Supplementary Material

to the paper entitled

"Daytime concentrations of minor and trace elements in atmospheric aerosols at four sampling sites of Dar es Salaam, Tanzania"

Albert Geoffrey Mmari[§], Hassan Ali Hassan[*], László Bencs[‡, 1]

[§] Department of Science and Laboratory Technology, Dar es Salaam Institute of Technology (DIT), P.O. Box 2958, Dar es Salaam, Tanzania

[*] Department of Physics, University of Dar es Salaam, P.O. Box 35063, Dar es Salaam, Tanzania

[‡] Institute for Solid State Physics and Optics, Wigner Research Centre for Physics, Hungarian Academy of Sciences, H-1525 Budapest, P.O. Box 49, Hungary

[1] Corresponding author: e-mail: bencs.laszlo@wigner.mta.hu; Tel.: +36-1-392-2222/ext. 1684; Fax: +36-1-392-2223; ORCID: https://orcid.org/0000-0003-1775-5170.

Auxiliary text

A1. Synoptic overview of meteorological data

Three-hourly average weather data, recorded during the sampling campaigns in June-August were acquired from local meteorological stations of Dar es Salaam, which were applied to calculate daily, monthly and seasonal averages and their fluctuations, compiled in Table S4, while the average daily data are visualized in Fig. S1. The June-August months (dry climatic period) are rather less rainy in the region, which are also characterized with moderate daily temperatures and high moisture content of air. Accordingly, the weather during the sampling campaigns was characterized with an average air temperature of around 24.1 ^{o}C, while the monthly average value did not change significantly, ranging between 23.9 ^{o}C and 24.3 ^{o}C for June, July and August (Fig. S1). Similarly low changes were observed for air pressure during the whole campaign period, i.e., 1016.6±2.1 mbar, while the monthly values were similar, as well as their fluctuations. The cloud coverage during the three months showed a rather broad fluctuation from clear sky to fully overcast sky, while its average value was only 28±19%. This value does not show too much deviation from the monthly averages, calculated for June, July and August, ranging in 27-29%, but, with fairly high fluctuations of 18-21%. The precipitation in the study period was rather irregularly distributed, developing high fluctuation, i.e., between 0 and 6.1 mm, with an average of 0.1 mm. The relative humidity (RH) of air showed quit high average values for the three-month-long period, ranging between 51-93% with average of 79% (±9%), while analogous values were observed for the individual months of the campaign, i.e., 78-81% (±8-10%), seen in Fig. S1.

The overall (three months) daily average wind velocity fluctuated between 4 and 28 km/h with an average of 15.3 km/h (±3.9 km/h), while similar average monthly values of 15.9, 16.1 and 13.9 km/h were observed for June, July and August, respectively (Table S4). Gusts determined during the sampling period were developing similar seasonal pattern as the wind velocity. The overall ruling wind direction was observed to be from S/SE/SSE, corresponding to a rather oceanic air-mass influence. As for the monthly ruling wind direction, one could see only slight, rather negligible changes for June only, in terms of low continental influence, i.e., S/SSW/SSE. Overall, one could infer that the weather conditions did not show any considerable change from month-to-month during the sampling periods. Thus their negligibly low influence on the aerosol composition at the studied sampling sites was concluded.

A2. Normality tests for elemental PM constituents

In general, the air concentrations of As, Br, Cd, Cr, Mn, Pb and Zn at the four Tanzanian sampling sites followed close to normal distribution, whereas Br and Sb content of PM developed lognormal distribution in the Jangwani site. The concentrations of Al, Ca, Cl,

Cu, Fe, K, Mg, Na and Si in aerosols usually followed normal distribution at the four sampling stations, except for Cu at the Jangwani and Chang'ombe sites, and Si at the Ubungo site, which developed lognormal distribution. It follows from these results that the non-parametric tests were proper to be applied for the evaluation of the current data set.

Table S1. Monthly and seasonal weather data in Dar es Salaam during the sampling campaigns of June-August, in 2014.

Parameter		Overall	June	July	August
Air temperature (°C)	Min-Max	20-29	21-29	20-28	20-29
	Average±SD	24.1±2.1	24.3±2.0	23.9±2.1	24.2±2.1
	Median	24.0	24.0	23.0	24.0
	RSD (%)	8.6	8.4	8.8	8.7
Air pressure (mbar)	Min-Max	1010-1022	1010-1022	1014-1022	1010-1020
	Average±SD	1016.6±2.1	1016.1±2.4	1017.6±1.5	1016.1±2.1
	Median	1017.0	1016.0	1018.0	1016.0
	RSD (%)	0.2	0.2	0.1	0.2
Cloud cover (%)	Min-Max	0-100	0-80	3-95	0-100
	Average±SD	28±19	28±18	27±19	29±21
	Median	24	25	21	26
	RSD (%)	68	63.0	70.0	70.1
Humidity (%)	Min-Max	51-93	58-92	51-93	59-93
	Average±SD	79±9	81±8	78±10	79±9
	Median	81	83	80	82
	RSD (%)	11.7	10.2	12.9	11.9
Precipitation (mm)	Min-Max	0-6.1	0-1.8	0-1.7	0-6.1
	Average±SD	0.1±0.3	0.08±0.23	0.09±0.24	0.11±0.46
	Median	0.0	0.0	0.0	0.0
	RSD (%)	363	294	274	434
Wind (km/h)	Min-Max	4-28	5-26	4-28	4-23
	Average±SD	15.3±3.9	15.9±3.7	16.1±3.9	13.9±3.7
	Median	15.0	16.0	16.0	14.0
	RSD (%)	25.4	23.1	24.1	26.7
Gust (km/h)	Min-Max	5-44	6-38	5-44	5-32
	Average±SD	23.3±6.5	24.7±6.3	24.6±6.5	20.6±5.9
	Median	24.0	25.0	25.0	22.0
	RSD (%)	28.1	25.7	26.6	28.6
Ruling wind direction		S/SE/SSE	S/SSW/SSE	S/SE/SSE	S/SE/SSE

Fig. S1. Trends of average daily meteorological parameters in Dar-es-Salaam, observed during the June-August campaign in 2014.

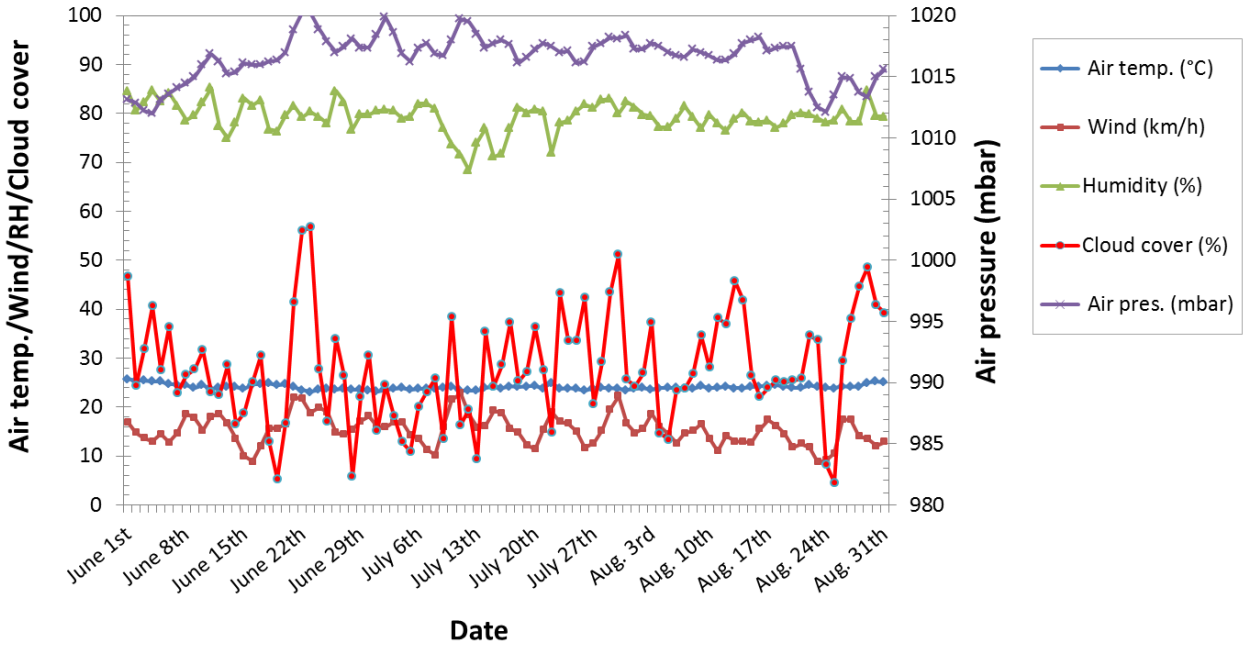

Table S2. Minimum detection limits (*MDL*) for various analytes calculated for sample filters on the S8 TIGER-2 WDXRF spectrometer and the limits of detection (LOD) for air samples.

Analyte	Z	MDL (µg/g)	LOD (ng/m^3)
Na	11	151	1.38
Mg	12	54	0.49
Al	13	52	0.47
Si	14	39	0.36
S	16	9.0	0.08
Cl	17	39	0.36
K	19	17	0.16
Ca	20	15	0.14
Fe	26	7.2	0.07
Cu	29	4.3	0.04

Table S3. Minimum detection limits (*MDL*) of elements for aerosol filter and limit of detection (LOD) values for air samples, acquired by means of the ICP-OES method.

Analyte	MDL (µg/g)	LOD (ng/m^3)
Mn	15	0.32
Cr	19	0.42
Ni	14	0.31
Zn	12	0.26
As	15	0.31
Br	22	0.47
Cd	14	0.30
Sb	12	0.26
Pb	15	0.31

Note: MDL was calculated on the base of 3σ-criterion.

Table S4. ICP-OES results for the analysis of various components of TILL-2 CRM samples.

Analyte	Elemental content ±SD (µg/g)	
	Measured	Reference
As	26.0±0.27	22
Cd	0.21±0.04	0.2
Co	14.6±0.08	13
Cr	38.9±0.28	40
Mn	529.3±1.1	530
Ni	30.8±0.12	31
Pb	23±0.14	21
Zn	118±0.15	116

Abbreviation: SD – standard deviation

Table S5. Average air concentrations of elements and their variation, expressed as standard deviation (±SD) at the study sites in Dar es Salaam in June-August, 2014.

Aerosol component	Average concentration ±SD (μg/m^3)			
	Kariakoo (commercial area)	Jangwani (mixed influence)	Ubungo (bus terminal)	Chang'ombe (industrial)
As	0.12±0.07	0.19±0.09	0.40±0.13	0.22±0.10
Br	0.53±0.45	0.57±0.31	0.61±0.25	0.42±0.30
Cd	0.22±0.09	0.18±0.07	0.17±0.09	0.16±0.05
Cr	0.45±0.20	0.74±0.34	1.47±0.31	0.45±0.18
Mn	0.21 ±0.07	0.19±0.10	0.17±0.14	0.23±0.12
Ni	0.43 ±0.09	0.38±0.13	0.62±0.18	0.33±0.14
Pb	1.09±0.83	0.89±0.85	1.32±0.66	0.70±0.59
Sb	0.24±0.08	0.26±0.08	0.47±0.16	0.29±0.12
Zn	2.15±1.07	0.49±0.18	1.56±0.95	1.31±1.04
Al	1.75 ±1.34	4.56±1.43	5.32±2.27	3.29±1.15
Ca	1.20±0.76	3.03±1.15	3.42±0.99	1.58±0.60
Cl	1.21±0.50	1.65±0.58	1.54±0.31	1.50±0.23
Cu	0.030±0.014	0.030±0.015	0.02±0.003	0.040±0.028
Fe	0.61±0.16	0.64±0.17	0.98±0.19	0.69±0.17
K	0.77±0.34	2.25±0.86	2.49±0.60	1.37±0.62
Mg	0.24±0.08	1.33±0.31	1.50±0.48	0.76±0.20
Na	3.53±1.88	5.14±1.27	4.60±1.52	4.68±0.87
S	0.76±0.10	2.40±0.62	2.34±0.59	2.02±0.46
Si	4.49±2.92	9.35±3.24	12.2±8.1	5.99±1.9
Min-Max	11-30	25-47	29-64	22-36
Average	20±6	34±8	41±11	26±5
Median	18	32	39	24

SD – standard deviation (n=10 sampling for each site).

Table S6. Elemental ratios in TSP calculated for the four sampling sites in Dar es Salaam.

Site/parameter	Pb/Br	Pb/Ni	Br/Ni	Sb/As	Ni/Sb	Br/Sb
Kariakoo						
Min-Max	0.05-19.2	0.1-6.5	0.1-3.1	0.6-14	1.1-2.8	0.3-7.2
Average±SD	**5.4±6.0**	**2.7±2.1**	**1.2±0.9**	**3.7±4.2**	**2.0±0.7**	**2.2±2.0**
Median	**3.5**	**2.3**	**1.0**	**1.8**	**2.1**	**1.7**
RSD (%)	113	76	76	115	33	92
Jangwani						
Min-Max	0.2-6.5	0.1-7.5	0.7-5.3	0.5-5.4	1.0-2.6	0.7-5.6
Average±SD	**2.0±2.3**	**2.5±2.4**	**1.7±1.4**	**2.0±1.6**	**1.5±0.6**	**2.3±1.4**
Median	**1.1**	**1.5**	**1.2**	**1.4**	**1.3**	**2.1**
RSD (%)	114	97	81	82	38	59
Chang'ombe						
Min-Max	0.12-3.2	0.1-5.8	0.1-5.9	0.4-6.8	0.4-2.3	0.1-2.5
Average±SD	**1.3±1.0**	**2.3±2.1**	**1.5±1.7**	**1.9±1.9**	**1.3±0.6**	**1.5±1.0**
Median	**1.0**	**2.3**	**1.0**	**1.2**	**1.2**	**1.8**
RSD (%)	78	91	111	101	48	63
Ubungo						
Min-Max	0.27-5.9	0.4-6.6	0.5-1.4	0.5-3.0	0.7-3.4	0.7-2.5
Average±SD	**2.6±1.7**	**2.5±1.8**	**1.0±0.3**	**1.3±0.8**	**1.5±0.8**	**1.4±0.6**
Median	**2.05**	**2.1**	**1.0**	**1.1**	**1.4**	**1.2**
RSD (%)	68	74	33	56	54	41
Overall (average)						
Min-Max	1.3-5.4	2.3-2.7	1.0-1.7	1.4-3.7	1.3-2.0	1.4-2.3
Average±SD	**2.8±1.8**	**2.5±0.2**	**1.3±0.3**	**2.2±1.0**	**1.6±0.3**	**1.8±0.5**
Median	**1.9**	**2.0**	**1.0**	**1.4**	**1.5**	**1.7**
RSD (average %)	64	7	23	46	18	26

Table S6. (continued).

Site/parameter	Zn/Cd	Zn/Sb	Ni/Cd	Sb/Cd	Zn/Pb	Cd/Cu
Kariakoo						
Min-Max	0.9-19	0.8-18.2	0.9-4.4	0.5-2.4	0.2-61	1.8-23
Average±SD	**11.4±6.0**	**9.5±4.7**	**2.3±1.0**	**1.3±0.5**	**9.5±19**	**9.5±7.0**
Median	**11.8**	**9.3**	**2.3**	**1.2**	**1.9**	**8.3**
RSD (%)	52	49	42	42	198	74
Jangwani						
Min-Max	1.5-7.8	0.6-4.4	1.1-5.1	0.5-2.7	0.1-21	3.0-10
Average±SD	**3.0±1.8**	**2.1±1.1**	**2.4±1.4**	**1.6±0.7**	**3.0±6.3**	**6.6±2.1**
Median	**2.5**	**1.8**	**2.3**	**1.7**	**1.1**	**6.2**
RSD (%)	61	52	57	45	38	32
Chang'ombe						
Min-Max	1.3-22.5	0.7-22.5	0.8-3.4	0.8-3.7	0.3-82	1.8-14
Average±SD	**8.7±6.5**	**5.5±6.2**	**2.2±0.8**	**1.9±0.9**	**14±26**	**5.7±4.1**
Median	**7.2**	**3.7**	**2.1**	**1.9**	**2.0**	**3.8**
RSD (%)	75	114	36	46	189	71
Ubungo						
Min-Max	1.4-41.7	0.7-6.3	1.1-10.2	0.6-8.4	0.2-8.5	2.9-18
Average±SD	**13.2±12.3**	**3.3±1.7**	**4.9±3.1**	**3.9±2.7**	**1.9±2.4**	**8.6±4.9**
Median	**9.7**	**2.9**	**4.0**	**2.9**	**1.1**	**8.1**
RSD (%)	93	50	63	70	132	57
Overall (average)						
Min-Max	3.0-13.2	2.1-9.5	2.2-4.9	1.3-3.9	1.9-14	5.8-9.5
Average±SD	**9.1±4.4**	**5.1±3.2**	**2.9±1.3**	**2.2±1.2**	**7.0±5.6**	**7.6±1.8**
Median	**7.8**	**4.5**	**2.7**	**1.9**	**1.5**	**6.6**
RSD (%)	49	64	34	54	80	23

Table S7. Statistic measures calculated for the dataset of various aerosol components determined over the four study sites in Dar es Salaam.

Sampling site		As	Br	Cd	Cr	Mn	Ni	Pb	Sb	Zn	Na	Cl	Si	Ca	Mg	Al	S	K	Fe	Cu
Kariakoo	Skewness	-0.21	1.67	0.42	0.71	0.65	0.62	0.79	1.06	-0.09	0.11	-0.22	1.11	0.82	0.67	0.66	0.57	-0.58	0.39	0.79
	Kurtosis	0.77	3.48	-0.50	-0.66	-1.16	-1.38	-0.03	0.50	0.50	-0.30	0.27	0.06	-0.11	0.84	-0.05	-1.00	-1.52	-0.31	-0.39
Jangwani	Skewness	-0.18	1.76	0.97	0.37	0.41	1.37	1.27	0.18	0.21	0.07	0.76	0.79	0.71	0.71	0.72	0.56	0.12	-0.23	1.44
	Kurtosis	-1.80	4.16	-0.36	-1.61	-1.02	1.76	1.32	-2.02	-0.02	-1.74	0.50	-0.90	-0.29	-0.11	-0.41	-0.63	-1.04	-0.25	1.15
Chang'ombe	Skewness	0.14	0.16	0.78	0.74	0.29	0.84	0.24	0.52	0.91	0.35	-0.01	0.64	1.29	0.35	0.86	0.30	0.31	0.21	1.69
	Kurtosis	-0.30	-1.49	0.62	-0.04	-0.94	1.14	-1.25	-0.84	-0.59	-1.03	0.78	0.45	2.83	-0.94	0.77	-0.22	-1.46	-0.62	2.96
Ubungo	Skewness	-0.23	1.22	0.29	-1.04	1.08	-0.16	-0.02	-0.15	0.62	-1.10	-0.14	2.06	0.03	-0.10	-0.09	0.07	0.45	-0.46	-0.33
	Kurtosis	0.45	1.41	-1.79	0.36	1.26	-0.97	-0.25	0.11	-0.29	1.18	-1.72	5.31	-1.02	-0.13	-0.50	-0.64	-0.87	-0.09	-1.25

Table S8. Bivariate correlation coefficients and mass ratios of ionic species in Dar es Salaam on the base of former TSP data (Mmari et al. 2013).

Sampling site	Correlation coefficient				Mass ratio								
					SO_4^{2-}/NH_4^+			Cl^-/NO_3^-			NO_3^-/NH_4^+		
	NH_4^+/NO_3^-	NH_4^+/SO_4^{2-}	NO_3^-/SO_4^{2-}	Cl^-/NO_3^-	Average	SD	Median	Average	SD	Median	Average	SD	Median
Coastal	0.33	**0.91**	0.01	**0.60**	**11.3**	1.5	**11.1**	**2.6**	1.0	**2.1**	**2.2**	0.9	**2.3**
Semi-urban	0.44	**0.75**	0.41	**0.61**	**10.4**	4.1	**11.0**	**2.5**	1.1	**2.2**	**2.9**	1.8	**2.9**
Rural	0.53	**0.69**	0.38	**0.87**	**6.1**	3.9	**6.1**	**1.5**	0.5	**1.4**	**3.0**	1.3	**2.6**

Table S9. Bivariate correlations between elements detected in tropospheric aerosols over the Ubungo sampling site, Dar es Salaam.

	Br	Cd	Cr	Mn	Ni	Pb	Sb	Zn	Na	Cl	Si	Ca	Mg	Al	S	K	Fe	Cu	
As	0.143	-0.082	-0.118	0.136	-0.155	-0.108	0.123	-0.110	0.236	**0.647**	0.338	0.176	0.158	0.145	0.472	0.013	0.273	**0.691**	**As**
Br		-0.497	0.557	-0.109	0.501	-0.314	0.441	-0.009	0.231	0.209	**0.814**	0.190	0.351	0.243	0.269	-0.190	0.263	0.155	**Br**
Cd			-0.549	0.262	-0.231	-0.109	-0.447	-0.201	0.320	-0.241	-0.232	-0.250	0.088	0.210	-0.240	-0.002	0.221	-0.058	**Cd**
Cr				-0.207	-0.178	0.176	0.243	-0.240	-0.196	-0.161	0.365	0.260	0.063	0.037	0.432	0.171	-0.169	0.054	**Cr**
Mn					-0.087	-0.106	-0.597	-0.564	0.371	-0.341	0.019	0.204	**0.737**	**0.728**	0.280	-0.133	0.431	-0.330	**Mn**
Ni						-0.331	0.201	0.372	0.251	0.414	0.369	0.302	0.233	0.101	-0.023	-0.170	0.289	-0.151	**Ni**
Pb							-0.170	0.307	-0.576	0.000	-0.318	-0.080	-0.531	-0.596	-0.084	0.007	-0.613	-0.447	**Pb**
Sb								0.527	-0.055	0.396	0.018	-0.169	-0.346	-0.451	-0.272	0.354	-0.395	0.441	**Sb**
Zn									-0.560	0.419	-0.334	-0.063	**-0.747**	**-0.822**	-0.448	0.251	-0.682	0.002	**Zn**
Na										0.119	0.454	-0.104	**0.763**	**0.702**	0.084	-0.296	**0.826**	0.109	**Na**
Cl											0.241	0.344	-0.139	-0.240	0.299	0.164	0.067	0.551	**Cl**
Si												0.124	0.506	0.452	0.411	-0.536	0.651	0.175	**Si**
Ca													0.302	0.312	**0.834**	0.493	0.112	0.230	**Ca**
Mg														**0.966**	0.459	-0.232	**0.823**	-0.068	**Mg**
Al															0.495	-0.189	**0.834**	0.016	**Al**
S																0.243	0.353	0.389	**S**
K																	-0.512	0.413	**K**
Fe																		0.102	**Fe**

Symbols: Bold green number – correlation is significant at p=0.01 level (strong correlation); thin blue number – correlation is significant at p=0.05 level (low correlation).

Table S10. Bivariate correlations between elements detected in tropospheric aerosols over the Jangwani sampling site, Dar es Salaam.

	Br	Cd	Cr	Mn	Ni	Pb	Sb	Zn	Na	Cl	Si	Ca	Mg	Al	S	K	Fe	Cu	
As	-0.535	0.491	-0.505	-0.326	-0.507	0.279	-0.381	0.026	-0.302	-0.081	0.501	0.257	0.116	0.286	0.217	0.333	-0.118	0.058	**As**
Br		-0.147	-0.083	0.364	-0.111	-0.144	-0.019	-0.305	-0.066	-0.184	-0.471	-0.419	-0.491	-0.403	-0.319	-0.668	-0.165	-0.078	**Br**
Cd			-0.684	0.202	-0.237	-0.069	-0.159	0.161	-0.407	-0.310	-0.243	-0.303	-0.402	-0.333	-0.426	-0.058	-0.241	0.610	**Cd**
Cr				0.319	0.571	-0.122	0.495	0.131	0.490	0.256	0.018	0.169	0.365	0.204	0.296	-0.054	-0.046	-0.159	**Cr**
Mn					0.369	-0.552	0.194	0.181	0.357	0.004	-0.486	-0.355	-0.163	-0.351	-0.250	-0.575	-0.335	0.442	**Mn**
Ni						-0.016	0.382	-0.127	0.067	-0.146	-0.293	-0.261	-0.173	-0.299	-0.425	-0.338	-0.061	0.150	**Ni**
Pb							0.395	-0.692	-0.603	-0.423	0.071	-0.068	-0.377	-0.015	-0.151	0.060	0.088	-0.192	**Pb**
Sb								-0.119	0.134	0.098	-0.473	-0.341	-0.167	-0.277	-0.137	0.009	0.301	0.024	**Sb**
Zn									0.512	**0.677**	0.084	0.070	0.507	0.069	0.286	0.432	0.226	-0.039	**Zn**
Na										**0.747**	0.109	0.275	**0.740**	0.295	0.579	0.333	0.472	-0.257	**Na**
Cl											-0.009	-0.033	0.567	0.004	0.392	0.425	0.626	-0.324	**Cl**
Si												**0.882**	**0.685**	**0.896**	**0.754**	0.609	0.048	-0.526	**Si**
Ca													**0.785**	**0.990**	**0.854**	0.605	-0.025	-0.313	**Ca**
Mg														**0.794**	**0.906**	**0.731**	0.350	-0.398	**Mg**
Al															**0.897**	0.620	0.010	-0.382	**Al**
S																**0.676**	0.231	-0.475	**S**
K																	0.615	-0.429	**K**
Fe																		-0.588	**Fe**

Symbols: Bold green number – correlation is significant at p=0.01 level (strong correlation); thin blue number – correlation is significant at p=0.05 level (low correlation).

Table S11. Bivariate correlations between elements detected in tropospheric aerosols over the Chang'ombe sampling site, Dar es Salaam.

	Br	Cd	Cr	Mn	Ni	Pb	Sb	Zn	Na	Cl	Si	Ca	Mg	Al	S	K	Fe	Cu	
As	-0.389	-0.134	-0.269	**0.665**	0.184	-0.439	-0.253	0.325	0.115	0.045	0.286	0.199	0.088	0.199	0.471	0.286	0.331	-0.374	**As**
Br		0.183	0.136	0.011	0.201	0.435	0.338	-0.276	0.195	-0.064	-0.013	-0.171	0.314	-0.070	-0.357	-0.165	0.220	0.644	**Br**
Cd			-0.208	0.230	0.479	0.175	0.182	0.078	-0.058	0.034	0.464	0.475	0.396	0.418	0.094	0.222	0.212	0.008	**Cd**
Cr				-0.348	**-0.762**	-0.246	-0.158	-0.643	0.202	-0.020	0.298	0.320	0.213	0.389	0.293	-0.453	0.549	-0.106	**Cr**
Mn					0.344	-0.534	-0.303	0.351	0.118	0.123	0.459	0.463	0.539	0.548	0.556	0.557	0.518	-0.291	**Mn**
Ni						0.257	0.463	0.479	-0.142	-0.178	-0.021	-0.100	-0.008	-0.195	-0.256	0.395	-0.203	0.475	**Ni**
Pb							0.589	-0.044	0.001	0.028	-0.575	-0.592	-0.189	-0.662	**-0.752**	-0.190	-0.575	0.397	**Pb**
Sb								0.201	-0.459	-0.615	-0.474	-0.371	-0.198	-0.513	-0.466	-0.359	-0.374	0.579	**Sb**
Zn									**-0.680**	-0.454	-0.024	-0.356	-0.338	-0.257	-0.302	0.271	-0.368	-0.010	**Zn**
Na										**0.868**	0.123	0.373	0.590	0.347	0.361	0.425	0.418	-0.218	**Na**
Cl											0.054	0.335	0.527	0.328	0.308	0.607	0.165	-0.500	**Cl**
Si												**0.655**	0.369	**0.796**	0.475	0.201	**0.793**	-0.194	**Si**
Ca													**0.727**	**0.937**	**0.884**	0.327	**0.748**	-0.482	**Ca**
Mg														**0.753**	0.608	0.513	**0.680**	-0.363	**Mg**
Al															**0.817**	0.370	**0.849**	-0.497	**Al**
S																0.261	**0.696**	-0.626	**S**
K																	0.122	-0.369	**K**
Fe																		-0.208	**Fe**

Symbols: Bold green number – correlation is significant at p=0.01 level (strong correlation); thin blue number – correlation is significant at p=0.05 level (low correlation).

Table S12. Bivariate correlations between elements detected in tropospheric aerosols over the Kariakoo sampling site, Dar es Salaam.

	Br	Cd	Cr	Mn	Ni	Pb	Sb	Zn	Na	Cl	Si	Ca	Mg	Al	S	K	Fe	Cu	
As	-0.514	**-0.772**	-0.430	-0.169	-0.176	-0.057	-0.036	-0.433	0.322	0.265	0.438	0.487	-0.095	0.347	0.127	0.380	0.224	0.592	**As**
Br		0.522	-0.256	0.472	0.468	-0.442	0.221	0.519	0.167	0.184	0.030	-0.124	-0.096	0.035	-0.278	0.005	-0.338	**-0.793**	**Br**
Cd			0.307	0.106	0.276	0.323	0.195	0.123	-0.049	0.089	-0.267	-0.393	0.314	-0.262	-0.253	0.152	-0.614	**-0.768**	**Cd**
Cr				-0.262	-0.110	**0.630**	0.245	0.233	**-0.820**	-0.347	**-0.709**	**-0.694**	0.422	**-0.754**	-0.055	-0.261	-0.262	0.123	**Cr**
Mn					**0.838**	-0.536	-0.246	0.595	-0.044	-0.269	-0.211	-0.230	-0.477	-0.139	-0.246	-0.322	-0.168	-0.280	**Mn**
Ni						-0.314	0.045	**0.674**	0.099	0.156	-0.279	-0.228	-0.135	-0.172	-0.515	-0.098	-0.519	-0.487	**Ni**
Pb							0.256	-0.325	-0.345	-0.013	-0.180	-0.174	**0.701**	-0.235	0.012	0.237	-0.350	0.084	**Pb**
Sb								0.231	-0.095	0.526	0.305	0.180	0.652	0.166	0.275	-0.064	-0.185	-0.425	**Sb**
Zn									-0.342	-0.121	-0.410	-0.314	-0.117	-0.284	-0.357	-0.570	-0.156	-0.332	**Zn**
Na										**0.715**	0.620	**0.675**	-0.100	**0.712**	-0.170	0.533	-0.034	-0.302	**Na**
Cl											0.463	0.463	0.451	0.455	-0.178	0.550	-0.370	-0.464	**Cl**
Si												**0.915**	0.081	**0.941**	0.547	0.123	0.424	-0.124	**Si**
Ca													-0.028	**0.974**	0.350	0.059	0.508	0.021	**Ca**
Mg														-0.015	0.152	0.204	-0.479	-0.341	**Mg**
Al															0.376	0.036	0.458	-0.147	**Al**
S																-0.410	**0.611**	0.171	**S**
K																	-0.544	-0.088	**K**
Fe																		0.537	**Fe**

Symbols: Bold green number – correlation is significant at p=0.01 level (strong correlation); thin blue number – correlation is significant at p=0.05 level (low correlation).