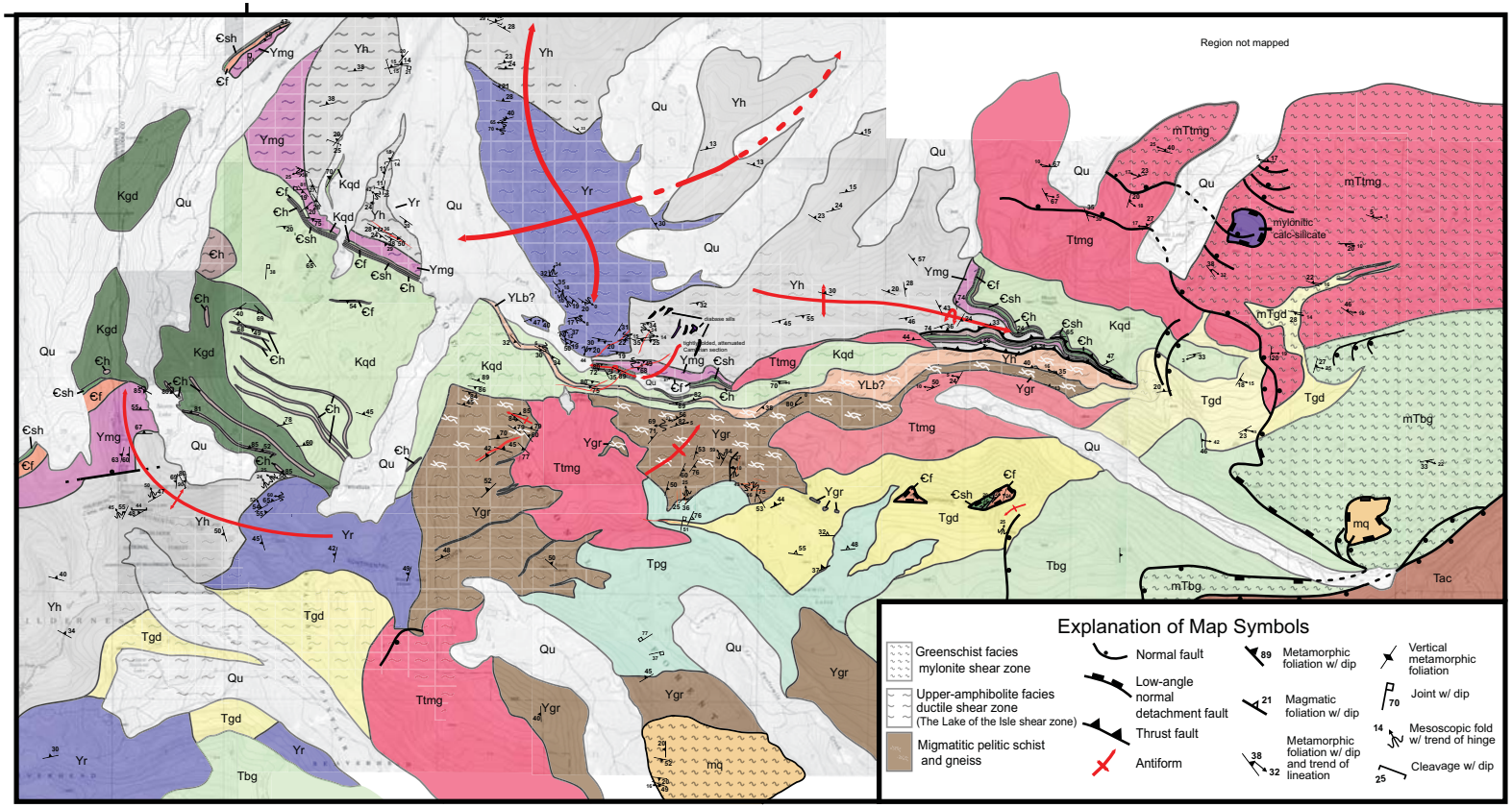
2010208



Description of Mapped Units

Qu	Quaternary undivided - moraines and alluvium
Tac	Anaconda Beds - sediments and volcaniclastics
Td	Dacitic dike
Tap	Aplite dike
Tpg	Two-mica porphoritic granite
Tgd	Biotite granodiorite (some mylonitic) (Hearst Lake suite)
Tbg	Biotite granite (often mylonitic, some porphoritic) (Hearst Lake suite)
Ttmg	Two-mica granite (often mylonitic) (Hearst Lake suite)
Kgd	Hornblende, biotite granodiorite (Storm Lake stock)
Kqd	Quartz diorite (often sheared)
Єh	Hasmark formation - white, coarse marble
Єsh	Silver Hill formation - mica schist
Єf	Flathead quartzite - white to pink, quartzite
Ymg	Missoula Group - green calc-silicate and biotite quartzite gneisses
Yh	Helena formation - calc-silicate gneiss
Yr	Ravalli Group - biotite quartzite gneiss and schist
Yg	Greyson formation - grt+bt+sill schist and gneiss (locally migmatitic)
mq	mylonitic quartzite - white, mylonitic quartzite (Niehart or Flathead equivalent?)
YLb?	

Geologic map of the footwall of the Anaconda Metamorphic Core Complex, Northeastern Anaconda-Pintlar Range, Western Montana

ORIGINAL MAP SCALE 1:24000

North

1 0 1 2
km

Contour interval is 40 feet
Map projection: 1927 NAD (North American Datum)
Declinatin is 16∞ East

Geology by Warren C. Grice (surveyed in summer 2004-2005) with the exception of the Mt. Haggin area geology which is from mapping of Heise (1983) and Thomas J. Kalakay. Limited structural data and some unit contacts follow Emmons and Calkins (1913) and Lonn *et al.* (2003).

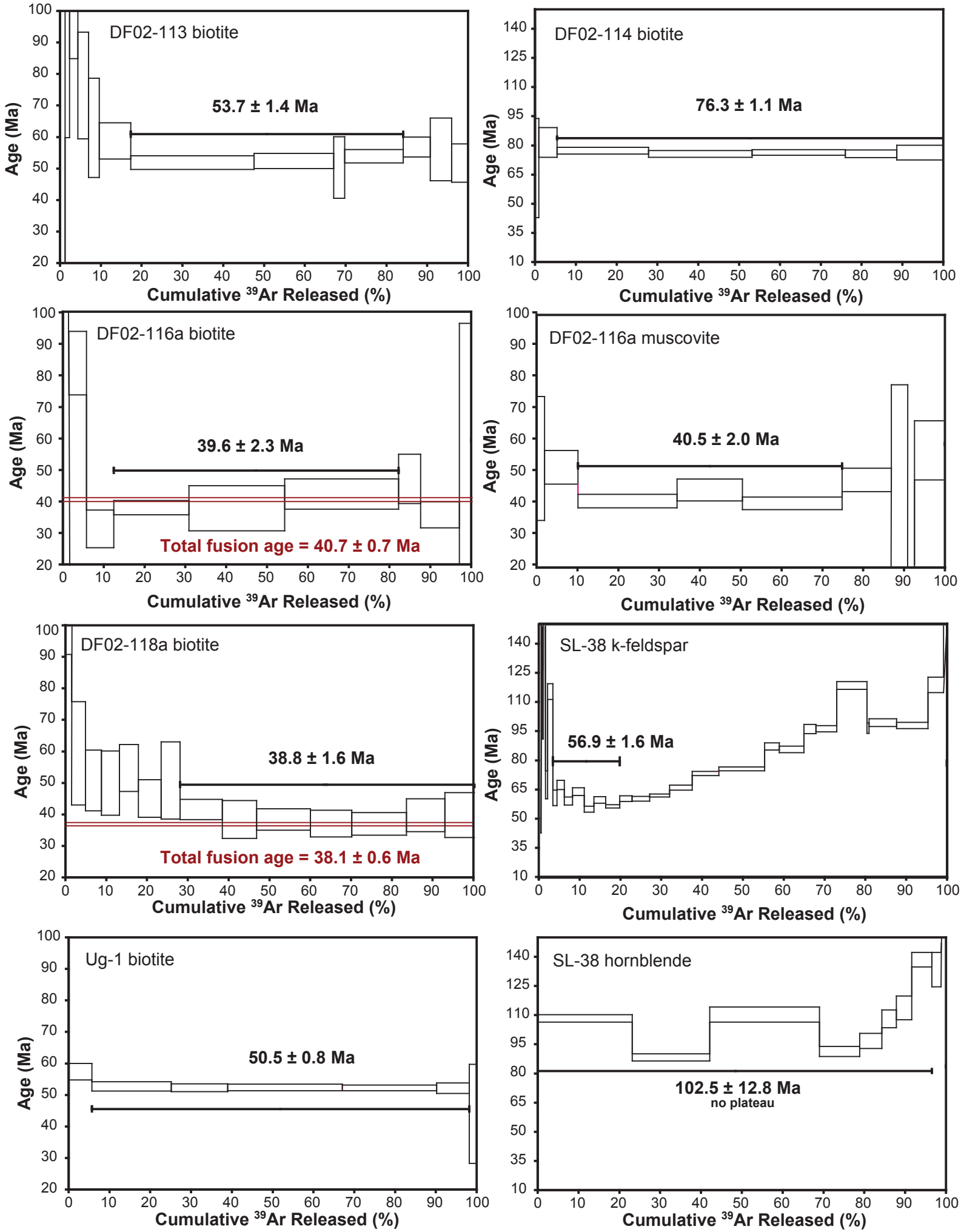
Base topography from USGS 1:24000 scale Storm Lake, Mount Evans,and Mount Haggin 7.5 minute qradrangles.

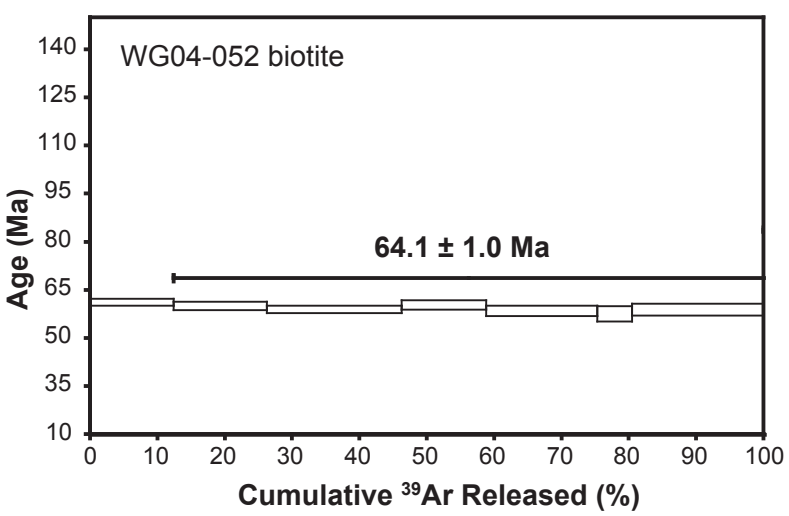
References cited:

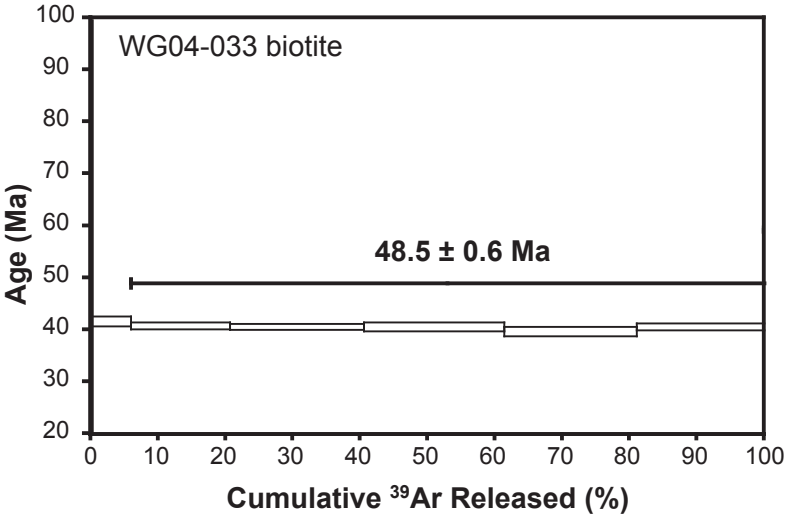
(1) Emmons, W. H. and Calkins, F. C., 1913, Geology and ore deposits of the Phillipsburg quadrangle, Montana: U.S. Geological Survey Professional Paper 78, 271 p.

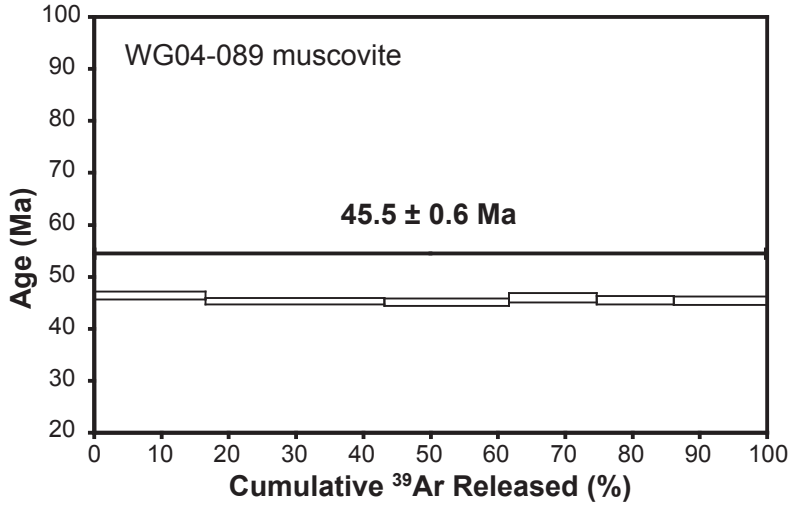
(2) Heise, B. A., 1983, Structural geology of the Mt. Haggin area, Deer Lodge country, Montana. Unpublished Masters Thesis, University of Montana, Missoula, Montana, 77 p.

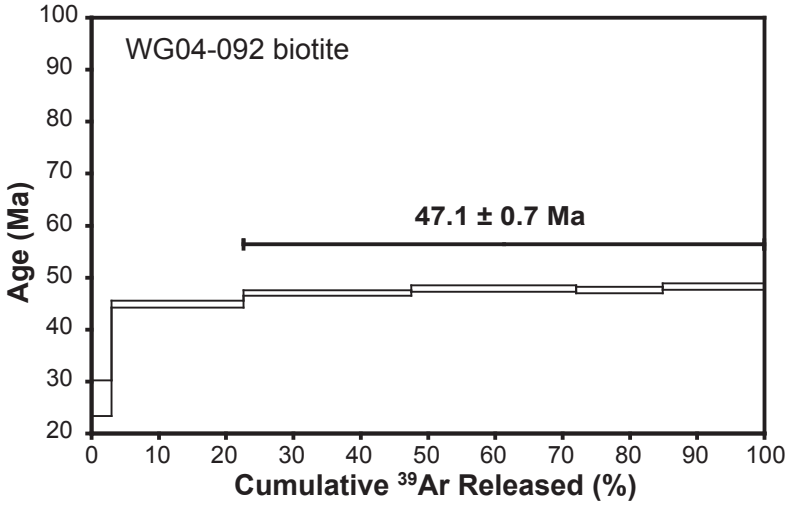
(3) Lonn, J. D., McDonald, C., Lewis, R. S., Kalakay, T. J., O'Neill, J. M., Berg, R. B., and Hargrave, P., 2003, Preliminary geologic map of the Philipsburg 30'x 60' quadrangle, western Montana: Montana Bureau of Mines and Geology Open file Report MBMG 483, scale: 1:100,000.

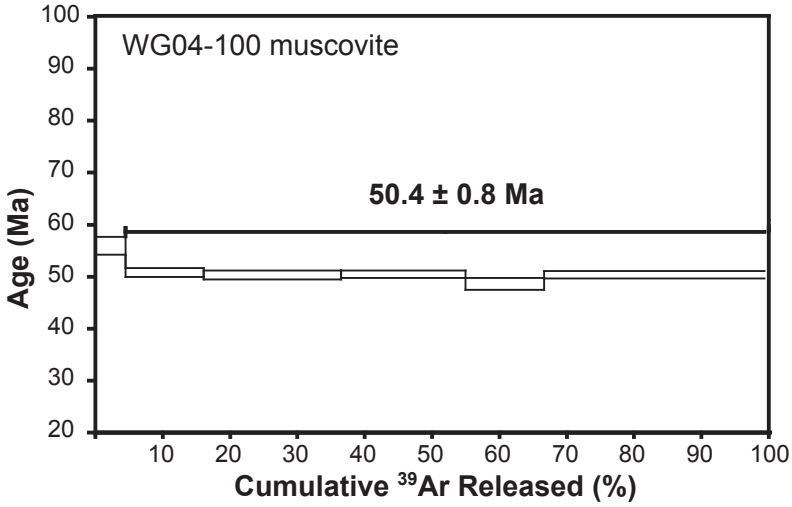

DF02-113 biotite
53.7 ± 1.4 Ma
DF02-114 biotite
76.3 ± 1.1 Ma
DF02-116a biotite
39.6 ± 2.3 Ma
Total fusion age = 40.7 ± 0.7 Ma
DF02-116a muscovite
40.5 ± 2.0 Ma
DF02-118a biotite
38.8 ± 1.6 Ma
Total fusion age = 38.1 ± 0.6 Ma
SL-38 k-feldspar
56.9 ± 1.6 Ma
Ug-1 biotite
50.5 ± 0.8 Ma
SL-38 hornblende
102.5 ± 12.8 Ma
no plateau
Age (Ma)
Cumulative 39Ar Released (%)

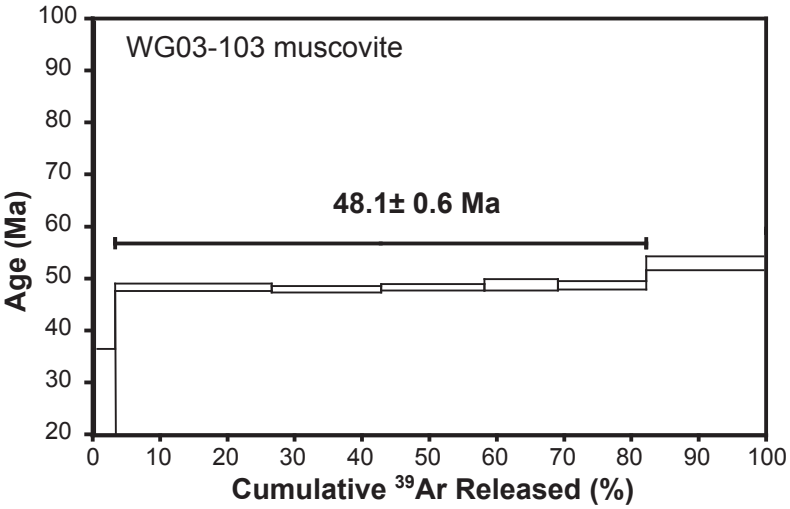

WG04-052 biotite
64.1 ± 1.0 Ma
Age (Ma)
Cumulative 39Ar Released (%)

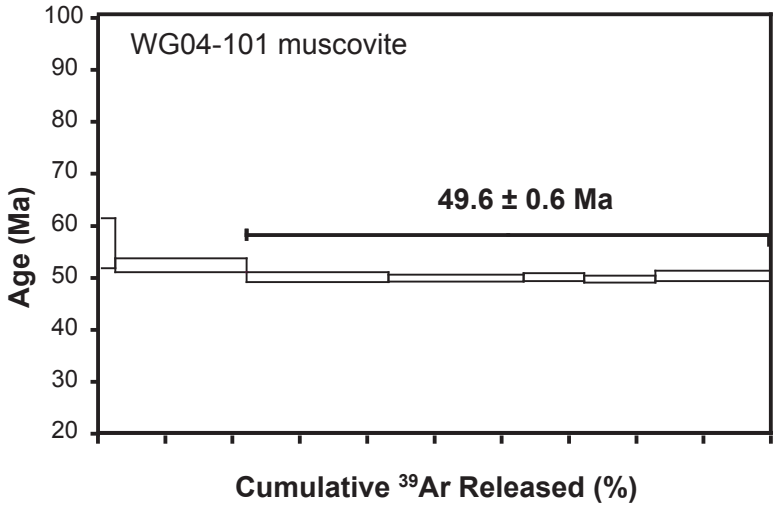

WG04-033 biotite
48.5 ± 0.6 Ma
Age (Ma)
Cumulative 39Ar Released (%)

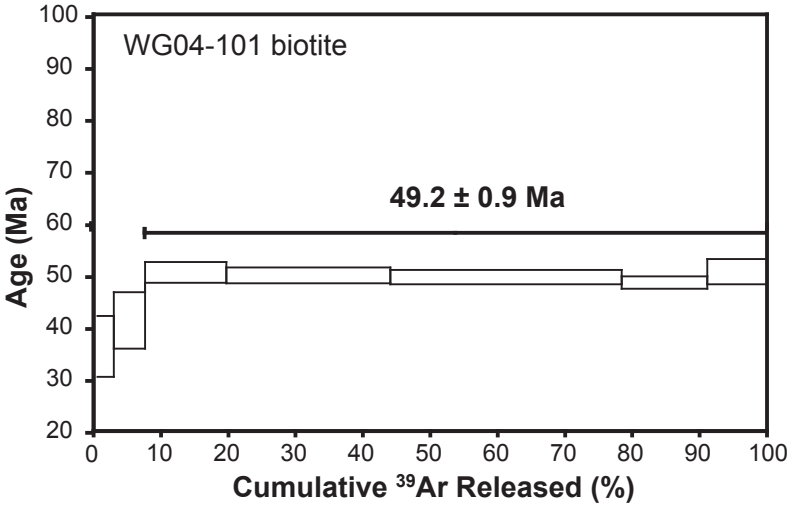

WG04-089 muscovite
45.5 ± 0.6 Ma
Age (Ma)
Cumulative 39Ar Released (%)

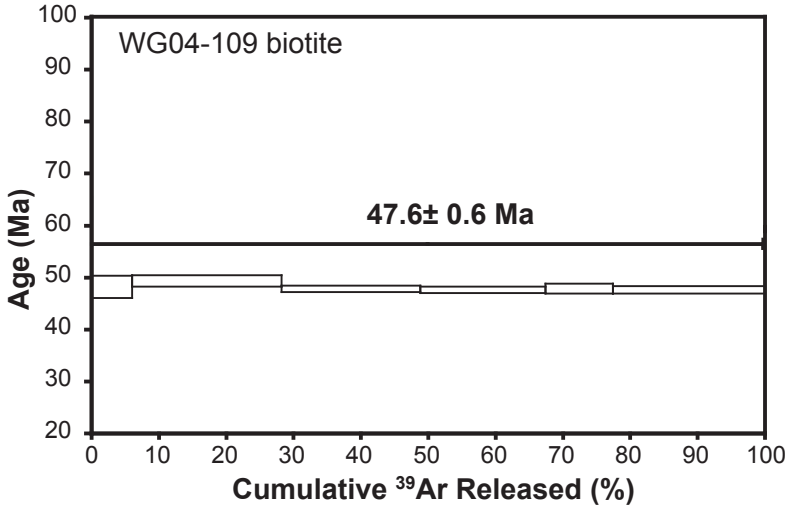

WG04-092 biotite
47.1 ± 0.7 Ma
Age (Ma)
Cumulative 39Ar Released (%)

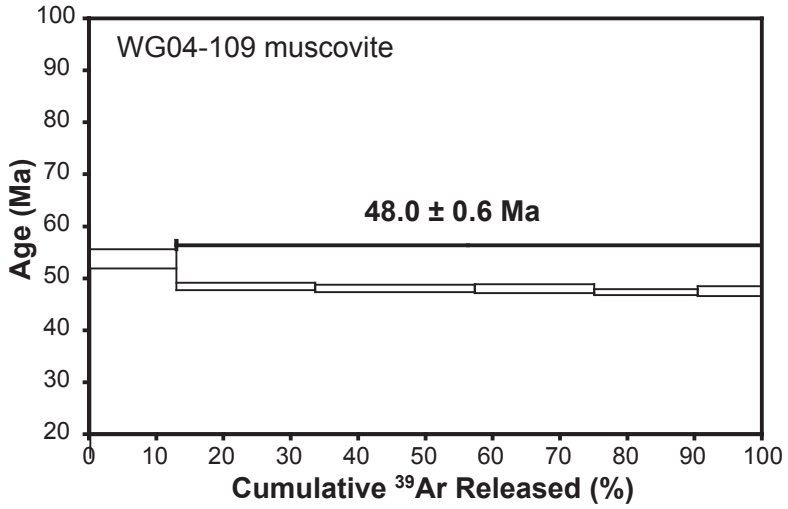

WG04-100 muscovite
50.4 ± 0.8 Ma
Age (Ma)
Cumulative 39Ar Released (%)

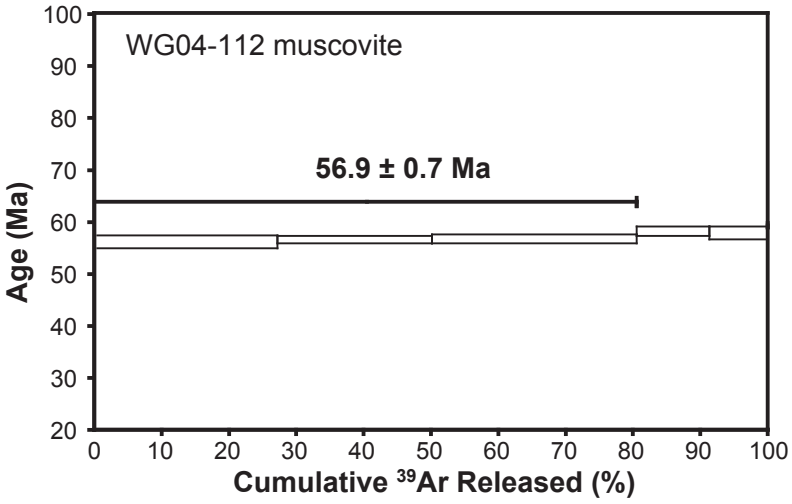

WG03-103 muscovite
48.1± 0.6 Ma
Age (Ma)
Cumulative 39Ar Released (%)

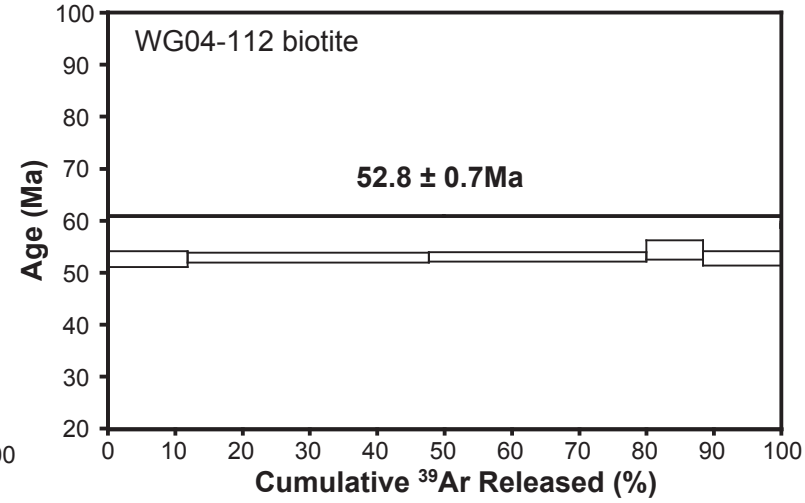

WG04-101 muscovite
49.6 ± 0.6 Ma
Age (Ma)
Cumulative 39Ar Released (%)

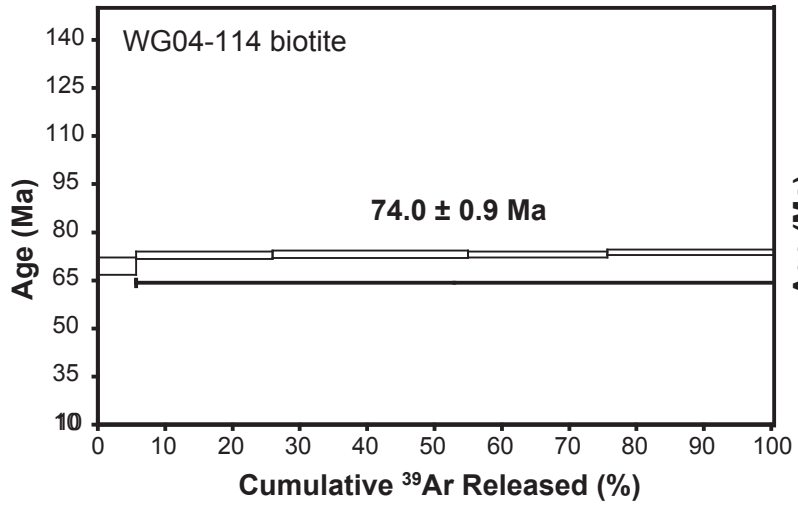

WG04-101 biotite
49.2 ± 0.9 Ma
Age (Ma)
Cumulative 39Ar Released (%)

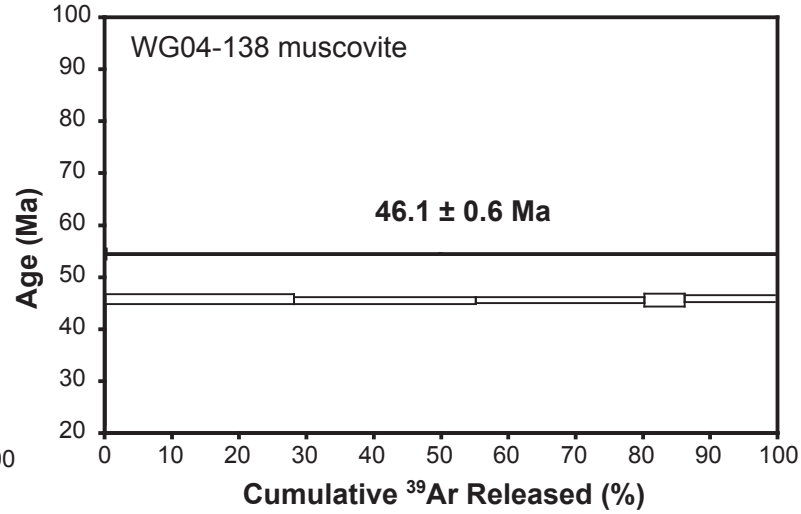

WG04-109 biotite
47.6± 0.6 Ma
Age (Ma)
Cumulative 39Ar Released (%)

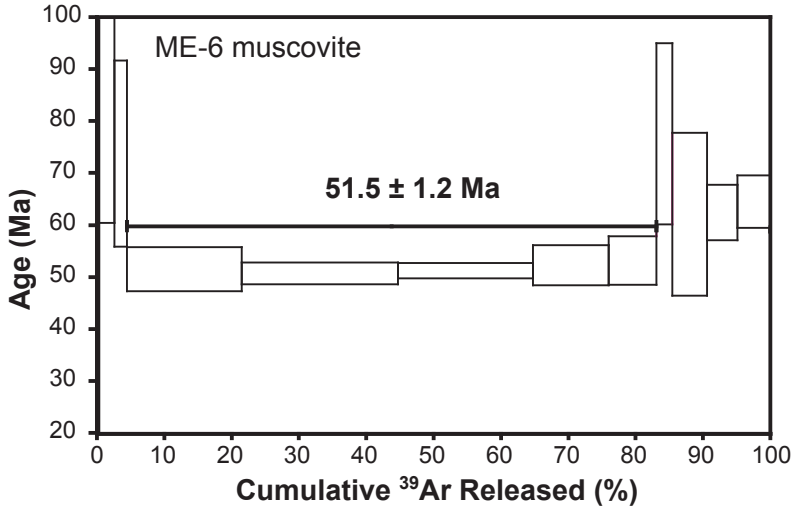

WG04-109 muscovite
48.0 ± 0.6 Ma
Age (Ma)
Cumulative 39Ar Released (%)

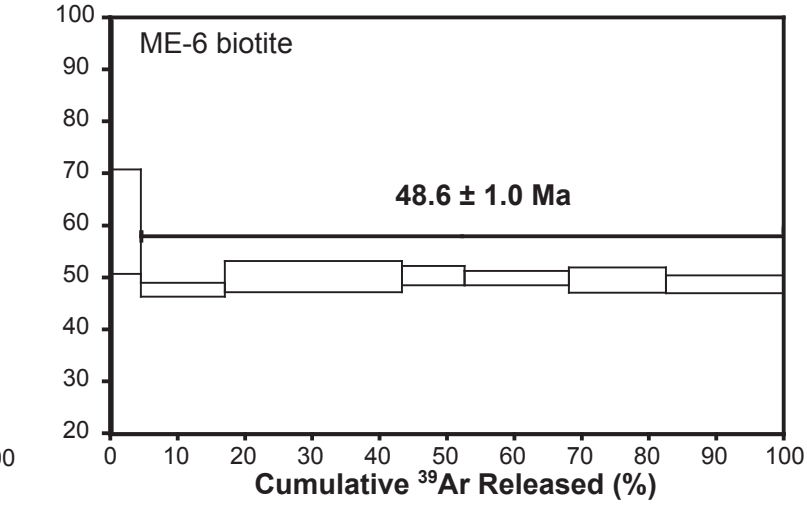

WG04-112 muscovite
56.9 ± 0.7 Ma
Age (Ma)
Cumulative 39Ar Released (%)


WG04-112 biotite
52.8 ± 0.7Ma
Age (Ma)
Cumulative 39Ar Released (%)


WG04-114 biotite
74.0 ± 0.9 Ma
Age (Ma)
Cumulative 39Ar Released (%)


WG04-138 muscovite
46.1 ± 0.6 Ma
Age (Ma)
Cumulative 39Ar Released (%)


ME-6 muscovite
51.5 ± 1.2 Ma
Age (Ma)
Cumulative 39Ar Released (%)


ME-6 biotite
48.6 ± 1.0 Ma
Age (Ma)
Cumulative 39Ar Released (%)

Data Repository: Table 1. 40Ar/39Ar data

Temp. (°C) or Laser (W)	36Ar(Ar)	37Ar(Ca)	38Ar(Cl)	39Ar(K)	40Ar(r)	Calculated age (Ma)	Error in age (± 2 s.d.)	40Ar(r) %	39Ar (K) %
SL38 biotite; J = 0.003830									
0.11 W	0.00039	0.00000	0.00000	0.00160	0.00000	0.00	± 0.00	0.00	0.31
0.21 W	0.00023	0.00000	0.00000	0.00601	0.09057	101.29	± 17.74	56.65	1.17
0.32 W	0.00016	0.00000	0.00001	0.02728	0.34358	84.98	± 4.86	88.01	5.31
0.32 W	0.00000	0.00000	0.00006	0.06437	0.75974	79.76	± 1.07	99.77	12.52
0.42 W	0.00000	0.00000	0.00009	0.08780	1.02452	78.88	± 0.95	99.77	17.07
0.42 W	0.00000	0.00000	0.00000	0.05931	0.69976	79.73	± 1.38	99.77	11.54
0.53 W	0.00004	0.00000	0.00003	0.07163	0.83478	78.78	± 1.94	98.25	13.93
0.64 W	0.00003	0.00000	0.00003	0.09150	1.04386	77.15	± 1.43	98.80	17.79
0.64 W	0.00005	0.00000	0.00000	0.02652	0.30579	77.97	± 4.33	94.85	5.16
0.74 W	0.00000	0.00000	0.00001	0.05034	0.60244	80.85	± 1.35	99.78	9.79
0.85 W	0.00002	0.00000	0.00000	0.01508	0.19238	86.07	± 8.88	96.72	2.93
1.06 W	0.00003	0.00000	0.00000	0.00752	0.09191	82.56	± 18.63	91.99	1.46
3.18 W	0.00004	0.00000	0.00000	0.00524	0.06697	86.15	± 21.36	84.22	1.02
SL38 hornblende; J = 0.003850									
800 °C	0.00225	0.14819	0.00055	0.37143	6.10617	110.72	± 1.93	90.04	22.65
900 °C	0.00059	0.17119	0.00070	0.31093	4.16204	90.66	± 1.82	95.82	18.96
1000 °C	0.00096	2.41732	0.00242	0.43832	7.33488	112.64	± 3.89	96.13	26.73
1050 °C	0.00037	0.91009	0.00092	0.16131	2.23473	93.74	± 2.52	95.17	9.84
1075 °C	0.00023	0.41792	0.00050	0.08865	1.30090	99.15	± 3.86	94.93	5.41
1110 °C	0.00014	0.30627	0.00031	0.05823	0.95535	110.50	± 4.56	95.71	3.55
1150 °C	0.00040	0.51388	0.00053	0.06204	1.07083	116.08	± 6.07	89.94	3.78
1210 °C	0.00080	0.83057	0.00093	0.07957	1.67789	140.82	± 3.75	87.60	4.85
1300 °C	0.00116	0.30932	0.00023	0.03776	0.76613	135.68	± 8.83	68.94	2.30
1400 °C	0.00273	0.54770	0.00034	0.03148	0.87101	182.59	± 13.98	51.90	1.92
SL38 K-feldspar; J = 0.003845									
450 °C	0.00250	0.00000	0.00006	0.01059	2.76156	1252.99	± 78.08	78.89	0.17
450 °C	0.00055	0.00000	0.00000	0.00462	0.09163	132.62	± 89.40	35.94	0.08
500 °C	0.00041	0.00000	0.00000	0.01332	0.42356	208.11	± 16.15	77.57	0.22
500 °C	0.00013	0.00000	0.00000	0.01343	0.21719	108.80	± 17.68	84.62	0.22
550 °C	0.00067	0.00000	0.00000	0.03618	1.07593	195.34	± 6.37	84.36	0.59
550 °C	0.00004	0.00000	0.00000	0.03386	0.33686	67.72	± 7.15	96.70	0.56
600 °C	0.00042	0.00000	0.00000	0.07624	1.30725	115.18	± 4.00	91.18	1.25
600 °C	0.00007	0.00000	0.00000	0.06249	0.55977	61.09	± 3.98	96.28	1.03
650 °C	0.00012	0.00000	0.00000	0.11109	1.10425	67.66	± 2.36	96.63	1.82
650 °C	0.00006	0.00000	0.00000	0.12183	1.06117	59.43	± 2.07	98.10	2.00
700 °C	0.00016	0.00000	0.00000	0.17443	1.64402	64.22	± 1.93	96.92	2.86
700 °C	0.00023	0.00000	0.00000	0.14744	1.19287	55.27	± 1.55	94.38	2.42
750 °C	0.00019	0.00000	0.00000	0.17526	1.54296	60.06	± 1.67	96.13	2.87
750 °C	0.00000	0.00000	0.00000	0.21035	1.74906	56.77	± 0.82	99.68	3.45
800 °C	0.00003	0.00000	0.00000	0.18518	1.64913	60.74	± 1.43	99.24	3.04
850 °C	0.00018	0.00000	0.00000	0.26022	2.31354	60.64	± 1.22	97.49	4.27
900 °C	0.00025	0.00000	0.00000	0.29984	2.73844	62.27	± 0.79	97.10	4.92
950 °C	0.00051	0.00000	0.00004	0.33786	3.28871	66.29	± 1.34	95.35	5.54
1000 °C	0.00085	0.00000	0.00000	0.40214	4.34847	73.49	± 1.13	94.29	6.60
1025 °C	0.00207	0.00000	0.00000	0.68218	7.61718	75.84	± 1.04	92.37	11.19
1050 °C	0.00081	0.00000	0.00000	0.21882	2.82168	87.30	± 1.81	92.05	3.59
1050 °C	0.00124	0.00000	0.00000	0.36988	4.68385	85.77	± 1.60	92.57	6.07
1075 °C	0.00054	0.00000	0.00000	0.17920	2.54934	96.08	± 2.34	93.95	2.94
1075 °C	0.00104	0.00000	0.00000	0.31249	4.45507	96.28	± 1.58	93.37	5.13
1100 °C	0.00162	0.00000	0.00000	0.45472	8.01832	118.35	± 1.99	94.22	7.46
1100 °C	0.00000	0.00000	0.00000	0.02929	0.41894	96.58	± 2.67	99.81	0.48
1100 °C	0.00104	0.00000	0.00000	0.41196	6.06803	99.39	± 2.03	95.02	6.76
1100 °C	0.00270	0.00000	0.00000	0.47043	6.82599	97.94	± 1.54	89.39	7.72
1100 °C	0.00399	0.00000	0.00022	0.23584	4.16873	118.63	± 3.93	77.85	3.87
1100 °C	0.01241	0.00000	0.00000	0.04706	1.22676	172.31	± 22.03	25.06	0.77
1250 °C	0.00000	0.00000	0.00000	0.00147	0.03613	162.67	± 77.11	99.89	0.02
1400 °C	0.00023	0.00000	0.00000	0.00554	0.27572	315.95	± 51.41	80.26	0.09
WG04-114 biotite, J = 0.0005140									
0.21 W	0.00037	0.00000	0.00000	0.00740	0.57172	70.24	± 2.62	83.84	5.80
0.53 W	0.00025	0.00000	0.00000	0.02586	2.09276	73.53	± 1.12	96.57	20.18
0.85 W	0.00023	0.00272	0.00000	0.03698	3.00367	73.78	± 1.12	97.78	28.87
1.06 W	0.00014	0.00000	0.00000	0.02638	2.14291	73.80	± 0.91	98.14	20.59
3.71 W	0.00034	0.00951	0.00003	0.03123	2.55984	74.45	± 0.87	96.25	24.38
WG04-112 muscovite, J = 0.0005140									
0.21 W	0.00048	0.00000	0.00000	0.03191	1.97455	56.49	± 1.20	93.33	26.94

0.42 W	0.00037	0.00000	0.00000	0.02734	1.70461	56.91	± 0.72	93.96	23.08
0.74 W	0.00040	0.00000	0.00000	0.03630	2.27001	57.08	± 0.81	95.10	30.64
1.06 W	0.00003	0.00000	0.00000	0.01286	0.82541	58.54	± 0.88	98.98	10.86
3.18 W	0.00006	0.00000	0.00000	0.01005	0.64070	58.17	± 1.19	97.16	8.48

WG04-052 biotite, J = 0.0005145

0.21 W	0.00106	0.00000	0.00000	0.01678	1.21432	65.94	± 1.08	88.02	12.03
0.32 W	0.00034	0.00000	0.00000	0.01940	1.37938	64.82	± 1.28	93.28	13.91
0.42 W	0.00037	0.00000	0.00000	0.02801	1.95819	63.75	± 1.10	94.66	20.08
0.64 W	0.00021	0.00000	0.00000	0.01754	1.25261	65.08	± 1.43	95.35	12.58
0.85 W	0.00032	0.00000	0.00000	0.02308	1.60231	63.31	± 1.61	94.43	16.55
0.95 W	0.00018	0.00000	0.00000	0.00726	0.49573	62.32	± 2.31	90.10	5.20
3.18 W	0.00040	0.00233	0.00000	0.02741	1.91374	63.67	± 1.78	94.15	19.65

WG04-033 biotite, J = 0.0005150

0.21 W	0.00053	0.00000	0.00000	0.00097	0.02818	26.85	± 32.98	15.19	0.31
0.42 W	0.00056	0.00000	0.00000	0.01784	0.96506	49.56	± 0.94	85.44	5.72
0.64 W	0.00030	0.00000	0.00000	0.04577	2.43093	48.68	± 0.66	96.47	14.69
0.95 W	0.00026	0.00000	0.00000	0.06187	3.27517	48.53	± 0.55	97.69	19.85
1.16 W	0.00019	0.00000	0.00000	0.06495	3.43740	48.52	± 0.81	98.41	20.84
1.59 W	0.00018	0.00000	0.00000	0.06120	3.17979	47.64	± 0.90	98.34	19.64
3.18 W	0.00021	0.00000	0.00000	0.05909	3.12949	48.55	± 0.63	98.02	18.96

WG04-109 biotite, J = 0.0005150

0.11 W	0.00007	0.00000	0.00003	0.00007	0.00000	0.00	± 0.00	0.00	0.02
0.21 W	0.00043	0.00000	0.00000	0.00101	0.00000	0.00	± 0.00	0.00	0.33
0.42 W	0.00121	0.00000	0.00006	0.01836	0.95914	47.88	± 2.08	72.78	6.02
0.74 W	0.00089	0.00000	0.00000	0.06756	3.61432	49.03	± 1.08	93.19	22.14
0.95 W	0.00054	0.00000	0.00000	0.06291	3.26384	47.57	± 0.62	95.37	20.62
1.16 W	0.00042	0.00000	0.00000	0.05647	2.91795	47.38	± 0.59	95.91	18.51
1.36 W	0.00023	0.00000	0.00000	0.03063	1.59047	47.60	± 0.94	95.87	10.04
3.28 W	0.00042	0.00000	0.00001	0.06809	3.51940	47.39	± 0.69	96.58	22.32

WG04-101 biotite, J = 0.0005150

0.11 W	0.00013	0.00086	0.00001	0.00108	0.04256	36.29	± 5.71	52.86	2.46
0.21 W	0.00006	0.00346	0.00003	0.00203	0.09087	41.19	± 5.28	84.33	4.63
0.42 W	0.00004	0.00000	0.00000	0.00533	0.29223	50.19	± 1.98	95.94	12.19
0.53 W	0.00008	0.00000	0.00000	0.01074	0.58173	49.64	± 1.45	96.10	24.53
0.95 W	0.00010	0.00000	0.00000	0.01519	0.81745	49.33	± 1.37	96.38	34.69
1.16 W	0.00005	0.00000	0.00000	0.00559	0.29426	48.27	± 1.14	95.23	12.77
3.18 W	0.00004	0.00000	0.00000	0.00382	0.21005	50.36	± 2.35	94.67	8.73

WG04-101 muscovite, J = 0.0005150

0.11 W	0.00054	0.00000	0.00000	0.00648	0.39758	56.09	± 4.68	71.34	2.04
0.32 W	0.00144	0.00000	0.00006	0.06235	3.53920	51.99	± 1.31	89.25	19.63
0.53 W	0.00050	0.00000	0.00000	0.06753	3.66554	49.74	± 0.92	96.15	21.27
0.85 W	0.00062	0.00000	0.00000	0.06424	3.47233	49.53	± 0.63	95.01	20.23
1.06 W	0.00019	0.00000	0.00000	0.02879	1.56228	49.72	± 0.73	96.56	9.07
1.48 W	0.00021	0.00000	0.00000	0.03367	1.81348	49.36	± 0.63	96.66	10.60
3.49 W	0.00020	0.00000	0.00000	0.05449	2.97032	49.95	± 0.99	98.08	17.16

WG04-100 muscovite, J = 0.0005150

0.21 W	0.00031	0.00000	0.00000	0.00028	0.00633	20.73	± 58.92	6.56	0.08
0.42 W	0.00130	0.00000	0.00006	0.01650	1.00793	55.86	± 1.64	72.45	4.55
0.64 W	0.00107	0.00000	0.00005	0.04217	2.33987	50.83	± 0.85	88.05	11.63
0.95 W	0.00054	0.00000	0.00004	0.07450	4.09617	50.38	± 0.83	96.25	20.54
1.16 W	0.00087	0.00000	0.00000	0.06733	3.71639	50.57	± 0.69	93.51	18.57
1.48 W	0.00056	0.00000	0.00000	0.04256	2.26160	48.70	± 1.11	93.17	11.74
3.49 W	0.00074	0.00000	0.00003	0.11929	6.56802	50.44	± 0.67	96.79	32.89

ME-6 muscovite, J = 0.006400

0.11 W	0.00106	0.00000	0.00000	0.02675	0.19900	83.90	± 23.53	38.77	2.07
0.11 W	0.00079	0.00622	0.00000	0.02427	0.15754	73.44	± 17.50	40.35	1.88
0.11 W	0.00214	0.00000	0.00013	0.22188	1.00717	51.66	± 4.15	61.20	17.18
0.21 W	0.00074	0.00000	0.00006	0.30173	1.34862	50.88	± 2.03	85.53	23.36
0.21 W	0.00023	0.00043	0.00000	0.26028	1.17549	51.40	± 1.45	94.11	20.15
0.32 W	0.00090	0.00000	0.00000	0.14649	0.67416	52.37	± 3.77	71.34	11.34
0.32 W	0.00021	0.00000	0.00000	0.09130	0.42777	53.30	± 4.56	87.16	7.07
0.32 W	0.00002	0.00000	0.00000	0.03092	0.21115	77.18	± 17.07	96.29	2.39
0.41 W	0.00024	0.00000	0.00006	0.06767	0.36978	62.01	± 15.35	83.70	5.24
0.42 W	0.00009	0.00000	0.00001	0.05797	0.31847	62.35	± 5.23	91.92	4.49
0.85 W	0.00016	0.00000	0.00004	0.06257	0.35509	64.37	± 4.97	88.02	4.84

UG-1 biotite, J = 0.003859

0.11 W	0.00015	0.00000	0.00000	0.00212	0.00000	0.00	± 0.00	0.00	0.39
0.21 W	0.00025	0.00000	0.00000	0.02984	0.24657	56.64	± 3.19	76.57	5.53
0.32 W	0.00012	0.00000	0.00000	0.10484	0.77786	50.93	± 1.76	95.44	19.42
0.42 W	0.00003	0.00000	0.00000	0.07461	0.54780	50.40	± 1.51	98.30	13.82
0.64 W	0.00000	0.00000	0.00000	0.15169	1.11620	50.52	± 1.25	99.63	28.10
0.85 W	0.00000	0.00000	0.00000	0.12478	0.91446	50.31	± 1.09	99.64	23.12
1.06 W	0.00000	0.00000	0.00000	0.04294	0.31431	50.25	± 2.06	99.64	7.95
3.28 W	0.00000	0.00000	0.00000	0.00898	0.05256	40.30	± 19.21	99.55	1.66

WG04-103 muscovite, J = 0.0005145

0.11 W	0.00096	0.00000	0.00000	0.00759	0.01435	1.75	± 7.32	3.54	2.65
0.42 W	0.00121	0.00000	0.00000	0.06736	3.53446	48.06	± 0.69	87.78	23.48
0.64 W	0.00069	0.00000	0.00000	0.04740	2.38125	46.04	± 0.72	89.44	16.52
0.95 W	0.00061	0.00000	0.00000	0.04442	2.26228	46.67	± 0.62	90.12	15.48
1.27 W	0.00037	0.00000	0.00000	0.03159	1.67302	48.50	± 1.06	91.71	11.01
1.59 W	0.00039	0.00000	0.00000	0.03812	2.01501	48.40	± 0.80	92.71	13.29
4.13 W	0.00033	0.00000	0.00000	0.05036	2.89509	52.59	± 1.34	95.58	17.56

WG04-092 biotite, J = 0.0005150

0.21 W	0.00086	0.00000	0.00000	0.00661	0.19195	26.79	± 3.33	42.92	2.79
0.42 W	0.00054	0.00000	0.00003	0.04670	2.26012	44.42	± 0.65	93.44	19.70
0.64 W	0.00042	0.00000	0.00000	0.05924	3.00542	46.53	± 0.55	96.00	24.99
0.95 W	0.00020	0.00000	0.00000	0.05808	2.99893	47.34	± 0.61	98.06	24.50
1.16 W	0.00011	0.00000	0.00000	0.03065	1.57405	47.09	± 0.60	97.97	12.93
3.18 W	0.00009	0.00000	0.00000	0.03581	1.86481	47.74	± 0.63	98.62	15.10

WG04-089 muscovite, J = 0.0005140

0.21 W	0.00064	0.00000	0.00000	0.00109	0.00000	0.00	± 0.00	0.00	0.29
0.42 W	0.00101	0.00000	0.00000	0.06263	3.16500	46.26	± 0.75	91.34	16.46
0.64 W	0.00036	0.00000	0.00001	0.10134	5.00793	45.25	± 0.62	97.90	26.63
0.95 W	0.00033	0.00000	0.00000	0.07015	3.45104	45.05	± 0.71	97.23	18.44
1.16 W	0.00026	0.00000	0.00000	0.04971	2.49031	45.86	± 0.88	96.99	13.06
1.59 W	0.00015	0.00000	0.00000	0.04363	2.16415	45.42	± 0.78	97.97	11.47
3.50 W	0.00010	0.00000	0.00000	0.05198	2.57423	45.35	± 0.80	98.85	13.66

WG04-138 muscovite, J = 0.0005150

0.11 W	0.00041	0.00000	0.00000	0.00136	0.00000	0.00	± 0.00	0.00	0.61
0.42 W	0.00099	0.00000	0.00000	0.06244	3.14466	46.19	± 0.89	91.46	27.94
0.64 W	0.00035	0.00000	0.00000	0.06039	3.02486	45.95	± 0.65	96.68	27.02
0.95 W	0.00032	0.00000	0.00000	0.05604	2.81188	46.03	± 0.56	96.71	25.07
1.05 W	0.00005	0.00000	0.00000	0.01328	0.66558	45.97	± 1.21	97.77	5.94
3.28 W	0.00019	0.00000	0.00000	0.02998	1.51306	46.30	± 0.64	96.34	13.41

DF02-116a muscovite, J = 0.003800

0.11 W	0.00057	0.00000	0.00000	0.00636	0.05035	53.49	± 19.20	22.99	2.07
0.21 W	0.00082	0.00000	0.00002	0.02520	0.18932	50.77	± 5.22	43.76	8.20
0.21W	0.00084	0.00000	0.00000	0.07483	0.44513	40.32	± 2.08	63.89	24.36
0.32 W	0.00108	0.00000	0.00000	0.04926	0.31805	43.73	± 3.40	49.88	16.03
0.32 W	0.00039	0.00000	0.00000	0.07528	0.44002	39.63	± 1.96	79.09	24.50
0.42 W	0.00066	0.00000	0.00000	0.03722	0.25776	46.86	± 3.65	56.91	12.12
0.64W	0.00073	0.00000	0.00000	0.01221	0.08792	48.69	± 27.65	28.89	3.98
.095 W	0.00049	0.03609	0.00000	0.00513	0.00000	0.00	± 0.00	0.00	1.67
3.28 W	0.00049	0.20722	0.00000	0.02172	0.18020	55.99	± 9.16	55.31	7.07

DF02-116a biotite, J = 0.003765

0.11 W	0.00006	0.00131	0.00004	0.00315	0.00232	5.01	± 121.68	11.11	1.44
0.21 W	0.00000	0.00000	0.00000	0.00940	0.11933	84.24	± 9.98	99.79	4.30
0.32 W	0.00000	0.00000	0.00000	0.01463	0.07016	32.27	± 5.91	99.45	6.70
0.42 W	0.00000	0.00000	0.00000	0.04032	0.23344	38.90	± 2.19	99.54	18.45
0.64W	0.00007	0.00000	0.00000	0.05132	0.29566	38.72	± 7.05	93.31	23.48
0.85 W	0.00057	0.00000	0.00010	0.06106	0.39297	43.19	± 4.79	69.84	27.94
0.95 W	0.00000	0.00000	0.00003	0.01180	0.08445	47.95	± 7.71	99.63	5.40
1.59 W	0.00000	0.00353	0.00000	0.02081	0.11359	36.69	± 4.12	99.51	9.52
3.18 W	0.00005	0.01211	0.00000	0.00603	0.04450	49.48	± 47.21	74.33	2.76

DF02-116a biotite, J = 0.006460

3.18 W	0.00153	0.00000	0.00031	0.89904	3.17225	40.66	± 0.62	86.99	100.00

DF02-120 biotite, J = 0.006577

3.18 W	0.00312	0.04897	0.00042	1.51499	5.05208	38.55	± 0.62	83.99	100.00

DF02-118a biotite, J = 0.003810

0.11 W	0.00053	0.00000	0.00002	0.00194	0.00000	0.00	± 0.00	0.00	0.33
0.21 W	0.00054	0.00000	0.00000	0.00862	0.14194	109.76	± 19.09	47.16	1.48

0.21 W	0.00073	0.00000	0.00000	0.01964	0.17233	59.32	± 16.39	44.42	3.37
0.32 W	0.00035	0.00000	0.00000	0.02274	0.17013	50.71	± 9.63	61.86	3.90
0.32 W	0.00021	0.00000	0.00000	0.02554	0.18776	49.84	± 10.22	74.99	4.38
0.42 W	0.00010	0.00000	0.00000	0.02681	0.21639	54.63	± 7.47	87.43	4.60
0.42 W	0.00007	0.00000	0.00000	0.03260	0.21589	44.95	± 5.98	91.25	5.60
0.42 W	0.00006	0.00000	0.00000	0.02680	0.20042	50.69	± 12.25	91.71	4.60
0.64 W	0.00012	0.00000	0.00000	0.05970	0.36442	41.48	± 3.23	90.66	10.25
0.64 W	0.00011	0.00000	0.00001	0.04885	0.27526	38.32	± 6.01	89.20	8.38
0.74 W	0.00021	0.00000	0.00000	0.07625	0.42966	38.32	± 3.41	86.91	13.09
0.85 W	0.00017	0.00000	0.00000	0.05887	0.32035	37.02	± 4.22	86.34	10.10
0.95 W	0.00018	0.00000	0.00000	0.07760	0.42079	36.89	± 3.56	88.42	13.32
1.16 W	0.00011	0.00000	0.00000	0.05477	0.31959	39.67	± 5.19	90.33	9.40
3.18 W	0.00025	0.00000	0.00000	0.04196	0.24510	39.71	± 7.12	76.93	7.20

DF02-118b biotite, J = 0.003854

0.11 W	0.00065	0.00000	0.00000	0.00512	0.02009	27.10	± 45.96	7.29	1.00
0.21 W	0.00069	0.00000	0.00000	0.01310	0.09351	48.96	± 15.43	25.62	2.56
0.21 W	0.00039	0.00000	0.00000	0.03476	0.20475	40.50	± 4.82	56.88	6.79
0.32 W	0.00013	0.00000	0.00000	0.04622	0.26224	39.02	± 6.95	83.35	9.03
0.42 W	0.00009	0.00000	0.00000	0.04273	0.25295	40.70	± 4.24	87.00	8.35
0.42 W	0.00003	0.00000	0.00000	0.04663	0.30404	44.78	± 5.21	95.77	9.11
0.53 W	0.00012	0.00000	0.00000	0.05982	0.33253	38.25	± 4.22	87.48	11.68
0.64 W	0.00003	0.00000	0.00002	0.06188	0.38421	42.66	± 3.76	96.24	12.09
0.64 W	0.00003	0.00000	0.00000	0.06475	0.42330	44.89	± 3.75	97.15	12.65
0.74 W	0.00002	0.00000	0.00001	0.07034	0.44996	43.94	± 4.36	98.05	13.74
0.95 W	0.00003	0.00000	0.00000	0.03462	0.23007	45.63	± 8.46	95.00	6.76
3.18 W	0.00005	0.00000	0.00000	0.03205	0.21053	45.10	± 8.42	91.56	6.26

DF02-113 biotite, J = 0.003765

0.11 W	0.00211	0.00000	0.00006	0.00520	0.00000	0.00	± 0.00	0.00	0.85
0.21 W	0.00064	0.01083	0.00004	0.00717	0.00000	0.00	± 0.00	0.00	1.18
0.21 W	0.00000	0.00000	0.00000	0.00651	0.08210	83.68	± 23.02	99.79	1.07
2.60 W	0.00055	0.00000	0.00000	0.01232	0.19408	103.91	± 18.38	54.32	2.03
0.32 W	0.00005	0.00000	0.00000	0.01567	0.18167	77.09	± 16.75	92.06	2.58
0.42 W	0.00002	0.00000	0.00000	0.01574	0.15044	63.79	± 15.56	95.20	2.59
0.53 W	0.00007	0.00000	0.00000	0.04643	0.41497	59.71	± 5.69	94.83	7.63
0.85 W	0.00025	0.00000	0.00004	0.18188	1.43623	52.85	± 2.15	94.75	29.91
0.85 W	0.00021	0.00000	0.00000	0.11763	0.93810	53.37	± 2.37	93.60	19.34
0.95 W	0.00000	0.00000	0.00000	0.01615	0.12369	51.30	± 9.64	99.65	2.65
1.06 W	0.00003	0.00000	0.00007	0.08672	0.71112	54.86	± 2.13	98.27	14.26
1.16 W	0.00000	0.00000	0.00002	0.03960	0.34203	57.73	± 3.13	99.69	6.51
1.38 W	0.00019	0.00230	0.00000	0.03180	0.27106	56.98	± 9.84	82.73	5.23
3.18 W	0.00005	0.00016	0.00000	0.02533	0.19941	52.70	± 6.05	93.01	4.16

DF02-114 biotite, J = 0.003788

0.11 W	0.00000	0.09591	0.00008	0.00037	0.00456	81.80	± 184.58	99.78	0.11
0.21 W	0.00004	0.00000	0.00000	0.00296	0.03016	68.35	± 25.49	69.85	0.84
0.32 W	0.00002	0.00000	0.00002	0.01571	0.19166	81.52	± 7.64	97.28	4.47
0.53 W	0.00000	0.00000	0.00018	0.07853	0.90764	77.30	± 1.77	99.77	22.36
0.85 W	0.00000	0.00000	0.00008	0.08921	1.00821	75.63	± 1.68	99.77	25.40
1.06 W	0.00000	0.00000	0.00015	0.08014	0.91481	76.37	± 1.42	99.77	22.82
1.28 W	0.00000	0.00000	0.00007	0.04436	0.50195	75.71	± 1.97	99.77	12.63
3.28 W	0.00003	0.00000	0.00002	0.03995	0.45571	76.32	± 3.74	97.86	11.37

Ages calculated using GA1550 biotite with an age of 98.79 ± 0.96 Ma, and 40K decay constant of 5.543E-10 y-1

Correction factors for interfering neutron reactions were determined by analyzing K-glass and optical grade CaF_2 with the following average values over several irradiations:

$(^{40}Ar/^{39}Ar)_K = 2.66 \times 10^{-2}$, $(^{36}Ar/^{37}Ar)_{Ca} = 2.70 \times 10^{-4}$, and $(^{39}Ar/^{37}Ar)_{Ca} = 6.76 \times 10^{-4}$

Data corrected for line blanks determined by measurements at each temperature, discrimination calculated by measurements of atmospheric argon, and 37Ar and 39Ar decay.