



## **The Paris MEGAPOLI campaign to better quantify organic aerosol formation in a large agglomeration: first results**

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Within the FP7 MEGAPOLI project, two intensive field campaigns have been conducted in the Greater Paris region during July 2009 and January/February 2010. The major aim was to quantify sources of primary and secondary aerosol, and the interaction with gaseous precursors, within a large agglomeration, and in its plume. Greater Paris has been chosen for such a campaign because it is a major and dense pollution source (more than 10 million inhabitants), surrounded by rural areas and relatively flat terrain. A particular focus is put on organic carbon, for which secondary formation, but also primary emissions are still not well quantified.

Detailed aerosol and gaseous precursor measurements have been conducted at an urban and two sub-urban sites, from five mobile platforms and from the French ATR-42 research aircraft (for plume characterisation). State of the art instrumentation has allowed determination of aerosol chemical composition, either with very high frequency (several minutes to half an hour), or with large chemical detail (several dozens of organic compounds from filter samples). In addition, the size distribution, optical and hygroscopic and mixing properties has been determined in order to relate the aerosol chemical composition to its potential radiative and climate impact in the urban region and its plume. Gas phase measurements have focussed especially on detailed VOC measurements in order to relate SOA build-up to gaseous precursor species abundance. A network of backscatter lidars at urban and rural sites and on a mobile platform gives the access to the aerosol vertical distribution in the region and to variations of the boundary layer height at the urban / rural interface. Meteorological parameters and especially wind profile measurements allow interpretation of transport processes in the region.

In this paper, the campaign set-up and objectives, meteorological and general pollution conditions observed during the field experiments and a first overview over the measurement results will be given.

First particular results obtained during the campaign will be highlighted. For instance, from airborne primary pollutant measurements it appeared that the pollution plume was still well defined at more than one hundred kilometres downwind from the agglomeration. This will give a "safe" framework for evaluating secondary organic aerosol build-up in the plume. Significant new particle formation events were observed in the area during the whole month of the campaign. These events were assisted by the relatively low particulate matter concentration levels and resulting low surface area during most of July 2009. Preliminary attribution of organic aerosol (OA) from AMS mass spectrometer urban and peri-urban measurements during the summer campaign shows a large fraction of oxidised organic aerosol (OOA), comprising both chemically processed (oxidized) primary organic aerosol and classical secondary organic aerosol (from aromatic and biogenic VOC precursors), and a smaller fraction of unoxidised organic aerosol (HOA) of primary origin. Another aspect is water solubility of OA available from PILS-TOC measurements. At the urban LHVP site, about half of OA is water soluble, corresponding probably to classical secondary organic aerosol, another half is water insoluble, corresponding probably to primary and chemically processed primary OA. First attempts of source attribution of primary OA will also be presented. Finally, the comprehensive data set obtained during the campaign will be used for a first evaluation of regional chemistry-transport model simulations.

