AOGS 2005

Seasonal Variability of Aerosols over the Indo-Gangetic Basin

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We examine the spatio-temporal characteristics of aerosols in recent years (2000-2004) over Indian region with special emphasis on northern India using data from Moderate Resolution Imaging Spectroradiometer (MODIS), Aerosol Robotic Network (AERONET) and Total Ozone Mapping Spectroradiometer (TOMS). Regional maps of MODIS show high aerosol optical depth (AOD) in the range 0.6-1.2 at 550 nm wavelength with significant spatial and temporal variation during summer (April to June). The associated fine mode AOD fraction (FMAF) was found to be low (<0.4). This indicates that the coarse mode particles are dominant in summer. Spatial distribution of Absorbing Aerosol Index (AAI) derived from TOMS, Angstrom Exponent (α) and singlescattering albedo (ω) measured at Kanpur (26.45oN, 80.346oE) also indicated the presence of absorbing coarse mode aerosols during summer. On the other hand, the entire Indo-Gangetic basin was dominated by the fine mode particles during winter (November to January) with AOD in the range 0.4-0.6. Their spatial and temporal variations, however, were quite low compared to the summer. Coarse mode particles were found to be more absorbing in winter season than in summer. This suggests that the larger dust particles may be coated by black carbon. Results reported in this paper indicate that the Indo-Gangetic basin has the highest aerosol loading in India during both the seasons. The region is dominated by the absorbing coarse mode particles (possibly transported dust from north-west of India) during summer and by the probable widespread emission sources of fine mode aerosols (primarily of anthropogenic origin) in the winter season. The unique topography and weather condition of the region have impact on the observed spatial and temporal distribution of aerosols.