DATA FOR INCLUSION IN THE G.S.A. DATA REPOSITORY

$^{40}Ar/^{39}Ar$ age constraints on Taconic and Acadian events in the Quebec Appalachians

James Whitehead, Peter H. Reynolds and John G. Spray.

PREPARATION METHOD

Pure mineral separates were prepared from 60-100 mesh grains using a Frantz magnetic separator and hand picking. Al-foil wrapped samples were irradiated along with 5-8 aliquots of the flux monitor: hornblende standard, MMhb-1 (assumed age = 520 ± 2 Ma; Samson and Alexander, 1987). Isotope analyses were carried out by Faraday and electron multiplier collectors on a VG 3600 mass spectrometer. All errors are quoted at 2 sigma (and exclude errors in the determined age of the standard, MMhb-1).

$^{40}Ar/^{39}Ar$ RELEASE DATA

COMMON NOTES

Step age errors are at the 1sigma level for all samples.
All isotopic ratios are corrected for interfering isotopes.
The flux monitor used was MMHb-1, whose age was taken as 520 Ma (Samson and Alexander, 1987).
Lambda (the decay constant) = $5.543 \times 10^{-10} y^{-1}$
† denotes the absence of atmospheric Ar corrections, though blank corrections were applied.
* defines those steps used in the calculation of the spectra (and isochron) ages.

Sample A: Edenitic-, magnesio-, and ferroan-pargasitic hornblende.
Rock Sample: Dynamothermal sole amphibolite, A714-9
Location: South wall of the Flintkote Mine, Robertsonville, PQ.
Location: 46° 09' 00" N, 71° 19' 00" W
Association: Adjacent to serpentinised harzburgites of the Pennington Sheet.

INCREMENTAL HEATING DATA						ISOTOPE CORRELATION DATA			
Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{38}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$ (†)	% Error	$^{36}Ar/^{40}Ar$ (†)	% Error
750	12.8	681.7 ± 8.5	8.74	0.001178	0.003612				
800	9.9	488.0 ± 11.3	4.02	0.000794	0.006268				
850	9.7	443.3 ± 11.4	2.56	0.000627	0.007439				
900	18.2	408.8 ± 6.5	4.39	0.000496	0.008536				
950	21.8	428.1 ± 5.0	16.42	0.000479	0.008152				
975*	9.8	510.5 ± 11.6	28.62	0.000649	0.006286	0.6641026	2.133937	0.5239258	4.179157
1000*	12.5	519.7 ± 10.0	21.86	0.000531	0.006424	0.6548591	1.892657	0.4293306	3.294927
1025*	23.7	495.9 ± 3.1	19.27	0.000334	0.007247	0.7332426	0.6796269	0.2725991	2.99775
1050*	36.7	480.8 ± 2.4	17.59	0.000211	0.00781	0.7871943	0.5420886	0.1689263	3.019027
1070*	25.2	494.1 ± 2.9	17.33	0.00025	0.007477	0.7559655	0.643544	0.1908392	3.351603
1090*	11.6	503.3 ± 10.7	18.32	0.000431	0.006898	0.7063799	2.154229	0.3083689	4.199838
1110*	8.2	477.2 ± 7.3	19.9	0.000637	0.00682	0.7057973	1.506065	0.4712454	3.971056
1140*	14.9	494.0 ± 4.6	18.99	0.000447	0.007011	0.7141606	0.9600474	0.3521423	3.279321
1170*	14.9	504.9 ± 4.8	18.87	0.000599	0.006484	0.6594467	0.9178693	0.5135451	2.741289
1200*	12.0	501.3 ± 9.3	18.16	0.000812	0.006036	0.6152808	1.624175	0.7185011	2.564302
1250*	14.2	491.7 ± 10.1	17.28	0.000812	0.00617	0.627357	1.784582	0.7328204	2.404617
1300*	16.7	486.8 ± 10.1	16.91	0.000962	0.005878	0.5957198	1.703414	0.900128	2.265059
1350*	40.4	496.5 ± 3.4	16.59	0.000765	0.006213	0.6250426	0.5863413	0.7374374	2.13002
1400*	17.0	514.8 ± 8.9	16.49	0.001436	0.004434	0.4465733	1.114625	1.399459	2.08583
1450	5.1	776.2 ± 68.1	16.51	0.002406	0.001366				

J = .002545

Slope = -3.777076 ± 0.1952843
Y - Intercept = 3.07167 ± 0.1370176

Sample B: Magnesio-Hornblende
Rock Sample: Dynamothermal sole amphibolite, A64-1
Location: SW Belmina Ridge, St.Jacques-le Majeur, PQ
Location: 45° 56' 50" N, 71° 28' 35" W
Association: 134 metres above basal sole contact, beneath the Thetford Mines Ophiolite.

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{38}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$ (†)	% Error	$^{36}Ar/^{40}Ar$ (†)	% Error
765	23.0	475.7 ± 5.9	3.69	0.000946	0.005279				
950	64.3	476.4 ± 2.7	6.2	0.000449	0.006344				
975	9.5	468.7 ± 6.5	20.27	0.000533	0.00628				
1000	10.1	504.7 ± 8.9	17.02	0.000442	0.005955				
1025*	23.4	481.9 ± 6.2	11.43	0.000288	0.006607	0.6664606	1.366512	0.2276029	2.415038
1050*	79.5	478.4 ± 2.5	9.6	0.000119	0.007025	0.7042117	0.5770423	0.1013642	1.820051
1070*	127.0	478.4 ± 2.1	9.12	0.000075	0.00712	0.7130112	0.5017212	0.0645343	1.654348
1090*	88.7	476.2 ± 2.2	9.1	0.000082	0.007142	0.7156675	0.5286918	0.0607686	2.075377
1110*	16.6	461.3 ± 5.2	9.71	0.000306	0.006902	0.7000338	1.192305	0.2153782	3.742197
1150*	20.1	480.1 ± 5.0	10.57	0.000336	0.006531	0.6598346	1.091855	0.2667891	2.407002
1200*	38.5	480.8 ± 3.7	10.58	0.000528	0.00611	0.6138892	0.7152606	0.4963629	1.365717
1250*	17.0	488.0 ± 5.6	9.24	0.000724	0.005594	0.5512588	1.002595	0.7246851	1.100165
1300*	21.3	482.0 ± 6.0	9.35	0.000887	0.005327	0.5362013	0.9899596	0.8412726	1.2053
1350*	40.6	486.8 ± 4.2	9.05	0.000589	0.005894	0.5919264	0.7872044	0.5607359	1.150313
1400*	24.9	503.7 ± 5.9	8.99	0.00112	0.004593	0.4608986	0.7213347	1.089656	1.088334
1450*	9.8	495.8 ± 13.6	8.87	0.001569	0.003748	0.3757427	1.574493	1.51774	1.120703

Slope = -4.165461 ± 0.07897666
Y - Intercept = 3.039724 ± .04999208
X - Intercept = 0.7297447

J = 0.002212
Total gas age = 480.2 Ma

Sample C: Muscovite
Rock Sample: Muscovite bearing intersheared amphibolite/metasediment, A99-A
Location: SW Belmina Ridge, St.Jacques-le Majeur, PQ
Location: 45° 55' 32" N, 71° 28' 29" W
Association: 0 metres above basal sole contact, beneath the Thetford Mines Ophiolite.

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$
650	22.4	415.9 ± 3.1	0.06	0.000306	0.008934
700*	30.1	448.7 ± 1.9	0.01	0.000199	0.00849
775*	74.6	463.7 ± 1.6	0	0.000095	0.008446
800*	75.5	459.6 ± 1.7	0	0.000078	0.008573
825*	94.3	462.0 ± 1.2	0	0.000068	0.008548
850*	119.3	460.7 ± 1.0	0	0.000054	0.008611
875*	148.8	461.6 ± 1.0	0	0.000049	0.008607
900*	128.7	461.3 ± 1.1	0	0.000053	0.008604
925*	101.6	460.2 ± 1.3	0.01	0.000065	0.008594
960*	102.1	461.6 ± 1.3	0.02	0.000077	0.008535
990*	89.3	460.4 ± 1.2	0.01	0.000072	0.008572
1020*	51.1	465.5 ± 1.8	0.02	0.000097	0.008402
1060	9.4	523.6 ± 8.7	0.16	0.000607	0.006207
1100	1.4	713.7 ± 108.	0.45	0.000847	0.003817

J = .002547
Total gas age = 461.0 Ma

Sample D: Muscovite
Rock Sample: Muscovite bearing intersheared amphibolite/metasediment, A573-7
Location: SW Belmina Ridge, St.Jacques-le Majeur, PQ
Location: 45° 56' 30" N, 71° 28' 10" W
Association: 1 metre above basal sole contact, beneath the Thetford Mines Ophiolite.

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$
700	28.2	455.0 ± 2.2	0.01	0.000256	0.008182
750*	52.2	470.3 ± 1.4	0	0.000124	0.008215
775*	82.8	464.4 ± 1.3	0	0.000095	0.008406
805*	159.8	466.3 ± 1.1	0	0.00006	0.008456
830*	134.1	462.5 ± 1.1	0	0.000055	0.008549
860*	154.3	462.8 ± 1.0	0	0.000039	0.008585
890*	135.9	462.4 ± 1.1	0	0.00006	0.008538
920*	98.3	464.7 ± 1.3	0	0.000078	0.008446
950*	96.7	464.4 ± 1.1	0.02	0.000095	0.008408
980*	99.2	460.0 ± 1.3	0.01	0.000089	0.008515
1020*	90.8	470.0 ± 1.4	0.01	0.000044	0.008422
1100*	25.3	461.6 ± 2.8	0.14	0.000422	0.007623
1250	16.8	486.4 ± 7.2	0.12	0.001457	0.004672

J = .002541
Total gas age = 464.4 Ma

Sample E: Muscovite
Rock Sample: Quartz-Muscovite-Garnet schist, A329-1
Location: 2 km towards Disraeli from Lac Breeches, PQ along route 263.
Location: 45° 55' 00" N, 71° 26' 16" W
Association: Caldwell Group metasedimary schists in the Carineault Hills window.

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$
650	64.8	419.7 ± 1.2	0	0.000149	0.009289
700	78.8	439.6 ± 1.3	0	0.000143	0.008835
775	260.4	449.4 ± 1.0	0	0.000073	0.008806
800	252.8	455.6 ± 1.0	0	0.000031	0.008779
825	349.6	457.8 ± 1.0	0	0.000019	0.008762
850	225.3	459.7 ± 1.0	0	0.00002	0.008718
875*	221.1	459.0 ± 1.0	0	0.000022	0.008729
900*	173.7	458.0 ± 1.0	0	0.000028	0.008734
930*	181.0	458.1 ± 1.0	0	0.000037	0.008709
960*	152.5	459.7 ± 1.0	0	0.000048	0.008647
990*	164.5	459.5 ± 1.0	0	0.000035	0.008684
1020*	283.4	460.1 ± 1.0	0	0.000038	0.008653
1050*	182.2	462.2 ± 1.1	0	0.000033	0.008634
1080*	78.7	460.7 ± 1.3	0.01	0.000077	0.00855
1150*	18.9	459.0 ± 4.7	0.11	0.000586	0.007265
1250	4.3	434.7 ± 32.2	0.28	0.00237	0.002797

J = .002547
Total gas age = 456.5 Ma

Sample F: Muscovite
Rock Sample: Dynamothermal sole amphibolite, B822-1
Location: Colline Beliveau, Asbestos, PQ.
Location: 45° 46' 22" N, 71° 58' 16" W
Association: Muscovite-bearing amphibolite, 100m from basal contact with Caldwell Group.

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$
600	15.8	431.1 ± 5.4	0.02	0.000257	0.007701
650	18.4	442.8 ± 6.7	0	0.000162	0.007699
700	25.8	436.7 ± 3.6	0.01	0.000136	0.007883
750	79.3	458.1 ± 2.3	0	0.000056	0.007652
780	78.2	459.5 ± 2.1	0	0.000046	0.007651
810	93.6	459.4 ± 2.0	0	0.000043	0.00766
840*	151.5	463.7 ± 2.0	0	0.000034	0.007599
870*	120.8	462.7 ± 2.0	0	0.000032	0.007622
900*	115.1	465.0 ± 2.0	0	0.000036	0.00757
930*	63.4	466.3 ± 2.5	0.01	0.000052	0.00751
1000*	85.0	466.3 ± 2.1	0.01	0.000042	0.007534
1100*	28.9	469.6 ± 4.0	0.05	0.000136	0.007262
1200	8.4	699.3 ± 24	0.08	0.000479	0.004079

J = .002251
Total gas age = 463.7 Ma

Sample G: Muscovite
Rock Sample: Muscovite-bearing intersheared amphibolite/metasediment, B819-3
Location: Colline Beliveau, Asbestos, PQ.
Location: 45° 46' 27" N, 71° 58' 00" W
Association: 0 metres above the basal sole contact of the Asbestos Ophiolite.

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$
600	26.7	448.0 ± 3.1	0.01	0.000252	0.00739
650	49.4	460.1 ± 2.2	0	0.000089	0.007544
700	117.3	456.5 ± 2.0	0	0.000058	0.007681
750	152.8	459.7 ± 2.0	0	0.000037	0.007671
780	237.7	459.5 ± 1.9	0	0.000025	0.007701
810	232.8	459.6 ± 1.9	0	0.000024	0.007702
840	228.8	461.6 ± 1.9	0	0.000021	0.007671
880*	272.8	463.6 ± 1.9	0	0.000023	0.007628
910*	146.2	464.8 ± 2.0	0	0.000039	0.007571
940*	103.8	468.1 ± 2.1	0	0.000046	0.007494
970*	74.5	465.2 ± 2.4	0	0.000064	0.007506
1020*	51.1	465.5 ± 2.4	0.01	0.000073	0.007481
1070*	31.9	467.2 ± 2.9	0.05	0.000215	0.00713
1120	10	495.9 ± 14.2	0.05	0.000453	0.006162
1200	11.1	466.2 ± 4.2	0.06	0.000992	0.005396

J = .002252
Total gas age = 461.9 Ma

Sample H: Muscovite
Rock Sample: Caldwell Group phyllite, B38
Location: NW wall, Mine Jeffrey, Asbestos, PQ.
Location: 45° 46' 30" N, 71° 57' 34" W
Association: Caldwell phyllite beneath the Asbestos ophiolite.

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$
600	24.5	351.5 ± 4.9	0.02	0.000131	0.010061
650	44.1	400.0 ± 2.1	0.01	0.00007	0.008885
700	57.4	410.6 ± 2.2	0	0.000076	0.008615
750	118.3	421.5 ± 1.8	0	0.000026	0.00849
780	65.2	437.7 ± 2.3	0	0.000031	0.008126
810	73.1	443.1 ± 2.3	0	0.000032	0.00801
840	58.9	445.2 ± 2.1	0.01	0.000036	0.007959
870	66.6	446.9 ± 2.1	0.01	0.000036	0.007926
900	73.8	450.9 ± 2.5	0	0.000032	0.007855
930	88.4	458.4 ± 2.2	0	0.000031	0.007713
960	67.8	455.5 ± 2.2	0	0.000031	0.007768
990	84.5	458.6 ± 2.2	0	0.000026	0.00772
1020*	91.2	462.0 ± 2.1	0	0.000031	0.007645
1050*	46.1	460.3 ± 2.7	0.01	0.000076	0.007573
1100*	15.5	479.7 ± 4.6	0.04	0.000178	0.007003
1200	7.5	426.6 ± 11.5	0.19	0.000849	0.006323

J = .002253
Total gas age = 441.7

Sample I: Orthoclase inclusions in low-K edenitic hornblende.
Rock Sample: *Dynamothermal sole amphibolite*, B3
Location: NW wall, Mine Jeffrey, Asbestos, PQ
Location: 45° 46' 50" N, 71° 58' 50" W
Association: Amphibolite dynamothermal sole <1m beneath the Asbestos Ophiolite

Temperature (°C)	mV ^{39}Ar	Age (Ma)	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{40}Ar$	$^{39}Ar/^{40}Ar$
750*	34.7	388.9 ± 3.2	1.35	0.000644	0.007445
800*	33.9	397.0 ± 3.2	1.27	0.000499	0.007659
850*	28.8	371.4 ± 3.6	1.08	0.000199	0.009104
900*	53.1	358.2 ± 2.4	4.36	0.000158	0.009599
950*	28.3	365.3 ± 2.2	12.85	0.000261	0.009096
975*	14.4	384.2 ± 5.0	10.91	0.000358	0.008332
1000*	13.4	374.6 ± 5.8	9.25	0.000366	0.008547
1025*	13.8	401.9 ± 4.9	15.73	0.000424	0.007755
1050	15.2	466.6 ± 4.9	30.72	0.000362	0.006692
1075	10.7	475.6 ± 8.0	35.13	0.0004	0.006466
1100	5.3	361.3 ± 24.4	17.98	0.0001	0.007028
1140	5.4	419.3 ± 18.2	30.36	0.000678	0.00676
1420	3.1	357.9 ± 44.8	23.5	0.000189	0.004452

J = .002213
Total gas age = 387.0 Ma