



A dense Black Carbon network in the region of Paris, France: Implementation, objectives, and first results

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Motivations. Road traffic and domestic wood burning emissions are two major contributors of particulate pollution in our cities. These two sources emit ultra-fine, soot containing, particles in the atmosphere, affecting health adversely, increasing morbidity and mortality from cardiovascular and respiratory conditions and causing lung cancer. A better characterization of soot containing aerosol sources in our major cities provides useful information for policy makers for assessment, implementation and monitoring of strategies to tackle air pollution issues affecting human health with additional benefits for climate change.

Objectives. This study on local sources of primary Particulate Matter (PM) in the megacity of Paris is a follow-up of several programs (incl. EU-FP7-MEGAPOLI) that have shown that fine PM - in the Paris background atmosphere - is mostly secondary and imported. A network of 14 stations of Black Carbon has been implemented in the larger region of Paris to provide highly spatially resolved long term survey of local combustion aerosols. To our best knowledge, this is the first time that such densely BC network is operating over a large urban area, providing novel information on the spatial/temporal distribution of combustion aerosols within a post-industrialized megacity.

Experimental. As part of the PRIMEQUAL “PREQUALIF” project, a dense Black Carbon network (of 14 stations) has been installed over the city of Paris beginning of 2012 in order to produce spatially resolved Equivalent Black Carbon (EBC) concentration maps with high time resolution through modeling and data assimilation. This network is composed of various real-time instruments (Multi-Angle Absorption Photometer, MAAP by THERMO; Multi-wavelength Aethalometers by MAGEE Scientific) implemented in contrasted sites (rural background, urban background, traffic) complementing the regulated measurements (PM, NO_x) in the local air quality network AIRPARIF (<http://www.airparif.asso.fr/>). Contribution of imported versus local EBC is calculated using the “Lenschow” methodology (Lenschow et al., 2001), whereas the influence of domestic wood burning EBC (vs traffic) over the region of Paris is evaluated using the Aethalometer model developed by Sandradewi et al. (2008).

Results and discussion. First results of this BC network are presented here including the temporal variations of EBC from wood burning (domestic heating) and fossil fuel (traffic) for the various sites (1-year observation for rural background and traffic sites; 4-year observations for urban background). The local versus imported contributions of EBC are also presented and discussed for these 2 sources.

References.

- Lenschow, P., et al., Some ideas about the sources of PM₁₀, Atmospheric Environment 35 Supplement No. 1 (2001) S23–S33
- Sandradewi, J., et al., Using aerosol light absorption measurements for the quantitative determination of wood burning and traffic emission contributions to particulate matter, Environ. Sci. Technol., 42, 3316–3323, 2008