

Sources of fine particulate organic matter in a Mediterranean urban area: Marseilles

I. El Haddad¹, N. Marchand¹, B. Temime-Roussel¹, H. Wortham¹, C. Piot², A. Albinet², J.L. Besombes², J.L. Jaffrezo³

¹ Laboratoire Chimie Provence (UMR 6264), équipe Instrumentation et Réactivité Atmosphérique, Universités d'Aix-Marseille I, II et III-CNRS, 3 place Victor Hugo, 13331 Marseille Cedex 3

² Laboratoire de Chimie Moléculaire et Environnement, Polytech Savoie- Université de Savoie, Campus Scientifique, 73376 Le Bourget du Lac Cedex, France

³ Laboratoire de Glaciologie et Géophysique de l'Environnement (UMR 5183), Université Joseph Fourier-CNRS, Rue Molière, BP 96, 38 402 St Martin d'Hères Cedex France.

Keywords: Source apportionment, molecular tracer, Mediterranean urban area

Particulate organic matter (POM) in atmospheric aerosols contributes in approximately 20 to 50% of the total fine aerosol mass at continental mid-latitude (Kanakidou *et al.*, 2005). Several epidemiological studies had associated this class of particulate material with adverse effects on human health (Grahame and Schlesinger, 2007). POM results from primary emissions as well as in situ formation through oxidative processes of gas-phase organic compounds. In order to reduce ambient particles concentrations, an accurate knowledge of the relative contribution of their different sources is required.

During the ESCOMPTE-2001 experiment, evidence has been brought of a large fraction of secondary organic aerosols (SOA) photochemically produced in the region of Marseilles, a French Mediterranean urban area, pointing out the need for a better characterization of these particles. In this context, a field campaign was carried out at an urban background site of Marseilles in July 2008, within the FORMES program, to estimate the respective influences of the main aerosol sources. More than 70 organic markers including hopanes/steranes, PAH, n-alkanes, phthalate esters, steroids, sugars and sugar anhydrides, and various carboxylic acids were measured.

Figure 1 shows the variation of two selected individual organic compounds, Hopane (vehicular marker) and Bis(2-ethylhexyl)phthalate (plasticizer) plotted along with the PM_{2.5} concentrations. The Bis(2-ethylhexyl)phthalate was one of the most abundant organic compounds with concentrations ranging between 1.7 and 25.6 ng.m⁻³. This compound shows a diurnal variation, with higher concentrations during the day, which may be caused by its enhanced emission from plastics with the ambient temperature (Staples *et al.*, 1997). Hopane concentrations present a large variation during the measurement period with concentrations ranging from 0.09 and 0.54 ng.m⁻³, accounting for 0.02 and 0.07 mg.g⁻¹ of OC. These are relatively small contributions to OC in an urban area, with no impact from wood combustion. This indicates the inputs from other sources to OC, including most likely primary emissions from regional activities such as ports, industries and petrochemical complex in addition to secondary processes.

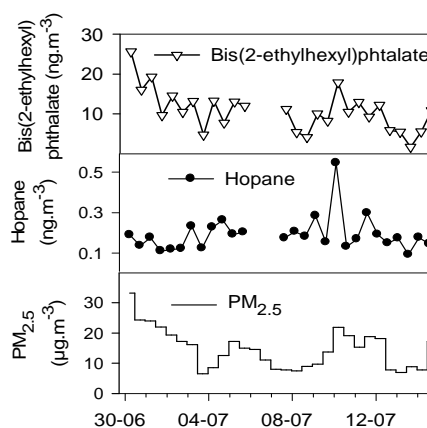


Figure 1: PM_{2.5}, Hopane and Bis(2-ethylhexyl)phthalate concentrations during the field campaign in Marseilles, July 2008.

Results of source apportionment using receptor based models will be presented together with the variations of secondary organic markers encountered during different meteorological conditions in the campaign.

This work has been supported by MEDAD (Ministère de l'Ecologie, du Développement et de l'Aménagement Durables) through the research program PRIMEQUAL. ATMOPACA are also acknowledged for providing NO_x, O₃ and PM data.

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