



Simulation of dust aerosol and its regional feedbacks over East Asia using a regional climate model

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The ICTP regional climate model (RegCM3) coupled with a desert dust model is used to simulate the radiative forcing and related climate effects of dust aerosols over East Asia. Two sets of experiments encompassing the main dust producing months, February to May, for 10 years (1997-2006) are conducted and inter-compared, one without (Exp.1) and one with (Exp.2) the radiative effects of dust aerosols. The simulation results are evaluated against ground station and satellite data. The model captures the basic observed climatology over the area of interest. The spatial and temporal variations of near surface concentration, mass load, and emission of dust aerosols from the main source regions are reproduced by model, with the main model deficiency being an overestimate of dust amount over the source regions and underestimate downwind of these source areas. Both the top-of-the-atmosphere (TOA) and surface radiative fluxes are decreased by dust and this causes a surface cooling locally up to -1 °C. The inclusion of dust radiative forcing leads to a reduction of dust emission in the East Asia source regions, which is mainly caused by an increase in local stability and a corresponding decrease in dust lifting. Our results indicate that dust effects should be included in the assessment of climate change over East Asia.