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Emerging Mineral Dust Source in 'A'äy Chù' Valley, Yukon, Canada Poses Potential Health Risk via Exposure to Metal and Metalloids Enriched in PM_{10} and $PM_{2.5}$ Size Fractions

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Table S1. Soil sampling locations in ’A’ą̈y Chù’ Valley, Kluane National Park and Reserve, Yukon, in Spring 2021

Sample	Latitude	Longitude
WP2660	61° 0'29.85"N	138°31'48.57"W
WP2661	61° 0'22.64"N	138°31'39.97"W
WP2662	61° 0'15.58"N	138°31'31.64"W
WP2663	61° 0'8.59"N	138°31'23.28"W
WP2664	60°59'54.54"N	138°31'6.58"W
WP2666	61° 0'14.54"N	138°32'8.93"W
WP2669	60°59'59.38"N	138°32'29.12"W
WP2670	60°59'52.43"N	138°32'20.99"W
WP2671	60°59'38.33"N	138°32'4.36"W
WP2675	60°59'45.39"N	138°32'12.60"W
WP2676	61° 0'7.31"N	138°32'0.35"W
WP2677	61° 0'0.51"N	138°31'52.19"W
WP2678	61° 0'1.54"N	138°31'14.86"W

Table S2. ICP-MS instrumental parameters for analysis using Nexion™ 5000 ICP-MS and Syngistix™ Software

Instrumental Parameter	Standard Mode	Direct Reaction Cell (DRC) Mode
Gas Flow (*L min^{-1}*)		
Nebulizer	1.02	
Auxiliary	1.2	
Plasma	16	
DRC	0	0.8
ICP RF Power *(W)*	1600	
Voltages *(V)*		
QID Fixed	−12	
Hyperskimmer Park	3	
OmniRing Park	3	
Inner Target Lens	1.5	
Outer Target Lens	−8.5	
Deflector Exit	−9	
Differential Aperture	−2	
Cell Rod Offset	−33	−4
Axial Field	0	200
Q3 AC Rod Offset	−4.5	−8.5
Q3 Rod Offset	0	−12
Analog Stage	−1650 ± 50	
Pulse Stage	1200 ± 50	
Rejection Parameter a	0	
Rejection Parameter q	0.25	0.45
Acquisition Timing *(ms)*		
Dwell Time Per AMU	40	
Integration Time	640	

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Table S3. Information for total determination of metals in mineral dust using ICP-MS. CRM 2710a was used for estimation of recovery. LOD refers to analytes in the final prepared solution following digestion. Uncertainties presented at 95% confidence.

Element	Al	Ag	As	Ba	Ca	Cd	Co	Cu	Fe
Isotope used for detection	27	107	75	138	43	114	59	63	57/73
CRM Recovery (%)	30.5	106	115	69.3	15.7	108	70.9	108	81
Uncertainty (%)	6.3	16	22	8.7	3.6	11	8.3	15	16
LOD for total determination ($\mu g\ L^{-1}$)	13.5	0.0185	0.0452	1.76	128	0.00352	0.0366	0.486	6.67
Element	K	Mg	Mn	Ni	Pb	Rb	Tl	U	V
Isotope used for detection	39	26	55	60	208	85	205	238	51/67
CRM Recovery (%)	18.4	62.2	83	82	111	52.4	37.6	67.1	73
Uncertainty (%)	3.0	9.3	10	28	14	8.9	9.9	3.8	16
LOD for total determination ($\mu g\ L^{-1}$)	221	31.3	0.634	0.590	0.133	0.156	0.0119	0.00363	0.0823

Table S4. Detailed gravimetric PM concentration results at 3.3 and 6.3 m above ground at Down Valley site.

Sample Date	Size Class	PM Concentration in Air ($\mu g\ m^{-3}$)	
		3.3 m	6.3 m
2021-06-04	TSP	10300	3640
2021-06-04	PM_{10}	29.8	12.7
2021-06-07	TSP	480	230
2021-06-07	PM_{10}	37.8	-
2021-06-08	TSP	1800	-
2021-06-08	PM_{10}	501	384
2021-06-08	PM_{10}	-	-
2021-06-09	TSP	5340	3540
2021-06-09	PM_{10}	-	701
2021-06-10	TSP	464	244
2021-06-10	$PM_{2.5}$	<LOD	<LOD
2021-06-11	TSP	230	248
2021-06-12	TSP	543	387
2021-06-12	$PM_{2.5}$	<LOD	<LOD
2021-06-14	TSP	128	193
2021-06-17	PM_{10}	19.1	-
2021-06-17	$PM_{2.5}$	19.7	9.6
2021-06-18	PM_{10}	310	192
2021-06-19	PM_{10}	488	275
2021-06-21	PM_{10}	840	613
2021-06-23	TSP	7200	4440
2021-06-23	PM_{10}	920	573
2021-06-26	TSP	2930	2730
2021-06-26	$PM_{2.5}$	65.5	31.7
2021-06-27	TSP	2100	1200
2021-06-29	PM_{10}	197	-
2021-06-16	PM_{10}	42.8	31.2
2021-06-19	PM_{10}	469	224
2021-06-21	PM_{10}	830	481
2021-06-22	TSP	104	57.3
2021-06-22	PM_{10}	56.2	29.3
2021-06-24	TSP	36900	17800
2021-06-24	$PM_{2.5}$	327	<LOD
2021-06-25	TSP	46100	30200
2021-07-01	PM_{10}	269	-
2021-07-02	PM_{10}	720	-
2021-07-02	PM_{10}	596	-

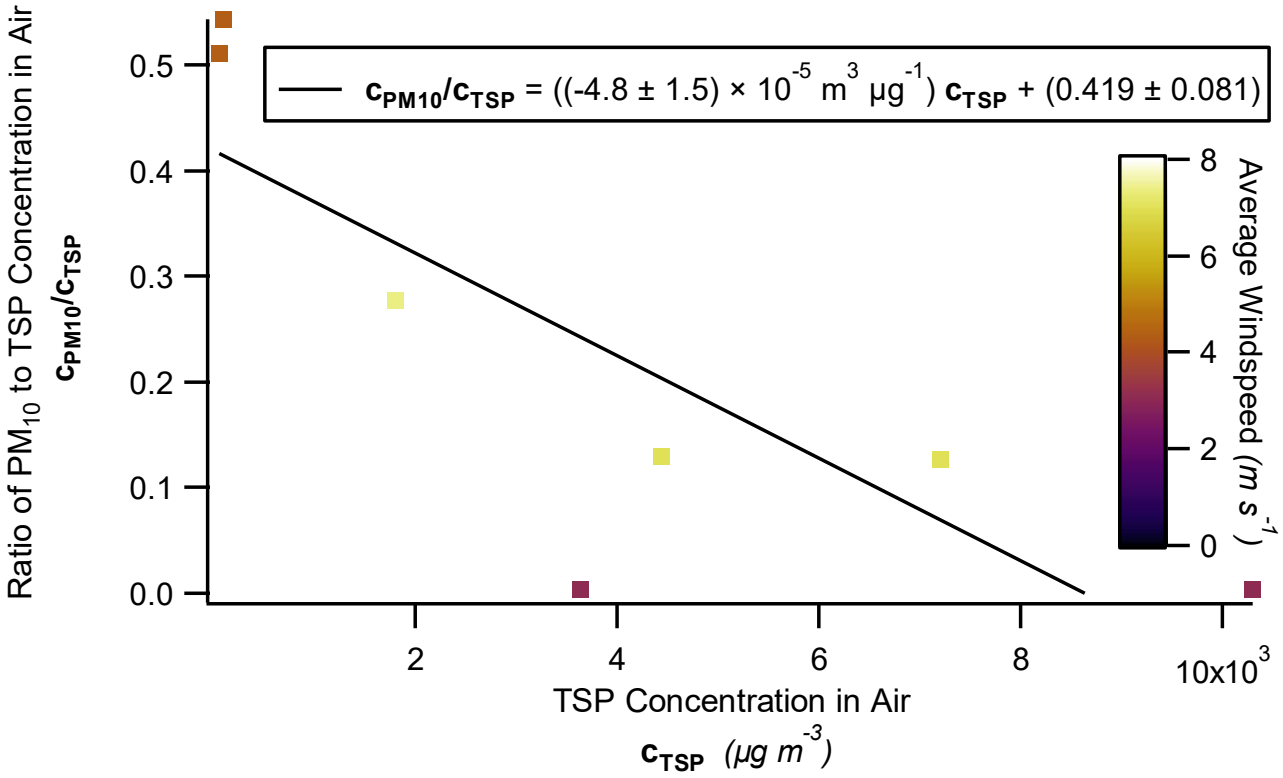

Figure S1. Ratio of PM_{10} concentration to TSP concentration with intensity of dust activity

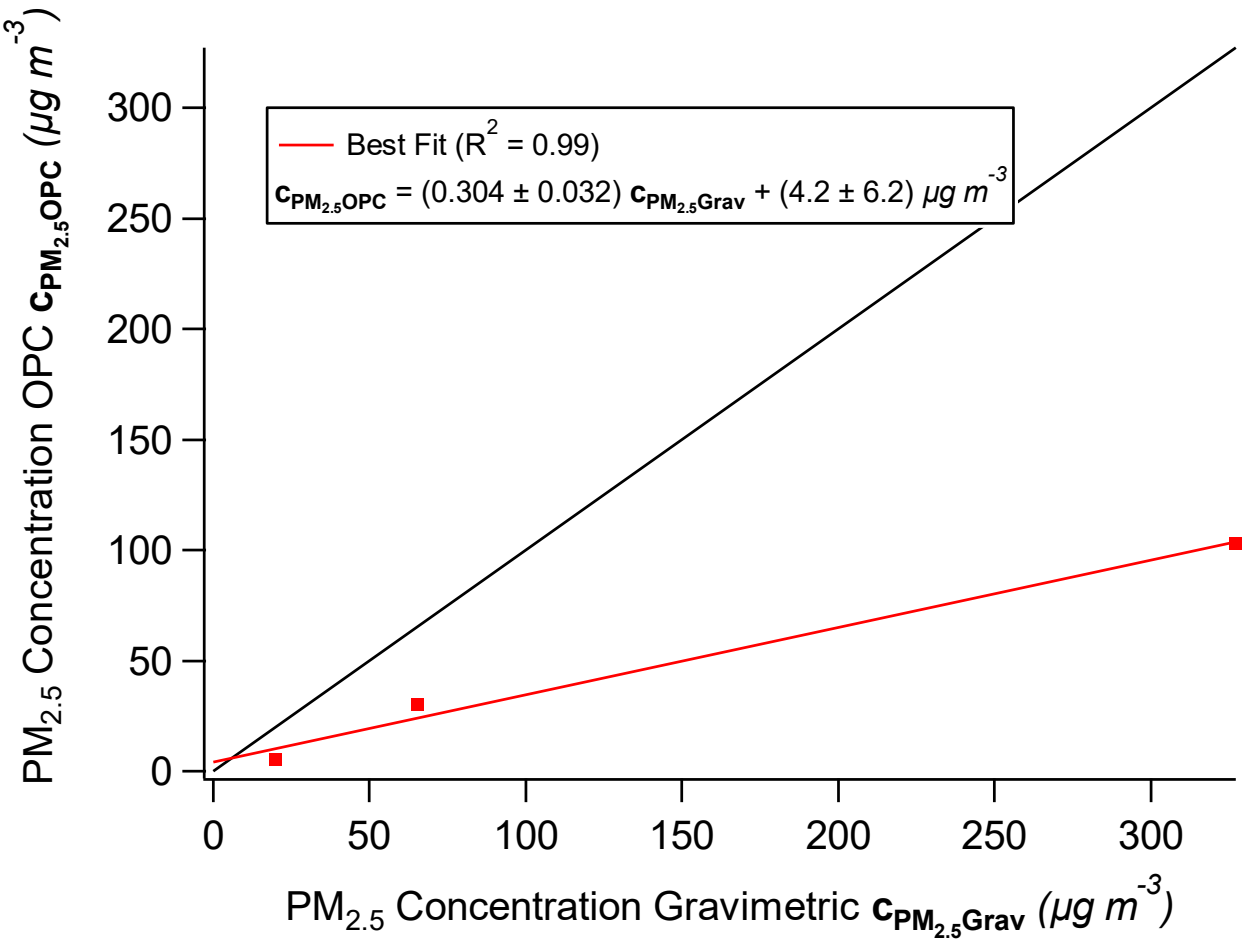

Figure S2. Comparison of $PM_{2.5}$ measurements at 3 m using OPC and Gravimetry. The black line represents the unity function. The linear function of best fit is presented along with associated standard errors.

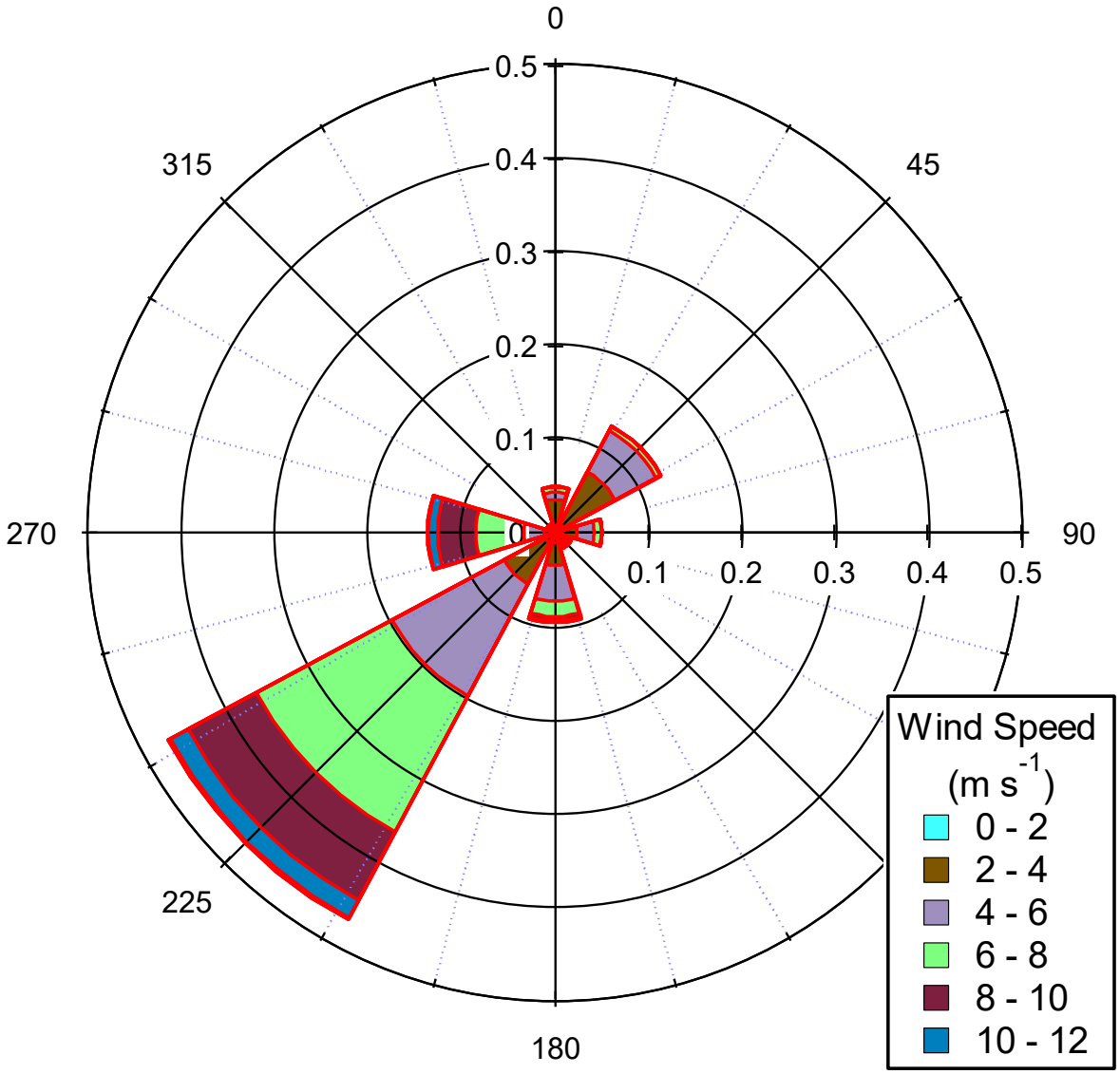

Figure S3. Wind rose for Down Valley site during sampling period, where 0° represents North

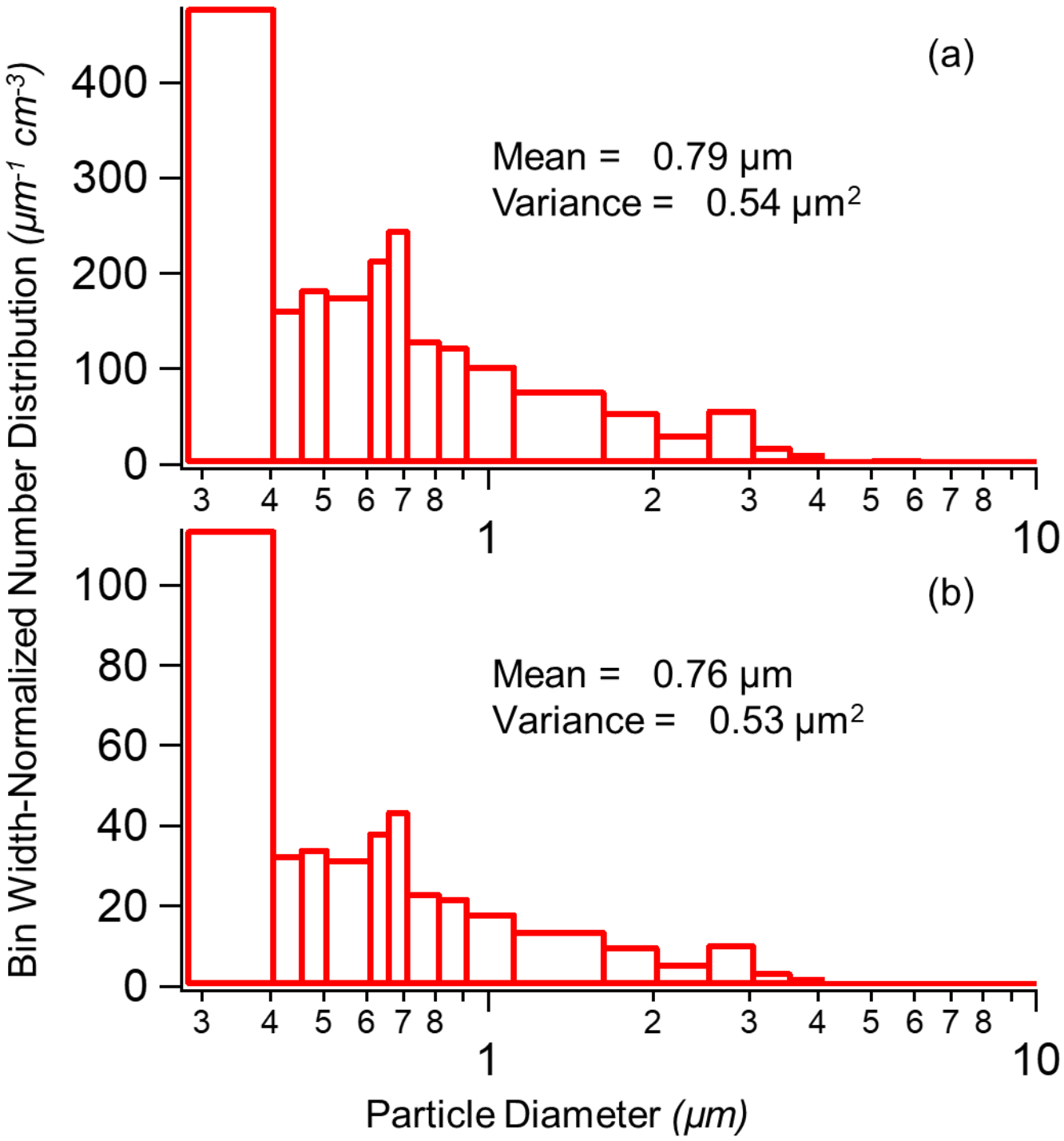

Figure S4. Comparison of size distribution for a) top 10 percentile of dust concentration and for b) whole campaign