Geophysical Research Abstracts,
Vol. 11, EGU2009-842-1, 2009
EGU General Assembly 2009

Analysis of two Saharan dust events of North Africa in the Mediterranean region by Using SKIRON/Eta model

D. Benaouda (1), G. Kallos (2), A Azzi (1), P Louka (2), and A Benlefki (1)

(1) University of Science and Technology, institute of Mechanics ORAN, Algeria, (hakou_djawed2005@yahoo.fr) , (2) University of Athens, School of Physics

As it is well known established that significant ecosystems effects can be produced by pollutants generated many hundreds of kilometres away. Desert is natural laboratories containing valuable mineral deposits that were formed in the arid environment or that were exposed by erosion. Dust is a key species of many biogeochemical. One important effect of the dust cycle is triggering of various biochemical reactions between dust ingredients and the environment. The biogeochemical impact of desert dust also remains a matter of discussion regarding its contribution for different major and minor elements to terrestrial and marine systems and especially its potential fertilising role for remote oceanic areas by supplying micronutrients such as phosphorus and iron. Saharan dust is responsible for the supply of nutrients resulting in the increase of the production of the pelagic system, but competitively may remove phosphorus, through the adsorption on dust particles, contributing to the oligotrophy of the system, in addition, the presence of Si and Fe in the dust deposition may change the phytoplankton communities resulting in fast growth rates leading to blooms. In addition to direct radiative forcing, dust participates in indirect climate forcing through its role as a cloud-condensation nucleus and potential atmospheric CO2 regulator via biospheric nutrient delivery. Scattering and absorption of radiation by dust have impacts on the Earth's radiation budget, the thermal structure of the troposphere, and actinic fluxes, altering dynamical and photochemical processes. Coating of dust particles under polluted conditions can change microphysical properties and promote surface chemical. The Mediterranean Sea is a semi-enclosed basin, which receives substances sporadically from the arid regions of the Sahara desert. In such processes, dust modifies biochemistry of the Mediterranean water, changes features of the terrestrial ecosystems, and neutralises acid rains. Mineral dust aerosol is involved in many important processes in Earth's climate system, with important implications for air quality, climate, atmospheric chemistry, and the biosphere, and different impacts on human health. The relative importance of mineral dust in particulate matter depends on location, season and particle size, mainly concentrated in the coarse fraction. Its impacts on climate and environment have increased years after years and needs to be more understood.
In the present work, the relationships between the meteorological conditions and dust transport phenomena from the Saharan regions of north Africa and their transport, deposition in both modes, dry and wet deposition in the Mediterranean region, and the Atlantic Ocean, during two dust events namely: case I (01/03/04 - 06/03/04), case II (29/05/05 - 03/06/05), that have been analysed and their major characteristics have been discussed. This analysis has been performed with the aid of the SKIRON modelling system of the University of Athens. The dust module of SKIRON/Eta model incorporates the state of the art parameterization of all the major phases of the desert dust cycle such as production, diffusion, advection and removal. Model results have been compared with TOMS-AI (Total Ozone Mapping Spectrophotometer Aerosol Index) data for a qualitative comparison of the model. The work has been conducted at the framework of TEMPUS project MADEPODIM.