Geophysical Research Abstracts
Vol. 13, EGU2011-12090, 2011
EGU General Assembly 2011

Impact of the Emissions from the Barcelona Metropolitan Area on the Levels and Composition of Fine Aerosols at both Urban and Regional Scale in the Western Mediterranean Basin: Preliminary Results of the DAURE Campaign.

Marco Pandolfi (1), Xavier Querol (1), Andrés Alastuey (1), Jose Luís Jimenez (2), Jorge Pey (1), Michael Cusack (1), Cristina Reche (1), Claudia Mohr (3), Peter DeCarlo (3), Amber Ortega (2), and the DAURE Team

(1) Institute of Environmental Assessment and Water Research (IDAEA - CSIC), Environmental Geochemistry, Barcelona, Spain (marco.pandolfi@idaea.csic.es), (2) University of Colorado, Boulder, CU, (3) Paul Scherrer Institute (PSI), Zurich, Switzerland

DAURE (Determination of the sources of atmospheric Aerosols in Urban and Rural Environments in the Western Mediterranean) was a multidisciplinary international field campaign aimed at estimating sources and origin of particulate matter (PM) in the Western Mediterranean Basin (WMB). Main focuses of the campaign were the study of the origin of the intense pollution episodes frequently occurring at regional scale in summer and winter in the WMB (Perez et al., 2008; Pey et al., 2010) and the impact of the emissions from the large Barcelona Metropolitan Area (BMA) on the levels and composition of PM at both urban and regional scale. Aerosol measurements were simultaneously performed at an urban/rural site pair during winter (Feb - Mar 2009) and summer (Jul 2009). The urban background (UB) site was Barcelona (NE Spain) while the regional background (RB) site was Montseny (NE Spain) which is part of the European Supersite for Atmospheric Aerosol Research (EUSAAR). About 20 institutions were involved in the DAURE campaign (http://cires.colorado.edu/jimenez-group/wiki/index.php/DAURE). State-of-the-art methods and techniques such as 14C analysis (Szidat et al., 2006), Proton-Transfer Reaction Mass Spectrometry (PTRMS) for volatile organic compounds (VOCs) and High-Resolution Aerosol Mass Spectrometry (HR-AMS) (DeCarlo et al., 2006) have been applied for the first time in the Western Mediterranean region as part of DAURE. Here we present an overview of the DAURE campaign by describing the objectives, groups involved, measurements performed and present key results for the interpretation of the broader set of measurements. As a major result, the variability in aerosol levels and chemical composition in the WMB were largely explained by the time of the year (winter vs. summer) and the ageing of air masses over the measurement sites and the depth of the planetary boundary layer. The sea breeze plays an important role in transporting pollutants from the BMA and the developed WMB coastlines towards rural land inwards. Higher levels of NR-PM1 (sum of organic aerosols, sulfate, nitrate, ammonium and chloride from HR-AMS) were measured at RB compared to UB under severe pollution episodes affecting the RB site indicating the importance of SIA and SOA formation at regional level under specific atmospheric conditions. Mean NR-PM1 concentration at RB site during winter was comparable with the range of concentrations observed in Central Europe.

Acknowledgment
This study was supported by the Spanish Ministry of Innovation and Science: Proyecto DOASUR: CGL2007-62505/CLI. Acción Complementaria DAURE CGL2007-30502-E/CLI, and Consolider-Ingenio project GRACCIE-CSD 2007-00067, by the European Union (6th framework CIRCE IP, 036961, EUSAAR RII3-CT-2006-026140), Spanish Government project CGL2006-04025/BOS and Consolider-Ingenio Montes (CSD2008-00040), and by the Catalan Government project SGR 2009-458.

References
Pérez et al., 2008, Science of Total Environment, 407, 527-540.
Pey et al., 2010, Science of Total Environment, 408, 1951–1959.
Szidat et al., 2006, J. Geophys. Res., 111, D07206, doi: 10.1029/2005JD006590.
DeCarlo et al, 2006, Anal. Chem., 78(24), 8281-8289.