



Supplement of

Laser ablation ICP-MS of size-segregated atmospheric particles collected with a MOUDI cascade impactor: a proof of concept

Marin S. Robinson et al.

Correspondence to: Johannes T. van Elteren (elteren@ki.si)

The copyright of individual parts of the supplement might differ from the CC-BY 3.0 licence.

MOUDI stage:			1		2		3		4		5	
cutpoint dia. (µm):			10		5.6		3.2		1.8		1.0	
no.	site	el.	conc.	(±%)	conc.	(±%)	conc.	(±%)	conc.	(±%)	conc.	(±%)
1(R)	LJ24	As	< DL		< DL		< DL		< DL		0.054	(0.8)
1(R)	LJ24	Cu	< DL		0.023	(3.1)	0.207	(1.5)	0.583	(1.5)	1.55	(1.9)
1(R)	LJ24	Fe	< DL		0.668	(3.4)	8.65	(1.5)	15.0	(1.2)	35.8	(0.9)
1(R)	LJ24	Mn	< DL		< DL		0.216	(1.3)	0.350	(1.0)	0.900	(0.8)
1(R)	LJ24	Ni	< DL		< DL		< DL		< DL		0.290	(4.0)
1(R)	LJ24	Pb	< DL		< DL		0.018	(1.5)	0.054	(1.2)	0.704	(0.8)
1(R)	LJ24	Sb	< DL		< DL		< DL		0.028	(1.4)	0.193	(1.1)
1(R)	LJ24	V	< DL		< DL		0.016	(1.4)	0.029	(1.1)	0.070	(1.0)
1(R)	LJ24	Zn	< DL		< DL		0.386	(1.4)	1.10	(1.2)	6.45	(0.7)
2(R)	LJ72	As	< DL		< DL		< DL		< DL		< DL	
2(R)	LJ72	Cu	< DL		0.047	(1.6)	0.471	(1.2)	0.686	(1.0)	0.899	(0.9)
2(R)	LJ72	Fe	< DL		4.35	(1.5)	21.1	(1.1)	32.9	(1.2)	42.0	(1.2)
2(R)	LJ72	Mn	< DL		0.115	(1.7)	0.472	(1.3)	0.614	(1.2)	0.921	(1.2)
2(R)	LJ72	Ni	< DL		0.310	(2.2)	0.704	(1.7)	0.634	(2.2)	0.599	(3.1)
2(R)	LJ72	Pb	< DL		0.004	(2.1)	0.032	(2.0)	0.057	(1.9)	0.233	(1.1)
2(R)	LJ72	Sb	< DL		< DL	(3.1)	0.054	(2.0)	0.094	(1.7)	0.153	(1.3)
2(R)	LJ72	V	< DL		0.007	(1.7)	0.027	(1.2)	0.034	(1.2)	0.045	(1.2)
2(R)	LJ72	Zn	< DL		< DL	(2.1)	1.10	(1.5)	1.64	(1.2)	4.54	(0.7)
3(NR)	MA24	As	ND		ND		< DL		< DL		0.027	
3(NR)	MA24	Cu	ND		ND		0.036		< DL		0.169	
3(NR)	MA24	Fe	ND		ND		5.97		14.0		33.2	
3(NR)	MA24	Mn	ND		ND		0.178		0.363		0.794	
3(NR)	MA24	Ni	ND		ND		< DL		< DL		0.116	
3(NR)	MA24	Pb	ND		ND		0.013		0.030		0.260	
3(NR)	MA24	Sb	ND		ND		< DL		< DL		0.027	
3(NR)	MA24	V	ND		ND		0.028		0.062		0.257	
3(NR)	MA24	Zn	ND		ND		< DL		0.175		1.02	

Table S1. Concentrations (C_{air}) for MOUDI stages 1–5. Concentrations (in ng m⁻³) are spike and blank corrected. Confidence limits (95%) are shown in parentheses for rotated samples. R = rotated; NR = non-rotated; DL = detection limit; ND = not determined; LJ = Ljubljana (24 and 72 h samples), MA = Martinska (24 h).

MA = Martinska (24 h). **MOUDI** stage: 7 8 9 10 6 0.32 0.18 0.10 0.056 cutpoint dia. (µm): 0.56 conc. no. site el. conc. (±%) conc. (±%) (±%) conc. (±%) conc. (±%) 1(R) LJ24 As 0.135 (0.7)0.255 (0.3)0.153 (0.3)0.089 (0.4) 0.026 (0.4) 1(R) LJ24 Cu 1.13 (1.2)1.18 (0.5)1.31 (0.6) 1.4 (0.6) 0.281 (0.9) 1(R) LJ24 (1.2)(0.6)(0.8)(0.8) (1.1)Fe 23.8 9.48 4.82 2.7 0.437 1(R) LJ24 (1.0)(0.5) 0.384 (0.6)(0.7) 0.022 Mn 0.925 0.721 0.148 (0.8) LJ24 1(R) Ni < DL 0.154 (0.6)0.122 (0.7)< DL < DL 1(R) LJ24 Pb 1.62 (0.9)3.14 (0.6)2.53 (0.6)1.04 (0.6)0.137 (0.6)1(R) LJ24 Sb 0.378 (1.0)0.793 (0.5)0.552 (0.6)0.216 (0.6) 0.027 (0.6) 1(R) LJ24 V 0.099 (1.1)0.232 (0.5)0.129 (0.6)0.02 (0.8) < DL 1(R) LJ24 Zn 5.61 (0.8)8.63 (0.4)12.8 (0.5) 7.67 (0.6) 0.950 (0.6) 2(R) LJ72 < DL 0.052 (0.4)0.055 (0.4)0.033 (0.4) < DL As 2(R) LJ72 Cu 0.438 (1.1)0.611 (0.6)0.556 (0.6)0.310 (0.7)0.079 (1.1)2(R) LJ72 13.2 (1.5)8.70 (0.8)5.72 (0.8)2.28 0.844 (2.1)Fe (1.0)2(R) LJ72 Mn 0.587 (1.3)0.635 (0.6)0.402 (0.6)0.194 (0.9)0.058 (1.8)2(R) LJ72 Ni 0.290 (3.0)0.278 (1.1)0.237 (0.8)0.126 (2.2)< DL 2(R) LJ72 Pb 0.539 (1.1)1.28 (0.7)1.23 (0.7)0.554 (0.6) 0.113 (0.8) 2(R) LJ72 Sb 0.100 (1.4)0.237 (0.6)0.228 (0.6) 0.105 (0.6) 0.024 (0.7) 2(R) LJ72 V 0.303 0.053 (1.3)0.039 (1.3)0.246 (0.6)(0.6)(0.6)0.005 2(R) LJ72 Zn (1.0)5.56 (0.5) 7.41 (0.5)3.13 (0.5) (0.6) 2.96 0.464 < DL 3(NR) **MA24** As 0.049 < DL 0.039 0.022 0.036 3(NR) MA24 Cu 0.160 0.069 0.075 0.015 3(NR) **MA24** Fe 13.0 3.19 1.16 1.10 < DL 3(NR) **MA24** Mn 0.424 0.116 0.053 0.031 < DL < DL 3(NR) MA24 Ni 0.122 0.169 0.577 < DL 3(NR) MA24 Pb 0.571 0.272 0.363 0.131 0.057 3(NR) **MA24** Sb 0.063 0.039 0.051 < DL < DL **MA24** V 0.557 3(NR) 0.413 1.92 0.212 0.030 3(NR) MA24 Zn 1.34 0.690 0.634 0.379 0.247 4(R) **MA24** As < DL (0.6) (0.4)ND 0.059 (1.4)0.066 0.027 4(R) **MA24** Cu 0.359 (2.0)1.02 (0.9) 0.599 (0.9) 0.124 (0.9) ND 4(R) **MA24** Fe 15.1 (2.1)7.66 (1.2)2.44 (1.2)< DL ND 4(R) **MA24** Mn 0.603 (1.9)0.526 (1.0)0.178 (1.1)0.033 (1.1)ND 4(R) MA24 Ni 0.135 (2.8)0.332 (1.1)0.597 (0.8)0.139 (0.8)ND 4(R) **MA24** Pb (1.8)(0.8)(0.8)0.281 (0.8) ND 0.395 1.15 0.945 4(R) Sb **MA24** 0.052 (2.0)0.244 (0.9)0.214 (0.9)0.063 (0.9)ND 4(R) **MA24** V (1.8)(0.8)(0.8)(0.7) ND 0.138 0.660 1.36 0.319 4(R) **MA24** Zn 3.03 (1.8)4.84 (0.8)3.20 (0.8)1.31 (0.8)ND

Table S2. Concentrations (C_{air}) for MOUDI stages 6–10. Concentrations (in ng m⁻³) are spike and blank corrected. Confidence limits (95%) are shown in parentheses for rotated samples. R = rotated; NR = non-rotated; DL = detection limit; ND = not determined; LJ = Ljubljana (24 and 72 h samples), MA = Martinska (24 h).

Supporting Information – Figures



Figure S1. Pseudocolored elemental maps of particles collected in sample 1 (Ljubljana) with rotation. MOUDI stages 6–10 are shown.



Figure S1 (cont.)

(A) Stage 6



Figure S2. Pseudocolored elemental maps of particles collected in sample 2 (Martinska) without rotation: (A) MOUDI stage 6 (80 nozzles) and (B) MOUDI stage 9 (2000 nozzles).



Figure S3. Elemental image maps of nickel (top) and lead (bottom) in stages 3–8 of a 72 h sample collected in Ljubljana with rotation. Note the less uniform deposition of nickel compared to lead particularly in stages 3 through 6. (Spikes were not removed.)



Figure S4. 3-D elemental image maps of Pb (sample 2, stages 5 and 6, no rotation). Pb is observed in-between impaction spots, evidence of particle bounce. The y-axis is in brightness values.



Figure S5. A 3-D elemental map of zinc (stages 6–10, sample 1) before (A) and after (B) spike removal. The *y*-axis is in brightness values.