



Modelling the Emission and Transport of Saharan Dust

Jamie Banks (1), Elisa Carboni (1), Don Grainger (1), Martin Juckes (2), and Benoit Laurent (3)

(1) University of Oxford, Atmospheric, Oceanic, and Planetary Physics, United Kingdom (banks@atm.ox.ac.uk), (2) Rutherford Appleton Laboratory, Chilton, UK, (3) Laboratoire Inter-universitaire des Systèmes Atmosphériques, Paris, France

A three-dimensional desert dust lifting and transport model, using meteorological fields from ECMWF analyses, is used to compare predicted mineral dust loading over the Sahara with observations of optical depth from AERONET ground stations, and from satellite instruments such as SEVIRI, AATSR, and MODIS. The model is used to investigate the sensitivity of the predicted aerosol profiles to variations in model parameters, such as dust emission. Estimates of yearly dust activity are presented for the period of March 2006- February 2007. Total emissions from North Africa are estimated to be 1157 Tg, of which 1001 Tg are deposited by gravitational settling and turbulent deposition, and of which 45 Tg are deposited by precipitation scavenging. During the course of the year, 62.0 Tg of dust were transported off the coast of West Africa into the Atlantic.

The period of March 2006 saw particularly intense dust storm activity. From the 6th March, a dust storm started to form in northern Algeria, which propagated south (and to the west and east) over the following two days. At its peak on the 8th March, the dust plume was observed to extend from the Atlantic off the coast of Western Sahara, through Mauritania, Mali and southern Algeria, to northern Niger. Using a data assimilation scheme, improved estimates can be made of dust transport during this event: 2.13 ± 0.11 Tg of dust were transported off the coast of West Africa into the Atlantic, $36.5 \pm 6.8\%$ of the total for March 2006.