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Modelling of Saharan dust events within SAMUM: Investigations on regional radiative forcing using LM-MUSCAT

J. Helmert (1), B. Heinold (1), I. Tegen (1), O. Hellmuth (1), R. Wolke (1)
Institute for Tropospheric Research, Leipzig (helmert@tropos.de)

Various studies have shown the influence of aerosol particles on Earth's climate through direct and indirect effects. Although soil-derived dust, mainly produced by aeolian erosion in arid and semiarid areas represents one of the major components of the atmospheric aerosol (Tegen et al., 1997), its contribution to aerosol induced radiative forcing is still unknown (IPCC, 2001). The radiative impact of mineral dust depends primarily on its optical parameters and abundance in the atmosphere. Due to high uncertainties in these factors, they will be subject of interest in the Saharan Mineral Dust Experiment (SAMUM), which includes measurements in the northern Sahara (Marocco) accompanied by mesoscale simulations of the Saharan dust cycle using the MUltiscale Chemistry Aerosol Transport Model (MUSCAT) (Wolke et al., 2004a and Wolke et al., 2004b) online-coupled with LM (Doms and Schättler, 1999) and a dust emission scheme (Tegen et al., 2002). The complex refractive index is most important for determining the dust optical properties. Using various measurements of Saharan dust refractive index, the most relevant optical parameters (single scattering albedo, extinction efficiency, asymmetry parameter) were derived from Mie calculations. This work focuses on the radiative effect of the simulated evolution of spatial dust distribution during a Saharan dust outbreak using the pre-calculated dust optical parameters in a LM-MUSCAT sensitivity study.

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