Geophysical Research Abstracts
Vol. 15, EGU2013-2976, 2013
EGU General Assembly 2013

Modeling Saharan dust emission and transport: sensitivity to emission parameterization schemes

Martin Todd (1), Carolina Cavazos (1), Wu Chenglai (2), Yi Wang (1), Zhaohui Lin (2), and Richard Washington (3)

(1) University of Sussex, United Kingdom (m.todd@sussex.ac.uk), (2) Institute of Atmospheric Physics, China, (3) University of Oxford

Mineral dust aerosols are an important component on the Earth System. Increasingly, the dust 'cycle' processes are being incorporated into numerical weather prediction models and Earth System models for climate analyses, to provide fully coupled aerosol-climate models. Dust emission is the fundamental process in the dust cycle but parameterising this in weather and climate models is challenging due to (i) the disparity in scale between the micro-scale emission processes and model grid cell resolution (ii) the lack of detailed soil and surface data over many desert regions (iii) the lack of adequate data for model validation. Previous studies indicate high uncertainty in model emission estimates. The project 'Fennec : the Saharan Climate System' provides a valuable test bed for comparing and validating model dust cycle processes. In this study an intercomparison of five widely-used dust emission parameterisations was conducted. The Marticorena & Bergametti (1995), Shao et al. (1996), Lu & Shao (1999), Shao (2001), and Shao (2004) schemes were coded into the WRF-CHEM model system. WRF-CHEM was configured over the Saharan domain with 3 nests of 27km-9km-3km grid resolution and run over the period June 2011 coincident with the Fennec Intensive Observation Period. We test the sensitivity of various dust cycle quantities (including dust emission, atmospheric load and continental scale dust budgets) to the emission scheme parameterisation. Based on the multi-scale model nesting this sensitivity assessment is analysed relation to the scale of the meteorological driving processes.