



## **Positive Matrix Factorization of hourly size-segregated PM elemental concentration at a street canyon: effect of street cleaning**

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Despite the high environmental and health burden of road dust emissions in urban environments, there is still a dearth of knowledge on the effectiveness of some possible remediation measures such as street cleaning activities. As a consequence of the recent notification from the EU commission for the exceedances of PM limit values (1999/30/EC), several EU countries (Austria, Germany and UK among others) have introduced street cleaning as one of the main measures to be taken in order to meet these limits in the next future.

Nevertheless, the effectiveness of street cleaning is still far from being definitively determined since only few tests have been carried out so far and with very different local conditions. An intensive campaign was carried out during spring 2009 in the city centre of Barcelona (NE of Spain) by means of the application of innovative techniques: i) the hourly elemental composition of size segregated PM was used to investigate short term variability of specific tracers of road dust resuspension; ii) a Positive Matrix Factorization was applied in order to identify the daily pattern of each PM source.

Hourly elemental concentrations were obtained by a two-stage streaker sampler, where particles are separated on different stages: an impactor deposits the aerosol coarse fraction (aerodynamic diameter between 2.5-10  $\mu\text{m}$ ) on a Kapton foil while the fine fraction ( $<2.5 \mu\text{m}$ ) is collected on a Nuclepore filter having 0.4  $\mu\text{m}$  pores. The two collecting plates (Kapton and Nuclepore) are paired on a cartridge which rotates at constant speed for a week: this produces a circular continuous deposition of particulate matter (streak) on both stages. Totally 349 samples were collected onto three pairs of stages and analyzed by Proton Induced X-Ray Emission (PIXE) external beam facility in Florence, based on a Van de Graaff accelerator. This facility has been used several times in the past for aerosol studies.

A Positive Matrix Factorization (PMF) model was applied to the chemical dataset obtained through the PIXE (Proton Induced X-Ray Emission) analysis, in order to investigate the temporal variability of the main PM sources, both in a daily scale and also along the campaign. To this aim the Multilinear Engine (ME-2; Paatero, 1999 and 2007) programming language was used to create a specific script file for the weighted non negative least squares problem.

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