



## Source apportionment studies at different european sites with time and size resolved trace element data

Agnes Richard (1), Markus Furger (1), Nicolas Bukowiecki (1), Peter Lienemann (2), Uwe Flechsig (3), Karen Rickers-Appel (4), Mari-Cruz Minguillon (1), Cristina Reche (5), Andre Prevot (1), and Urs Baltensperger (1)

(1) Paul-Scherrer-Institut, Laboratory of Atmospheric Chemistry, 5232 Villigen PSI, Switzerland, (2) School of Life Sciences and Facility Management, Einsiedlerstrasse 31, 8820 Wädenswil, Switzerland, (3) Swiss Light Source, optics Beamline, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland, (4) Hamburger Synchrotronstrahlungslabor at Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, 22603 Hamburg, Germany, (5) Institute of Earth Sciences Jaume Almera, CSIC, C/Lluis Sole i Sabaris s/n, 08028 Barcelona, Spain

Although trace elements do not contribute substantially to the total mass of air pollutants they can attribute significantly to source identifications. Apportionment studies performed with positive matrix factorization (PMF) took advantage of the gain in information obtained through a high time resolution (i.e. in the order of hours). Furthermore, aerosols sampled with the rotating drum impactor (RDI) are segregated into three size ranges (PM<sub>10-2.5</sub>, PM<sub>2.5-1</sub> and PM<sub>0.1-1</sub>). This involves the possibility to identify different sources for a single element depending on its emitted particle size. An example is iron, which is attributed to mineral dust in the coarse mode and to mechanical abrasion in the fine mode. A broad range of elements (Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, Se, Sr, Zr, Cd, Sn, Sb, Ba) was analyzed with synchrotron-radiation based x-ray fluorescence. Field measurements were carried out during 2008 and 2009 at different places in Europe in the context of EUCAARI (Zürich, CH), EMEP (Payerne, CH) and DAURE (Barcelona, ES) campaigns. Comparison of source profiles from different campaigns shows regional variability due to individual properties of rural and urban sites. As would be expected, urban areas exhibit stronger traffic factors, whereas mineral dust is enhanced at rural sites. Also geographical differences can be distinguished by PMF, as the Barcelona site clearly showed a marine factor and industrial influences, which are absent in Switzerland.