

Title: Development and testing of a desert dust module in a regional climate model

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Abstract:

We develop a desert dust module and implement it within a regional climate model (RegCM). The dust module includes emissions, transport, wet and dry removal and calculations of dust optical properties. The coupled RegCM dust model is applied to the simulation of two dust episodes over the Sahara region (a northeastern Africa dust outbreak, and the west Africa – Atlantic SHADE dust outbreak) as well as a three month simulation over an extended domain covering the Africa-Europe sector. Comparison with satellite and in-situ (for SHADE) measurements shows that the model captures the main spatial (both horizontal and vertical) and temporal features of the dust distribution. The main model deficiency occurred in the SHADE case, when the model failed to accurately simulate the development of a mesoscale low associated with an easterly wave which contributed to the dust outbreak. The model appears suitable to conduct long term simulations of the effects of Saharan dust on African and European climate.