrackers with environment-friendly alternatives. Farmers should also be made aware of the problems due to crop residue burning. Suitable mitigation options should be implemented by government to manage the waste after harvesting practices.