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Primary and secondary gaseous organic carbon in Paris plume during the MEGAPOLI summer experiment

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Within the FP7 MEGAPOLI project, an intensive field campaign was conducted in the Greater Paris region during July 2009. The main objective of the campaign was to quantify sources of primary and secondary aerosol and the role of organic gas-phase precursors, in and around a large agglomeration and to describe their evolution in the megacity plume.

Observed gaseous organic carbon include a large dataset of primary and secondary VOCs of both anthropogenic and biogenic origin (monofunctionnal and bifunctionnal alkanes, alkenes, aromatics, terpenes, alcohols, aldehydes and ketones). Instruments were simultaneously deployed on ground-based platforms (MILEAGE) at two urban and suburban sites and one mobile platform (the French ATR-42 aircraft). Flights were designed to describe the urban plume ageing by performing several legs at increasing distances from the city centre. Techniques include on-line sampling and analysis by GC-FID and PTR-MS (on-board the aircraft) at high-time resolution and off-line sampling on carbonaceous cartridges and 2.4-DNPH-cartridges at 3-hour-time resolution. These measurements are collocated with other relevant trace gases measurements (O3, CO, NO, NO2, NOy) and meteorological parameters.

First, the spatial and temporal variability of VOC from urban to regional scale is discussed regarding environmental conditions (air masses origin, meteorology, chemical regimes and photochemical ageing based on various photochemical clocks) and with respect to their sources. Then, the SOA forming potential of air masses is determined from laboratory determined particle-yields and observed gaseous organic precursors.