



## **African dust contribution to mean ambient PM<sub>10</sub> across the Mediterranean Basin: A quantitative approach to investigate spatial and seasonal patterns**

X. Querol (1), M. Pandolfi (1), J. Pey (1), A. Alastuey (1), M. Cusack (1), N. Pérez (1), F. Amato (1), T. Moreno (1), M. Viana (1), and N. Mihalopoulos (2)

(1) Institute of Environmental Assessment and Water Research, CSIC, Barcelona, Spain (xavier.querol@ija.csic.es, 0034 934110012), (2) Environmental Chemical Processes Laboratory, University of Crete, Greece

The aim of the present study is quantifying African dust contributions to mean PM<sub>10</sub> levels recorded across the Mediterranean basin (2001-2008, 1995-2008 in one case) and evidencing spatial variations and seasonal trends. To this end the same methodology has been applied to a number of data sets on PM levels recorded in aerosol research monitoring sites (Montseny-EUSAAR, Spain, Finokalia-EUSAAR, Greece) and from a number of regional background (RB) monitoring sites from the Co-operative Program for Monitoring and Evaluation of the Long-Range Transmission of Air pollutants in Europe (EMEP) and regional air quality monitoring networks available from Airbase-EEA data set. Around 20 data series spread across the whole Mediterranean and bordering regions have been selected and analyzed in the present study. Once the PM data were obtained the days under the influence of African dust outbreaks were identified (using HYSPLIT, DREAM-BSC, SKIRON and NAAPS tools) for each receptor site. Subsequently, a method (Escudero et al., 2007) based on the statistical data treatment of time series of PM levels, without a need of chemical analysis, was used for the quantification of the daily African PM load during dust outbreaks at each site. Finally, PM speciation data available at MSY and FKL were used to differentiate the local/regional from the African mineral contributions across the Mediterranean Basin.

Results show a clear W to E and N to S increasing gradients, both on annual PM levels and annual African dust load. In the Eastern Mediterranean the episodes are more intense and are relatively frequent in spring and summer period. However in the western side of the basin, African dust outbreaks are more frequent in summer and winter. In the N, NW and NE sides of the basin 1-2  $\mu\text{gPM}_{10}/\text{m}^3$  of mean annual dust contribution was quantified, whereas in the S, SE, SW this annual contribution ranges from 6 to 10  $\mu\text{gPM}_{10}/\text{m}^3$ . The number of exceedances of the PM<sub>10</sub> daily limit value attributable to the African dust contributions was also evaluated from the whole Mediterranean.

Comparison of the African dust annual load with PM<sub>10</sub> speciation allowed quantifying regional dust contributions. Thus, in urban areas we are able to discriminate the contribution of African, regional, urban and road dust.

### References

Escudero M. et al., (2007). *Atmos. Environ.*, 41, 5516- 5524.

### Acknowledgements

This study was supported by the Ministry of Science and Innovation (CGL2005-03428-C04-03/CLI, CGL2007-62505/CLI, GRACCIE- CSD2007-00067), the European Union (6th framework CIRCE IP, 036961, EUSAAR RII3-CT-2006-026140). Finally, we would like to express our gratitude to Airbase-EEA for allowing free access to ambient PM levels recorded at a large number of sites in Europe.