

Impact of Unusual Dust Event on Regional Climate in India

Authors : Kanika Taneja, V. K. Soni, Kafeel Ahmad, Shamshad Ahmad

Abstract : A severe dust storm generated from a western disturbance over north Pakistan and adjoining Afghanistan affected the north-west region of India between May 28 and 31, 2014, resulting in significant reductions in air quality and visibility. The air quality of the affected region degraded drastically. PM10 concentration peaked at a very high value of around 1018 μgm^{-3} during dust storm hours of May 30, 2014 at New Delhi. The present study depicts aerosol optical properties monitored during the dust days using ground based multi-wavelength Sky radiometer over the National Capital Region of India. High Aerosol Optical Depth (AOD) at 500 nm was observed as 1.356 ± 0.19 at New Delhi while Angstrom exponent (Alpha) dropped to 0.287 on May 30, 2014. The variation in the Single Scattering Albedo (SSA) and real $n(\lambda)$ and imaginary $k(\lambda)$ parts of the refractive index indicated that the dust event influences the optical state to be more absorbing. The single scattering albedo, refractive index, volume size distribution and asymmetry parameter (ASY) values suggested that dust aerosols were predominant over the anthropogenic aerosols in the urban environment of New Delhi. The large reduction in the radiative flux at the surface level caused significant cooling at the surface. Direct Aerosol Radiative Forcing (DARF) was calculated using a radiative transfer model during the dust period. A consistent increase in surface cooling was evident, ranging from -31 Wm^{-2} to -82 Wm^{-2} and an increase in heating of the atmosphere from 15 Wm^{-2} to 92 Wm^{-2} and -2 Wm^{-2} to 10 Wm^{-2} at top of the atmosphere.

Keywords : aerosol optical properties, dust storm, radiative transfer model, sky radiometer

Conference Title : ICRC 2015 : International Conference on Regional Climate

Conference Location : Amsterdam, Netherlands

Conference Dates : August 06-07, 2015