



Assessment of African and local wind-blown dust contributions at three rural sites in SE Spain: aerosol size distribution

J.A.G. Orza (1,2), M. Cabello (1,2), V. Lidón (2), and J. Martínez (2)

(1) SCOLab, Física Aplicada, Universidad Miguel Hernandez, 03202 Elche, Spain (ja.garcia@umh.es), (2) Aeolian Erosion Research Group, Universidad Miguel Hernandez, 03202 Elche, Spain

Aerosol number size distribution and meteorological parameters were measured at three rural sites in semiarid southeastern Spain. Number concentrations of suspended particles in 31 size bins between 0.25 and 32 μm diameter were continuously recorded with a GRIMM 190 aerosol spectrometer at: (i) a rural background (RB) location in a perennial tussock grassland, from July to October 2006; (ii) a rural site surrounded by abandoned croplands, and influenced by mineral industries and by a small paved road having a small traffic load located 30 m to the East (RA), from June to December 2007; and (iii) a rural (R) location in an agricultural plot previously cleared and then lightly leveled and compacted for future lemon-tree cultivation, from February to June 2008.

Events of long range transport from North Africa to the study area (African dust outbreaks, ADOs) were identified by aerosol transport models, back-trajectories and satellite imagery.

There is an increase in the concentration of particles larger than 2 μm with increasing wind speed while the concentrations decrease for smaller particles at the RB and R sites. At the RA location, that increase is observed for particles in the range 1.6 – 3.5 μm (the precise value depends on the wind speed) when there are West winds.

Particulate resuspension is found to occur at all wind speeds, although wind threshold values can be identified by a sharp increase in particle concentrations for a range of particle sizes. Light winds entrain large particles while stronger winds additionally entrain particles of smaller size (down to 2.5 μm for the highest winds).

The size distributions present maxima at 1.6 and 3 μm on days with ADO. Concentration for almost every particle size is higher on ADOs than on days without such events, due in part to the associated meteorological situation.

This work was partially supported by the Spanish Ministerio de Educación y Ciencia under grant CGL2004-04419 (RESUSPENSE Project).