

Appendix A (Data Repository?)

Table DR1. $^{40}\text{Ar}/^{39}\text{Ar}$ incremental step-heating data for hornblende separates from the central Southern Alps, New Zealand.

Fig. DR1. Incremental step-heating age spectra for hornblende from the central Southern Alps, New Zealand.

$^{40}\text{Ar}/^{39}\text{Ar}$ methods

The $^{40}\text{Ar}/^{39}\text{Ar}$ dating technique is described in detail by McDougall & Harrison (1999). Hornblendes were separated using of a Franz isodynamic separator and heavy liquids. All separates (212-250 μm grain-size fraction) were handpicked under a binocular microscope and ultrasonically washed in deionized water, alcohol, and acetone until >99% pure. Approximately 80 mg (range, 15-118 mg) of hornblende separate was wrapped in an aluminium packet and placed into an aluminium (PRISE) or fused silica (Stanford) irradiation canister together with interspersed aliquots of the flux monitor. At PRISE laboratory, this was GA1550 (assumed age of 97.9 Ma) (McDougall and Roksandic, 1974); at the University of Las Vegas this was the Fish Canyon Tuff sanidine (assumed age of 27.9 Ma) (Cebula et al., 1986; Steven et al., 1967), and at Stanford University this was Taylor Creek Rhyolite sanidine (assumed age of 27.92 Ma) (Sharpton et al., 1992). The irradiation canister was irradiated at the HIFAR reactor, Lucas Heights, Sydney, Australia (PRISE samples), at the USGS TRIGA reactor in Denver Colorado (Stanford samples), or at the Texas A&M Nuclear Science Centre (Las Vegas samples). After irradiation, the sample was removed from its packaging and ~30 mg aliquots were loaded into tin foil packets for analysis. The samples were then dropped into a double-vacuum (Staudacher-type) Tantalum resistance furnace containing a Mo liner, and heated to progressively higher temperatures. The temperature of each step was estimated by a thermocouple in contact with the bottom of the crucible and monitored continuously by a digital temperature controller. Temperatures were maintained for fifteen minutes per step at PRISE and Las Vegas and 8 minutes per step at Stanford. At PRISE, step-heating analyses on the extracted gases were carried out on a VG 3600 mass spectrometer using a Daly detector, at Stanford, with a MAP 216 mass spectrometer, and at Las Vegas with a MAP 215-50 rare gas mass spectrometer. The isotopic

abundances and ages were corrected for interference of Ca- and K-derived Ar isotopes produced during irradiation, decay since irradiation, presence of atmospheric argon, mass discrimination, and system backgrounds. Resistance furnace blanks for ^{40}Ar were typically c. 1×10^{-15} at 1400°C at PRIZE and c. 1.2×10^{-16} moles at 1200 °C at Stanford. Decay constants are those recommended in Steiger & Jager (1977). The term “plateau age” is used here as defined by Dalrymple and Lanphere (1971).

Table DR1. $^{40}\text{Ar}/^{39}\text{Ar}$ Incremental Step-Heating Data (Hornblende)

Note:

1. Isotopic ratios are corrected for mass spectrometer backgrounds, mass discrimination and radioactive decay.
2. Errors on ages are reported as 1ω uncertainties and include uncertainty in the J-value.

Sample No. 1 (hornblende)

Field No: I125

Mass = 82.27mg

J-value = 0.001867 ± 0.000006

ANU (PRISE) laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. H36 Easting (m) 2,265,760 Northing (m) 5,730,960 Elev. (m) 1630

Temp. (°C)	Cum. Frac. ^{39}Ar	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	Vol. ^{39}Ar $\times 10^{-14}\text{mol}$	%Atmos. ^{40}Ar	Ca/K	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	$\pm 1\omega$ (Ma)
600	0.0038	169.96	8.79	0.294	0.142	49.4	16.8	84.56	264.4	9.3
700	0.0229	33.19	4.00	0.046	0.718	60.0	7.6	19.96	66.0	0.6
800	0.0433	36.05	2.75	0.052	0.770	57.6	5.2	20.82	68.8	0.6
900	0.1130	25.59	7.98	0.031	2.629	66.8	15.3	17.20	57.0	0.3
950	0.1634	27.48	11.89	0.022	1.906	80.1	22.8	22.23	73.4	0.3
975	0.2632	28.36	11.03	0.017	3.773	86.1	21.1	24.63	81.1	0.3
1000	0.3437	23.92	11.22	0.015	3.047	85.4	21.5	20.60	68.1	0.3
1025	0.3576	23.28	10.82	0.027	0.523	70.0	20.7	16.44	54.5	0.7
1050	0.3882	24.71	11.78	0.029	1.159	69.9	22.6	17.43	57.8	0.4
1075	0.5843	24.15	11.75	0.022	7.417	77.5	22.5	18.87	62.4	0.5
1090	0.6927	24.64	12.01	0.018	4.104	82.4	23.0	20.47	67.7	0.2
1105	0.7584	24.37	11.91	0.016	2.483	84.9	22.8	20.89	69.0	0.2
1125	0.8080	23.62	11.71	0.014	1.878	86.8	22.4	20.67	68.3	0.3
1150	0.8455	23.44	11.77	0.013	1.417	87.9	22.6	20.80	68.7	0.4
1200	0.9147	22.92	11.72	0.014	2.617	87.3	22.5	20.18	66.7	0.2
1250	0.9610	22.62	11.77	0.012	1.751	89.0	22.5	20.31	67.1	0.2
1300	0.9818	23.71	11.93	0.014	0.790	87.7	22.9	20.97	69.3	0.4
1400	1.0000	26.69	11.99	0.024	0.680	77.2	23.0	20.80	68.7	0.5

Sample No. 2 (hornblende)

Field No. M6-12

Mass = 93.61mg

J-value = 0.001888 ± 0.000006

ANU (PRISE) laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. H36 Easting (m) 2,268,200 Northing (m) 5,737,800 Elev. (m) 375

Temp. (°C)	Cum. Frac. ^{39}Ar	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	Vol. ^{39}Ar $\times 10^{-14}\text{mol}$	%Atmos. ^{40}Ar	Ca/K	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	$\pm 1\omega$ (Ma)
600	0.0097	173.33	2.34	0.462	0.431	21.4	4.5	37.17	122.4	6.8
700	0.0589	32.78	0.54	0.073	2.190	34.3	1.0	11.24	37.9	0.9
800	0.0967	29.53	0.92	0.059	1.682	40.7	1.7	12.03	40.5	0.7
900	0.1876	19.57	9.51	0.040	4.071	44.3	18.2	8.74	29.5	0.4
950	0.2464	15.06	10.34	0.035	2.636	37.3	19.8	5.66	19.2	0.4
1000	0.4493	15.93	11.42	0.024	9.104	61.5	21.9	9.87	33.3	0.5

Sample No. 3 (hornblende)

Field No. M6-13

Mass = 90.86mg

J-value = 0.001908 ± 0.000006

ANU (PRISE) laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. Easting (m) Northing (m) Elev. (m)
H35 2,264,850 5,740,800 115

Temp. (°C)	Cum. Frac. ³⁹ Ar	⁴⁰ Ar/ ³⁹ Ar	³⁷ Ar/ ³⁹ Ar	³⁶ Ar/ ³⁹ Ar	Vol. ³⁹ Ar x10 ⁻¹⁴ mol	%Atmos. ⁴⁰ Ar	Ca/K	⁴⁰ Ar*/ ³⁹ Ar	Age (Ma)	± 1ω (Ma)
600	0.0061	478.24	7.49	0.3664	0.209	77.5	14.3	372.86	969.5	10.4
700	0.0198	78.22	4.50	0.1212	0.473	54.7	8.6	42.95	142.1	1.9
800	0.0306	84.92	5.73	0.2105	0.371	27.4	10.9	23.34	78.6	2.6
900	0.0824	32.85	12.71	0.0778	1.794	33.6	24.4	11.15	38.0	1.1
950	0.1246	25.51	14.30	0.0515	1.464	45.5	27.5	11.74	40.0	0.6
975	0.1858	30.74	15.04	0.0566	2.125	50.2	28.9	15.60	52.9	0.7
1000	0.3048	22.78	14.67	0.0294	4.128	67.8	28.2	15.61	53.0	0.4
1050	0.3692	16.62	14.05	0.0254	2.235	62.6	27.0	10.51	35.8	0.3
1070	0.4288	24.31	14.56	0.0457	2.066	50.0	28.0	12.28	41.8	0.9
1085	0.5681	24.74	14.42	0.0388	4.834	59.1	27.7	14.78	50.2	0.5
1100	0.7233	25.65	14.43	0.0330	5.381	67.2	27.7	17.42	59.0	0.3
1125	0.7724	31.31	14.45	0.0323	1.707	73.8	27.8	23.37	78.7	0.4
1150	0.9206	26.85	14.39	0.0253	5.140	77.1	27.6	20.92	70.6	0.3
1200	0.9923	24.03	14.09	0.0251	2.487	74.5	27.1	18.10	61.3	0.3
1300	0.9990	29.72	14.24	0.0475	0.231	57.2	27.4	17.17	58.2	1.0
1400	1.0000	153.57	14.30	0.4562	0.035	13.1	27.5	20.27	68.5	36.9

Sample No. 4 (hornblende)

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. Easting (m) Northing (m) Elev. (m)
H35 2,270,300 5,741,700 100

J-value = 0.0014300 ± 0.000006

Stanford University laboratory

Temp. (°C)	Cum. Frac. ³⁹ Ar	⁴⁰ Ar/ ³⁹ Ar	³⁷ Ar/ ³⁹ Ar	³⁶ Ar/ ³⁹ Ar	Vol. ³⁹ Ar (mol)	%Atmos. ⁴⁰ Ar	Ca/K	⁴⁰ Ar*/ ³⁹ Ar	Age (Ma)	± 1ω (Ma)
700	0.0070	-0.64	15.00	0.5309	9.9E-15	100.4	250.0	-0.66	-1.7	5.1
800	0.0280	33.71	20.07	2.0766	1.2E-13	94.9	19.6	33.70	84.9	40.8
900	0.0530	13.49	9.59	0.3867	2.9E-14	89.5	9.5	13.50	34.5	1.7
1000	0.1360	2.18	9.79	0.0583	1.4E-14	88.4	8.6	2.17	5.6	0.4
1030	0.1880	2.89	9.38	0.0393	6.3E-15	79.1	4.8	2.87	7.4	0.6
1045	0.2760	3.36	10.36	0.0212	6.8E-15	62.2	2.6	3.34	8.6	0.3
1060	0.3820	3.11	10.58	0.0162	6.7E-15	56.4	2.3	3.11	8.0	0.3
1075	0.4310	2.74	10.09	0.0188	3.2E-15	63.7	2.8	2.76	7.1	0.5
1100	0.4540	2.89	8.70	0.0262	2.0E-15	71.2	3.5	2.87	7.4	1.1
1125	0.5030	2.56	10.60	0.0202	3.4E-15	66.9	3.0	2.56	6.6	0.6
1150	0.5590	3.00	11.84	0.0242	4.6E-15	67.8	3.1	2.99	7.7	0.5
1175	0.6410	2.61	11.96	0.0186	5.2E-15	63.9	2.8	2.60	6.7	0.4
1200	0.6900	2.48	11.81	0.0198	3.2E-15	66.7	3.0	2.49	6.4	0.5
1250	0.7770	3.11	11.73	0.0121	4.4E-15	46.3	1.9	3.11	8.0	0.3
1400	1.0000	3.12	11.47	0.0116	1.1E-14	45.1	1.8	3.11	8.0	0.1

Sample No. 5 (hornblende)

Field No. Waik-3

Mass = 14.81mg

J-value = 0.001528 ± 0.000008

University of Las Vegas laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. Easting (m) Northing (m) Elev. (m)

H35 2,272,894 5,745,981 261

Temp. (°C)	Cum. Frac. ³⁹ Ar	⁴⁰ Ar/ ³⁹ Ar	³⁷ Ar/ ³⁹ Ar	³⁶ Ar/ ³⁹ Ar	Vol. ³⁹ Ar (mol)	%Atmos. ⁴⁰ Ar	Ca/K	⁴⁰ Ar*/ ³⁹ Ar	Age (Ma)	± 1ω (Ma)
750	0.0040	3003.73	4.43	8.6932	4.7E-17	84.7	10.2	458.88	958.54	18.1
850	0.0542	86.74	1.74	0.2486	6.0E-16	83.9	4.0	14.00	38.18	0.9
950	0.1207	28.58	3.24	0.0794	7.9E-16	81.3	7.5	5.33	14.64	0.3
990	0.1788	17.19	6.18	0.0419	6.9E-16	71.3	14.3	4.94	13.58	0.2
1020	0.2332	13.80	4.72	0.0338	6.4E-16	71.8	10.9	3.89	10.69	0.2
1040	0.3056	15.27	6.24	0.0262	8.6E-16	50.2	14.4	7.61	20.86	0.2
1060	0.3894	11.79	6.87	0.0186	9.9E-16	46.2	15.9	6.34	17.38	0.2
1080	0.4192	8.94	6.86	0.0178	3.5E-16	58.2	15.9	3.75	10.3	0.3
1110	0.4698	7.86	11.23	0.0182	6.0E-16	67.9	26.0	2.52	6.943	0.2
1135	0.5815	8.89	9.06	0.0159	1.3E-15	52.5	21.0	4.22	11.606	0.1
1155	0.6705	9.18	8.71	0.0132	1.1E-15	42.2	20.1	5.31	14.583	0.1
1185	0.7906	9.00	8.12	0.0117	1.4E-15	38.0	18.8	5.58	15.305	0.2
1210	0.8361	7.47	8.05	0.0072	5.4E-16	28.2	18.6	5.37	14.732	0.2
1280	0.9282	8.09	8.00	0.0093	1.1E-15	33.5	18.5	5.38	14.764	0.1
1340	0.9713	4.52	7.99	0.0003	5.1E-16	0.4	18.5	4.51	12.39	0.2
1400	1.0000	7.76	8.08	0.0069	3.4E-16	25.8	18.7	5.78	15.852	0.6

Sample No. 6 (hornblende)

New Zealand 1:50,000 Topographic Series Grid Reference

Field No. Waik-2

Sheet No. Easting (m) Northing (m) Elev. (m)

Mass = 23.43mg

H35 2,272,796 5,746,767 219

J-value = 0.001516 ± 0.000008

University of Las Vegas laboratory

Temp. (°C)	Cum. Frac. ³⁹ Ar	⁴⁰ Ar/ ³⁹ Ar	³⁷ Ar/ ³⁹ Ar	³⁶ Ar/ ³⁹ Ar	Vol. ³⁹ Ar (mol)	%Atmos. ⁴⁰ Ar	Ca/K	⁴⁰ Ar*/ ³⁹ Ar	Age (Ma)	± 1ω (Ma)
750	0.0093	1470.55	2.29	3.0742	1.74E-16	61.1	5.3	573.23	1128.3	6.7
850	0.1046	58.52	0.78	0.1422	1.78E-15	71.1	1.8	16.93	45.7	0.5
950	0.2074	26.38	0.71	0.0642	1.92E-15	71.2	1.6	7.60	20.7	0.2
990	0.2693	17.68	1.19	0.0346	1.16E-15	57.3	2.8	7.55	20.5	0.2
1020	0.3552	16.80	2.83	0.0192	1.60E-15	33.4	6.5	11.18	30.3	0.2
1040	0.4445	24.14	4.87	0.0220	1.67E-15	26.7	11.2	17.71	47.8	0.3
1060	0.5375	34.42	5.90	0.0271	1.73E-15	23.0	13.6	26.51	71.1	0.4
1080	0.6375	29.77	6.31	0.0228	1.87E-15	22.4	14.6	23.10	62.1	0.4
1095	0.6751	14.79	3.57	0.0141	7.02E-16	27.9	8.2	10.66	28.9	0.2
1110	0.7009	11.21	4.79	0.0116	4.81E-16	30.3	11.1	7.86	21.4	0.2
1130	0.7269	17.08	7.11	0.0172	4.85E-16	29.5	16.4	12.11	32.8	0.3
1155	0.7678	31.24	8.25	0.0252	7.63E-16	23.6	19.1	23.95	64.3	0.4
1185	0.8141	50.71	9.52	0.0358	8.65E-16	20.7	22.0	40.36	107.1	0.6
1220	0.8645	61.80	9.84	0.0430	9.41E-16	20.3	22.8	49.37	130.2	0.8
1260	0.9303	48.53	9.58	0.0320	1.23E-15	19.3	22.2	39.26	104.3	0.6
1300	0.9769	40.04	9.24	0.0276	8.69E-16	20.2	21.4	32.07	85.6	0.5
1400	1.0000	41.02	9.40	0.0300	4.32E-16	21.4	21.8	34.52	92.0	0.7

Sample No. 7 (hornblende)

Field No. I53b

Mass = 118.8mg

J-value = 0.001870 ± 0.000006

ANU (PRISE) laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. Easting (m) Northing (m) Elev. (m)

H35 2,283,797 5,753,983 200

Temp (°C)	Cum. Frac. ^{39}Ar	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	Vol. ^{39}Ar $\times 10^{-14}$ mol	%Atmos. ^{40}Ar	Ca/K	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	$\pm 1\omega$ (Ma)
600	0.0095	133.45	14.52	0.4273	0.509	6.4	27.9	8.59	28.7	4.2
700	0.0281	68.09	6.20	0.2137	0.980	8.1	11.8	5.52	18.5	2.5
750	0.0392	93.78	2.16	0.2888	0.590	9.2	4.1	8.60	28.8	3.0
800	0.0474	87.81	2.90	0.2772	0.433	7.0	5.5	6.14	20.6	3.0
900	0.1050	20.17	10.51	0.0631	3.061	12.4	20.1	2.52	8.5	0.7
950	0.1377	13.70	15.40	0.0405	1.742	23.0	29.6	3.20	10.8	0.3
1000	0.3657	9.04	11.63	0.0243	1.212	32.4	22.3	2.95	9.9	0.2
1050	0.4536	8.32	12.03	0.0226	4.673	33.0	23.1	2.77	9.3	0.3
1080	0.6394	10.53	11.96	0.0312	9.884	22.9	22.9	2.44	8.2	0.2
1100	0.7625	8.96	12.14	0.0246	6.549	31.1	23.3	2.81	9.5	0.2
1125	0.8446	7.62	12.06	0.0201	4.366	36.5	23.1	2.81	9.5	0.4
1175	0.8920	7.10	11.96	0.0179	2.519	40.8	22.9	2.92	9.8	0.2
1300	0.9939	6.64	11.92	0.0168	5.418	41.4	22.9	2.77	9.3	0.2
1400	1.0000	23.11	12.04	0.0681	0.326	17.7	23.1	4.13	13.9	1.2

Sample No. 8 (hornblende)

Field No. MG-9

Mass = 70.50mg

J-value = 0.001870 ± 0.000006

ANU (PRISE) laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. Easting (m) Northing (m) Elev. (m)

I35 2,293,601 5,761,953 235

Temp (°C)	Cum. Frac. ^{39}Ar	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	Vol. ^{39}Ar $\times 10^{-14}$ mol	%Atmos. ^{40}Ar	Ca/K	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	$\pm 1\omega$ (Ma)
600	0.0303	61.04	6.44	0.2065	0.993	1.0	12.3	0.60	2.0	2.2
700	0.0707	43.20	2.79	0.1437	1.324	2.2	5.3	0.95	3.2	1.4
800	0.0965	50.17	2.68	0.1572	0.842	7.9	5.1	3.95	13.3	1.9
900	0.1827	12.15	8.16	0.0373	2.835	15.3	15.6	1.87	6.3	0.4
950	0.2432	8.53	10.42	0.0249	1.990	24.8	20.0	2.13	7.2	0.2
1000	0.3920	7.41	11.27	0.0202	4.902	33.3	21.6	2.49	8.4	0.3
1050	0.4644	8.63	12.21	0.0252	2.385	26.5	23.4	2.31	7.8	0.2
1075	0.6585	9.05	11.92	0.0266	6.400	25.1	22.9	2.29	7.7	0.3
1085	0.7505	7.72	11.99	0.0216	3.030	31.6	23.0	2.46	8.3	0.2
1100	0.8165	6.90	11.79	0.0183	2.175	37.1	22.6	2.58	8.7	0.2
1125	0.8619	6.56	11.64	0.0169	1.498	39.9	22.3	2.64	8.9	0.2
1175	0.9552	5.92	11.69	0.0149	3.073	43.4	22.4	2.59	8.7	0.2
1300	0.9965	6.64	11.73	0.0172	1.362	39.8	22.5	2.66	9.0	0.2
1400	1.0000	41.81	11.74	0.1355	0.115	6.8	22.5	2.86	9.6	4.2

Sample No. 9 (hornblende)

Field No. TAL-25

Mass = 26.00mg

J-value = 0.002628 ± 0.00008

ANU (PRISE) laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. I35 Easting (m) 2,301,739 Northing (m) 5,763,130 Elev. (m) 250

Temp (°C)	Cum. Frac. ^{39}Ar	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	Vol. ^{39}Ar $\times 10^{-16}$ mol	%Atmos. ^{40}Ar	Ca/K	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	± 1 σ (Ma)
700	0.0005	937.90	11.09	2.8699	0.290	90.3	21.3	91.76	389.7	383.2
900	0.0055	177.20	13.27	0.5134	3.240	84.86	25.5	27.10	124.1	10.2
1000	0.0188	47.93	13.62	0.1545	8.430	92.38	26.2	3.69	17.4	3.9
1100	0.1272	12.63	14.33	0.0308	69.100	60.76	27.5	5.01	23.6	0.5
1120	0.2227	12.06	13.14	0.0270	60.900	55.12	25.2	5.47	25.7	0.5
1160	0.3704	10.00	12.52	0.0190	94.190	43.73	24.0	5.68	26.7	0.3
1200	0.5324	8.99	13.23	0.0217	103.300	56.57	25.4	3.95	18.6	0.3
1250	0.7474	9.16	13.09	0.0198	137.000	49.63	25.1	4.66	22.0	0.3
1300	0.9760	9.70	12.42	0.0182	145.800	42.66	23.8	5.62	26.4	0.2
1350	1.0000	38.47	12.49	0.1152	15.280	85.26	24.0	5.73	27.0	2.1

Sample No. 10 (hornblende)

Field No. TAL-5

Mass = 90.10mg

J-value = 0.001889 ± 0.000006

ANU (PRISE) laboratory

New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. I35 Easting (m) 2,301,287 Northing (m) 5,765,411 Elev. (m) 387

Temp (°C)	Cum. Frac. ^{39}Ar	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	Vol. ^{39}Ar $\times 10^{-16}$ mol	%Atmos. ^{40}Ar	Ca/K	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	± 1 σ (Ma)
600	0.0156	133.61	17.62	0.4286	0.580	6.4	33.9	8.728	29.50	5.29
700	0.0317	140.90	15.28	0.4496	0.598	6.7	29.4	9.548	32.25	5.25
800	0.0441	283.30	4.15	0.9087	0.456	5.3	7.9	15.169	50.97	9.43
850	0.0553	66.75	6.51	0.1917	0.413	16.0	12.4	10.718	36.16	2.88
900	0.0755	27.71	9.59	0.0710	0.746	27.4	18.4	7.644	25.86	1.34
950	0.1116	14.15	13.15	0.0350	1.337	35.5	25.2	5.073	17.20	0.46
1000	0.2187	12.46	13.18	0.0314	3.964	35.4	25.3	4.456	15.12	0.26
1050	0.5433	5.53	13.04	0.0127	12.020	54.0	25.0	3.018	10.25	0.14
1070	0.5762	11.34	13.42	0.0249	1.219	45.9	25.8	5.255	17.82	0.35
1080	0.6170	10.25	13.57	0.0250	1.509	40.2	26.0	4.159	14.12	0.31
1090	0.6753	9.82	13.55	0.0257	2.162	35.3	26.0	3.501	11.89	0.34
1105	0.7597	8.92	13.53	0.0216	3.128	42.5	26.0	3.828	13.00	0.20
1125	0.8421	8.36	13.40	0.0187	3.051	48.5	25.7	4.100	13.92	0.25
1150	0.8728	7.07	13.32	0.0176	1.135	43.9	25.6	3.135	10.65	0.23
1200	0.9571	7.45	12.94	0.0183	3.121	43.5	24.8	3.273	11.12	0.26
1300	0.9969	9.29	12.86	0.0255	1.474	31.5	24.7	2.955	10.04	0.52
1400	1.0000	44.29	12.85	0.1314	0.116	15.0	24.6	6.713	22.74	8.34

Sample No. 11 (hornblende)

Field No. SK-41

Mass = 27.47mg

J-value = 0.002628 ± 0.00008

ANU (PRISE) laboratory

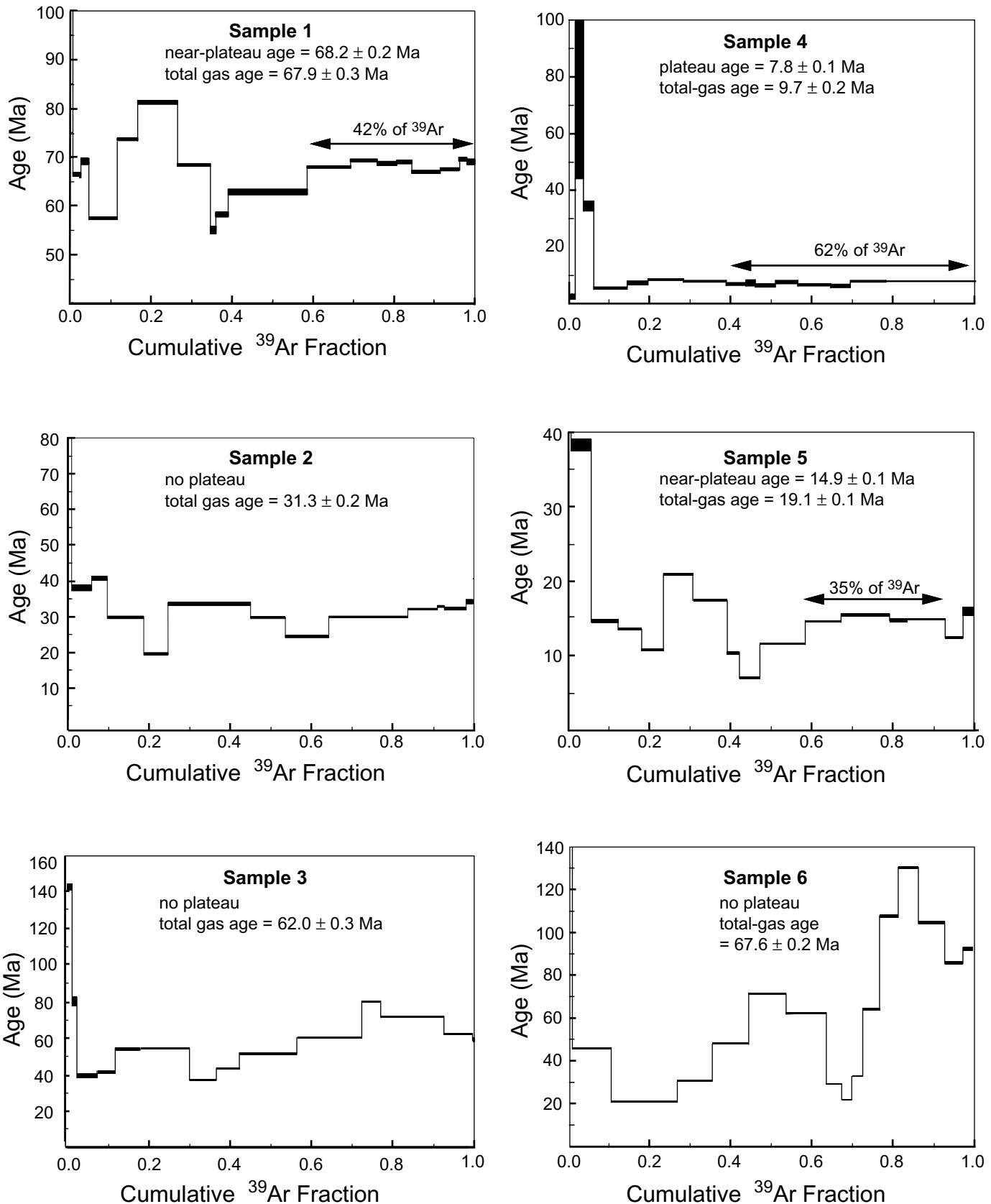
New Zealand 1:50,000 Topographic Series Grid Reference

Sheet No. Easting (m) Northing (m) Elev. (m)

J33 2,361,350 5,809,200 130

Temp (°C)	Cum. Frac. ³⁹ Ar	⁴⁰ Ar/ ³⁹ Ar	³⁷ Ar/ ³⁹ Ar	³⁶ Ar/ ³⁹ Ar	Vol ³⁹ Ar x10 ⁻¹⁶ mol	%Atmos. ⁴⁰ Ar	Ca/K	⁴⁰ Ar*/ ³⁹ Ar	Age (Ma)	± 1σ (Ma)
650	0.0005	6286.20	4.39	3.6088	0.350	16.96	8.4	5238.300	4857.0	19.0
750	0.0023	1821.80	4.46	0.7272	1.390	11.77	8.5	1613.000	2988.0	20.0
750	0.0029	556.40	2.50	1.3119	0.430	69.63	4.8	169.280	663.9	66.9
800	0.0046	412.10	1.97	0.5331	1.310	38.18	3.8	255.160	925.8	17.9
850	0.0080	272.10	2.30	0.3020	2.560	32.73	4.4	183.350	709.5	10.5
900	0.0121	274.30	3.41	3.0761	3.040	33.02	6.5	184.200	712.2	4.8
950	0.0154	422.80	5.33	0.4094	2.540	28.49	10.2	303.590	1058.0	7.4
1000	0.0205	181.40	7.57	0.2827	3.810	45.63	14.5	99.230	418.1	5.2
1050	0.0428	63.94	12.92	0.0771	16.800	33.59	24.8	42.900	194.1	1.3
1100	0.0766	48.55	14.56	0.0450	25.530	24.36	28.0	37.150	168.1	1.1
1100	0.4237	45.35	11.35	0.0167	261.600	8.4	21.8	41.910	188.5	0.9
1160	0.4498	45.71	11.21	0.0619	19.620	37.54	21.5	28.800	131.6	1.5
1180	0.4575	76.62	11.31	0.2017	5.790	76.31	21.7	18.310	84.8	4.3
1250	0.6869	28.93	11.43	0.0209	172.900	17.41	21.9	24.110	110.8	0.4
1300	0.8399	33.00	11.59	0.0259	115.300	19.69	22.2	26.740	122.5	0.5
1350	0.9294	36.65	11.44	0.0444	67.470	32.64	21.9	24.910	114.4	0.7
1400	0.9747	56.48	11.58	0.1154	34.090	58.32	22.2	23.760	109.3	1.3
1450	0.9935	153.8	11.55	0.4457	14.200	84.92	22.1	23.400	107.7	7.2
1450	1.0000	791.7	11.31	2.5958	4.910	96.75	21.7	25.970	119.1	28.3

Little et al., Fig. A



Little et al., Fig. A (continued)

