Chemical Characterization of Brown Carbon Aerosol Sampled in the Indo-Gangetic Plain Area

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Abstract

The light-absorbing fraction of organic aerosols, commonly known as brown carbon (BrC), is a significant contributor to climate change. Biomass burning (BB) emissions of BrC are ubiquitous over Indo-Gangetic Plain (IGP). BB is very common in India because of biofuel usage for heating and cooking, agricultural residue burning, and uncontrolled garbage burning. Despite their abundance, the molecular-level understanding of BrC composition in IGP area is limited. Here, we present chemical composition of BrC collected at a suburban site in the northwest IGP. The aerosol samples were collected at the Atmospheric Chemistry Facility (30.667° N−76.729° E, 310 m above sea level) of IISER Mohali, India. Compositional information was obtained by employing ambient ionization with high-resolution mass spectrometry. Specifically, Direct Analysis in Real-Time High-Resolution Mass Spectroscopy (DART-HRMS) was used to analyze samples of organic aerosols collected on the filter spots of 7-wavelength aethalometer. The samples were collected in two different seasons – post-monsoon, and winter. Post-monsoon season is dominated by largescale paddy residue burning whereas winter season is dominated by biofuel (wood and dungcakes) burning for heating and cooking purposes. Comparative analysis of optical records from the aethalometer and molecular information from DART-HRMS was used to assess the relationship between the chemical composition and optical properties of BrC.

Early Career Scientist

YES, I am an early career scientist.

IGAC Activities

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