Geophysical Research Abstracts
Vol. 14, EGU2012-2213, 2012
EGU General Assembly 2012
© Author(s) 2012

Assessment of two physical parameterization schemes for desert dust emissions in an atmospheric chemistry general circulation model

M. Astitha (1), M. Abdel Kader (1), A. Pozzer (2), J. Lelieveld (1,3)

(1) Energy, Environment and Water Research Centre, The Cyprus Institute, Nicosia, Cyprus(m.astitha@cyi.ac.cy), (2) Earth System Physics Section, International Centre for Theoretical Physics, Trieste, Italy, (3) Max Planck Institute for Chemistry, Becherweg 27, 55128 Mainz, Germany

Atmospheric particulate matter and more specific desert dust has been the topic of numerous research studies in the past due to the wide range of impacts in the environment and climate and the uncertainty of characterizing and quantifying these impacts in a global scale. In this work we present two physical parameterizations of the desert dust production that have been incorporated in the atmospheric chemistry general circulation model EMAC (ECHAM5/MESSy2.41 Atmospheric Chemistry). The scope of this work is to assess the impact of the two physical parameterizations in the global distribution of desert dust and highlight the advantages and disadvantages of using either technique. The dust concentration and deposition has been evaluated using the AEROCOM dust dataset for the year 2000 and data from the MODIS and MISR satellites as well as sun-photometer data from the AERONET network was used to compare the modelled aerosol optical depth with observations. The implementation of the two parameterizations and the simulations using relatively high spatial resolution (T106∼1.1deg) has highlighted the large spatial heterogeneity of the dust emission sources as well as the importance of the input parameters (soil size and texture, vegetation, surface wind speed). Also, sensitivity simulations with the nudging option using reanalysis data from ECMWF and without nudging have showed remarkable differences for some areas. Both parameterizations have revealed the difficulty of simulating all arid regions with the same assumptions and mechanisms. Depending on the arid region, each emission scheme performs more or less satisfactorily which leads to the necessity of treating each desert differently. Even though this is a quite different task to accomplish in a global model, some recommendations are given and ideas for future improvements.