



Water-soluble organic aerosols at two sites in the central Indo-Gangetic Plain: Variance in chemical and light absorption properties

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Over Indo-Gangetic plain (IGP), a large fraction of total organic aerosols (OA) is composed of water-soluble organic aerosols (WSOA) especially during wintertime, which affects the chemical and light absorption properties of aerosols. Towards this, we have studied the chemical characteristics of WSOA at two sites (Kanpur and Allahabad) in the central IGP to understand the atmospheric processing and light absorption properties. The ratio of WSOA/OA in Kanpur is $\sim 55\%$ suggests significant contributions from secondary organic aerosols. In Kanpur, O/C ratio is found to be higher than that in Allahabad. In Van Krevelen diagram (H/C vs O/C plot), a much shallower slope has been observed for Allahabad than Kanpur indicating significantly different composition and characteristics of WSOA. Oxidation ratio (O/C) of WSOA is relatively higher than that of OA and independent of WSOA loading. Presence of more oxidized aerosols at Kanpur has been reported as compared to Allahabad. Similarly, the light absorption of WSOA was also observed higher at Kanpur. A strong correlation of WSOA with vehicular emission OA marker has been obtained for Allahabad site. Lower WSOA/OA ratios have been observed in case of higher OA loadings suggesting the presence of less oxidized primary organics. Transformation of organics through aqueous processing has been inferred from the significant presence of organo-sulfates. The presence of organo-nitrates over the region has been linked with light absorption. These results provide an understanding of chemical characteristics and processing of WSOA and OA.