

Table S1 Slope and intercept of each SS-ETV-ICPOES calibration curve obtained with increasing amounts of Montana soil SRM 2710, using Ar 763.511 nm for internal standardization, with and without sheathing gas or water vapour.

Analyte, nm	No sheath		H ₂ sheath		N ₂ sheath		Water vapour sheath	
	Slope (µg ⁻¹)	Intercept	Slope (µg ⁻¹)	Intercept	Slope (µg ⁻¹)	Intercept	Slope (µg ⁻¹)	Intercept
Al II 167.078	0.041 ± 0.003	0.9 ± 0.5	0.10 ± 0.02	2.2 ± 3.6	0.10 ± 0.01	0.9 ± 0.9	0.10 ± 0.01	0.3 ± 2.3
Al I 176.641	0.89 ± 0.03	-8.3 ± 5.6	1.02 ± 0.07	-14 ± 14	2.0 ± 0.1	-42 ± 28	1.87 ± 0.05	-12 ± 10
Cd II 226.502	96 ± 3	-0.1 ± 0.2	164 ± 13	-0.2 ± 0.9	319 ± 20	-1.9 ± 1.3	222 ± 21	-1.5 ± 1.4
Cd I 228.802	242 ± 10	-1.1 ± 0.7	303 ± 34	-2.0 ± 2.3	670 ± 69	-4.4 ± 4.5	607 ± 72	-7.2 ± 5.0
Co II 228.616	59 ± 4	0.03 ± 0.13	102 ± 7	-0.08 ± 0.22	186 ± 12	-0.47 ± 0.36	139 ± 7	-0.2 ± 0.2
Cr II 205.618	49 ± 4	-0.3 ± 0.5	78 ± 18	-1.3 ± 2.1	176 ± 14	-2.9 ± 1.6	80 ± 11	0.5 ± 1.3
Cu II 224.700	23.0 ± 0.5	-7.9 ± 4.2	17 ± 4	19 ± 34	28 ± 1	0 ± 11	27 ± 1	-15 ± 9
Mn I 403.076	22 ± 2	-63 ± 44	20 ± 4	-80 ± 110	66 ± 7	-330 ± 210	40 ± 2	-71 ± 50
Mo II 202.095	100 ± 11	-0.8 ± 0.6	140 ± 53	-1.4 ± 3.1	411 ± 38	-3.8 ± 2.2	137 ± 47	0.5 ± 2.8
Ni II 174.828	28 ± 3	-0.2 ± 0.1	40 ± 13	-0.4 ± 0.5	102 ± 11	-0.8 ± 0.5	58 ± 8	-0.07 ± 0.37
P I 178.287	10 ± 1	-3.9 ± 3.3	13 ± 1	-5.4 ± 4.7	25 ± 3	-16 ± 10	18 ± 2	-8.5 ± 6.8
V II 292.402	16 ± 4	1.0 ± 0.9	28 ± 8	0.8 ± 1.9	39 ± 5	0.5 ± 1.1	47 ± 5	-0.2 ± 1.3
Zn II 206.200	15 ± 1	4 ± 22	14 ± 1	0.4 ± 22.5	47 ± 5	-150 ± 100	26 ± 4	28 ± 80

Table S2 Detection limits (3σ, n = 10) in mg kg⁻¹ by SS-ETV-ICPOES based on 3-mg sample aliquots

Analyte, nm	No sheath	H ₂ sheath	N ₂ sheath	Water vapour sheath
Al II 167.078	200	40	60	40
Al I 176.641	5	10	2	3
Cd II 226.502	0.07	0.02	0.007	0.02
Cd I 228.802	0.03	0.01	0.01	0.01
Co II 228.616	0.1	0.06	0.03	0.04
Cr II 205.618	0.4	0.1	0.03	0.06
Cu II 224.700	0.4	0.4	0.2	0.2
Mn I 403.076	0.4	0.3	0.09	0.1
Mo II 202.095	0.05	0.04	0.01	0.02
Ni II 174.828	0.2	0.2	0.05	0.1
P I 178.287	0.5	0.4	0.1	0.2
V II 292.402	0.4	0.2	0.1	0.08
Zn II 206.200	0.5	0.3	0.1	0.2

Table S3 Average background emission signals in counts per second (± standard deviation, n = 10) for SS-ETV-ICPOES with and without sheathing gas or water vapour.

Analyte, nm	No sheath	H ₂ sheath	N ₂ sheath	Water vapour sheath
Al II 167.078	830 ± 270	1710 ± 110	840 ± 160	660 ± 110
Al I 176.641	1380 ± 140	4493 ± 340	2140 ± 130	740 ± 150
Cd II 226.502	4440 ± 180	13600 ± 110	6187 ± 64	2880 ± 120
Cd I 228.802	7300 ± 170	21590 ± 120	9890 ± 190	4610 ± 190
Co II 228.616	7600 ± 170	21900 ± 200	10250 ± 190	5070 ± 160
Cr II 205.618	3050 ± 880	5600 ± 210	3090 ± 130	1780 ± 140
Cu II 224.700	3990 ± 240	11430 ± 180	5290 ± 130	3400 ± 170
Mn I 403.076	40000 ± 280	129550 ± 200	52360 ± 180	35620 ± 180
Mo II 202.095	3350 ± 140	7970 ± 190	4410 ± 130	2220 ± 110
Ni II 174.828	3950 ± 170	5800 ± 180	5210 ± 150	2980 ± 190
P I 178.287	2060 ± 160	3900 ± 160	2000 ± 96	870 ± 150
V II 292.402	4910 ± 170	16620 ± 140	6800 ± 140	3800 ± 110
Zn II 206.200	3150 ± 240	9350 ± 140	4420 ± 190	1580 ± 160