Geophysical Research Abstracts
Vol. 18, EGU2016-15445, 2016
EGU General Assembly 2016

Seasonal variation of PM10 chemical constituents in different French urban environments

Dalia Salameh (1), Benjamin Golly (1), Jean Luc Besombes (2), Laurent Alleman (3), Olivier Favez (4), and Jean Luc Jaffrezo (1)

(1) Université Grenoble 1-CNRS, LGGE UMR5183, 38041 Grenoble, France, (2) Université de Savoie, LCME, 73376 Le Bourget du lac, France, (3) Mines Douai, CE, 59508 Douai, France, (4) INERIS, DRC/CARA/CIME, 60550 Verneuil-en-Halatte, France

Particulate matter (PM10, with a diameter less than 10 μm) is a heterogeneous mixture of natural and anthropogenic components including organic and elemental carbon (OC, and EC), sulfates, nitrates, ammonium, mineral dust, trace elements, seasalt, which has been linked to adverse impact on human health, visibility, and climate change. Atmospheric PM concentration and composition can vary widely due to different climatic conditions and local features such as anthropogenic source types, emission rates and dispersion patterns. Moreover, the contribution of natural sources (e.g. seasalt and dust) varies from one region to another. However, a fundamental step towards a better understanding and identification of the sources of PM10 is constituted by the study of aerosol chemical composition. Moreover, in order to define cost effective emission abatement strategies, research studies to interpret the variability of PM10 levels and components and to identify the main emission sources influencing ambient air PM10 levels is still needed.

In a national context of a better understanding of PM composition and sources, and therefore the implementation of efficient reduction plans of PM in France, various monitoring campaigns were carried out recently within different air quality programs, where PM10 filter samples were collected on a 24 hour basis at various type of French sites (e.g. urban, rural, etc.,), located in different urban environments. An extensive chemical characterization of PM10 composition at these sites was performed, and a large range of analytical techniques was used to determine the concentrations of various chemical species which included the analysis of OC, and EC, major ionic species (SO42-, NO_3-, Cl-, NH4+, K+, Na+, Mg2+, and Ca2+), metals and trace elements (e.g. Al, Ca, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, V, Zn, etc.,), and organic compounds (e.g. sugars, polyols, PAH, methyl PAH, sulfur PAH, alkanes, hopanes, and methoxyphenols).

The seasonal and spatial variability in PM10 levels and in the concentrations of various aerosol components observed at the different studied sites were investigated and compared. Moreover, the PM mass closure has been also obtained, and allowed us to link some of the quantified chemical species with their specific sources.

Acknowledgments
The authors acknowledge the French Ministry of Environment (MEDDE, Ministère de l'Ecologie, du Développement durable, et de l'Energie) and the national reference laboratory for air quality monitoring (LCSQA) for their funding the different programs and of the collection of PM10 samples.