Tables

Temporal and spatial variations of dust deposition along a Red Sea coastal section

Illia Shevchenko[1], Johann P. Engelbrecht[1,2], Suleiman Mostamandi[1], and Georgiy Stenchikov[1]

[1]King Abdullah University of Science and Technology (KAUST), Physical Science and Engineering Division (PSE), Thuwal, 23955-6900, Saudi Arabia.

[2]Desert Research Institute (DRI), Reno, Nevada 89512-1095, U.S.A.

Table 1. Sampling localities, sampling intervals and sample retrievals. At each site there are two samplers, except at the Beacon site four samples were collected for a limited period.

	Site	Latitude	Longitude	Elev. m.a.s.l.	Sampling Start	Sampling End	Sampling interval, months	Months sampled, actual	Samples Retrieved
DT2	CMOR	22°18'16.60"N	39°06'07.91"E	2	May-15	Dec-19	56	56	96
DT3	NEO	22°18'17.31"N	39°06'30.51"E	1	Dec-14	Jun-19	56	54	114
DT5	Beacon	22°18’08.07"N	39°05’39.78"E	1	Mar-16	Dec-19	47	44	143
DT6	Al Misk	22°17'56.11"N	39° 04'52.03"E	1	Nov-17	Feb-19	22	8	14
DT7	Bld3roof	22°18'29.73"N	39° 06'20.04"E	25	Dec-17	Dec-19	25	25	47
DT8	Post	22°17'56.11"N	39° 04'52.03"E	2	May-18	Nov-19	19	15	28
Total number of samples retrieved									442

Table 2 Monthly deposition rates (DR) and their logarithmically transformed values, for three sampler pairs at Beacon DT5, Bld3roof DT7, and CMOR DT2, on which comparative statistical analyses were performed.

Date	Sampler	Beacon-DT5 Deposition Rate (DR) ($g\ m^{-2}\ month^{-1}$)	Beacon-DT5 Log (DR)	Bld3roof DT7 Deposition Rate (DR) ($g\ m^{-2}\ month^{-1}$)	Bld3roof DT7 Log (DR)	CMOR DT2 Deposition Rate (DR) ($g\ m^{-2}\ month^{-1}$)	CMOR DT2 Log (DR)
May-2019	1	5.25	0.72	4.77	0.68	7.09	0.85
	2	6.47	0.81	5.40	0.73	7.64	0.88
Jun-2019	1	7.41	0.87	7.97	0.90	7.67	0.88
	2	7.74	0.89	8.24	0.92	5.27	0.72
Jul-2019	1	4.00	0.60	4.27	0.63	3.68	0.57
	2	5.05	0.70	3.48	0.54	5.34	0.73
Aug-2019	1	6.79	0.83	8.35	0.92	13.22	1.12
	2	12.06	1.08	9.51	0.98	9.17	0.96
Sep-2019	1	10.08	1.00	11.56	1.06	7.15	0.85
	2	6.37	0.80	12.58	1.10	10.26	1.01
Oct-2019	1	11.26	1.05	13.84	1.14	16.31	1.21
	2	8.76	0.94	11.73	1.07	14.52	1.16
Nov-2019	1	3.58	0.55	7.42	0.87	5.84	0.77
	2	3.90	0.59	5.40	0.73	7.10	0.85
Dec-2019	1	3.73	0.57	5.17	0.71	5.17	0.71
	2			6.18	0.79	5.73	0.76

Table 3. Comparison of pairs of logarithmic transformed variances of deposition rates from three land-based sampling sites: Bld3roof DT7, Beacon DT5, and CMOR DT2, showing sample variances to be similar, at a 0.05 level of significance. The null hypothesis is not rejected since H_o: $\sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \sigma_1^2$

	Bld3roof	Beacon	CMOR	Beacon	Bld3roof	CMOR
Mean	0.86	0.80	0.88	0.80	0.86	0.88
Variance	0.03	0.03	0.03	0.03	0.03	0.03
Observations	16	15	16	15	16	16
df	15	14	15	14	15	15
F	1.07		1.04		1.03	
P(F<=f) one-tail	0.46		0.48		0.48	
F Critical one-tail	2.46		2.46		2.40	

Table 4. Analysis of variance (ANOVA) performed on logarithmically transformed mass data from the three land-based sites, Beacon DT5, Bld3roof DT7 and CMOR DT2. The sample means are similar within a 0.5 level of significance implying that the null hypothesis is not rejected and Ho: $\mu_1 = \mu_2 = \mu_3$.

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.05	2	0.02	0.78	0.47	3.21
Within Groups	1.40	44	0.03			
Total	1.44	46				

Table 5. Statistics of mineral percentages, including minima, maxima, averages, standard deviations, geometric means, medians, modes, and Pearson's skewness coefficients.

	Minimum	Maximum	Average	Std dev	Geo mean	Median	Mode	Skewness
Quartz	5.46	39.38	22.18	6.17	21.25	22.50	22.94	-0.053
Feldspar	4.19	37.65	18.71	5.22	17.90	18.16	12.95	0.105
Kaolinite	1.70	14.90	6.12	2.02	5.79	5.83	7.02	0.141
Illite	1.48	17.16	5.07	2.52	4.55	4.40	5.96	0.266
Chlorite	1.75	11.82	5.86	2.01	5.51	5.72	5.07	0.071
Mica	4.71	22.48	12.34	3.83	11.68	12.66	16.65	-0.084
Hematite	0.24	6.65	1.19	0.70	1.06	1.08	1.09	0.160
Dolomite	0.47	5.66	2.21	1.02	1.97	2.11	2.04	0.095
Calcite	0.45	8.02	2.52	1.44	2.16	2.29	1.45	0.157
Gypsum	1.94	18.63	8.44	3.25	7.81	7.72	5.76	0.221
Halite	2.18	66.36	15.41	9.91	12.64	14.16	19.06	0.127

Table 6. Correlation coefficients of semi-quantitative XRD measured mineral concentrations. Correlation coefficients outside ± 0.27 are in italics, underlined if positive, and in bold, underlined if negative.

	Quartz	**Feldspar**	**Kaolinite**	**Illite**	**Chlorite**	**Micas**	**Hematite**	**Dolomite**	**Calcite**	**Gypsum**	**Halite**
Quartz	1										
Feldspar	*0.30*	1									
Kaolinite	-0.08	0.00	1								
Illite	**-0.28**	-0.09	*0.34*	1							
Chlorite	-0.01	0.08	*0.31*	*0.31*	1						
Mica	-0.11	-0.01	0.17	0.02	0.16	1					
Hematite	**-0.28**	0.04	0.25	0.14	0.04	-0.05	1				
Dolomite	**-0.31**	**-0.30**	0.11	*0.30*	-0.20	-0.06	0.17	1			
Calcite	**-0.40**	-0.24	-0.12	0.13	-0.02	0.01	0.14	*0.29*	1		
Gypsum	-0.16	-0.12	-0.20	0.02	-0.10	-0.11	0.01	0.15	*0.59*	1	
Halite	**-0.49**	**-0.60**	**-0.33**	-0.24	**-0.39**	**-0.34**	-0.03	0.10	0.00	-0.16	1

Table 7. PMF modelled mineralogical factors from XRD measurements. The factors have been assigned mineral profile or source profile names from the major modelled mineral abundances in each individual PMF factor (marked in bold).

	Factor 1 Marine	**Factor 2** Clay	**Factor 3** Gypsum - Carbonate	**Factor 4** Quartz
Quartz	3.28	**6.05**	28.73	**61.93**
Feldspar	2.38	**58.19**	0.00	**39.42**
Kaolinite	8.54	**52.91**	5.57	**32.97**
Illite	6.17	**61.05**	12.67	**20.11**
Chlorite	5.43	**50.60**	9.72	**34.25**
Muscovite	7.76	**59.22**	3.62	**29.39**
Hematite	16.48	**64.47**	6.99	12.06
Dolomite	17.76	**31.05**	**32.65**	18.54
Calcite	7.16	**29.15**	**63.68**	0.00
Gypsum	0.00	12.84	**74.36**	12.80
Halite	**70.82**	0.00	**21.49**	7.69

Table 8. Average volumetric particle size distributions comparing unsieved and sieved sample sets for the ≤20µm, ≤10 µm, and ≤2.5 µm particle sizes, as well as their volume ratios.

	≤20µm		**≤10µm**		**≤2.5µm**		**≤2.5µm/ ≤10µm**	**≤2.5µm/ ≤20µm**	**≤10µm/ ≤20µm**
	Volume %	Std dev	Volume %	Std dev	Volume %	Std dev			
Unsieved	8.59	2.39	5.45	2.05	1.06	0.46	0.20	0.12	0.63
Sieved	10.54	1.76	7.51	1.91	1.39	0.51	0.19	0.13	0.71

Table 9. Average size cuts derived from AERONET particle size distributions, together with standard deviations, volume ratios.

	≤10 µm		**≤2.5 µm**		**Fine (≤0.88 µm)**		**Coarse (>0.88 µm)**		**≤2.5 µm/≤10 µm**	**Fine/Coarse**
	Volume %	Std dev	Volume %	Std dev	Volume %	Std dev	Volume %	Std dev	Ratio	Ratio
Aeronet PSD	94.86	1.38	39.4	4.56	23.66	6.92	76.34	1.38	0.42	0.31