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Title of article Ordovician and Silurian metamorphic cooling ages along the Laurentian margin of the Quebec Appalachians: Bridging the gap between New Engla and Newfoundland

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SEE:

___ *GSA Bulletin*

_X_ *Geology*

___ *GSA Today*

_____ v. 25 #7, p. 583 - 586

Contents

5 pg.

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ANALYTICAL PROCEDURES

The single grains of muscovite used for the experiments were carefully handpicked under a binocular microscope from the 0.25 to 0.5 mm fraction of the crushed rock sample. The handpicking criteria for monocrystals were a good preservation of the surface texture, minimal alteration, and an automorph shape of the minerals. The samples were wrapped in Al foil to form small packets (11 x 11mm.). The packets were staked up to form a pile within which were inserted packets of irradiation standard. The pile, put in an irradiation can, was irradiated for 70 hr at the McMaster reactor (Hamilton, Canada) with a total flux of 9 x 10^{18} $n.cm^{-2}$. The irradiation standard was the amphibole Hb3gr (1071.7+/-5.4 Ma; Zartman, 1964; Turner et al., 1971; Roddick, 1983). The sample arrangement allows to monitor the flux gradient with a precision of ±0.2%.

The step-heating experiments on single grains (described in details by Ruffet et al., 1991, 1995) were performed with a laser-probe using a Coherent Innova 70-4 continuous argon-ion laser model with a maximum output power of 6 W in multiline mode. The laser beam is focused through an optical system onto a sample located in a Ultra High Vacuum (UHV) sample chamber.

Each experiments (heating phase) lasts for 3 min 40 s: (1) 3 minutes in the purification line (cold trap and getter) (which includes 1 min of laser heating); (2) 40 s of inlet time into the VG3600 mass spectrometer. The static measurements of argon isotopes (40, 39, 38, 37, 36) consist of 11 peak hopping scans. Blanks are performed routinely each third run, and are subtracted from the subsequent sample gas fractions.

To define a plateau age, we need a minimum of three consecutive steps, corresponding to a minimum of 70% of the total $^{39}Ar_K$ released, and the individual fraction ages should agree within 2σ with the integrated age of the plateau segment.

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$^{40}Ar/^{39}Ar$ STEP-HEATING DATA

Muscovite A (Q1-26/2; V350)

Step n°	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma)
1	57.563	0.06	0.000	13.634	372.1±99.4
2	22.835	0.33	0.000	14.244	387.1±14.9
3	8.378	0.82	0.000	16.580	443.4±5.9
4	2.609	3.01	0.002	17.128	456.3±1.9
5	1.335	4.69	0.002	17.408	462.9±1.5
6	0.181	28.92	0.001	17.592	467.2±0.7
7	0.158	19.34	0.000	17.621	467.9±0.7
8	0.185	4.12	0.000	17.574	466.8±1.4
9	0.029	10.41	0.000	17.646	468.5±0.8
10	0.029	10.09	0.000	17.661	468.8±1.1
11	0.021	5.83	0.001	17.603	467.5±1.5
12	0.000	5.73	0.000	17.677	469.2±2.3
13	0.000	4.27	0.000	17.705	469.9±1.6
14	0.000	1.23	0.000	17.740	470.7±4.2
15	0.000	0.57	0.000	17.903	474.5±7.4
fuse	4.357	0.59	0.000	17.325	461.0±8.4

Muscovite B (Q1-26/1; V638)

Step n°	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma)
1	47.903	0.56	0.006	11.096	276.1±94.9
2	33.925	0.72	0.021	14.522	353.5±83.5
3	11.795	1.92	0.014	17.448	417.1±25.8
4	1.499	4.76	0.000	20.135	473.5±5.3
5	0.596	59.33	0.000	19.544	461.2±0.9
6	0.406	17.68	0.000	19.611	462.6±2.3
7	2.248	6.17	0.007	19.031	450.5±6.7
8	0.139	5.04	0.000	19.504	460.4±10.0
fuse	2.762	3.81	0.030	19.340	457.0±14.4

Muscovite C (95-DOM-01; v640)

Step n°	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma)
1	2.691	2.06	0.005	18.936	457.8±6.5
2	0.000	1.69	0.000	19.523	470.3±8.0
3	1.567	3.30	0.000	19.339	466.4±5.5
4	0.633	35.34	0.001	19.168	462.8±0.8
5	0.411	39.17	0.004	19.131	462.0±0.7
fuse	0.598	18.45	0.019	19.095	461.2±1.0

Muscovite D (95-SC-18; v607)

Step n°	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma)
1	19.780	0.47	0.018	16.036	404.7±39.3
2	10.906	1.01	0.014	16.144	407.1±26.9
3	5.049	1.21	0.002	16.200	408.4±18.0
4	13.896	2.97	0.004	16.639	418.2±7.2
5	0.000	1.79	0.000	17.412	435.5±9.2
6	1.340	65.87	0.001	16.748	420.7±0.7
7	1.228	9.73	0.001	16.628	418.0±2.0
fuse	0.359	16.95	0.001	16.874	423.5±1.1

Muscovite E (94-AT-10b; v343)

Step n°	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma)
1	8.021	0.96	0.000	15.462	418.3±8.3
2	0.207	2.03	0.000	15.778	425.9±4.3
3	0.638	47.06	0.000	15.713	424.3±0.7
4	0.065	14.39	0.000	15.650	422.8±0.7
fuse	0.129	35.57	0.000	15.802	426.4±0.6

Muscovite F (94-SC-56; v336)

Step n°	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma)
1	7.955	2.90	0.000	15.540	417.8±6.1
2	27.653	3.81	0.000	15.590	419.0±4.5
3	8.351	1.06	0.000	15.427	415.1±13.3
4	0.678	44.80	0.000	15.823	424.6±0.7
5	0.403	16.48	0.001	15.795	423.9±1.1
6	0.000	7.06	0.003	15.910	426.7±2.4
7	0.000	7.04	0.002	15.837	424.9±2.2
fuse	0.201	16.86	0.002	15.870	425.7±1.1

Muscovite G (94-SC-67; v347)

Step n°	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma)
1	41.144	0.37	0.000	9.682	271.4±88.6
2	5.451	1.38	0.000	16.631	443.8±19.6
3	0.140	24.62	0.000	15.964	427.9±1.9
4	0.000	27.29	0.003	15.833	424.8±1.4
5	0.000	9.47	0.004	15.806	424.2±3.9
6	0.000	10.08	0.006	15.817	424.4±3.5
7	0.729	12.80	0.009	15.631	420.0±2.8
8	0.000	9.89	0.158	15.984	428.4±2.8
fuse	2.057	4.09	0.065	15.612	419.5±8.7