



## Source apportionment of particle number at an urban site in the Western Mediterranean

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Particle number and size distribution of aerosols between 13-800 nm were registered in Barcelona (NE Spain) from November 2003 to December 2004 in a 7 minute basis by means of a DMPS system (CPC 3022 and DMA 3071). Simultaneous  $PM_{10}$ ,  $PM_{2.5}$  and  $PM_1$  levels in an hourly basis were recorded with a GRIMM laser spectrometer. These real-time measurements were corrected with the simultaneous  $PM_{10}$  and  $PM_{2.5}$  gravimetric 24 hour samples obtained with high volume samplers on quartz-fibre filters. The filters were then analyzed for chemical speciation. In order to identify the main sources of particle number, a receptor model (PCA, principal component analysis) was applied to a database composed of: the number concentration and size distribution, the chemical speciation of  $PM_{2.5}$ , the gaseous pollutant concentrations from a nearby air quality station and the meteorological data.

Mean concentration of particle number in the range 13-800 nm ( $N_{13-800}$ ) was around  $17000 \text{ cm}^{-3}$ , which is similar to other European urban areas. The peak distribution was found at 40 nm, indicating the strong influence of road traffic.

The application of the receptor model to the aforementioned data allows us to identify five sources of particle number (road traffic, mineral matter, sea spray, industrial and fuel-oil combustion). Furthermore, two atmospheric processes have been identified (regional/urban accumulation and photochemical nucleation).

Road traffic is characterized by  $N_{20-300}$ , carbonaceous aerosols, Sn and Sb, with a

contribution close to 70% to the total particle number. Accumulation is composed by  $N_{300-800}$ , sulphate, nitrate and ammonium. The contribution is close to 25% to the total number. Finally, the photochemical nucleation is represented by the  $N_{13-20}$  fraction, the ozone and a little contribution of sulphate. The contribution of this source is around 3% to the total number, but can be very important in the summer.

The application of the PCA confirms us the importance of the road traffic to the total number concentration but allows us to identify not only sources of particulate matter but also atmospheric processes.

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