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Properties of aerosol found over a rural site in peninsular India and their impact on direct aerosol radiative forcing

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A systematic investigation of aerosol optical and chemical properties has been initiated using a set of collocated measurements at Gadanki (13.5N, 79.2E) a rural site in peninsular India. The measurements include columnar aerosol optical depth using a sky-radiometer (Prede), aerosol scattering coefficient using nephelometer (TSI), aerosol absorption coefficient using aethalometer (Magee), aerosol profiles using lidar (indigenously developed) and concentrations of major water soluble ionic species by routinely analyzing the aerosol samples collected through dry and wet depositions. Aerosols found within the boundary layer and close to ground level are mainly coarse sand dust particles and soot produced from biomass burning activities around the site. Above the boundary layer the aerosol characteristics are influenced by long range transport of pollutants mainly from urban locations. Chemical sampling of several rain water samples collected during a prolonged rain event show a significant variation in acidity with later stage of the precipitation showing higher acidity than compared to earlier stage indicating the influence of long range transport of more acidic aerosols over the measurement site. However, the direct aerosol radiative forcing over the measurement site is dominated by soot particles produced from local sources From observations and radiative model calculations we find large atmospheric radiative forcing (absorption), of the order of 20 W/m2 which can cause an atmospheric heating of the order of 0.5 K/day. What are the manifestations of this regional level radiative heating on atmospheric dynamics in general and convective activities in particular are further investigated.