

Trace elements in suburban Paris aerosols during the winter 2010 MEGAPOLI campaign

M. Furger, S. Visser, P. Zotter, J. Slowik, K. Appel¹, U. Flechsig, A. S. H. Prévôt and U. Baltensperger

Paul Scherrer Institute, CH-5232 Villigen PSI, Switzerland
¹HASYLAB, DESY, Notkestrasse 85, 22607 Hamburg, Germany

The MEGAPOLI project (Megacities: Emissions, urban, regional and Global Atmospheric POLLution and climate effects, and Integrated tools for assessment and mitigation) provided the framework for two field campaigns (IOPs) in the greater Paris area during the summer of 2009 and the winter of 2010 [1]. During these IOPs we collected size-segregated aerosols with 3-stage rotating drum impactors (RDI) with 2-hour time resolution at an urban site near the city center and at a suburban background site 20 km southwest of the city center. Aerosols were separated into three size classes (stages) from 0.1 – 1.0 μm (fine), 1.0 - 2.5 μm (intermediate) and 2.5 - 10 μm (coarse). The samples were analyzed with synchrotron radiation-induced X-ray fluorescence spectrometry (XRF) for their elemental composition at HASYLAB, beamline L (elements from Ti to Pb), and at the SLS Optics beamline (Na to Zn) [2]. The measured spectra were mass-calibrated with ICP-OES measurements of in-house produced calibration standards, and the obtained concentrations were assembled to time series for each analysed element. The overlapping range of elements analysed at both beamlines showed good agreement.

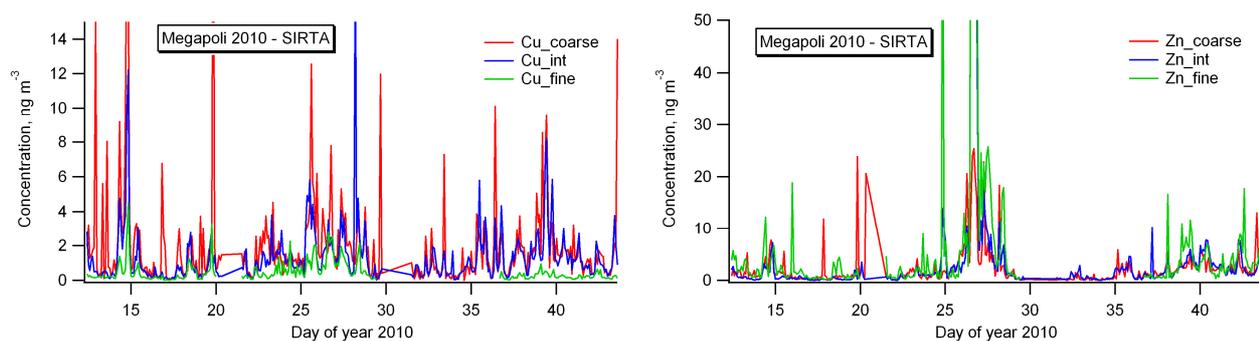


Figure 1: Time series of Cu (left) and Zn (right) in three size ranges measured at the suburban background site SIRTA (Palaiseau, southwest of Paris) in January and February 2010. To better resolve the fine size range, the graphs were cropped at 15 ng m^{-3} and 50 ng m^{-3} .

Time series of Cu and Zn are shown in Figure 1. Cu is most abundant in the coarse and intermediate size fraction, which hints to crustal material, mechanical abrasion and re-suspension of (road) dust as its possible source. Zn shows a similar abundance in all sizes, with a strong predominance of the fine fraction in a few cases that indicates combustion processes, such as the large peak at day 27. This probably indicates a strong local (perhaps industrial) source and requires a more detailed analysis. These results are preliminary, and further analyses are ongoing.

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References

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