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Supplementary Materials

U–Pb Geochronology of Hydrothermal Monazite from Uraniferous Greisen Veins associated with the High Heat Production Mount Douglas Granite, New Brunswick, Canada

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Table S1. Results of *in-situ* LA-ICP-MS U-Pb geochronology of 44069 monazite standard.

Spot	Approx. Conc.		U/Th	^{204}Pb	^{206}PbCps/	%Pb*	Final Isotope Ratios				err.	Age (Ma)				%conc.
	U (ppm)	Th (ppm)		(Cps)	^{204}PbCps		^{207}Pb/^{235}U	2σ	^{206}Pb/^{238}U	2σ	corr.	^{207}Pb/^{235}U	2σ	^{206}Pb/^{238}U	2σ	
44069-1	4141	30780	0.13	18	1081	99.29	0.510	0.019	0.068	0.001	0.133	418	13	423	7	101.1
44069-2	5544	36300	0.15	−15	−1698	99.52	0.503	0.020	0.068	0.001	0.305	416	14	424	8	101.9
44069-3	3676	37610	0.10	7	2541	99.69	0.498	0.021	0.069	0.001	0.127	412	14	431	8	104.6
44069-4	2769	29120	0.10	−25	−540	99.09	0.529	0.023	0.068	0.001	0.147	434	16	422	8	97.2
44069-5	2769	29120	0.10	−25	−540	99.09	0.529	0.023	0.068	0.001	0.147	434	16	422	8	97.2

Note: Approx. conc. = Approximate concentrations; Cps: Count per second; %Pb: percentage of radiogenic Pb calculated from Andersen's method [46]; 2σ = two standard deviations; err. corr. = error correlation; %conc. = degree of discordance calculated as 100 × [(^{206}Pb/^{238}U)$_{age\ (Ma)}$ / (^{207}Pb/^{235}U)$_{age\ (Ma)}$-1].

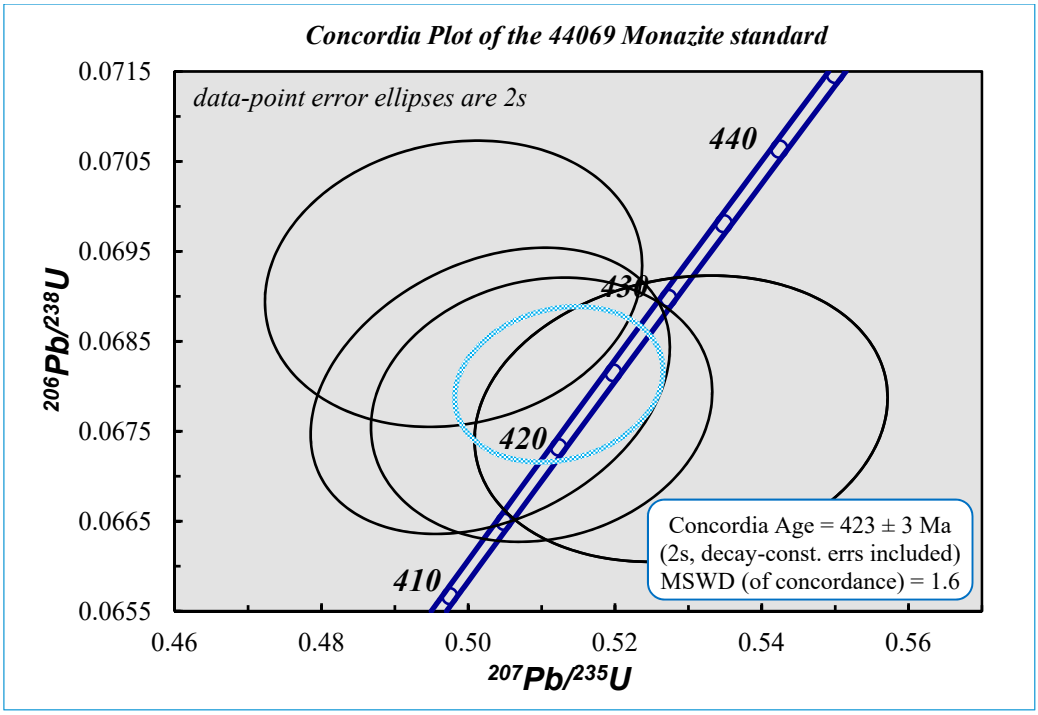

Figure S1. Results of U-Pb geochronology of the 44069 monazite standard that was used to check the accuracy of the data (424.9 ± 0.4 Ma; [37].

Laser ablation ICP-MS whole-rock geochemical analyses of selected granites from the Mount Douglas Granite

Analytical Procedures

Whole-rock analytical data from 79 samples of various units from the Mount Douglas Granite were compiled from McLeod (1990), and an additional 9 least-altered granite samples were analyzed for major- and selected trace-elements, including rare earth elements (REEs).

The method was applied on fused glass beads produced in-house using a carbon strip heater. To produce the fused glass beads, 100 mg of fine powder of each sample was combined with 200 mg of lithium meta/tetra borate flux to create a 2:1 ratio and then the mixture was homogenized in acetone using a mortar and pestle. Then, approximately50 mg of the dried mixture was added to a carbon strip heater and the temperature was increased until the solution started to melt. Once a clear transparent liquid sphere was produced, the liquid was quenched by simultaneously turning off the power and increasing inert gas flow. A sub-spherical glass bead was then removed from the carbon strip heater and mounted in an epoxy puck and left to cure overnight. The puck was polished using various grits of sandpaper until the cores of each bead were exposed. The puck was then polished with 6, 3, and 1 μm diamond paste. Once the puck was cleaned in ethanol, it was then carbon coated and analyzed using SEM/EDS for major element chemistry. Major elements were obtained by a JEOL JSM 6400 Scanning Electron Microscope equipped with an EDAX Genesis X-ray microanalysis system (SEM-EDS) at the University of New Brunswick. The accelerating voltage was 15 kV with the probe current of approximately 1.5 nA. Spectra were collected for 50 s live-time. Trace-element analyses were performed using LA-Q-ICP-MS with a 45 μm diameter crater. Standards used were NIST-610 (primary concentration standard), NIST-612 (secondary concentration standard), and BCR-2G (QC standard). To check the precision and accuracy on the fusion beads, standards of BCR-2, GSP-2, and SY-4 were fused in the same manner and used as certified reference materials. The geochemical results are displayed in Table 1. Loss on ignition (LOI) content of the samples were measured at 1100 °C in the Geochemistry Lab of the Department of Earth Sciences at UNB.

Table S2. Laser ablation ICP-MS whole-rock geochemical analyses of selected granites from the Mount Douglas Granite. Oxides are in wt.% and elements are in ppm.

Unit	**Dmd1**			**Dmd2**				**Dmd3**	
Sample	161-4	50-3C	79-6	110-2	117-7	15-53	15-54	115-5	139-5A
SiO_2	71.16	75.34	74.16	75.5	73.62	77.92	77.11	73.47	77.46
TiO_2	0.80	0.60	0.49	0.67	0.61	0.18	0.08	0.75	0.22
Al_2O_3	13.75	12.24	13.03	12.05	12.8	12.03	11.69	12.50	12.4
FeO	2.79	1.99	1.49	1.84	1.98	1.71	1.25	2.42	1.57
MnO	0.73	0.43	0.4	0.5	0.54	0.04	0.04	0.64	0.57
MgO	0.58	0.2	0.37	0.05	0.15	0.17	0.11	0.53	0.25
CaO	1.13	0.65	0.49	0.65	0.27	0.33	0.31	0.67	0.15
Na_2O	3.28	2.65	3.58	3.01	3.3	2.6	2.75	3.11	3.63
K_2O	5.04	5.09	5.26	4.89	5.99	5.16	4.53	5.2	3.17
P_2O_5	0.05	0.02	0.00	0.00	0.00	-	-	0.03	0.01
LOI	0.98	1.22	0.44	0.77	0.2	2.16	0.79	0.58	0.98
Total	100.3	100.45	99.713	99.918	99.468	102.3	98.661	99.89	100.42
Cl	0.2	0.3	0.2	0.4	0.2	-	-	0.3	0.1
Rb	243.6	347.7	342.6	351.6	386.2	282.9	251.2	307.3	281.6
Cs	5.5	11.0	6.3	6.5	6.5	8.4	5.1	6.3	4.4
Ba	397.0	83.7	108.9	42.3	88.9	122.8	110.1	158.0	61.9
Sr	118.9	26.5	33.0	20.7	25.3	40.1	34.5	51.1	34.3
Be	4.0	6.9	3.7	5.2	4.8	-	-	5.2	3.7
W	1.0	2.6	2.2	1.7	2.8	3.4	1.8	6.1	6.5
Ta	1.5	3.5	3.8	2.9	4.3	2.6	2.0	2.1	3.6
Nb	18.1	27.3	24.8	19.7	25.5	26.6	18.2	18.3	33.3
Hf	7.1	3.9	4.7	5.4	2.8	7.0	3.4	5.2	6.8
Zr	237.7	102.9	139.0	135.6	60.8	238.6	83.6	181.9	176.9
Y	35.5	76.0	28.7	29.2	52.5	56.7	25.7	37.9	36.1
La	57.0	53.9	35.9	41.5	38.0	54.0	8.1	72.1	24.9
Ce	88.4	114.4	76.4	82.0	89.3	116.2	40.7	141.0	75.5
Pr	10.0	12.8	7.6	7.8	7.8	12.6	2.3	13.5	5.3
Nd	36.9	46.9	24.5	28.2	27.1	47.4	9.3	45.9	19.1
Sm	6.1	10.9	3.6	4.5	5.3	9.6	3.0	7.6	3.9
Eu	0.8	0.2	0.1	0.2	0.2	0.2	0.1	0.3	0.1
Gd	4.9	10.1	3.2	4.3	5.6	8.1	2.9	6.2	3.1
Tb	0.9	1.9	0.6	0.8	1.1	1.6	0.6	1.1	0.8
Dy	5.2	13.1	4.5	4.9	7.7	9.8	4.2	6.3	5.4
Ho	1.2	2.7	1.1	1.0	1.8	2.0	1.0	1.3	1.2
Er	3.5	8.1	3.2	3.4	5.0	5.8	2.8	3.6	3.4
Tm	0.5	1.3	0.5	0.5	0.8	0.8	0.4	0.5	0.6
Yb	3.7	8.6	4.9	3.9	5.8	5.8	3.5	4.1	5.3
Lu	0.6	1.4	0.6	0.6	0.9	0.9	0.4	0.7	0.8
Ni	5.6	4.3	4.9	3.4	2.5	4.8	2.7	4.7	2.0
Cr	21.8	8.5	7.0	9.4	6.3	-	-	7.9	6.7
V	20.6	6.2	3.5	2.9	3.2	-	-	12.1	5.2
Co	2.9	1.2	0.8	0.9	0.7	1.3	1.2	1.7	2.4
Sc	5.8	8.6	3.8	4.3	4.2	-	-	6.6	8.3
Mo	0.6	0.9	1.0	1.4	0.4	1.8	0.5	1.1	0.5
Cu	19.1	33.0	12.1	15.6	29.7	9.5	6.8	7.8	7.5
Pb	39.7	231.4	16.6	27.0	31.3	8.2	23.5	32.3	109.8
Sn	11.9	29.0	96.4	18.8	124.3	5.7	4.7	130.3	20.2
Sb	1.9	1.4	0.9	0.8	1.2	0.9	1.4	1.1	2.1
Zn	18.4	81.9	17.4	12.6	31.0	13.1	32.6	23.2	163.0
Bi	0.6	0.2	0.1	0.3	0.2	0.3	0.1	0.2	3.3
Au	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ag	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
As	4.0	13.4	-	-	4.0	3.6	13.0	4.0	6.8
Ga	16.6	17.1	16.6	15.2	18.7	15.3	15.1	16.4	17.7
In	0.1	0.4	0.4	0.2	0.5	0.1	0.1	0.6	0.3
Cd	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Ge	1.7	1.6	3.2	0.4	2.2	1.2	1.3	1.6	2.1
Tl	0.8	1.1	0.3	0.6	0.9	0.2	0.7	1.2	1.0