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# Characterization of the inorganic aerosol in Barcelona site during DAURE 2009 field campaigns

Javier Plaza (1), Francisco J. Gómez-Moreno (1), M. Aránzazu Revuelta (1), Esther Coz (1), Natalia Moreno (2), Manuel Pujadas (1), and Begoña Artíñano (1)

(1) CIEMAT, Dept. Medio Ambiente, Av. Complutense 22, 28040 Madrid, Spain (fj.gomez@ciemat.es), (2) IDAEA-CSIC, C/ Jordi Girona, 18-26, 08034 Barcelona, Spain

Inorganic compounds account for a significant mass of the ambient aerosol. However this contribution varies with time and aerosol size fraction, depending on the influence of source emissions and ambient conditions, which can be relevant in the formation processes of secondary species. Time series of particulate nitrate, 10 m time resolution, have been obtained during the February-March and July 2009 DAURE (Determination of the sources of atmospheric Aerosols in Urban and Rural Environments in the western Mediterranean) field campaigns in the urban area of Barcelona by means of an R&P8400N monitor. Meteorological conditions during these periods were relevant for the photochemical formation and accumulation of secondary species. Ambient concentrations were higher in winter, specially coinciding with development of atmospheric stagnant episodes that enhanced the accumulation of pollutants including particulate nitrate that reached concentrations of 25 $\mu$gm-3 in some occasions, day or night, under these conditions. High humidity periods favored in occasions the formation of nitrates at submicronic scale. Variations in wind direction resulted in transport of particulate nitrate from near emission areas.

Size segregated aerosol was sampled during the winter campaign with a micro-orifice uniform deposit impactor (MOUDI) using eleven size stages with aluminum substrates and a quartz fiber backup filter. Samples were collected twice per day for day/night periods. The first sampling period tried to collect secondary aerosol as it started after the early morning emission period. The second sample collected the night aerosol and the emission period. Soluble ions (sulfate, nitrate, ammonium and calcium) were later analyzed by IC.

The nitrate mass was concentrated in two modes, the accumulation one around 0.75 $\mu$m and the coarse one around 3.90 $\mu$m. The sulfate and ammonium masses were concentrated in the accumulation mode, around 0.50 $\mu$m, although a small peak close to 5 $\mu$m also appeared. The ammonium measured in the accumulation mode was able to neutralize the inorganic acidity caused by the nitrate and sulfate, but not the acidity in the coarse mode caused by the nitrate. This particulate nitrate was generated by the reaction of gaseous nitric acid with crustal calcium carbonate thus being calcium the neutralizing cation.

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