

Appendix A

McMurdo Dry Valley Snow Pit Data for Commonwealth and Howard Glaciers.

Commonwealth Glacier

Stake 11

20-Jan-99

Layer	Thickness	Total Mass	Mass of Bag	Snow Mass	Density	Weighted Density
	cm	g	g	g	g/cm3	g/cm2
I	1				0.15	
	Note:	Use stake 13 surface density				

Stake 12

20Jan99

Layer	Thickness	Total Mass	Mass of Bag	Snow Mass	Density	Weighted Density
	cm	g	g	g	g/cm3	g/cm2
I	2		0			
II	8	23		23	0.23	1.84
III	5	36		36	0.36	1.8
IV	8	24		24	0.24	1.92
V	6	31		31	0.31	1.86
sum	27					7.42

average snowpack density

0.27

Layer	hardness	crystal	size
I	1 finger	wind crust	1
II	4 finger	facets	2
III	pencil	rounds	1
IV	4 finger	facets	2-3
	pencil	facets/rounds	3
Below 0: Glacier ice			

Stake 13

19Jan99

Layer	Thickness	Total Mass	Mass of Bag	Snow Mass	Density	Weighted Density
	Cm	g	g	g	g/cm3	g/cm2
I	3.5	15	0	15	0.15	0.525
II	7	40	0	40	0.4	2.8
III	7.5	36	0	36	0.36	2.7
IV	12	24	0	24	0.24	2.88
sum	30					8.905
		average snowpack density			0.29	

<u>Layer</u>	<u>hardness</u>	<u>crystal</u>	<u>size</u>
I	fist	broken stellars	1
II	1 finger	round	1
III	pencil	rounds	1-1.5
IV	4 finger	facets	2
Below 0: Hard snow			

Stake 14
20Jan99

<u>Layer</u>	<u>Thickness</u>	<u>Total</u>	<u>Mass</u>	<u>Snow</u>	<u>Density</u>	<u>Weighted</u>
	<u>cm</u>	<u>Mass</u>	<u>of Bag</u>	<u>Mass</u>	<u>g/cm3</u>	<u>Density</u>
		<u>g</u>	<u>g</u>	<u>g</u>		<u>g/cm2</u>
I	1					
II	8	29	0	29	0.29	2.32
III	7	45	0	45	0.45	3.15
IV	26	30	0	30	0.3	7.8
V	24	19	0	19	0.19	4.56
Sum	66					17.83
average snowpack density:					0.27	

<u>Layer</u>	<u>hardness</u>	<u>crystal</u>	<u>size</u>
I	wind crust		1
II	1 finger	rounds	1.5
III	knife	rounds	1
IV	pencil	facets/rounds	3
V	1 finger	honeycomb	3-10
--ice--	Below 0: Glacier ice		

Stake 15
20Jan99

<u>Layer</u>	<u>Thickness</u>	<u>Total</u>	<u>Mass</u>	<u>Snow</u>	<u>Density</u>	<u>Weighted</u>
	<u>cm</u>	<u>Mass</u>	<u>of Bag</u>	<u>Mass</u>	<u>g/cm3</u>	<u>Density</u>
		<u>g</u>	<u>g</u>	<u>g</u>		<u>g/cm2</u>
I	33.5	25	0	25	0.25	8.375
II	10.5	33		33	0.33	3.465
III	9	25		25	0.25	2.25
IV	1					
V	10	19		19	0.19	1.9
sum	63					15.99
average snowpack density					0.25	

<u>Layer</u>	<u>hardness</u>	<u>crystal</u>	<u>size</u>
I	4 finger	rounds	1
II	1 finger	rounds	1
III	4 finger	facets/rounds	2
IV		wind crust/ facets	
V	4 finger	facets	2
Below 0: Hard dirty snow			

Stake 16
20Jan99

Layer	Thickness	Total Mass	Mass of Bag	Snow Mass	Density	Weighted Density
	cm	g	g	g	g/cm ³	g/cm ²
I	3	22	0	22	0.22	0.66
II	9	44		44	0.44	3.96
III	2	22		22	0.22	0.44
IV	8	42		42	0.42	3.36
V	12	27		27	0.27	3.24
VI	16	32		32	0.32	5.12
Sum	50					16.78
average snowpack density:					0.33	

Layer	hardness	crystal	size
I	fist	broken stellar	1.5
II	pencil	rounds	1
III	1 finger	facets/rounds	2
IV	1 finger	rounds	1
V	fist	facets/rounds	2.5
VI	4 finger	rounds	2
Below 0: Hard layer			

Stake 17
20Jan99

Layer	Thickness	Total Mass	Mass of Bag	Snow Mass	Density	Weighted Density
	cm	g	g	g	g/cm ³	g/cm ²
I	4	25		25	0.25	1
II	8	24		24	0.24	1.92
III	1				0.22	0.22
IV	3	19		19	0.19	0.57
V	7	20		20	0.2	1.4
VI	19	35		35	0.35	6.65
VII						
VIII	11	16		16	0.16	1.76
Sum	53					13.52
average snowpack density:					0.25	

Layer	hardness	crystal	size
I	fist	rounds/facets	2
II		crust/rounds	1
III	fist	facets/rounds	2
IV	4 finger	facets/rounds	2
V	1 finger	honeycomb	2-3
VI	1 mm ice lens		
VII	1 finger	honeycomb	3-6
Below 0: Hard dirty layer			

Stake 18
19Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	3.4	19	0	19	0.19	0.64
II	18.2	50		50	0.5	9.1
III	18	33		33	0.33	5.94
IV	1	33		33	0.33	0.33
V	15	29		29	0.29	4.35
sum	55.6					20.36
average snowpack density:					0.36	

Layer	hardness	crystal	size
I	fist	broken stellars	1
II	knife	rounds	0.5
III	4 finger	rounds and facets	2
IV	1 finger	rounds	1
V	4 finger	rounds and facets	1-2
Below 0: Hard layer			

Stake 19
19Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	4.6	15	0	15	0.15	0.69
II	7	34		34	0.34	2.38
III	29.8	29		29	0.29	8.642
IV	1	33		33	0.33	0.33
V	16	26		26	0.26	4.16
VI	10	32		32	0.32	3.2
Sum	68.4					19.40
average snowpack density:					0.28	

Layer	hardness	crystal	size
I	fist	broken stellars	.5-1.0
II	1 finger	rounds	1
III	fist	facets	2
IV	1 finger	rounds	0.5-1
V	4 finger	facets - rounds	2
VI	1 finger	rounds	1
Below 0: Hard layer			

Stake 20
36161

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	7.8	18	0	18	0.18	1.404
II	8.5	35		35	0.35	2.975
III	4.5	22		22	0.22	0.99
IV	10	31		31	0.31	3.1
V	4.5	20		20	0.2	0.9
VI	2	29		29	0.29	0.58
VII	3	26		26	0.26	0.78
VIII	7	27		27	0.27	1.89
sum	47.3					12.61
		average snowpack density			0.26	

Layer	hardness	crystal	size
I	fist	broken stellars	0.5-1
II	1 finger	rounds	1.5
III	fist	facets	2-3
IV	1 finger	rounds	1
V	fist	facets-rounds	2-3
VI	1 finger	rounds	1
VII	4 finger	rounds-facets	2
VIII	1 finger	rounds	1-2

Below 0: Hard Layer

Stake 21
19Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	3.6	14	0	14	0.14	0.504
II	22.6	52		52	0.52	11.752
III	5	27		27	0.27	1.35
IV	5.7	34		34	0.34	1.938
V	4.3	19		19	0.19	0.817
VI	10	23		23	0.23	2.3
sum	51.2					18.66
		average snowpack density			0.36	

Layer	hardness	crystal	size
I	fist	broken stellar	.5-1
II	pencil	rounds	0.5
III	4 finger	facets	1-2
IV	1 finger	rounds	2
V	4 finger	facets - rounds	2-3
VI	1 finger	rounds some facets	1

Below 0: Hard layer

Stake 22
19Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	9.3	15	0	15	0.15	1.395
II	14.1	32		32	0.32	4.512
III	17.2	27		27	0.27	4.644
sum	40.6					10.55

average snowpack density

0.25

Layer	hardness	crystal	size
I	fist	broken stellars	.5-1
II	1 finger	rounds	1
III	4 finger	facets-rounds	2
Below 0: Hard layer			

Stake 23
19Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	2.5	33	0	33	0.33	0.825
II	3	17		17	0.17	0.51
III	7	30		30	0.3	2.1
IV	11	41		41	0.41	4.51
V	14	26		26	0.26	3.64

sum 37.5 11.58

average snowpack density

0.30

Layer	hardness	crystal	size
I	1 finger	broken stellars.	Light wind crust 0.5-1
II	4 finger	broken stellars.	1
III	1 finger	facets, rounds	1
IV	pencil	rounds	1-2
V	4 finger	facets, rounds	2
Below 0: Hard layer			

Howard Glacier
Stake 24
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	1	20	0	20	0.20	0.20
sum	1				0.20	

snowpack density 0.20

Stake 25
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm ³	Weighted Density g/cm ²
I	2	20	0	20	0.20	0.40
II	4.7	56		56	0.56	2.63
III	5.5	30		30	0.30	1.65
IV	12	42		42	0.42	5.04
V	4.9	35		35	0.35	1.72
sum	29.1				11.44	
	average density:		0.39			

Stake 26
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm ³	Weighted Density g/cm ²
I	5	16	0	16	0.16	0.80
II	4.4	40		40	0.40	1.76
sum	9.4				2.56	
	average density:		0.27			

Stake 27
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm ³	Weighted Density g/cm ²
I	4	20	0	20	0.20	

Stake 28
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm ³	Weighted Density g/cm ²
I	4	20	0	20	0.20	

Stake 30
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm ³	Weighted Density g/cm ²
I	4	20	0	20	0.20	

Stake 31
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	4	20	0	20	0.20	

Between Stakes 29,30,66
21Jan99

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	2.5	19	0	19	0.19	0.48
II	7	45		45	0.45	3.15
III	7	32		32	0.32	2.24
sum	16.5				5.87	
			snowpack density	0.36		

Stake 66
1/21/1999

Layer	Thickness cm	Total Mass g	Mass of Bag g	Snow Mass g	Density g/cm3	Weighted Density g/cm2
I	2.5	20	0	20	0.20	0.50
sum	2.5				0.5	
			average density:	0.20		