

Supplementary material to manuscript

amt-2010-56:

Quantitative sampling and analysis of trace elements in atmospheric aerosols: impactor characterization and Synchrotron-XRF mass calibration

**A. Richard¹, N. Bukowiecki¹, P. Lienemann², M. Furger¹, M. Fierz³,
M. C. Minguillón^{1,4}, B. Weideli², R. Figi⁵, U. Flechsig⁶, K. Appel⁷, A. S. H. Prévôt¹,
and U. Baltensperger¹**

¹Laboratory of Atmospheric Chemistry, Paul Scherrer Institut, Villigen, Switzerland

²School of Life Sciences and Facility Management, Wädenswil, Switzerland

³University of Applied Sciences Northwestern Switzerland, Windisch, Switzerland

⁴Institute for Environmental Assessment and Water Research (IDAEA), CSIC, Barcelona,
Spain

⁵Empa, Swiss Federal Laboratories for Materials Testing and Research, Dübendorf,
Switzerland

⁶Swiss Light Source, Paul Scherrer Institut, Villigen, Switzerland

⁷Hamburger Synchrotronstrahlungslabor at Deutsches Elektronen-Synchrotron DESY, a
Research Centre of the Helmholtz Association, Hamburg, Germany

Correspondence to: M. Furger
(markus.furger@psi.ch)

1 Supplementary Material

1.1 Scatterplots

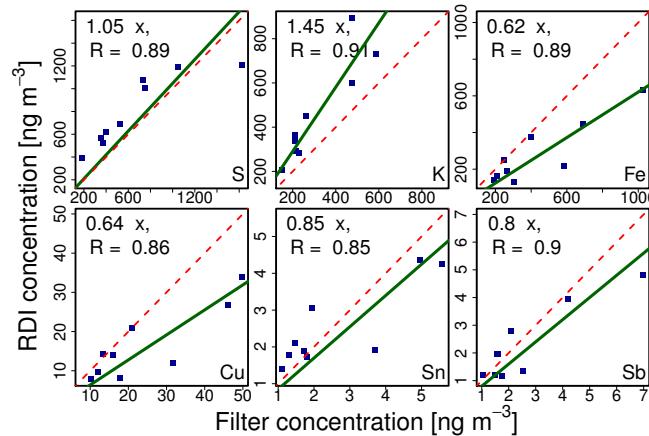


Fig. 1. Scatterplots of RDI concentrations in ng m^{-3} versus filter concentrations in ng m^{-3} showing the correlation of PM_{10} values for the Zürich winter campaign 2008/09. The same selection of elements as in Fig. 11 is shown: S, K, Fe, Cu, Sn and Sb. Regressions are forced to have an intercept of zero. Each data point corresponds to one day, i.e. one filter value and the mean of 12 RDI values.

1.2 Averaged Values

Table 1. Comparison of average mass concentrations: the first two columns present mean values of elements measured by PM_1 and PM_{10} high-volume filters compared to the same elements measured with the RDI. PM_1 daily filter samples were taken every day in the period from 30 November 2008 till 17 December 2008 and analyzed for the following elements (a): Al, P, S, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Rb, Sr, Zr, Cd, Sn, Sb, Ba and Pb. PM_{10} daily filter samples were taken every second day in the period from 1 till 17 December 2008 and analyzed for the following elements (b): Al, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Rb, Sr, Zr, Mo, Cd, Sn, Sb, Ba and Pb. In addition, average values for all data points throughout the whole campaign as well as the same period excluding New Year's Eve (NYE, 31 December 2008 15:00 LT to 1 January 2009 05:00 LT) are shown. The third column lists the average values for the whole range of elements, which can be detected by the RDI-SR-XRF method (c): Al, Si, P, S, Cl, K, Ca, Ti, Cr, Mn, Fe, Co, Ni, Cu, Zn, Sr, Zr, Mo, Cd, Sn, Sb, Ba and Pb. The last two columns give averaged values for quasi-continuously monitored PM_{10} mass concentrations as well as averaged $PM_{2.5}$ and PM_{10} mass concentrations from daily filter analysis. Values marked with an asterisk (*) are averaged only for days in 2008 (28 November till 31 December).

PM_1	Filter (a)	RDI (a)	all RDI elements (c)	PM_1 cont.	PM_1 daily
Filter period	0.64	0.68	0.69	-	-
Whole camp.	-	1.99	2.02	-	-
Period w/o NYE	-	1.67	1.68	-	-
$PM_{2.5}$	Filter (NA)	RDI (NA)	all RDI elements (c)	$PM_{2.5}$ cont.	$PM_{2.5}$ daily
Whole camp.	-	-	3.52	-	-
Period w/o NYE	-	-	3.08	-	21.19*
PM_{10}	Filter (b)	RDI (b)	all RDI elements (c)	PM_{10} cont.	PM_{10} daily
Filter period	2.7	2.55	2.78	20.56	20.61
Whole camp.	-	5.09	5.3	25.23	-
Period w/o NYE	-	4.58	4.79	24.64	24.96*