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 highPM_{10} ($268\pm107\mu gm^{-3}$) and $PM_{2.5}$($150\pm89\mu gm^{-3}$) values were reported for the study period. The varying aerosol distribution during winter recognized a high aerosol loading episode (HALD; PM_{10}:$366\pm101\mu gm^{-3}$, $PM_{2.5}$:$230\pm86\mu gm^{-3}$), two medium aerosol loading episodes ($MALD_1$: PM_{10}:$272\pm86\mu gm^{-3}$, $PM_{2.5}$:$171\pm70\mu gm^{-3}$) & $MALD_2$: (PM_{10}:$230\pm41\mu gm^{-3}$, $PM_{2.5}$:$123\pm51\mu gm^{-3}$) and a low aerosol loading episode (LALD; PM_{10}:$180\pm68\mu gm^{-3}$, $PM_{2.5}$:$67\pm18\mu gm^{-3}$). 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.