

# Chemical Characterization and source apportionment of PM<sub>2.5</sub> over an upwind site of Delhi during Biomass Burning and Diwali Festival period

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## Abstract

Each year Delhi experiences extremely poor air quality in the post-monsoon season when large scale stubble burning occurs in the upwind states of Punjab and Haryana and bursting of firecrackers indiscriminately during the Diwali festival along with the unfavorable meteorological phenomenon such as shallow inversion on the top of source. Several previous studies have reported on occurrences of severe haze episodes in Delhi and attributed them to the long-range transport of biomass burning aerosols from the upwind areas. In the present study, we investigate the variability in chemical composition of non-refractory PM<sub>2.5</sub> using Time-of-Flight Aerosol Chemical Speciation Monitor (ToF-ACSM) and black carbon (BC) aerosols using an Aethalometer AE31 at an upwind side of Delhi-NCR in Sonipat, Haryana (28.9° N, 77.1° E) during the stubble burning period and Diwali time (25 Oct 2023 to 15 Nov 2023). Variability in mass concentrations of biomass burning tracer species, such as levoglucosan, mannosan, and potassium (K<sup>+</sup>), along with other chemical constituents are quantified. The daily average concentrations of levoglucosan, mannosan and K<sup>+</sup> in NR-PM<sub>2.5</sub> were  $1.28 \pm 1.27$ ,  $0.02 \pm 0.01$  and  $5.38 \pm 4.57 \mu\text{g m}^{-3}$ , respectively. Results of preliminary analysis show higher concentration of biomass burning tracers, carbonaceous aerosols, and secondary inorganic aerosols during nighttime as compared to daytime. The daily average mass concentrations of Organics are  $108 \pm 48.5$  and  $70.2 \pm 49.7 \mu\text{g m}^{-3}$ , and BC are  $18.8 \pm 86.0 \mu\text{g m}^{-3}$  and  $24.0 \pm 10.2 \mu\text{g m}^{-3}$  during biomass burning and Diwali festival period, respectively. We are further trying to identify various sources contributing to the PM<sub>2.5</sub> concentration through source apportionment over the region using models such as Positive Matrix Factorization (PMF). More results with greater details will be presented.

## Early Career Scientist

YES, I am an early career scientist.

## IGAC Activities

BBURNED: Biomass Burning Uncertainty: ReactionNs, Emissions and Dynamics, MAP-AQ: Monitoring, Analysis and Prediction of Air Quality, AMIGO: Analysis of eMIssions usinG Observations

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