

Supplementary Data Table A1. Localities, Samples, Concentrations, and Isotope Ratios

Locality	Sample No.	T(c) Ga	[Rb]	[Sr]	[Sm]	[Nd]	87Rb/86Sr	147Sm/144Nd			
MILLER RANGE											
Camp Ridge	86 BMR M28	1.7	168.837	314.835	7.5639	38.7195	1.5572	0.11817			
MILLER FORMATION											
Gerard Bluffs	86 BMR M36A	>1.7	48.359	138.596	3.7280	13.3730	1.0128	0.16863			
Orr Peak	86 BMR M37	>1.7	167.503	950.023	11.9254	70.1628	0.5110	0.10281			
Camp Ridge	86 BMR M39	>1.7	84.451	351.837	4.3902	25.7400	0.6965	0.10577			
Argosy Fm											
Aurora Heights	86 BMR M24	>1.7	120.079	435.349	5.5489	31.7406	0.7983	0.10575			
Argosy Fm (?)											
Krieling Mesa	85 DCT M2	>0.5	135.666	84.159	8.0783	45.9908	4.7228	0.10625			
SHACKLETON COAST											
Goldie Formation											
Wise Bay	85 BCT 125M	>0.5	115.076	397.114	6.391	32.75	0.841	0.11805			
Reid Spur	85 BCT 152M	>0.5	86.242	191.738	7.630	29.02	1.3042	0.15904			
pre-500 Ma basalt; assume 750 Ma											
near Mt Dick	NP 86-005	=0.75	5.205	165.693	6.6706	25.5098	0.0909	0.15817			
ADELIE COAST											
Dumont D'Urville	89 DDU 4	granite; unknown age			99.211	161.910	7.3277	41.7616			
99.211											
BYRD GLACIER											
Carlyon granodiorite											
Darnell Nunatak	89 BBG 101A	0.568	181.076	209.336	8.0024	47.2688	2.5108	0.10241			
N wall Byrd Glacier	89 BBG 105A	0.568	140.40	228.50	7.109	39.99	1.778	0.1075			
Bastion Hill	89 DBG 4	0.568	155.471	140.978	5.8866	27.1618	3.2008	0.13110			
Brown Hills	89 BBG 113	0.568	86.400	163.406	7.9769	47.4720	1.5329	0.10164			
Horney Formation											
Darnell Nunatak	89 BBG 101B	>0.568	338.758	247.304	8.8062	44.4321	3.9802	0.11989			
E of The Nozzle	89 BBG 111B	>0.568	245.391	206.472	7.5391		3.4531				
HORLICK MTNS											
ca. 500 Ma granites											
NW Ford Nun.	HM 1	0.500	101.819	109.696	10.7580	50.4425	2.6919	0.12901			
Feeley Peak	HM 3	0.500	170.292	255.738	5.3506	30.6657	1.9297	0.10554			
Treves Butte	HM 4B	0.500	238.029	120.110	6.6437	39.0999	5.7576	0.10278			
Darling Ridge	HM 5	0.500	374.101	71.639	3.7748	17.2464	15.2682	0.13240			
Savage Nunatak	HM 16	0.500	401.547	26.545	1.9734	6.6103	45.1790	0.18058			
S of Gratton Nunatak	HM 33	0.500	312.779	52.996	6.7316	28.5361	17.2990	0.14269			
pre-500 Ma basement											
McCrilliss Nunatak	HM 9A (wacke)		250.839	65.449	6.9376	34.1739	11.1842	0.12280			
	HM 9B (shale)		334.010	38.602	9.7072	47.6704	25.4232	0.12318			
Spear Nunatak	HM 14A (mafic gneiss)		11.362	132.771	3.7794	10.8190	0.2477	0.21131			
DRY VALLEYS											
Granulite Xenoliths from the McMurdo Volcanic Province											
Dry Valleys area	A83-82	0.5	0.43	737.1	4.53	17.00	0.0017	0.16113			
Dry Valleys area	A82-182	0.5	2.56	567.7	5.32	23.56	0.0131	0.13651			
Dry Valleys area	A84-239	0.5	26.94	703.6	8.48	34.10	0.1108	0.15039			
Dry Valleys area	A84-256	0.5	2.80	857.5	3.89	18.67	0.0094	0.12610			
WHITMORE MTNS	WM 1	0.120	189.637	170.897	6.9815	34.3850	3.2151	0.12282			

Supplementary Data Table A2. Localities, Samples, Concentrations, and Isotope Ratios

Sample No.	143Nd/144Nd(0)	fSm/Nd	E-Nd(0)	E-Nd(0.5)	T-DM (Ga)	87Sr/86Sr	fRb/Sr	E-Sr(0)	E-Sr(0.5)
86 BMR M28	0.510504	-0.399	-26.03	-21.03	2.74	0.740465	17.83	510.5	361.7
86 BMR M36A	0.511296	-0.143	-10.55	-8.77	3.48	0.736311	11.25	451.5	357.8
86 BMR M37	0.510259	-0.477	-30.81	-24.83	2.83	0.720034	5.18	220.5	177.3
86 BMR M39	0.510130	-0.462	-33.33	-27.55	3.10	0.733286	7.42	408.6	346.8
86 BMR M24	0.510395	-0.462	-28.15	-22.36	2.72	0.730206	8.65	364.9	292.8
85 DCT M2	0.511027	-0.460	-15.81	-10.03	1.81	0.832213	56.11	1812.8	1344.6
85 BCT 125M						0.733038	9.17	405.1	328.7
85 BCT 152M						0.725590	14.77	299.4	176.0
NP 86-005	0.511847	-0.196	0.21	2.68	1.23	0.704188	0.10	-4.4	-5.3
89 DDU 4	0.510647	-0.460	-23.23	-17.46	2.36	0.748031	20.53	617.9	446.5
89 BBG 101A	0.511046	-0.479	-15.43	-9.41	1.91	0.736507	29.36	454.3	208.9
89 BBG 105A						0.726041	20.50	305.8	134.4
89 DBG 4	0.511232	-0.334	-11.80	-7.61	1.80	0.735571	37.70	441.0	125.8
89 BBG 113	0.511182	-0.483	-12.78	-6.70	1.72	0.723757	17.54	273.3	126.8
89 BBG 101B	0.511114	-0.390	-14.11	-9.20	1.94	0.747086	47.13	604.5	210.5
89 BBG 111B						0.746276	40.75	593.0	252.3
HM 1	0.511589	-0.344	-4.83	-0.49	1.26	0.727627	31.55	328.3	64.4
HM 3	0.511437	-0.463	-7.80	-1.96	1.38	0.719938	22.33	219.1	32.4
HM 4B	0.511387	-0.477	-8.77	-2.77	1.44	0.745815	68.62	586.4	12.5
HM 5	0.511501	-0.327	-6.55	-2.43	1.41	0.811313	183.62	1516.2	-19.7
HM 16	0.511668	-0.082	-3.28	-2.25	1.40	1.033196	545.30	4665.7	104.7
HM 33	0.511545	-0.275	-5.69	-2.23	1.40	0.836740	208.18	1877.1	135.9
HM 9A	0.511394	-0.376	-8.64	-3.91	1.52	0.791458	134.24	1234.3	111.6
HM 9B	0.511390	-0.374	-8.71	-4.01	1.53	0.862075	306.41	2236.7	-326.5
HM 14A	0.512324	0.074	9.53	8.61		0.706532	1.99	28.8	12.2
A83-82	0.511473	-0.181	-7.09	-4.82	1.59	0.708934	-0.98	62.9	71.2
A82-182	0.511501	-0.306	-6.55	-2.70	1.43	0.710145	-0.84	80.1	87.2
A84-239	0.511282	-0.235	-10.82	-7.87	1.81	0.711686	0.34	102.0	99.2
A84-256	0.511326	-0.359	-9.96	-5.45	1.64	0.708974	-0.89	63.5	71.0
WM 1	0.511625	-0.376	-4.12	0.61	1.19	0.718124	37.88	193.4	117.6

E-Sr(Tc)

Supplementary Data Tables A1 and A2. Notes

Notes:

For analytical procedures and details of calculations see:

Borg, S.G., DePaolo, D.J., and Smith, B.M., 1990, Isotopic structure and tectonics of the central Transantarctic Mountains: Journal of Geophysical Research, v. 95, p. 6647-6667.

143Nd/144Nd normalized to 146Nd/142Nd = 0.63613; 87Sr/86Sr normalized to 86Sr/88Sr = 0.1194. E-Nd means epsilon-Nd; E-Sr means epsilon-Sr; T-DM means Nd depleted mantle model age (Ga).

E-Nd is calculated relative to a model depleted mantle with present 143Nd/144Nd = 0.511836 and 147Sm/144Nd = 0.1967. 147Sm decay constant = $6.54 \times 10^{-12} \text{ yr}^{-1}$.

E-Sr is calculated relative to a uniform reservoir with present 87Sr/86Sr = 0.7045 and 87Rb/86Sr = 0.0827. 87Rb decay constant = $1.42 \times 10^{-11} \text{ yr}^{-1}$.

$f_{\text{Sm/Nd}} = (147\text{Sm}/144\text{Nd})_{\text{measured}} + 0.1967 - 1$; $f_{\text{Rb/Sr}} = (87\text{Rb}/86\text{Sr})_{\text{measured}} + 0.0827 - 1$.

E-Nd(0) and E-Sr(0) are calculated at the present (T=0); similarly E-Nd(0.5) is calculated at 0.5 Ga.

Elemental concentrations in ppm. Uncertainties of parent-daughter and isotope ratios are:
E-Nd and E-Sr, ≤ 0.4 epsilon units; parent/daughter ratios, $\leq 0.1\%$ ($\leq 2\%$ if based on mixed spikes).

For granitic rocks with known age:

T(DM) is calculated from E-Nd initial (E-Nd at crystallization age T(c)) and f(Sm/Nd) for average crustal rocks (dependent on crustal age) after DePaolo (1988, Age dependence of the composition of continental crust: Evidence from Nd isotopic variations in granitic rocks: Earth and Planetary Science Letters, v. 90, p. 263-271).

For metasedimentary rocks or granitic rocks with unknown age:

T(DM) is calculated from the measured values E-Nd(0) and f(Sm/Nd) relative to a depleted mantle described by the curve $E\text{-Nd(DM)} = 8.6 - 1.91 \times T$ (T = age in Ga).

Italics indicate:

- 1) concentrations from mixed spike, unseparated mass spectrometer runs;
- 2) parent daughter ratios based on mixed spike concentrations.

Supplementary Data Table B. Sample Locations

Sample No.	Rock Type	Pluton/Fm	Location	Latitude	Longitude
Horlick Mountains					
HM 1	tonalite	ca. 500 Ma granites	North end, Ford Nunataks	85°32'30"S	131°44'0"W
HM 3	monzogranite	ca. 500 Ma granites	Feeley Peak	85°27'0"S	126°26'0"W
HM 4B	monzogranite	ca. 500 Ma granites	Treves Butte	84°42'0"S	114°22'0"W
HM 5	monzogranite	ca. 500 Ma granites	North end, Darling Ridge	84°45'0"S	115°56'0"W
HM 9A	graywacke	≈Beardmore Group	McCulliss Nunatak	85°26'30"S	128°56'0"W
HM 9B	shale	≈Beardmore Group	McCulliss Nunatak	85°26'30"S	128°56'0"W
HM 14A	mafic gneiss	within basement	Spear Nunatak	86°32'0"S	124°53'36"W
HM 16	granite	ca. 500 Ma granites	Savage Nunatak	86°27'12"S	124°53'48"W
HM 33	granite	ca. 500 Ma granites	South of Gratton Nunatak	86°10'18"S	127°25'6"W
Whitmore Mountains					
WM 1	monzogranite		Whitmore Mountains	82°26'0"S	103°51'36"W
Darwin-Byrd Glaciers Region					
89 DBG 4	granite	Carlyon granodiorite	Bastion Hill	79°50'40"S	158°16'19"E
89 BBG 101-A	granite	≈Carlyon granodiorite (?)	Darnell Nunatak	80°27'14"S	155°54'33"E
89 BBG 101-B	banded gneiss	Horney formation ?	Darnell Nunatak	80°27'14"S	155°54'33"E
89 BBG 105-A	granite	≈Carlyon granodiorite (?)	North wall, Byrd Glacier	80°26'54"S	156°44'11"E
89 BBG 111-B	banded gneiss	Horney Formation	East of The Nozzle	79°56'37"S	159°32'12"E
89 BBG 113	granite	≈Carlyon granodiorite (?)	East of Goorkha Craters	79°46'50"S	159°43'20"E
Churchill Mountains (collected by M. Rees)					
NP-86-005	basalt	within basement	Near Mt Dick	≈80°50'S	≈158°40E
Miller Range					
85 DCT M2	schist	Argosy formation	Kreiling Mesa	83°11'8"S	158°5'9"E
86 BMR M24	schist	Argosy formation	Aurora Heights	83°7'32"S	157°8'8"E
86 BMR M28	orthogneiss	Endurance mylonite	Camp Ridge	83°8'58"S	156°0'41"E
86 BMR M36A	greenschist	Miller formation	Gerard Bluffs	83°36'37"S	157°16'39"E
86 BMR M37	banded gneiss	Miller formation	South flank, Orr Peak	83°29'29"S	157°48'29"E
86 BMR M39	banded gneiss	Miller formation	Camp Ridge	83°8'50"S	156°2'1"E
Adelie Coast (collected by S. Draggan)					
89 DDU 4	granite dike		Dumont D'Urville Station	66°42'S	139°46'E

Note: Locations for other samples in Table A are contained in:

Borg, S.G., DePaolo, D.J., and Smith, B.M., 1990, Isotopic structure and tectonics of the central Transantarctic Mountains: Journal of Geophysical Research, v. 95, p. 6647-6667.