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Implementation and testing of a desert dust module in a regional climate model

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Abstract. In an effort to improve our understanding of aerosol impacts on climate, we implement a desert dust module within a regional climate model (RegCM). The dust module includes emission, transport, gravitational settling, wet and dry removal and calculations of dust optical properties. The coupled RegCM-dust model is used to simulate two dust episodes observed over the Sahara region (a northeastern Africa dust outbreak, and a west Africa-Atlantic dust outbreak observed during the SHADE "Saharan Dust Experiment"), as well as a three month simulation over an extended domain covering the Africa-Europe sector. Comparisons with satellite and local aerosol optical depth measurements shows that the model captures the main spatial (both horizontal and vertical) and temporal features of the dust distribution. The main model deficiency occurs in the representation of certain dynamical patterns observed during the SHADE case which is associated with an active easterly wave that contributed to the generation of the dust outbreak. The model appears suitable to conduct long term simulations of the effects of Saharan dust on African and European climate.

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