6.176 Intra-seasonal variability in wintertime aerosols at middle Indo Gangetic Plain.

Early Career Scientist

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Abstract:
A unique wintertime aerosol behavior was identified at middle Indo-Gangetic Plain (IGP) with characteristic episodic variations in their mass loadings, physico-chemical properties and sources within winter months. To assess wintertime aerosol characteristics over middle IGP, near surface PM$_{10}$, PM$_{2.5}$ and their ionic compositions were examined. Concurrently columnar aerosol distribution through satellite measurements was also made. Exceptionally high PM$_{10}$ (268±107µg m$^{-3}$) and PM$_{2.5}$ (150±89µg m$^{-3}$) values were reported for the study period. The varying aerosol distribution during winter recognized a high aerosol loading episode (HALD; PM$_{10}$:366±101µg m$^{-3}$, PM$_{2.5}$:230±86µg m$^{-3}$), two medium aerosol loading episodes (MALD$_1$: PM$_{10}$:272±86µg m$^{-3}$, PM$_{2.5}$:171±70µg m$^{-3}$) & MALD$_2$: (PM$_{10}$:230±41µg m$^{-3}$, PM$_{2.5}$:123±51µg m$^{-3}$) and a low aerosol loading episode (LALD; PM$_{10}$:180±68µg m$^{-3}$, PM$_{2.5}$:67±18µg m$^{-3}$). Changes in columnar aerosol properties (MODIS AOD: 0.609-0.937) were found consistent with near surface particulates. A steady shift in fine mode fractions (FMF: 0.01-1.00) between different episodes revealed the existence of a variety of particulates in wider size domains. Satellite derived FMF were found in line with near surface particulate ratio (0.41-0.61). Variable particulate ionic fractions (19-29%) during different aerosol loading episodes were observed. Higher fractions of secondary inorganic aerosols during onset and peak winter (26-29%) highlighted the influence of biomass burning events at IGP along with locally emitted particles. The lagging winter episode however clearly depicted a sharp reduction in particulate ionic species (19-23%). The variability in aerosol characteristics at middle IGP clearly identified the intra-seasonal variations which is associated with their modifying source strength and regional meteorology.