Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07182, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07182
EGU General Assembly 2008

Dust sandstorm dynamics analysis in Northern China by means of atmospheric, emission, dispersion modeling

Pasqui, M. (1), Bottai, L. (1), Busillo, C.(1), Calastrini, F.(1), Gualtieri, G. (1), Guarnieri, F.(1), Taramelli A.(2), Small, C.(2), Martinelli M.(3)

(1) Institute of Biometeorology and National Research Council/IBIMET-CNR, Firenze, FI, Italy (2) Lamont Doherty Earth Observatory of Columbia University, New York, USA (3) Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Rome, Italy

The application of Numerical Prediction Models to strong weather phenomena such as dust sandstorm (DSS) is considered of prime importance in the evaluation of control/mitigation measures. The relationships between climate, land cover/land use and principal sand storm mechanisms acting from different areas will allow us to improve present knowledge of aerosols in climatic effects and their impacts on natural and managed ecosystem status with a focus on recent trends. The aim of this research is to provide a regional characterization of the relationship between climate change, land cover and principal sand storm mechanisms acting on the Northern China. In the framework of the WinDust Project, a three-dimensional comprehensive atmospheric, emission, dispersion large-scale model was developed for the northern Asia domain in order to provide a regional characterization of DSS dynamics acting on the area covering Alashan to Beijing. This comprehensive system was based on three different modules: 1) the atmospheric model - Regional Atmospheric Modeling System (RAMS), 2) the dust emission model, called DUSTEM, and 3) the dispersion model - Comprehensive Air quality Model with extensions (CAMx). Using the Reanalysis-2 dataset as atmospheric forcing for RAMS, a three-nested grid approach with different horizontal resolution was adopted. The proposed regional characterization was based on numerical modeling simulations for a relevant DSS events, 20-22 March 2002. These simulations were aimed at inferring large-scale meteorological factors

responsible for DSS events affecting the Beijing area and analyzing the DSS dynamics. The performed analyses and modeling activities were carried out to: (i) infer the dust/sand transport dynamics from Alashan to the Beijing target area; (ii) understand the role played respectively by the Alashan area and degraded areas surrounding Beijing in the DSS affecting the capital; (iii) evaluate DSS reduction based on the land cover changes, e.g. implementation of large scale mitigation and control measures. By running different emission scenarios, the contribution of the Alashan area to the DSS affecting Beijing was estimated. The effects of mitigations measures in terms of dust/sand emission reduction were evaluated by running future intervention scenarios. Full system implementation and validation, based on both meteorological and dust concentration data, is provided.