Table 2. The results from 104 samples of 1 m surface snow pits with the geographical position and elevation, measured isotope content for the upper 1 m snow, estimated mean temperature and accumulation rate. Isotope concentrations are expressed in terms of $\delta^{18}O$, the relative deviations in per mil from the concentration in Standard Mean Ocean Water (Craig, 1961a). SMOW has D/H and $^{18}O/^{16}O$ ratios respectively equal to 155.76 and 2005.2 ppm (Hagemann and others, 1970; Baerstchi, 1976)

Station	Position	Distance	Elevation	δD	$\delta^{18}O$	Excess d	Mean annual temperature	Accumulation rate	Location
		km	m	‰	‰	‰	°C	g cm^{-2} a^{-1}	
1	65°05′ S, 59°35′ W	0	0	−188.7	−24.3	5.5	−12.1		Seal Nunataks
2	65°10′ S, 59°59′ W	3	20	−154.6	−19.5	1.6	−12.3		
3	65°17′ S, 60°19′ W	11	20	−157.9	−20.3	4.5	−12.3		
4	65°27′ S, 60°45′ W	48	20	−148.8	−19.0	3.4	−12.4		
5	65°35′ S, 61°10′ W	63	50	−156.5	−19.8	2.2	−12.6		
6	65°42′ S, 61°32′ W	76	70	−172.0	−22.1	5.0	−12.7		
7	65°50′ S, 61°57′ W	100	90	−171.5	−22.1	5.5	−12.9		
8	66°20′ S, 62°36′ W	153	70	−177.9	−22.5	2.1	−12.9		
9	66°54′ S, 63°32′ W	249	50	−174.3	−22.5	6.0	−13.0		
10	67°20′ S, 64°07′ W	303	50	−175.2	−22.8	6.9	−13.1		
11	67°47′ S, 64°42′ W	360	80	−174.4	−22.2	3.4	−13.4	60.0	
12	68°25′ S, 65°15′ W	418	200	−182.7	−23.7	7.1	−14.3		
13	68°43′ S, 65°26′ W	459	1200	−179.9	−23.3	6.9	−15.8		
14	68°48′ S, 65°22′ W	465	1250	−183.0	−23.6	5.7	−16.0		
15	68°57′ S, 65°26′ W	473	1350	−189.7	−24.5	7.8	−16.5	50.0	
16	69°04′ S, 65°20′ W	488	1400	−180.4	−23.5	7.3	−17.0		
17	69°10′ S, 65°18′ W	497	1700	−187.3	−24.2	6.4	−17.3		Weyerhaeuser Glacier
18	69°41′ S, 65°13′ W	570	1600	−188.3	−24.1	4.2	−19.6	16.4	
19	70°25′ S, 64°44′ W	607	1950	−211.8	−27.3	7.0	−19.8	16.4	
20	70°58′ S, 64°41′ W	676	2000	−220.6	−28.3	5.5	−21.3		
21	71°17′ S, 65°43′ W	708	1650	−195.2	−25.0	4.3	−20.7		
22	71°56′ S, 65°18′ W	782	1250	−185.1	−23.3	1.5	−18.1		
23	72°14′ S, 65°29′ W	814	1250	−199.7	−25.3	2.4	−18.1		
24	72°33′ S, 65°55′ W	851	1000	−203.8	−26.6	8.9	−16.4		
25	73°14′ S, 66°48′ W	929	1200	−188.6	−24.3	5.9	−18.3		
26	73°56′ S, 67°30′ W	1014	1300	−140.1	−18.2	5.3	−20.0	50.0	
27	74°05′ S, 69°57′ W	1101	1450	−193.8	−25.0	6.2	−20.0	33.8	
28	74°46′ S, 72°46′ W	1217	1520	−210.0	−27.0	6.3	−22.1	25.1	
29	74°51′ S, 75°45′ W	1302	700	−213.9	−27.7	8.1	−23.0	26.5	
30	75°26′ S, 78°29′ W	1400	450	−239.6	−30.7	5.6	−24.8	22.8	Eights
31	75°47′ S, 81°40′ W	1503	750	−246.4	−31.7	7.4	−25.8		
32	76°25′ S, 85°10′ W	1569	1050	−258.2	−32.9	5.3	−27.7	34.4	
33	76°56′ S, 86°15′ W	1633	1100	−255.8	−32.6	5.2	−27.9		
34	77°39′ S, 87°07′ W	1703	1500	−248.4	−31.8	6.3	−29.9		
35	78°12′ S, 87°39′ W	1761	1650	−251.9	−32.0	3.8	−30.6	40.0	
36	78°49′ S, 87°14′ W	1838	2050	−295.4	−37.5	4.2	−32.1	30.0	
37	79°10′ S, 86°51′ W	1872	1800	−363.3	−33.2	2.6	−31.2		
38	79°45′ S, 85°18′ W	1946	1680	−296.2	−37.5	3.6	−30.7	20.0	
39	80°18′ S, 81°21′ W	2092	700	−263.6	−33.4	3.7	−27.3		Patriot Hills
40	80°45′ S, 81°15′ W	2116	900	−271.0	−34.9	8.3	−27.3		
41	81°12′ S, 82°00′ W	2148	900	−289.3	−36.9	6.2	−28.2		
42	81°48′ S, 82°50′ W	2224	1050	−280.1	−35.7	5.6	−29.1		
43	81°55′ S, 83°20′ W	2263	1150	−303.9	−37.8	−1.2	−29.7		
44	82°41′ S, 84°00′ W	2329	1250	−300.0	−38.1	4.7	−30.9		
45	83°05′ S, 84°45′ W	2369	1320	−300.6	−38.4	6.9	−31.5		
46	83°47′ S, 87°25′ W	2446	1480	−317.7	−40.0	2.1	−33.1	15.0	
47	84°12′ S, 88°05′ W	2490	1550	−311.3	−39.2	2.6	−3.9		
48	84°35′ S, 88°55′ W	2534	1650	−321.3	−40.8	5.4	−34.8		
49	85°11′ S, 88°58′ W	2622	1730	−339.1	−42.8	3.4	−36.8		
50	85°53′ S, 88°10′ W	2709	1850	−314.8	−40.6	10.2	−39.2		Thiel Mountains
51	86°12′ S, 88°25′ W	2746	2000	−344.2	−43.6	4.8	−40.3	10.0	
52	86°34′ S, 88°57′ W	2828	2050	−353.5	−45.0	6.3	−41.6		
53	86°54′ S, 90°19′ W	2875	2200	−335.7	−42.3	2.9	−42.7		
54	87°36′ S, 91°06′ W	2946	2380	−371.3	−47.6	9.1	−45.1		

55	87°57′ S, 91°55′ W	2984	2550	−378.5	−48.4	9.0	−46.3	8.2	
56	88°38′ S, 92°26′ W	3062	2650	−386.7	−49.3	8.0	−49.1	8.0	
57	89°00′ S, 92°58′ W	3100	2750	−394.5	−50.8	11.8	−50.7	7.6	
58	89°22′ S, 91°39′ W	3141	2850	−395.4	−50.9	11.6	−51.1	8.1	
59	90°00′ S	3207	2880	−398.3	−51.2	11.0	−49.3	8.5	South Pole
60	89°53′ S, 114°22′ E	3220	2880	−404.7	−51.7	9.0	−49.6		
61	89°32′ S, 108°18′ E	3259	2900	−403.2	−51.6	9.6	−50.3		
62	89°11′ S, 105°35′ E	3297	2950	−398.7	−51.6	14.3	−51.5		
63	88°26′ S, 104°27′ E	3382	3050	−413.8	−53.4	13.0	−51.4		
64	88°03′ S, 104°35′ E	3424	3070	−415.0	−53.3	11.6	−52.5		
65	87°42′ S, 104°39′ E	3463	3130	−416.6	−53.4	10.2	−53.5		
66	87°20′ S, 104°25′ E	3504	3150	−415.2	−53.2	10.1	−52.7		
67	86°36′ S, 104°57′ E	3585	3150	−418.7	−53.7	10.9	−51.5		
68	85°33′ S, 105°40′ E	3703	3160	−422.5	−54.2	10.7	−51.6		
69	85°13′ S, 105°49′ E	3740	3180	−427.8	−54.5	8.3	−51.7		
70	84°28′ S, 106°17′ E	3824	3210	−432.2	−55.3	10.0	−51.8		
71	84°07′ S, 106°17′ E	3863	3230	−426.1	−54.7	11.3	−51.9		
72	83°44′ S, 106°24′ E	3905	3230	−430.0	−55.3	12.3	−52.1		
73	83°00′ S, 106°12′ E	3986	3260	−436.5	−56.2	12.7	−52.9		
74	82°40′ S, 106°19′ E	4024	3280	−422.5	−54.3	12.1	−53.6		
75	81°50′ S, 106°28′ E	4117	3310	−436.6	−55.8	9.8	−53.9		
76	81°05′ S, 106°26′ E	4200	3410	−435.1	−56.0	12.6	−54.3		
77	80°42′ S, 106°12′ E	4243	3400	−446.9	−57.7	14.8	−54.4		
78	80°17′ S, 106°14′ E	4289	3420	−440.7	−56.7	13.2	−54.7		
79	79°42′ S, 106°04′ E	4354	3430	−414.5	−53.1	10.6	−54.9		
80	79°08′ S, 106°08′ E	4418	3430	−453.7	−58.4	13.6	−55.2		
81	78°46′ S, 106°41′ E	4460	3480	−441.1	−57.2	16.3	−55.5	2.3	Vostok Station
82	78°07′ S, 105°47′ E	4535	3500	−425.0	−54.7	12.6	−5.4	2.3	
83	77°43′ S, 104°47′ E	4585	3510	−414.7	−56.9	13.5	−55.2	3.0	
84	77°00′ S, 102°55′ E	4677	3550	−427.9	−55.2	13.9	−54.6	3.3	
85	76°36′ S, 102°00′ E	4727	3550	−417.7	−53.8	12.9	−54.3	3.6	
86	75°54′ S, 100°31′ E	4814	3560	−423.9	−54.2	9.6	−53.7	3.7	
87	75°33′ S, 100°31′ E	4854	3550	−416.4	−53.5	11.7	−53.4	3.7	
88	74°44′ S, 98°41′ E	4959	3550	−407.0	−52.0	9.4	−52.9	3.7	
89	74°21′ S, 98°00′ E	5006	3500	−399.2	−51.7	14.1	−52.6	6.6	Komsomolskaya
90	73°41′ S, 97°26′ E	5082	3490	−387.6	−49.8	10.4	−50.7	6.1	
91	73°18′ S, 97°09′ E	5126	3430	−375.3	−47.6	5.7	−49.6	7.1	
92	72°51′ S, 96°59′ E	5176	3380	−364.9	−46.4	6.4	−48.3	7.8	
93	72°28′ S, 96°45′ E	5220	3320	−344.2	−43.9	7.0	−47.1	9.1	Vostok-1
94	71°42′ S, 96°17′ E	5306	3180	−353.4	−44.3	1.1	−45.3	12.3	
95	71°20′ S, 96°01′ E	5348	3090	−351.0	−44.6	5.6	−43.9	12.3	
96	70°57′ S, 95°54′ E	5391	2980	−335.1	−43.0	8.7	−42.5	12.9	
97	70°33′ S, 95°43′ E	5436	2870	−322.6	−40.9	4.7	−41.1	12.6	
98	70°11′ S, 95°35′ E	5477	2820	−290.8	−37.1	5.8	−39.7	16.0	
99	69°46′ S, 95°22′ E	5524	2720	−283.4	−36.0	4.3	−38.0	12.6	Pionerskaya
100	69°26′ S, 95°07′ E	5562	2650	−298.7	−37.9	4.1	−35.5	11.2	
101	68°51′ S, 94°37′ E	5630	2400	−248.6	−32.0	7.4	−31.0	10.8	
102	68°05′ S, 93°50′ E	5721	2080	−229.6	−29.4	5.5	−27.7	18.9	
103	67°42′ S, 93°39′ E	5765	1850	−202.9	−25.3	−0.3	−24.1	40.3	
104	67°21′ S, 93°26′ E	5805	1480	−164.6	−20.9	2.6	−20.9	49.0	
105	66°33′ S, 93°00′ E	5896	41						Mirny

latitude effect. They are distributed mainly throughout regions of West Antarctica, particularly on the Larsen Ice Shelf, the Antarctic Peninsula and the mountain regions. In order to estimate these temperatures, altitude and latitude effects must be known and account must be taken of peculiarities, such as the fact that the Antarctic Peninsula is a natural barrier which demarcates a distinct climatic division between a maritime climate in the west and a continental climate in the east (Schwerdtfeger, 1970; Aristarain and others, 1986).

For example, we estimated the temperatures on the Larsen Ice Shelf, (from station 1 to 12) using data from Esperanza Station (63°24′ S, 57°00′ W; mean annual temperature of −5.3°C at 7 m a.s.l.; Schwerdtfeger, 1975) and James Ross Island (64°13′ S, 57°54′ W, −14.3°C at 1640 m a.s.l.; Aristarain and others, 1986), two sites with very close geographic positions and different altitudes. For this area, the estimated lapse rate is about 0.56°C/100 m. As the next step, we chose Matienzo Station (−12.1°C as the temperature at sea level; Jacka and others, 1984) and Gipps Ice Rise (68°46′ S, 60°56′ W; −14.9°C as the 10 m snow temperature and 290 m a.s.l.; Peel and Clausen, 1982) to calculate the latitudinal effect which is equal to 0.316°C per degree of latitude in this region.

We have to estimate the lapse rate and the latitudinal effect separately for each region because of the different geographic conditions. From station 13 to 18 in Palmer