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Title: Near Surface aerosol characteristics at a coastal industrial location, Visakhapatnam, India

Abstract: Aerosols affect the radiative balance of the atmosphere by absorbing and back scattering the incoming solar radiation, thereby altering the atmospheric energetics. The direct and indirect effect of aerosols depend on the particle size characteristics and mass distribution. The aerosol size-mass/number density distribution at a given time and specific location depends on the source strengths and prevailing meteorology besides transport from sources of non local origin. At a coastal urban location like Visakhapatnam (17.7 N), the industrial airmass rich in gas phase reaction products continuously interacts with the marine boundary layer resulting in the formation of new species as well as modification of existing anthropogenic aerosol leading to complex radiative processes. With a view to supplement the ongoing column integrated aerosol optical depth measurements with near surface aerosol features, a Quartz crystal microbalance system is used to measure the size segregated aerosol mass distribution with ten cut off stages in the size range 0.05 to 25 mm and the preliminary results are reported. All the fundamental and derived parameters like the total mass concentration, mass size distribution, mass mean radius and number size distribution are evaluated and studied as a function of synoptic weather over the location. It is observed that during winter, accumulation mode aerosol dominate while in monsoon higher concentration of coarse mode aerosols is seen. During summer, the prevailing winds from south/south west bring the industrial airmass onto the observing site leading to the build up of the sub micron aerosols. Further, it is observed that the percent share of the sub-micron aerosol to total mass loading is more through out the year indicating the anthropogenic influence on the boundary layer aerosols. The observed features are compared with the column integrated aerosol number density mass distributions derived from the inversion of the aerosol spectral optical depths and the results are interpreted basing on the synoptic and mesoscale weather.

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