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Regional model simulation of dust emission/transport during a selection of severe dust events in the Sahara Desert.

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Mineral dust is one of the most important contributors for the radiative forcing of the Earth's atmosphere. However, estimates are uncertain due to the complexity of its optical properties and the difficulty in quantifying natural sources and those of anthropogenic origin. This work considers the potential of a regional model to simulate dust emission, transport and climate impact Particular emphasis is given to the preferential source regions within the Sahara including the Bodele Depression of Northern Chad. Firstly, the ability of the RegCM3 model to accurately simulate the sources and magnitudes of dust emission and subsequent transport in 3-dimensions is assessed. For a model inter-comparison, the output of RegCM3 is compared to in-situ data, satellite estimates of Aerosol Optical Thickness (AOT) from MISR, OMI and SEVIRI as well as other regional models with dust modules including the MesoNH-DEAD, LM-Muscat, and DREAM for the BoDEx 2005 dust event (Todd et al, 2007). A severe mineral dust event in march of 2006 covering central and north Africa is also evaluated. The sensitivity of model dust emission estimates to the following factors is quantified: land surface characteristics including soil texture and surface roughness; model resolution and model topography. Different combinations of soil maps are used, inferring a possible modification in the soil characteristics in the zone. It includes a map based on activation sources derived from the frequencies in emissions from three thermal IR wavelength channels of the SEVIRI instrument (Schepanski et al, 2007). High variability in dust emissions in the different mineral dust sources is found when the different experiments are compared. There are some underestimated values of AOT when the results are compared with AERONET profiles and the other models. The

reasons for these discrepancies are discussed.