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Contribution of Black Carbon, Brown Carbon and Lensing Effect to Total Aerosol Absorption in Indo-Gangetic Plain

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This study reports the optical and physical properties of atmospheric and denuded (heated at 300˚C) aerosols from Indo-Gangetic Plain (IGP) during 20 December 2014 to 28 February 2015. A Single Particle Soot Photometer (SP2) and High Resolution Time of Flight Aerosol Mass Spectrometer (HR-ToF-AMS) were used to measure black carbon (BC) and organic carbon (OC) in real time respectively. During experiments large scale carbonaceous aerosol loading is observed in IGP. Multiple biomass burning events are observed with varying intensity and duration. Refractive index of brown carbon (BrC) is derived from filter extracts using Liquid Core Wave Capillary Cell (LWCC). Refractive index of BrC at 405 is 4 times higher in IGP when compared to studies conducted in USA. Through Mie modelling we identified the percentage contribution of black carbon, BrC and lensing effect to total aerosol absorption. On average 75% of absorption is from black carbon alone, while rest is contributed from volatile components. Within the volatile component contribution, at 405 nm BrC contributes around 20% and rest from lensing effect. But at 781 nm lensing contributed more than BrC. Overall results indicate the special characteristics on BrC aerosols in IGP and the importance of considering spectral absorption in global aerosol modelling studies.