Supplemental Data for

Thermal Properties of Antarctic Soils: Wetting Controls Subsurface Thermal State

Joseph S. Levy[1]

Logan M Schmidt[1]

[1]University of Texas Institute for Geophysics

Contents of this file

Figures S1 to S3

Table S1

Additional Supporting Information (Files uploaded separately)

Captions for Datasets supp1 and supp2

This supplementary data document contains three figures, one table, and two data set captions. Figures S1 and S2 show the complete measurement results for soil heat capacity (c) and thermal conductivity (k) from which the thermal diffusivity versus soil moisture content plot in the manuscript was calculated. Colour coding in these plots is the same as in Fig. 2 in the manuscript. Figure S3 shows the full grain size distribution for all sediment samples measured in this study, in both cumulative and histogram form. Table S1 summarizes these grain size statistics into three grain size bins—silt, sand, and coarse material. Dataset supp1 gives the full measured c, k, and D experimental values for each station, from which the average values presented in the plots are calculated. Dataset supp2 contains the field-measured soil moisture versus depth values measured in Taylor Valley for both wetted and dry soils. Soil moisture content was measured using a

Decagon Devices 5Te probe. From these depth profiles, average wet and dry soil moisture profiles (Fig. 3) were calculated.

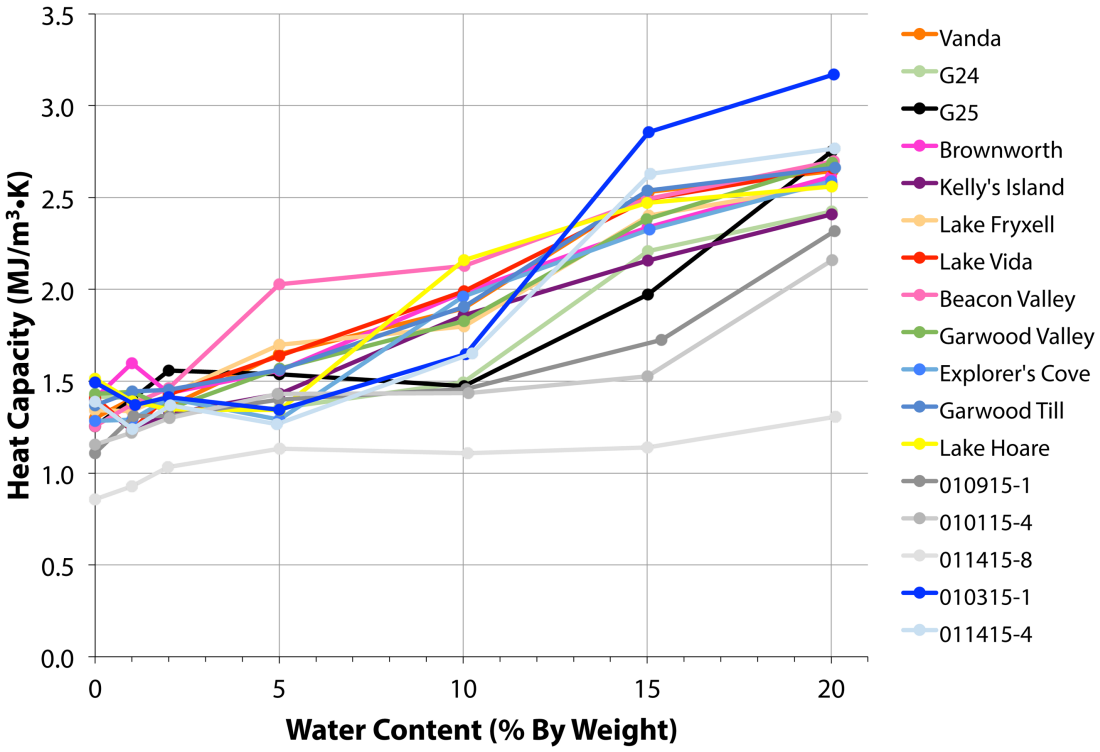


Figure S1. Average heat capacity for each soil sample versus water content.

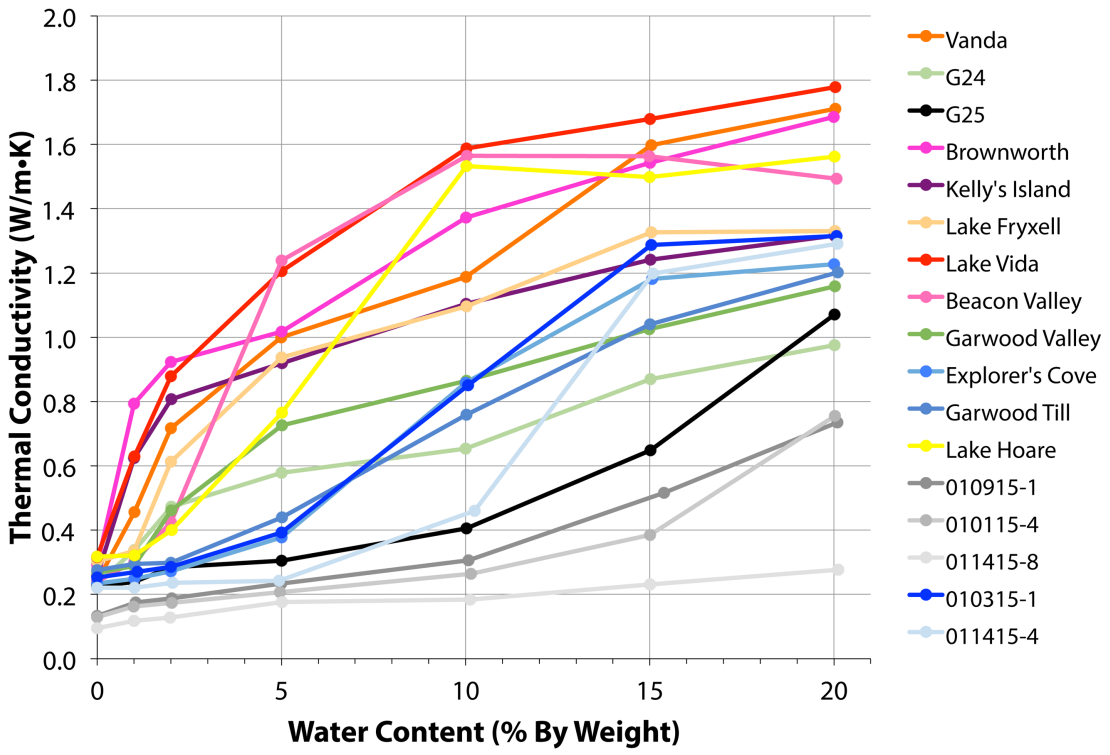
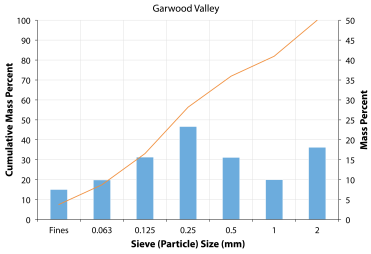
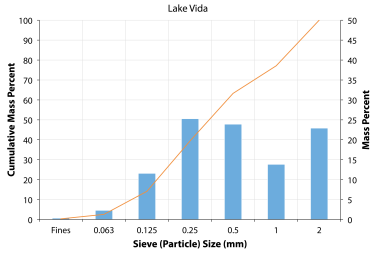
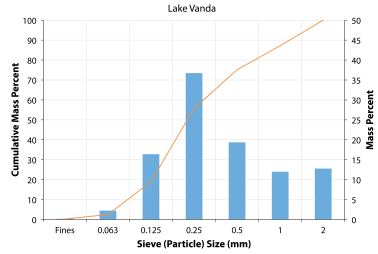
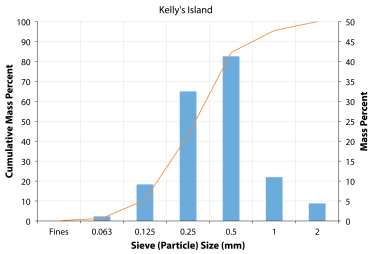


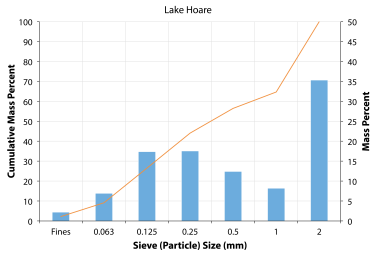
Figure S2. Average thermal conductivity for each samples versus soil moisture content.

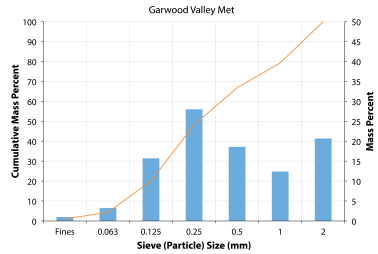

Garwood Valley
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

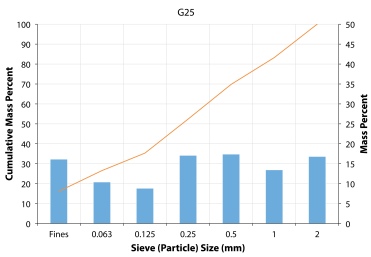

Lake Vida
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

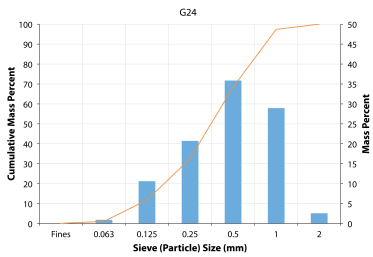

Lake Vanda
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

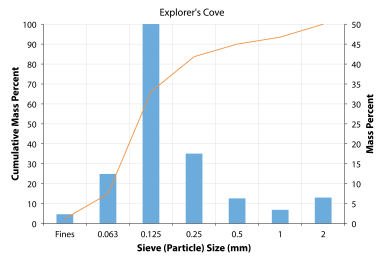

Kelly's Island
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

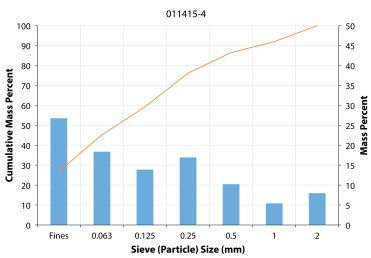

Lake Hoare
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

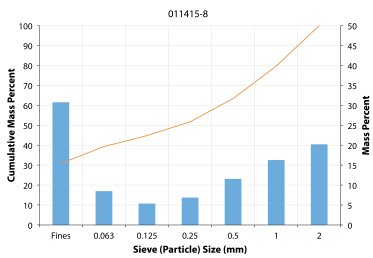

Garwood Valley Met
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

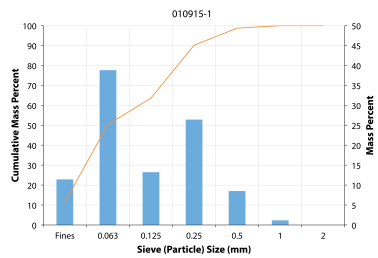

G25
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

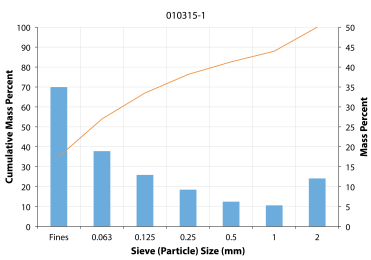

G24
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

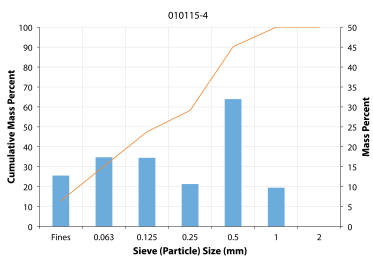

Explorer's Cove
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

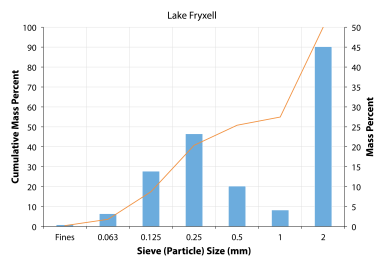

011415-4
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

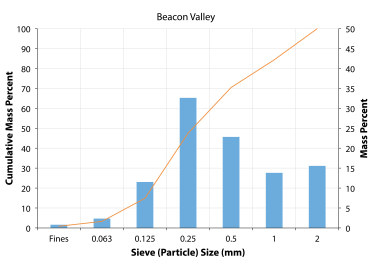

011415-8
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)


010915-1
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)


010315-1
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)


010115-4
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)


Lake Fryxell
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)


Beacon Valley
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

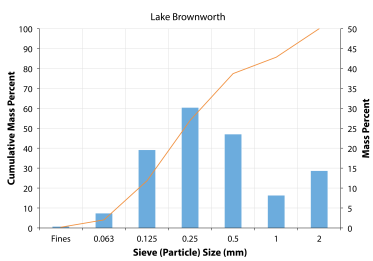

Lake Brownworth
Cumulative Mass Percent
Mass Percent
Fines
0.063
0.125
0.25
0.5
1
2
Sieve (Particle) Size (mm)

Figure S3. Grain size distributions for all soil samples. Sediments were dry-sieved using a ro-tap shaker and standard sieves.

Sample Name	Latitude	Longitude	Bulk Density (g/cm3)	% Silt (<63 μm)	% Sand (63 μm – 2 mm)	% Coarse (>2 mm)
Lake Brownworth	-77.43347	162.70363	1.81	0.38	85.26	14.37
Beacon Valley	-77.828	160.65684	1.60	0.86	83.51	15.63
Lake Fryxell	-77.61094	163.16961	1.75	0.42	54.50	45.08
Lake Vida	-77.37785	161.80057	1.83	0.32	76.79	22.89
Lake Vanda	-77.51681	161.66678	1.72	0.25	86.92	12.83
G24	-78.03318	164.225	1.69	0.08	97.30	2.61
Kelly's Island	-77.62544	162.90579	1.67	0.13	95.41	4.46
G25	-78.03245	164.23473	1.44	16.11	67.10	16.79
Garwood Valley Met	-78.03841	164.3289	1.77	1.05	78.22	20.73
Garwood Valley Till	-78.02968	164.16295	1.54	7.51	74.39	18.10
Explorer's Cove	-77.58873	163.41752	1.54	2.37	91.08	6.55
Lake Hoare	-77.62537	162.9004	1.77	2.20	62.47	35.33
011415-8	-77.6235	163.18245	0.77	30.85	48.87	20.29
010915-1	-77.58246	163.46717	1.25	11.49	88.46	0.05
010115-4	-77.68849	162.58573	1.32	12.81	87.19	0.00
010315-1	-77.71692	162.45172	1.51	35.02	52.87	12.11
011415-4	-77.62146	163.18359	1.18	26.82	65.17	8.01

Table S1. Summary grain size distribution statistics for each sample.

Data Set supp1. Full measurement data (c, k, D) for each soil sample and each experimental water addition.

Data Set supp2. Field-derived soil moisture versus depth data for Taylor Valley.