PM10 in a residential area of Naples (Southern Italy): chemical and microbiological characterisation

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Air pollution by airborne particulate matter (PM) is presently an environmental problem of primary concern. Numerous studies reported associations between airborne particles and adverse health effects. For the understanding of PM effects and for the individuation of PM sources it is pivotal to assess dimension, chemical and microbiological composition of particulate matter. Microbiological particles, indicated as BioPM, are particles of biological origin suspended in the air, such as: bacteria, fungi, viruses, microbial toxins, proteins and enzymes. All of those components may determine severe health effects, as asthma or allergies. Typologies and quantities of different microbiological species depend on period of the year, meteorological conditions and special transport events, such as Saharan transport (Prospero et al., 2005).

In these study, PM10 was sampled in a residential area of Naples (southern Italy) by means of a low volume gravimetric sampler (TECORA Echo model) using glass fibre filters; sampling period was of 24 h.

Filter, sampler head and all parts involved in PM collection was sterilized by means of immersion in ethylic alcohol, for to avoid sample contamination.

After sampling, half filter was destined to extraction in ultrapure water and successive ionic analyse to determine ionic soluble components as CH_3COO^-, Cl^-, NO_3^-, SO_4^{2-}, PO_4^{3-}, $HCOO^-$, Na^+, NH_4^+, K^+, Mg^{2+}, Ca^{2+}.

pH of water solution was also determined, because that parameter can be related to microorganism concentration.

The remaining part of filters was analysed to assess BioPM composition; specifically, bacteria and fungi colonies were determined suspending particulate matter in a sterile physiological solution (0.9 % NaCl); aliquots were plated on different media for bacterial and fungal counting. Filters were also examined by microscopic observation to identify microorganism colonies.

These analyses were repeated on samples collected on winter, spring and summer period to investigate temporal variability on chemical and biological components and to assess the contribution of Saharan dust events.

First results on chemical analyses show the prevalence of ions indicating secondary origin of particulate matter (NO_3^-, SO_4^{2-}, NH_4^+) or deriving by marine aerosol (Na^+ , Cl^-).

Microbiological analyses showed a concentration comparable with these reported in literature (Alghamdi et al., 2014); microscopic observations allowed the identification of two species of moulds, present also in other work (Haas et al. 2013): Penicillium spp. and Aspergillus spp, often associate to a contamination of respiratory system with effects for human health effects as asthma and allergies.

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