

Late autumn aerosol trace element composition and source tracking over the Southern Mozambique channel

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Table S1. Sampling periods for all aerosol filters (A1-A10) collected during the RESILIENCE campaign in April-May 2022 together with the associated ship's coordinate and volume of air sampled through each 47mm filter. HYSPLIT meteorological data on precipitation pattern (rainfall) along individual sample's prevailing air-mass trajectory is also given in millimetres of rain per 24h sampling period.

Sample ID	Start Date /Time (UTC)	Lat (� S)	Long (� E)	End Date /Time (UTC)	Lat (� S)	Long (� E)	Volume air (m ³)
A1	22.04.2022 07:45	24.335	49.772	23.04.2022 07:45	-26.231	44.133	130
A2	23.04.2022 09 :30	26.049	43.760	24.04.2022 09:30	-24.554	41.019	130
A3	24.04.2022 11 :15	24.208	40.926	25.04.2022 04:30	-21.731	39.542	92
A4	26.04.2022 07 :40	21.234	38.925	27.04.2022 05:40	-21.530	38.753	119
A5	27.04.2022 05 :50	21.530	38.757	28.04.2022 05:15	-21.188	38.620	127
A6	28.04.2022 06:30	21.197	38.665	29.04.2022 06:00	-21.668	38.766	127
A7	29.04.2022 06:00	21.668	38.766	30.04.2022 07:30	-21.958	38.679	138
A8	30.04.2022 11:00	21.931	38.683	01.05.2022 06:00	-23.027	37.396	103
A9	01.05.2022 07:00	23.221	37.283	02.05.2022 06:00	-27.228	34.374	124
A10	02.05.2022 07:30	27.413	34.177	03.05.2022 05:00	-30.055	30.997	116

Table S2. Absolute mass measured for ~10mg of reference material, either Arizona Test Dust (Powder Technologies Inc.: ISO 12103-1, A1 Ultrafine Test Dust, “ATD”, n=3) or BCR-414 (Bureau of Reference plankton certified reference material, “BCR”, n=3), as well as the reference values (ATD ref and BCR ref) and the average recovery obtained in this study for each trace element of interest (meanATD and meanBCR). Missing data are due to analytical failure (high instrumental relative standard deviation) during the analytical run.

	Al	Cd	Cr	Cu	Fe	Ni	Pb	Ti	V	Zn
ATD ref	67573± 3853*	0.4±0.1*	59±6*	49±9*	32922± 3425*	31±6*	35±4*	3299± 316*	72±6*	134±19*
ATD-1	68653	0.5	67	52	37249	37		3590	83	148
ATD-2	62854	0.5	54	42	30942	32	37	2985	67	126
ATD-3	71994		64	49	36032	36		3506	78	142
BCR ref	2406±180	0.4±0.01*	24±1*	29±1*	1850±	19±1*	4.0±0.2*	127±11	8±0.2*	112±2*
BCR-1	2680	0.4	23	28	1956	18	4.3	135	9.0	107
BCR-2 ^a	2966		27	35	2333	22		154	11	139
BCR-3	2824	0.4	24	28	2095	19	4.0	143	9.5	113
meanATD	100±7	124±0.4	104±12	97±11	106±10	113±10	105	102±10	105±12	104±8
meanBCR	117±6	99±0.1	102±8	104±13	115±10	103±12	104±5	113±7	120±12	107±15

Only values indicated with a “*” symbol are consensus (ATD, Landing and Morton, pers. comm. March 2024) or certified (BCR).

Other values are indicative (ATD: Landing and Morton, pers. comm. May 2014; BCR: https://georem.mpch-mainz.gwdg.de/sample_query.asp)

^aBCR-2 sample mass likely underestimated due to unstable weighing conditions.

Table S3. Average trace element content in procedural blank samples (n=2), expressed in nanograms (ng) per 47mm filter sample. Procedural blank contribution to the smallest sample mass (PB/SM_{min}) measured is also displayed for indication together with the smallest quantifiable sample name (when other than A2).

	Cd	Pb	Al	Ti	V	Cr	Fe	Ni	Cu	Zn
Average procedural blank (ng)										
Labile leach	0.01	0.09	14.0	0.39	0.04	0.68	7.80	0.32	0.09	4.68
Total sample	0.07	0.16	162.0	100.3	0.30	6.68	58.7	1.07	1.18	25.8
PB/SM _{min} (%)										
Labile leach	3	58 (A10)	44	59 (A3)	22 (A10)	95 (A1)	17 (A10)	71	2 (A10)	32 (A10)
Total sample	12 (A9)	77 (A10)	39 (A7)	263 (A1)	69 (A4)	44 (A9)	58 (A5)	62 (A10)	23 (A10)	104 (A10)

Table S4. Fractional solubility of “major” (Al, Cr, Cu, Fe, Zn, and T) and “minor” (Cd, Ni, Pb, and V) trace elements measured in aerosol samples (A1-A10) collected over the southern Mozambique Channel expressed in percent (%). Values indicated in red correspond to soluble trace metal concentrations when the refractory metal fraction was below blank value (resulting in 100% solubility). LQ indicates soluble fractions below the instrumental limit of quantification (defined as 10*standard deviation analytical blank)

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
<i>Major trace elements, %</i>										
Al	50	100	73	87	39	72	100	86	82	78
Cr	4	4	4	8	5	9	40	28	45	57
Cu	73	76	36	53	35	91	79	91	78	68
Fe	4	LQ	21	38	37	16	48	30	21	35
Ti	LQ	LQ	0.2	5	6	LQ	LQ	0.7	0.2	LQ
Zn	100	100	100	97	97	100	100	100	100	59
<i>Minor trace elements, %</i>										
Cd	100	100	100	100	92	100	100	100	95	95
Ni	47	90	78	83	55	64	100	83	77	60
Pb	89	100	51	70	74	81	98	99	96	75
V	52	LQ	23	80	50	40	100	59	64	47

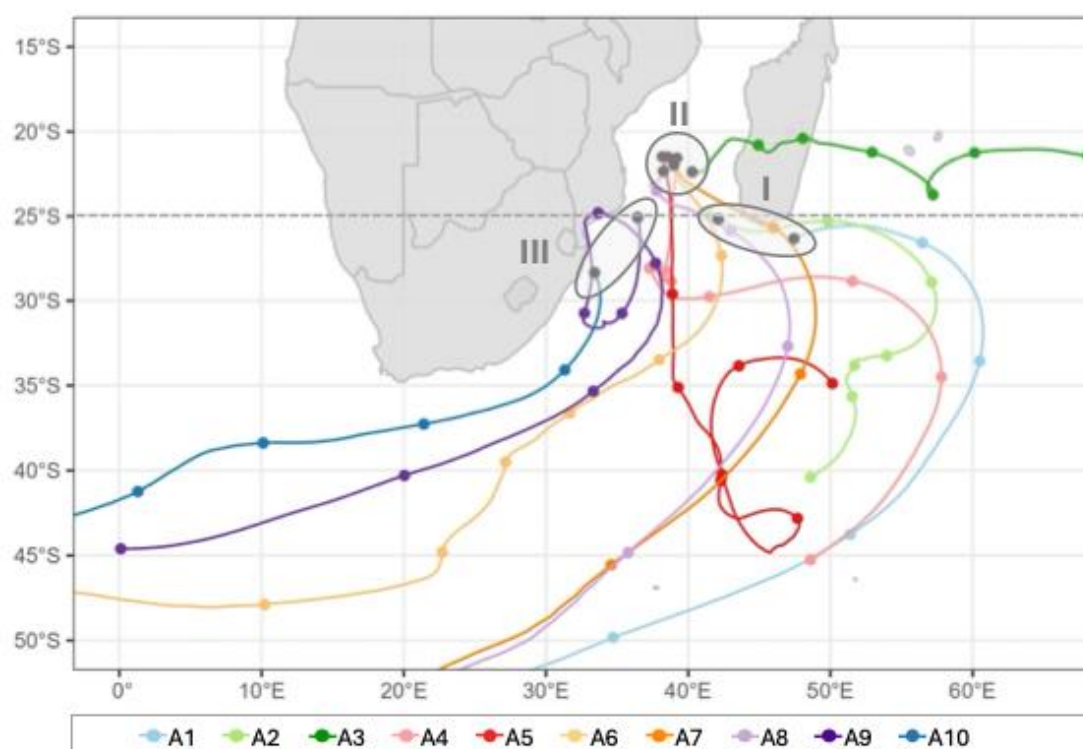


Figure S1. Seven days single back-trajectory analysis for prevailing air-masses at 10m height ending at the mid-sampling position of each individual aerosol sampling transect. The colour code refers to individual aerosol samples. Air-mass influence groups (I, II and III) as defined in section 3.1 are circled.

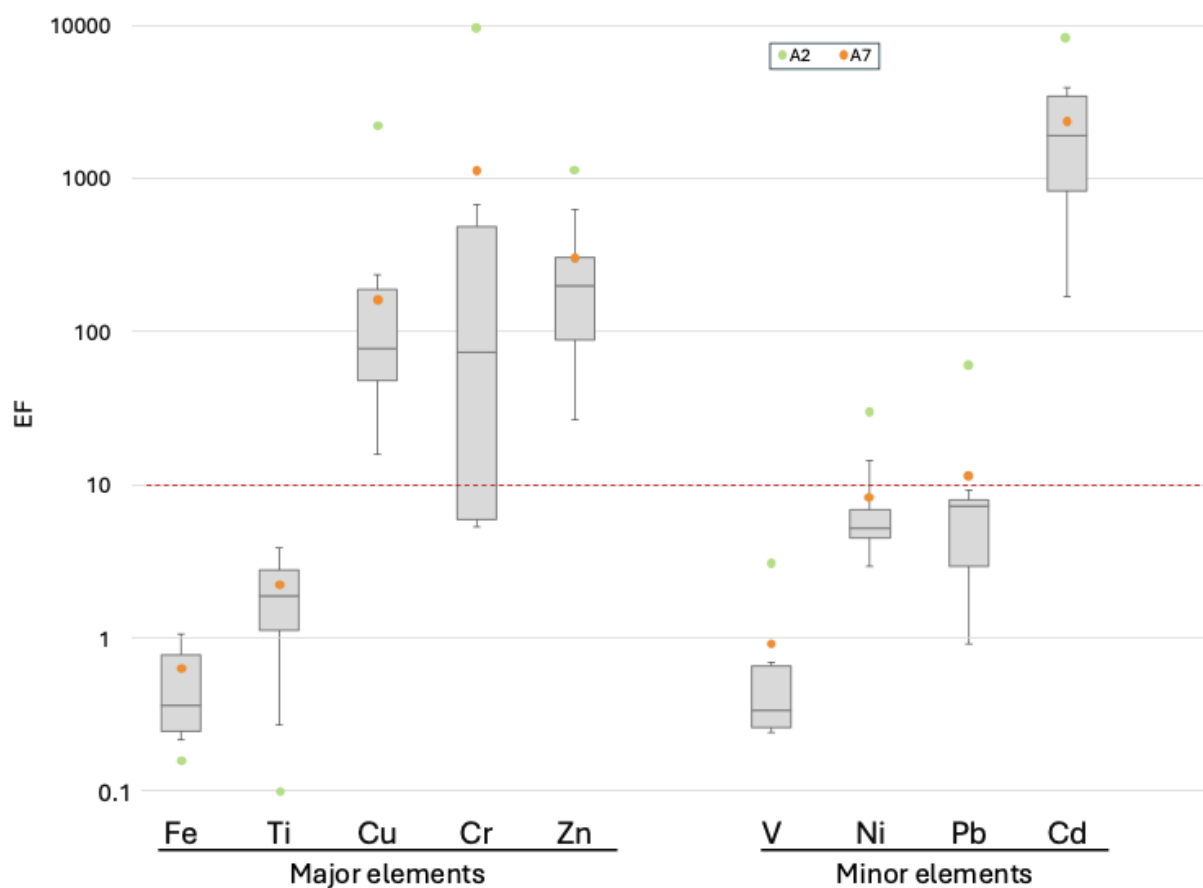


Figure S2: Enrichment factor calculated in aerosols collected over the southern Mozambique Channel. The horizontal lines within boxes indicate medians, boxes indicate interquartile ranges, and whiskers indicate values within 1.5 times the interquartile range from boxes. The green and orange dots indicate the EF values associated with samples A2 and A7, respectively, which have not been used to make the box and whiskers and are not used in this study (see Methods section). The dashed red line indicates the threshold value of 10 used in this study.

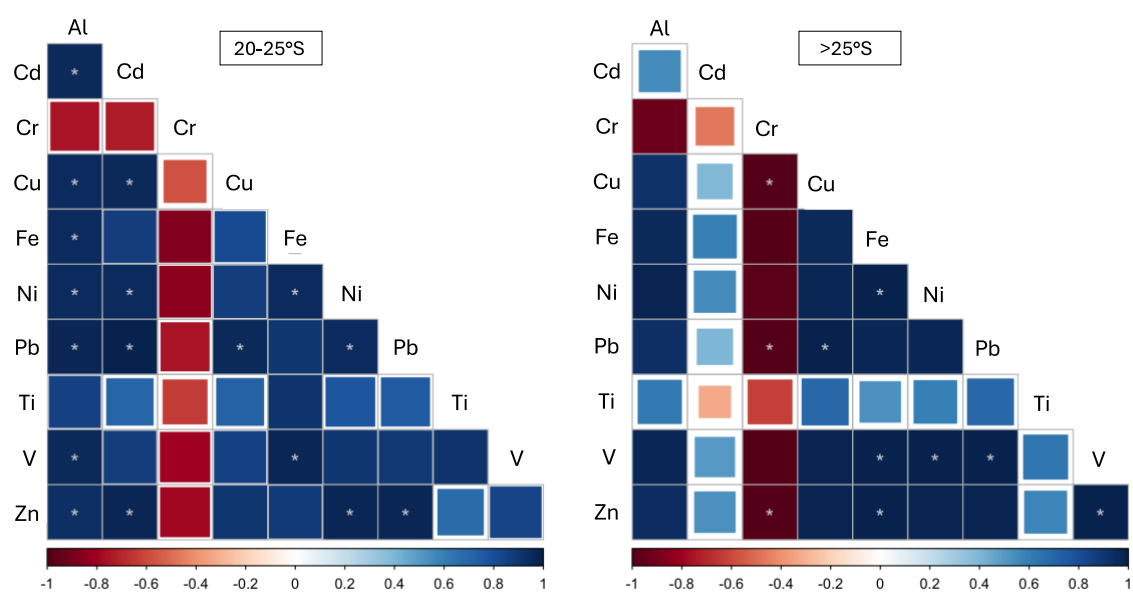


Figure S3: Correlation heatmap between the trace element total concentrations in aerosols collected over the southern Mozambique Channel. Both the colour and size of each box indicate the degree of correlation between elements. Star symbols correspond to very strong and significant correlation (p-value<0.01). The panel on the left- and to the right-hand side correspond to samples collected at latitudes 20-25°S (sample Group II) and south to 25°S (sample Groups I and III), respectively.