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Characterization of trace metals on soot aerosol particles with the SP-AMS: detection and quantification

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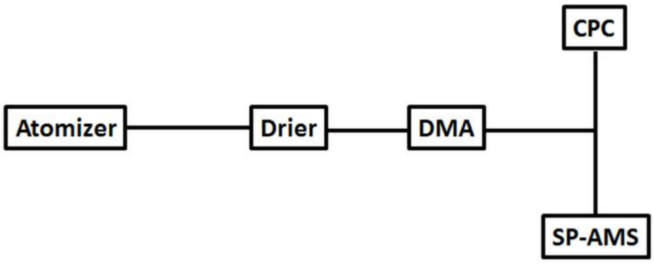

Figure S1 – Instrument setup to measure trace elements in the laboratory.

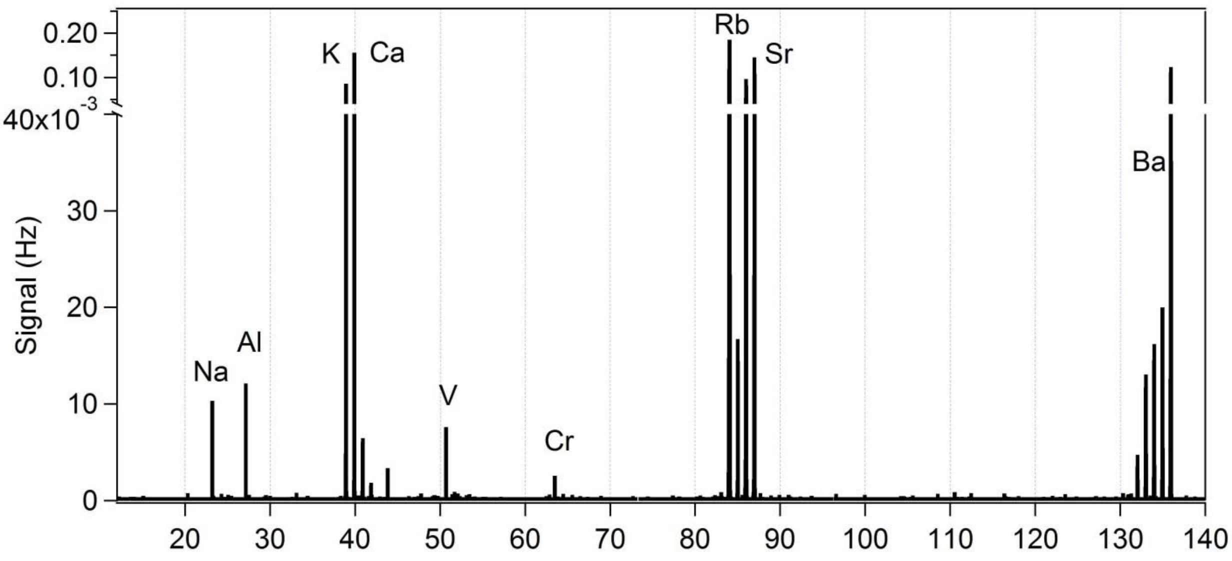

Figure S2 – Mass spectrum obtained with Tungsten vaporizer and filament switched off and laser vaporizer on.

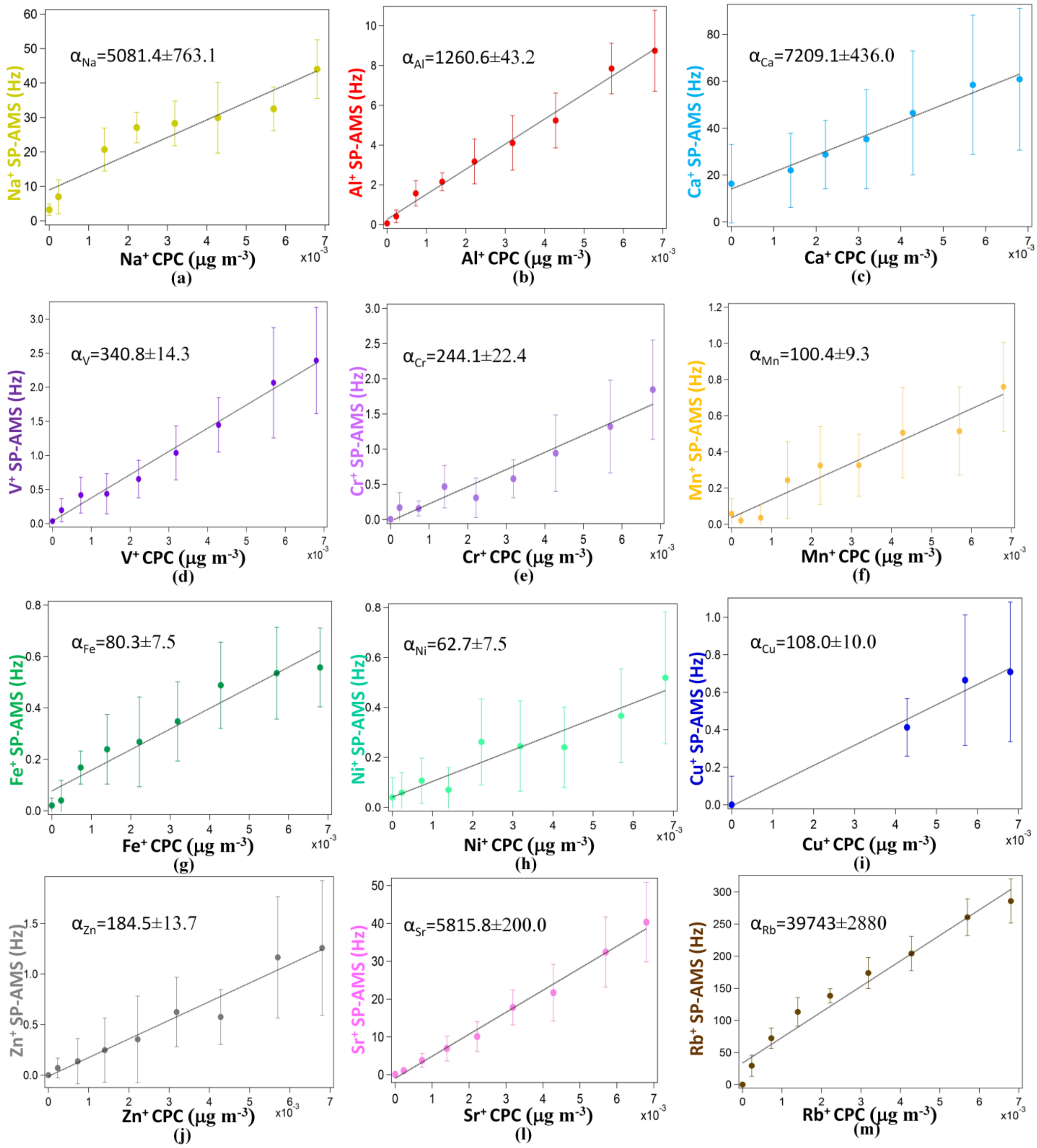

Figure S3- Signal measured by the SP-AMS (Hz) versus the mass concentration obtained by the CPC (µg m^{-3}) for each trace element and respective slope values (α).

Table S1- Relative atomic mass, isotopic composition, standard concentration, nitric acid concentration and identified isotopes of the trace elements investigated in this study.

Element	Relative atomic mass [a]	Isotopic composition (%) [a]	Standard concentration (mg L^{-1}) [b]	HNO_3 concentration (%, w/w) [b]	Identified isotopes with the SP-AMS
Na	22.9897	100.00	1000	2	$^{23}Na^+$
Al	26.9815	100.00	1000	2	$^{27}Al^+$
Ca	39.9625	96.94	1000	2	$^{40}Ca^+$, $^{42}Ca^+$, $^{44}Ca^+$
V	50.9439	99.75	1000	3	$^{51}V^+$
Cr	51.9405	83.78	1000	2	$^{52}Cr^+$, $^{53}Cr^+$, $^{54}Cr^+$
Mn	54.9380	100.00	998	2	$^{55}Mn^+$
Fe	55.9349	91.75	1000	2	$^{54}Fe^+$, $^{55}Fe^+$, $^{56}Fe^+$, $^{57}Fe^+$,
Ni	57.9353	68.07	1000	2	$^{58}Ni^+$, $^{60}Ni^+$, $^{61}Ni^+$, $^{62}Ni^+$,$^{64}Ni^+$
Cu	62.9295	69.15	1000	2	$^{63}Cu^+$, $^{64}Cu^+$,
Zn	63.9291	48.26	1000	2	$^{64}Zn^+$, $^{66}Zn^+$, $^{67}Zn^+$, $^{68}Zn^+$, $^{70}Zn^+$
Rb	84.9117	72.17	1000	2	$^{85}Rb^+$, $^{87}Rb^+$
Sr	87.9056	82.58	1000	2	$^{84}Sr^+$, $^{86}Sr^+$, $^{87}Sr^+$, $^{88}Sr^+$,
Ba	137.9052	71.69	1000	2	$^{130}Ba^+$, $^{132}Ba^+$, $^{134}Ba^+$, $^{135}Ba^+$, $^{136}Ba^+$, $^{137}Ba^+$, $^{138}Ba^+$

[a] Watson et al., 2004.

[b] Sigma-Aldrich standards in nitric acid.

Table S2 – Metallic salts, oxides and respective fragments investigated in the laboratory experiment with the metals solution. Their presence in this experiment is identified with “Y” (yes) or “N” (no).

Fragment	MW	Presence
$Al(NO_2)_3^+$	164.9602	N
$Al(NO_3)_3^+$	212.9449	N
$Al_2O_3^+$	101.9478	N
AlN^+	40.9846	N
$AlNO^+$	56.9795	N
$AlNO_2^+$	72.9744	N
$AlNO_3^+$	88.9693	N
AlO^+	42.9764	N
AlO_2^+	58.7136	N
AlO_3^+	74.9662	N
$Ba(NO_2)_2^+$	229.8910	N
$Ba(NO_3)_2^+$	261.8808	N
BaN^+	151.9082	N
$BaNO^+$	167.9031	N
$BaNO_2^+$	183.8981	N
$BaNO_3^+$	199.8930	N
BaO^+	153.9001	N
$Ca(NO_2)_2^+$	131.9483	N
$Ca(NO_3)_2^+$	163.9382	N
$CaNO^+$	69.9605	N
$CaNO_2^+$	85.9554	N
$CaNO_3^+$	101.9504	N
CaO^+	55.9574	Y
$Cr(NO_2)_3^+$	189.9192	N
$Cr(NO_3)_3^+$	237.9039	N
$Cr_2O_3^+$	151.8657	N
CrN^+	65.9435	Y
$CrNO^+$	81.9384	N
$CrNO_2^+$	97.9334	N
$CrNO_3^+$	113.9283	N

CrO^+	67.9354	N
CrO_2^+	83.9303	Y
CrO_3^+	99.9252	N
CrO_5^+	131.9150	N
$Cu(NO_2)_2^+$	154.9154	N
$Cu(NO_3)_2^+$	186.9052	Y
Cu_2O^+	141.8541	N
$Cu_2O_3^+$	173.8439	N
CuN^+	76.9326	N
$CuNO^+$	92.9275	N
$CuNO_2^+$	108.9225	N
$CuNO_3^+$	124.9174	Y
CuO^+	78.9245	N
CuO_2^+	94.9194	N
$Fe(NO_2)_3^+$	193.9136	N
$Fe(NO_3)_3^+$	241.8983	N
$Fe_2O_3^+$	159.8546	N
$Fe_3O_4^+$	231.7844	N
$Fe_4O_3^+$	271.7245	N
$Fe_4O_5^+$	303.7143	N
FeN^+	69.9380	N
$FeNO^+$	85.9329	Y
$FeNO_2^+$	101.9278	N
$FeNO_3^+$	117.9227	N
FeO^+	71.9298	N
$Mn(NO_2)_2^+$	146.9238	N
$Mn(NO_3)_2^+$	178.9136	N
$Mn_2O_3^+$	157.8608	N
$Mn_2O_7^+$	221.8405	N
$Mn_3O_4^+$	228.7938	N
MnN^+	68.9411	Y
$MnNO^+$	84.9360	Y
$MnNO_2^+$	100.9309	N

$MnNO_3^+$	116.9258	N
MnO^+	70.9329	N
MnO_2^+	86.9278	N
MnO_3^+	102.9227	N
Na_2O^+	61.9744	Y
NaN^+	36.9928	N
$NaNO^+$	52.9877	N
$NaNO_2^+$	68.9826	Y
$NaNO_3^+$	84.9775	Y
$Ni(NO_3)_2^+$	161.8614	N
$Ni_2O_3^+$	163.8554	N
NiN^+	71.9384	N
$NiNO^+$	87.9331	Y
$NiNO_2^+$	103.9282	N
$NiNO_3^+$	119.9229	N
NiO^+	73.9302	Y
Rb_2O^+	185.8184	N
RbN^+	98.9148	N
$RbNO^+$	114.9097	Y
$RbNO_2^+$	130.9346	Y
$RbNO_3^+$	146.8996	N
RbO^+	100.9067	N
$Sr(NO_2)_2^+$	179.8914	N
$Sr(NO_3)_2^+$	211.8812	N
$Sr_3N_2^+$	292.7229	N
SrN^+	111.9090	Y
$SrNO^+$	127.90358	N
$SrNO_2^+$	143.8985	N
$SrNO_3^+$	159.8934	Y
SrO^+	103.9005	N
$V (NO_3)_3^+$	236.9074	N
$V(NO_2)_5^+$	280.984	N
$V_2O_3^+$	149.8726	N

$V_2O_5^+$	181.8625	N
VN^+	64.9470	N
VNO^+	80.9419	N
VNO_2^+	96.9368	N
VNO_3^+	112.9317	N
$VO(NO_3)_3^+$	252.9023	N
VO^+	66.9388	N
VO_2^+	82.9337	Y
$Zn(NO_2)_2^+$	155.9149	N
$Zn(NO_3)_2^+$	187.9047	Y
ZnN^+	77.9322	N
$ZnNO^+$	93.9271	N
$ZnNO_2^+$	109.9220	N
$ZnNO_3^+$	125.9169	Y
ZnO^+	79.9240	N