

# Characterization and interaction between bacterial community and chemical composition of Particulate Matter in two areas of Po Valley

E. Innocente<sup>1</sup>, G. Rampazzo<sup>1</sup>, S. Squizzato<sup>1</sup>, V. Bertolini<sup>2</sup>, A. Franzetti<sup>2</sup>, I. Gandolfi<sup>2</sup>, G. Bestetti<sup>2</sup>

<sup>1</sup>Department of Environmental Sciences, Informatics and Statistics - University Ca' Foscari, Venice, 30123, Italy

<sup>2</sup>Department of Earth and Environmental Sciences (DISAT) - University of Milano-Bicocca, Milan, Italy

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Presenting author email: elena.innocente@unive.it

At present many of studies are focused on chemical composition, source apportionment, and health effect of atmospheric particulate matter (Pope and Dockery, 2006, Heinrich et al., 2012).

Recently, there is an increasing attention on the bioaerosol and on the characterization of the bacterial population associated to particulate matter especially due to the presence of endotoxins and pathogenic bacteria that are of great concern for their potential harmful effects (Mueller- Annelin et al., 2004, Peccia et al., 2008).

However the relationship between chemical composition and biological fraction has been poorly investigated. Therefore the aim of this study is to disclose a connection between those different approach of aerosols study.

Sampling sites were located in two different areas of the Po Valley, the most industrialized and urbanized area of Italy. Three sites were located in the Venice area, a coastal site influenced by the presence of the lagoon and industries, in the eastern part of the Po Valley. The last one is located in Milan a polluted area in the middle of the Valley.

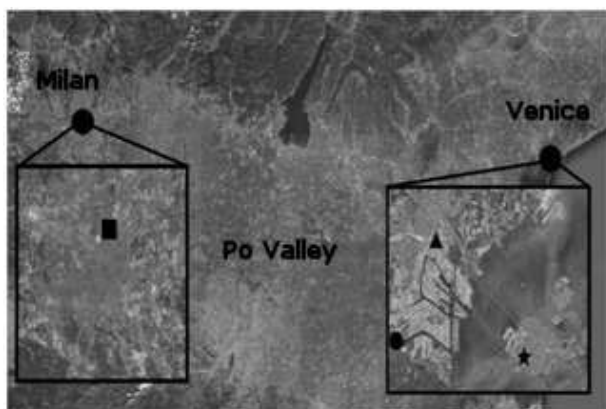


Figure 1. Sampling site location.

PM<sub>10</sub> and total suspended particulate (TSP) samples were collected on quartz fiber filters (Ø 100 and 150 mm) using high volume samplers during 24-hours sampling events distributed along five seasonal periods in 2011 and 2012 (April 2011, July 2011, October 2011, January 2012, March-April 2012) to evaluate seasonal variability.

Meteorological parameters were also collected during the sampling campaign

The filters were cut in two portions for the analyses.

The first part was used for the microbiological analyses: DNA was extracted from the quartz fiber filters and the bacterial hypervariable region V5-V6 of gene 16S rRNA was amplified with barcoded primers to study the bacterial community composition in sampling areas.

The second part was further spliced in two parts and used for chemical analyses:

- water soluble inorganic ions (WSIIs) were extracted by ultrasonic method and analyzed by ion chromatography (Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>, F<sup>-</sup>, Cl<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>) (Squizzato et al, 2012).
- the second part was digested by microwave assessed digestion and elements (Al, Fe, Ca, Mg, K, S, Ti, Cr, Ni, Mn, V, Zn, Cu, Ba, As, Ag, Cd, Pb, Sb, Co) were analyzed by ICP-MS and ICP-OES.

The relationship between chemical composition, bacterial community and meteorological parameters will be investigated by statistical methods. The correlation between cytotoxic elements in air particulate matter that can affect bacterial taxon composition, and other elements or ions that can enhance or reduce bacterial concentration will be particularly considered.

The species composition of bacterial communities and their correlation with seasons and meteorological conditions (e.g. wind speed and direction, temperature) will be also investigated.

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