

Appendix A

Diffusion Experiment Data

This appendix contains experimental conditions, sample types, measured data, and calculated quantities for the diffusive ice-loss experiments presented in Chapters 3 and 4.

The quantities tabulated are:

Date	month/day, date of experiment
Δ_z	cm, thickness of sample
p_0	pascal, total pressure of experimental chamber
T_{ice}	K, temperature of ice surface
T_{air}	K, temperature of air at relative humidity sensor
RH	percent, relative humidity measured above sample
J_1	$\text{mg m}^{-2} \text{s}^{-1}$, flux of water vapor
\bar{c}	unitless, vapor density ratio ρ_1/ρ_0
$\Delta\rho_1$	g m^{-3} , vapor density difference across sample
D	$\text{cm}^2 \text{s}^{-1}$, corrected diffusion coefficient
D/\mathcal{D}_{12}	unitless, obstruction factor
ϕ	percent, calculated porosity of sample
τ	unitless, calculated tortuosity of sample
X_f	percent, mass fraction of fine materials relative to total mass
Salt Content	percent, weight percent of epsomite in salt crust

Table A.1: 50–80 micron glass beads at 263 K

Table A.2: 50–80 micron glass beads at pressures other than 600 mbar

Table A.3: Various simulants performed at 263 K

Table A.4: 50–80 micron glass beads at 250 K

Table A.5: 1 cm Epsomite salt crusts at 250 K

Table A.6: Mixtures of 50–80 micron glass beads with crushed JSC Mars-1 at 250 K

Table A.7: Mixtures of 50–80 micron glass beads with 1–3 micron dust at 250 K

Table A.8: Pure dusts of crushed JSC Mars-1 or 1–3 micron dust at 250 K; compacted and uncompactd

50–80 μm Glass Beads @ 260 K

Conditions	Date	Δz cm	p_0 Pa	T_{ice} K	T_{air} K	RH %	J_1 $\text{mg m}^{-2}\text{s}^{-1}$	\bar{c}	$\Delta\rho_1$ g m^{-3}	D cm^2s^{-1}	D/D_{12}
263 K CO ₂	Nov 28	1.03	612	256.9	260.8	20.56	27.25	0.072	0.88	5.02±0.66	0.20±0.03
	Dec 05	1.05	611	256.7	261.2	11.13	20.44	0.065	1.02	3.27±0.41	0.13±0.02
	Dec 08	0.99	634	256.6	260.8	15.57	19.71	0.064	0.94	3.31±0.41	0.13±0.02
	Dec 15	1.06	584	256.3	260.2	13.06	26.00	0.066	0.96	4.47±0.53	0.17±0.03
	Dec 15	0.93	584	256.7	260.3	12.35	29.83	0.068	1.01	4.47±0.54	0.17±0.03
	Feb 06	1.02	630	254.5	260.1	19.65	22.51	0.056	0.68	5.31±0.73	0.22±0.03
	Dec 16	2.10	596	257.4	260.8	12.92	20.60	0.072	1.07	5.15±0.52	0.20±0.02
	Dec 16	1.92	596	256.7	260.8	7.38	22.63	0.063	1.09	5.21±0.51	0.20±0.02
	Dec 17	2.10	598	257.5	260.9	7.93	19.19	0.069	1.17	4.41±0.42	0.17±0.02
	Dec 17	1.92	598	257.1	260.9	13.35	22.12	0.070	1.02	5.41±0.56	0.21±0.03
	Feb 07	1.87	598	256.5	260.7	15.29	17.77	0.068	0.94	4.64±0.50	0.18±0.02
	Feb 07	1.85	598	256.2	260.5	16.57	20.05	0.067	0.88	5.54±0.62	0.21±0.03
	Feb 14	2.08	594	257.1	261.1	14.98	17.46	0.072	0.99	4.69±0.50	0.18±0.02
	Feb 14	2.15	594	256.7	261.0	17.74	19.62	0.072	0.90	5.95±0.66	0.23±0.03
	Feb 17	1.74	592	256.6	260.5	18.05	20.14	0.071	0.90	5.17±0.59	0.20±0.03
	Feb 17	1.71	592	256.1	260.3	19.48	20.86	0.069	0.83	5.75±0.68	0.22±0.03
	Sep 16	4.76	571	259.1	262.0	10.63	12.71	0.088	1.30	5.24±0.46 ^a	0.19±0.04
	Sep 22	4.95	586	259.2	262.1	13.83	11.11	0.090	1.25	4.93±0.45 ^a	0.18±0.03
	Dec 18	4.94	595	259.3	261.5	5.18	12.71	0.082	1.44	4.87±0.40	0.18±0.02
	Dec 18	4.97	595	259.5	261.5	4.55	9.57	0.082	1.47	3.61±0.29	0.14±0.02
	Jan 09	5.04	603	259.6	261.5	4.72	9.75	0.082	1.49	3.68±0.30	0.14±0.02
	Jan 09	5.14	603	259.8	261.4	5.52	10.21	0.084	1.50	3.90±0.32	0.15±0.02
	Feb 08	4.95	594	259.0	261.4	7.34	12.30	0.081	1.36	5.01±0.42	0.19±0.02
	Feb 08	4.91	594	258.9	261.2	5.48	10.36	0.078	1.38	4.13±0.34	0.16±0.02
	Dec 09	10.13	616	260.5	261.6	6.07	7.37	0.089	1.58	4.98±0.39	0.20±0.03
	Dec 09	10.11	616	260.3	262.7	3.84	6.09	0.086	1.59	4.10±0.32	0.16±0.02
	Dec 20	9.98	575	260.3	261.6	3.17	7.10	0.093	1.62	4.64±0.35	0.17±0.02
	Dec 20	9.97	575	260.3	261.5	3.51	6.38	0.094	1.61	4.17±0.32	0.15±0.02
	Feb 10	9.90	580	260.0	261.6	6.67	5.98	0.092	1.50	4.17±0.33	0.15±0.02
	Feb 10	9.69	580	259.9	261.5	7.87	8.95	0.092	1.48	6.22±0.50	0.23±0.03
	Feb 18	9.84	583	260.0	261.5	8.20	7.07	0.092	1.48	4.99±0.41	0.19±0.02
	Apr 13	9.87	589	259.8	261.5	8.43	6.03	0.089	1.44	4.37±0.36	0.16±0.02
Apr 13	9.79	588	259.8	261.3	7.95	7.74	0.087	1.45	5.54±0.45	0.21±0.02	
253 K ^b CO ₂	Apr 03	2.08	592	248.4	248.4	22.40	8.19	0.029	0.44	3.87±0.59	0.21±0.03
	Mar 22	5.02	572	249.5	251.1	10.45	3.83	0.031	0.55	3.49±0.16	0.15±0.02
	Mar 27	4.96	585	249.7	251.3	11.10	5.69	0.031	0.56	5.04±0.30	0.23±0.02
	Mar 29	4.96	602	249.5	251.2	13.87	5.03	0.031	0.53	5.73±0.31	0.22±0.02
Mar 31	4.96	610	249.8	251.3	14.75	5.11	0.031	0.53	4.75±0.27	0.22±0.02	
263 K	Jan 04	0.94	625	256.1	259.8	14.57	31.55	0.061	0.92	5.57±0.88	0.22±0.03
	Jan 04	0.92	625	256.6	259.9	11.21	33.33	0.062	1.02	5.24±0.76	0.21±0.03
N ₂	Jan 06	10.01	637	260.1	261.5	3.73	8.59	0.082	1.57	5.84±0.18	0.23±0.02
	Jan 06	9.85	637	260.0	261.5	5.38	7.13	0.083	1.54	4.89±0.14	0.19±0.02

Table A.1: Experimental conditions, data, and corrected diffusion coefficients for 50–80 μm glass beads at ~ 600 Pa. Data taken in 2005–2006

^aExperiments on Sep 16 and 22 carried out in a plastic vacuum chamber built in-house.

^b z_{corr} not calculated for 253 K experiments; uncorrected diffusion coefficients, D' , reported.

Glass Beads at Variable Pressures @ 260 K

Date	Δz cm	p_0 Pa	T_{ice} K	T_{air} K	RH %	J_1 $\text{mg m}^{-2}\text{s}^{-1}$	\bar{c}	$\Delta\rho_1$ g m^{-3}	D' cm^2s^{-1}	D'/D_{12}
Mar 31	4.79	294	257.6	260.8	11.64	13.14	0.178	1.22	5.61 ± 0.50	0.11 ± 0.01
600 Pa data are reported in the table on page 157										
Feb 21	4.95	1173	260.2	261.8	7.41	7.24	0.041	1.52	2.37 ± 0.19	0.18 ± 0.02
Feb 21	4.92	1173	260.1	261.7	7.44	7.88	0.041	1.51	2.58 ± 0.21	0.19 ± 0.02
Mar 29	4.86	2917	260.8	261.5	13.58	3.46	0.018	1.49	1.13 ± 0.10	0.21 ± 0.02
Mar 14	4.98	5875	261.3	261.6	5.99	1.25	0.008	1.71	0.37 ± 0.03	0.14 ± 0.01
Mar 14	4.94	5875	261.2	261.4	4.87	3.88	0.008	1.73	1.11 ± 0.09	0.42 ± 0.04
Mar 16	4.98	5880	261.0	261.5	5.05	1.41	0.008	1.68	0.42 ± 0.03	0.16 ± 0.02
Mar 16	4.94	5880	261.1	261.4	6.71	2.89	0.008	1.68	0.85 ± 0.07	0.33 ± 0.03
Mar 27	4.96	5899	261.3	261.7	12.50	1.80	0.009	1.59	0.56 ± 0.05	0.21 ± 0.02
Mar 27	4.82	5899	261.3	261.6	13.08	1.78	0.009	1.58	0.54 ± 0.05	0.20 ± 0.02

Table A.2: Experimental conditions and diffusion coefficients for 5 cm samples of 50–80 μm beads at 263 K and various pressures. A correction term was not determined for pressures other than 600 Pa; the values reported are therefore raw values D' . These data are plotted in Figure 3.8 along with non-linear fit parameters for $D_F(p_0)$ and D_K . Data taken in 2006.

Additional Experiments @ 260 K

Sample	Date	Δz cm	p_0 Pa	T_{ice} K	T_{air} K	RH %	J_1 $\text{mg m}^{-2} \text{s}^{-1}$	\bar{c}	$\Delta\rho_1$ g m^{-3}	D' $\text{cm}^2 \text{s}^{-1}$	D/D_{12}
Frit 4	Feb 13	0.63	582	255.0	259.0	27.47	26.92	0.068	0.63	2.71±0.55	0.10±0.02
Frit 5	Feb 13	0.57	582	255.0	259.0	28.37	27.40	0.068	0.62	2.53±0.55	0.10±0.02
Frits 1 & 4	Feb 03	1.28	594	257.9	260.3	16.56	23.25	0.078	1.08	2.75±0.33	0.10±0.01
	Feb 23	1.28	588	256.0	260.2	19.15	21.10	0.069	0.83	3.26±0.42	0.12±0.02
	Feb 24	1.28	586	256.9	260.1	20.05	18.37	0.075	0.91	2.57±0.21	0.10±0.01
	Feb 28	1.28	584	256.8	259.9	21.09	21.34	0.075	0.89	3.07±0.33	0.12±0.02
Mar 01	1.28	542	256.5	260.8	11.04	21.54	0.072	1.00	2.75±0.40	0.10±0.01	
Feb 03	1.20	594	257.4	260.1	18.83	19.63	0.076	0.98	2.39±0.31	0.09±0.01	
Feb 23	1.20	588	256.8	260.0	22.93	22.73	0.076	0.86	3.17±0.43	0.12±0.02	
Frits 5 & 8	Feb 24	1.20	586	256.6	260.2	19.45	22.67	0.072	0.88	3.08±0.41	0.12±0.02
	Feb 28	1.20	584	256.3	259.8	22.74	22.12	0.073	0.82	3.25±0.44	0.12±0.02
	Mar 01	1.20	542	256.0	260.9	9.94	23.89	0.068	0.97	2.95±0.36	0.10±0.02
Frits 1–4	Jan 28	2.52	610	258.5	261.0	7.39	14.18	0.074	1.30	2.74±0.25	0.11±0.01
	Jan 29 ^a	2.52	609	259.0	261.0	5.80	13.96	0.077	1.39	2.52±0.22	0.10±0.01
Frits 5–8	Jan 28	2.46	610	258.7	260.9	3.67	15.26	0.072	1.38	2.71±0.24	0.11±0.01
	Jan 29	2.46	609	258.8	260.9	7.28	15.58	0.077	1.34	2.85±0.26	0.11±0.01
	Feb 15	2.46	630	258.7	261.1	15.99	14.82	0.079	1.17	3.12±0.31	0.13±0.02
Frits 1–8	Mar 20	5.07	589	259.8	261.5	10.12	7.79	0.091	1.41	2.80±0.24	0.11±0.01
	Mar 21	5.07	589	259.8	261.6	10.01	7.98	0.091	1.42	2.85±0.24	0.11±0.01
JSC Mars-1	Apr 03	2.03	595	254.6	260.8	18.99	23.97	0.061	0.68	7.18±0.90	0.27±0.04
	Mar 22	5.05	594	257.9	261.2	13.55	11.58	0.077	1.11	5.29±0.49	0.20±0.02
	Mar 22	5.08	594	257.6	261.1	11.40	13.12	0.073	1.11	5.98±0.54	0.23±0.03
1-3 μm loose	Apr 03	10.11	608	259.0	261.4	7.98	6.29	0.079	1.34	4.73±0.39	0.18±0.02
	Oct 24	0.98	503	257.7	260.8	10.47	22.60	0.087	1.15	1.93±0.26	0.06±0.01
	Apr 17	2.09	584	255.8	260.7	17.91	17.45	0.067	0.81	4.50±0.52	0.17±0.02
1-3 μm packed	Apr 17	2.00	584	255.1	260.5	15.25	20.15	0.061	0.80	5.07±0.57	0.19±0.03
	Nov 02	0.95	547	260.3	261.3	10.53	12.10	0.105	1.48	0.77±0.10	0.027±0.005
	Nov 04	0.96	540	260.7	262.3	5.59	12.24	0.107	1.62	0.73±0.09	0.025±0.005
	Apr 25	1.04	604	261.2	259.2	11.93	8.69	0.101	1.63	0.55±0.07	0.022±0.003
1-3 μm packed	Apr 25	1.11	604	261.1	258.2	9.51	8.96	0.099	1.64	0.60±0.07	0.024±0.003
	Sep 14	2.07	625	261.4	262.7	6.98	1.65	0.099	1.70	0.20±0.02	0.008±0.001
	Apr 21	2.21	591	260.1	261.5	8.38	4.08	0.091	1.48	0.61±0.06	0.023±0.003
	Apr 21	2.20	591	259.8	261.3	7.45	9.29	0.088	1.46	1.40±0.13	0.053±0.006

Table A.3: Experimental data and diffusion coefficients for various simulants measured under 600 Pa CO_2 . Correction terms were either near zero (frits) or not determined due to insufficient data. Raw diffusion coefficients D' are reported. Data taken in 2005–2006.

^aExperiment on Jan 29 with frits 1–4 was run upside-down to check for gravity-dependent effects.

50–80 μm Glass Beads @ 250 K

Date	Δz , cm	p_0 , Pa	T_{ice} , K	T_{air} , K	RH, %	J_1 , $\text{mg m}^{-2} \text{s}^{-1}$	$\Delta\rho_1$, g m^{-3}	D , $\text{cm}^2 \text{s}^{-1}$	D/D_{12}	ϕ , %	τ
26 Sep	1.09	599	247.8	250.0	32.25	10.75	0.32	3.54 ± 0.66	0.14 ± 0.03	42.7	3.0
26 Sep	0.99	599	247.6	251.0	36.00	10.87	0.26	3.96 ± 0.87	0.16 ± 0.04	41.7	2.6
30 Oct	0.88	610	247.4	249.8	37.65	10.99	0.27	3.50 ± 0.79	0.15 ± 0.03	42.9	2.9
30 Oct	0.89	610	247.5	250.8	30.59	11.82	0.30	3.42 ± 0.72	0.14 ± 0.03	43.4	3.1
3 Apr	1.93	613	248.5	250.4	24.68	7.60	0.40	3.62 ± 0.49	0.15 ± 0.02	48.1	2.9
18 Sep	2.08	592	248.4	251.1	21.80	8.19	0.41	4.14 ± 0.54	0.16 ± 0.02	42.0	2.8
18 Sep	1.83	595	248.5	250.4	27.36	7.97	0.38	3.74 ± 0.54	0.15 ± 0.02	49.6	3.1
9 Nov	2.08	595	248.7	251.5	21.49	8.11	0.42	4.01 ± 0.52	0.16 ± 0.02	42.3	2.8
20 Sep	4.95	599	249.6	250.5	14.17	4.21	0.53	3.87 ± 0.38	0.16 ± 0.02	45.0	2.9
20 Sep	4.91	599	249.4	251.5	14.14	4.03	0.52	3.82 ± 0.38	0.15 ± 0.02	44.8	2.9
6 Oct	5.03	593	249.4	251.7	12.25	4.00	0.53	3.81 ± 0.37	0.15 ± 0.02	44.2	2.9
10 Oct	4.95	591	249.2	251.5	11.12	4.06	0.53	3.80 ± 0.37	0.15 ± 0.02	43.4	2.9
16 Oct	4.95	600	249.5	250.4	15.52	3.66	0.53	3.43 ± 0.34	0.14 ± 0.02	42.6	3.0
16 Oct	4.83	600	249.4	251.5	13.57	3.98	0.52	3.66 ± 0.36	0.15 ± 0.02	46.8	3.1
25 Oct	4.91	603	249.6	250.4	16.13	3.65	0.52	3.43 ± 0.34	0.14 ± 0.02	45.9	3.3
25 Oct	4.82	603	249.4	251.5	13.43	3.90	0.52	3.58 ± 0.36	0.25 ± 0.02	46.2	3.2
29 Oct	9.87	599	250.2	250.6	8.95	2.25	0.61	3.63 ± 0.32	0.15 ± 0.02	43.7	3.0
29 Oct	9.72	599	250.0	251.6	7.15	2.31	0.61	3.69 ± 0.32	0.15 ± 0.02	44.4	2.9
3 Nov	9.71	610	250.2	250.6	9.86	2.30	0.60	3.71 ± 0.33	0.15 ± 0.02	44.7	2.9
3 Nov	9.83	610	249.9	251.7	7.69	2.24	0.60	3.68 ± 0.32	0.15 ± 0.02	45.0	3.0

Table A.4: Experimental conditions, data, and corrected diffusion coefficients for 50–80 μm glass beads. Data taken in 2006.

Epsomite Salt Crusts @ 250 K

Salt Content % Epsomite	Date	Δz , cm	p_0 , Pa	T_{ice} , K	T_{air} , K	RH, %	J_1 , $\text{mg m}^{-2} \text{s}^{-1}$	$\Delta\rho_1$, g m^{-3}	D , $\text{cm}^2 \text{s}^{-1}$	D/D_{12}
18.4 %	29 Jan	1.47	596	250.5	251.1	12.21	1.902	0.60	0.47±0.05	0.02±0.00
	16 Jul	1.00	586	247.3	249.0	15.71	2.200	0.41	0.53±0.06	0.02±0.00
	16 Jul	1.00	586	247.0	247.9	12.86	2.943	0.43	0.69±0.07	0.03±0.00
14.2 %	10 Oct	0.88	591	249.6	250.3	16.35	5.440	0.52	0.91±0.14	0.04±0.01
9.7 %	6 Oct	1.96	593	249.7	250.5	18.20	5.511	0.51	2.10±0.23	0.08±0.01
	12 Feb	1.25	586	249.0	251.6	20.20	7.075	0.44	1.99±0.27	0.08±0.01
	17 Feb	1.10	586	248.5	250.2	27.74	6.863	0.38	1.97±0.30	0.08±0.01
	20 Feb	1.10	586	248.7	250.3	31.29	6.293	0.37	1.87±0.30	0.07±0.01
	27 Nov	1.00	613	248.3	250.4	25.60	8.070	0.38	2.11±0.33	0.08±0.01
4.9 %	27 Nov	1.00	613	248.4	251.5	24.97	8.771	0.37	2.34±0.37	0.10±0.02
	30 Apr	1.00	586	245.8	248.9	31.87	7.340	0.25	2.92±0.51	0.12±0.02
	7 May	1.10	586	245.3	248.5	40.27	8.685	0.19	5.04±1.04	0.20±0.04
	22 Nov	1.00	624	249.4	250.8	19.85	6.428	0.48	1.33±0.19	0.06±0.01
	22 Nov	1.00	624	249.1	251.9	21.74	5.855	0.44	1.34±0.20	0.06±0.01
2.0 %	1 Dec	1.00	590	248.1	250.1	27.56	8.570	0.37	2.34±0.37	0.09±0.02
	1 Dec	1.00	590	248.0	251.1	24.90	9.183	0.37	2.52±0.40	0.10±0.02
	14 Dec	1.00	581	250.6	250.2	29.06	9.682	0.50	1.92±0.29	0.08±0.01
	14 Dec	1.00	581	247.8	251.2	26.80	9.660	0.34	2.88±0.47	0.11±0.02
	19 Dec	1.00	586	247.9	250.1	30.75	11.21	0.33	3.36±0.56	0.13±0.02
1.0 %	19 Dec	1.00	586	247.3	251.2	27.54	9.871	0.31	3.20±0.54	0.13±0.02
	16 Apr	1.00	583	246.3	249.0	28.11	6.435	0.29	2.20±0.26	0.09±0.02
	16 Apr	1.00	583	246.1	247.9	22.77	6.743	0.33	2.04±0.31	0.08±0.01
	20 Apr	1.00	586	246.1	248.9	30.56	7.213	0.27	2.66±0.45	0.11±0.02
	20 Apr	1.00	586	246.0	247.8	26.45	7.936	0.31	2.59±0.41	0.11±0.02
	7 May	0.45	586	245.2	247.3	39.49	10.79	0.21	2.29±0.63	0.09±0.03

Table A.5: Experimental conditions, data, and corrected diffusion coefficients for salt crusts. Data taken in 2006–2007.

Mixtures of Glass Beads with JSC Mars-1 @ 250 K

X_f %	Date	Δz , cm	p_0 , Pa	T_{ice} , K	T_{air} , K	RH, %	J_{11} , $\text{mg m}^{-2} \text{s}^{-1}$	$\Delta\rho_{11}$, g m^{-3}	D , $\text{cm}^2 \text{s}^{-1}$	D/D_{12}	ϕ	τ
43.1	22 Dec	4.68	591	250.2	251.9	7.344	1.932	0.61	1.48±0.13	0.06±0.01	57.8	9.8
	10 Jan	4.84	596	250.7	252.5	7.557	1.357	0.64	1.03±0.09	0.04±0.00	53.3	12.9
	19 Jan	5.03	586	250.5	252.2	7.480	1.783	0.63	1.43±0.13	0.06±0.01	57.3	10.2
27.4	24 Jan	5.01	596	250.2	252.2	9.471	2.809	0.60	2.36±0.22	0.09±0.01	52.3	5.5
	6 Feb	4.96	596	250.2	252.0	10.75	2.750	0.58	2.34±0.27	0.09±0.01	48.6	5.2
	13 Apr	4.95	586	247.6	248.3	11.34	2.293	0.46	2.47±0.23	0.10±0.01	53.3	5.4
15.9	24 Jan	4.93	596	249.9	251.1	12.13	3.606	0.56	3.17±0.30	0.13±0.01	47.8	3.7
	6 Feb	4.94	596	249.2	250.9	13.70	3.573	0.51	3.46±0.34	0.14±0.02	47.3	3.4
	26 Mar	5.11	586	247.4	249.3	12.63	2.714	0.43	3.13±0.30	0.13±0.01	47.6	3.8
	13 Apr	5.02	586	249.6	250.5	11.09	3.354	0.56	3.07±0.28	0.12±0.01	50.1	4.1
11.4	19 Mar	5.16	586	249.9	250.9	9.852	2.934	0.58	2.60±0.24	0.10±0.01	50.9	4.9
	10 Apr	5.09	586	247.6	248.2	11.71	2.515	0.46	2.80±0.26	0.11±0.01	51.4	4.5
7.06	22 Dec	4.75	591	249.7	250.8	10.98	3.530	0.56	2.99±0.28	0.12±0.01	46.0	3.8
	10 Jan	4.87	595	250.2	251.4	11.66	3.336	0.58	2.79±0.26	0.11±0.01	49.5	4.4
	19 Jan	4.97	586	250.0	251.1	11.19	3.334	0.57	2.88±0.27	0.11±0.01	46.3	4.0
	26 Mar	5.16	586	249.4	251.6	12.07	3.140	0.53	3.05±0.29	0.12±0.01	52.7	4.4
3.29	19 Mar	5.14	586	249.6	251.9	12.91	3.726	0.53	3.59±0.35	0.14±0.02	45.7	3.2
	10 Apr	5.10	586	247.3	249.3	13.56	3.095	0.42	3.73±0.37	0.15±0.02	46.6	3.1

Table A.6: Experimental conditions, data, and diffusion coefficients for 50–80 μm sand and JSC Mars-1 dust mixtures. Data taken in 2006–2007.

Mixtures of Glass Beads and 1–3 μm dust @ 250 K

X_f %	Date	Δz , cm	p_0 , Pa	T_{ice} , K	T_{air} , K	RH, %	J_1 , $\text{mg m}^{-2} \text{s}^{-1}$	$\Delta\rho_1$, g m^{-3}	D , $\text{cm}^2 \text{s}^{-1}$	D/\mathcal{D}_{12}	ϕ	τ
39.8	7 Jun	4.62	586	247.0	249.1	13.53	3.057	0.41	3.42 ± 0.15	0.14 ± 0.01	74.2	5.4
	11 Jun	5.00	586	247.0	249.1	15.13	3.221	0.40	4.00 ± 0.16	0.16 ± 0.01	74.6	4.6
	11 Jun	5.00	586	247.0	249.1	14.66	3.171	0.40	3.92 ± 0.17	0.16 ± 0.01	74.6	4.7
24.9	9 May	4.95	586	247.0	249.1	13.87	2.923	0.41	3.51 ± 0.17	0.14 ± 0.01	65.0	4.6
	16 May	4.96	586	247.0	249.1	13.93	2.941	0.41	3.54 ± 0.16	0.14 ± 0.01	63.9	4.5
	1 Jun	5.32	586	247.2	249.4	14.03	3.105	0.41	3.98 ± 0.30	0.16 ± 0.02	66.1	4.1
14.2	9 May	5.05	586	247.2	248.0	12.68	2.553	0.43	2.98 ± 0.15	0.12 ± 0.01	60.0	5.0
	5 Jun	5.34	586	247.0	249.1	13.87	2.941	0.41	3.84 ± 0.17	0.15 ± 0.01	59.3	3.8
10.1	14 May	5.05	586	247.1	249.1	13.79	2.770	0.41	3.38 ± 0.16	0.14 ± 0.01	54.7	4.0
	19 May	5.00	586	247.1	249.1	14.10	2.993	0.41	3.62 ± 0.19	0.15 ± 0.01	57.5	4.0
	22 May	5.14	586	247.0	249.1	13.81	3.174	0.43	3.95 ± 0.17	0.16 ± 0.01	58.1	3.7
	1 Jun	5.20	586	247.3	248.3	13.80	3.069	0.42	3.71 ± 0.22	0.15 ± 0.01	58.1	3.9
6.19	14 May	5.00	586	247.1	248.0	13.51	2.457	0.42	2.90 ± 0.14	0.12 ± 0.01	56.9	4.9
	19 May	4.97	586	247.1	248.0	13.87	3.083	0.42	3.62 ± 0.20	0.15 ± 0.01	53.9	3.7
	5 Jun	5.12	586	247.0	248.0	14.28	2.939	0.42	3.62 ± 0.17	0.15 ± 0.01	54.3	3.7
2.82	16 May	5.12	586	247.0	248.0	13.82	3.050	0.42	3.72 ± 0.17	0.15 ± 0.01	54.3	3.6
	22 May	5.10	586	247.0	248.0	13.90	2.518	0.42	3.06 ± 0.15	0.12 ± 0.01	53.8	4.4
	7 Jun	5.50	586	247.0	248.1	13.96	3.098	0.42	4.06 ± 0.18	0.16 ± 0.01	55.1	3.4

Table A.7: Experimental conditions, data, and diffusion coefficients for 50–80 μm sand and 1–3 μm dust mixtures. Data taken in 2007.

Pure Dusts: JSC Mars-1 and 1–3 μm Dust @ 250 K

Sample %	Date	Δz , cm	p_0 , Pa	T_{ice} , K	T_{air} , K	RH, %	J_1 , $\text{mg m}^{-2} \text{s}^{-1}$	$\Delta\rho_1$, g m^{-3}	D , $\text{cm}^2 \text{s}^{-1}$	D/D_{12}	ϕ	τ
JSC Mars-1:	2 Feb	4.98	586	250.5	251.3	9.78	0.891	0.61	0.72 ± 0.08	0.03 ± 0.00	72.5	25
Loose	26 Feb	5.06	586	250.0	250.7	8.25	2.338	0.60	1.98 ± 0.08	0.08 ± 0.01	78.8	10
	16 Jun	4.92	586	247.4	249.1	9.86	1.594	0.45	1.72 ± 0.08	0.07 ± 0.01	75.2	11
JSC Mars-1:	26 Feb	2.28	586	250.1	251.8	7.34	1.192	0.61	0.45 ± 0.03	0.02 ± 0.00	62.9	36
Packed	25 Jun	3.42	586	247.6	249.2	9.75	1.147	0.47	1.04 ± 0.05	0.04 ± 0.00	85.8	21
1–3 μm dust:	17 Oct ^a	1.03	600	248.4	249.4	74.48	5.964	0.10	6.04 ± 4.36	0.25 ± 0.18	85.8	3.5
Loose	11 Jun	4.48	586	246.7	248.0	17.28	3.895	0.38	4.54 ± 0.20	0.18 ± 0.01	66.8	3.6
	11 Jun	4.48	586	246.8	248.0	16.15	3.963	0.39	4.51 ± 0.21	0.18 ± 0.01	91.3	5.0
	16 Jun	5.13	586	246.8	248.1	15.85	4.106	0.40	5.31 ± 0.26	0.21 ± 0.02	91.5	4.3
1–3 μm dust:	19 Oct	1.02	550	249.2	249.8	60.39	4.177	0.22	1.94 ± 0.68	0.07 ± 0.03	83.1	11
Packed	21 Oct	1.91	550	249.4	249.9	27.02	1.770	0.44	0.76 ± 0.12	0.03 ± 0.00	78.0	27
	25 Jun	3.49	586	247.3	248.1	12.62	2.705	0.44	2.16 ± 0.09	0.09 ± 0.01	90.8	10

Table A.8: Experimental conditions, data, and diffusion coefficients for crushed JSC Mars-1 and 1–3 μm dusts. Data taken in 2005–2007.

^aData not used in analyses.