Title: In situ studies of aerosols over land and ocean regions surrounding Indian subcontinent: Regional radiative impacts in a global perspective

Abstract:
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I will present results from observational and modeling studies of aerosols carried out over the Indian main land and the surrounding ocean regions to know their impacts on the regional scale aerosol radiative forcing. Major part of our research work is devoted to understand the seasonal and inter-annual variabilities in various aerosol parameters measured over Ahmedabad, an urban location in western India, and to asses their implications for the regional scale aerosol radiative forcing. Different properties of aerosols and differences in their vertical distribution give rise to different heating rates within the atmosphere for different seasons. I will also describe results obtained from a ship cruise experiment conducted in February-2003 over the Bay of Bengal (BoB) and on the direct aerosol radiative forcing computed using the SBDART radiative transfer model. We find higher aerosol concentration over the BoB region than compared to the Arabian sea and the Indian Ocean and the net direct shortwave radiative forcing in the range of -30.6 to -26.6 W/m2 at the surface and -8.4 to -10.6 W/m2 at the TOA. Magnitude of longwave forcing is found to be about 10% of its shortwave counterpart. Extensive measurements of spectral dependence of aerosol light absorption, black carbon mass concentration made at different locations over the central and peninsular Indian region during February 2004 show an excess absorption of up to 30% in lower wavelength range than compared to that expected from fossil fuel burning, indicating the presence of other absorbing particles from biofuel/biomass combustion or mineral dust. Our results indicate towards a possible gradient that exists in the aerosol atmospheric forcing from the Arabian Sea in the west, peninsular India in the middle and the BoB in the east, in addition to the north-south gradient established during the INDOEX for the winter season. Another intensive experiment campaign was made in Delhi in winter 2004 to understand the alteration in physical and optical properties of aerosols during hazy and intense fog conditions and its impact on the regional level radiative forcing of the climate.