AEROSOL-CLOUD RADIATIVE INTERACTIONS IN THE LONGWAVE DOMAIN

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While often neglected in the thermal infrared radiative transfer calculations, absorption and scattering by sea salt and mineral dust may significantly impact longwave radiative fluxes and cooling rates in the troposphere. A comprehensive Monte Carlo (MC) radiative transfer model coupled to a correlated k-distribution algorithm has been used to quantify the effects of 3D aerosol-cloud radiative interactions in the middle infrared window (8-12 microns) with a particular emphasis on the aerosol radiative forcing. Based on the results of recent aerosol campaigns (INDOEX and ACE-Asia), two realistic aerosol profiles have been specified as inputs into the MC model: (1) boundary layer sea salt and mineral dust residing below a broken cloud layer and (2) a heavy mineral dust loading above the cloud tops. The aerosol forcing results are presented for a variety of cloud and aerosol model parameters constrained by INDOEX and ACE-Asia observations.