DR3. $^{40}Ar/^{39}Ar$ data repository for:

Cenozoic collapse of the eastern Uinta Mountains and drainage evolution of the Uinta Mountain region

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Table1. Analytical Methods and Instrumentation

Sample preparation and irradiation:

Minerals separated by standard magnetic, heavy liquid and hand-picking techniques.

Chosen detrital grains were visibly clear when viewed under a binocular microscope.

Samples were loaded into machined Al discs and irradiated for 16 (NM-271)

at the USGS TRIGA Reactor, Denver, CO.

Neutron flux monitor Fish Canyon Tuff sanidine (FC-2). Assigned age = 28.201 Ma (Kuiper et al., 2008).

Decay constant 5.463e-10 /a (Min et al., 2000).

Instrumentation:

Thermo-Fisher Scientific ARGUS VI mass spectrometer on line with automated all-metal extraction system.

System = Jan

Multi-collector configuration: 40Ar-H1, 39Ar-Ax, 38Ar-L1, 37Ar-L2, 36Ar-L3

Amplification: H1, L1, L2 1E12 Ohm Faraday, AX 1E13 Ohm Faraday, L3 - CDD ion counter, dead time 14 nS.

Laser single crystal total fusion.

Samples fused for 30 seconds at 3 W using a 75W Photon-Machines CO_2 laser.

Reactive gases removed by 30 second reaction with 1 SAES NP-10 getter operated at 1.6 A

and 1 D-50 getter operated at room temperature.

Analytical parameters:

Mass spectrometer sensitivity = 6E-17 mol/fA

Typical total system blank and background: Sanidine; 6±5%, 0.07±5%, 0.02±125%, 0.10±40%, 0.02±8%, x 10^{-17} moles for masses 40, 39, 38, 37, 36, respectively.
J-factors determined to a precision of ~± 0.02% by CO_2 laser-fusion of 10-15 single crystals

from each radial position around the irradiation tray.

Table2. Analytical Data

ID	$^{40}Ar/^{39}Ar$	$^{38}Ar/^{39}Ar$	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{39}Ar$ (x 10^{-3})	$^{39}Ar_K$ (x 10^{-15} mol)	K/Ca	$^{40}Ar^*$ (%)	Age (Ma)	±1σ (Ma)
Bishop Conglomerate (Elk Springs, CO), Tbp 7912-1, San/Micro, J=0.0038105±0.02%, IC=1.03888±0.001200, Lab#=63183									
24	4.521	0.0136	0.0078	0.2956	0.822	65.7	98.1	30.62	0.11
70	4.644	0.0096	0.0072	0.2421	1.249	70.4	98.5	31.57	0.16
42	4.997	0.0095	0.0110	0.5056	0.562	46.5	97.0	33.45	0.22
10	5.117	0.0121	0.0029	0.4268	0.953	175.9	97.5	34.433	0.079
06	5.176	0.0115	0.0080	0.4644	1.960	63.9	97.4	34.760	0.040
66	5.243	0.0095	0.0078	0.6828	1.369	65.6	96.2	34.78	0.14
48	5.156	0.0131	0.0040	0.3289	3.630	126.7	98.1	34.896	0.040
17	5.159	0.0129	0.0066	0.3395	3.013	76.9	98.1	34.901	0.029
68	5.140	0.0135	0.0070	0.2733	2.583	73.0	98.4	34.902	0.075
18	5.232	0.0128	0.0109	0.5722	1.204	47.0	96.8	34.929	0.071
62	5.196	0.0121	0.0038	0.3088	1.829	133.8	98.2	35.211	0.098
26	5.899	0.0099	0.0085	0.4497	0.787	60.0	97.8	39.74	0.12
09	6.880	0.0099	0.0084	0.2592	1.011	60.5	98.9	46.800	0.075
56	9.291	0.0122	0.0016	0.5666	1.706	319.4	98.2	62.50	0.22
02	9.347	0.0121	0.0037	0.3273	1.258	138.5	99.0	63.36	0.29
43	20.32	0.0072	0.0442	5.655	0.328	11.6	91.8	125.7	1.7
59	20.94	0.0155	0.0119	0.5593	1.296	43.0	99.2	139.38	0.47
71	32.29	0.0129	0.0034	0.8073	6.690	149.3	99.3	210.87	0.21
38	35.43	0.0195	0.0011	4.418	1.306	463.2	96.3	223.74	0.78

ID	$^{40}Ar/^{39}Ar$	$^{38}Ar/^{39}Ar$	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{39}Ar$ (x 10^{-3})	$^{39}Ar_K$ (x 10^{-15} mol)	K/Ca	$^{40}Ar^*$ (%)	Age (Ma)	±1σ (Ma)
Bishop Conglomerate (Elk Springs, CO), Tbp 7912-1, San/Micro, J=0.0038105±0.02%, IC=1.03888±0.001200, Lab#=63183 (continued)									
12	49.90	0.0152	0.0264	1.453	0.720	19.3	99.1	316.1	1.7
37	52.57	0.0174	0.0042	3.203	2.683	122.0	98.2	328.69	0.62

41	65.41	0.0123	0.0002	1.779	2.456	2552.3	99.2	404.37	0.64
72	98.42	0.0073	0.0039	1.075	1.089	132.4	99.7	581.3	2.0
28	99.84	0.0137	-0.0028	1.029	1.221	-	99.7	588.6	1.7
74	102.0	0.0139	0.0033	0.6352	4.623	156.6	99.8	600.06	0.68
75	111.2	0.0128	0.0043	0.8499	2.251	118.2	99.8	645.29	0.89
50	111.2	0.0158	-0.0005	0.6311	0.968	-	99.8	645.8	2.1
14	117.8	0.0140	0.0026	0.6447	2.909	200.0	99.8	677.71	0.92
69	122.7	0.0051	-0.0065	0.7064	1.198	-	99.8	701.3	2.6
05	124.5	0.0146	0.0052	1.476	5.265	97.3	99.6	708.37	0.63
36	124.8	0.0115	0.0010	1.411	1.546	503.5	99.7	710.1	2.0
58	141.1	0.0156	0.0028	1.288	1.663	181.0	99.7	785.7	1.8
64	156.0	0.0133	-0.0027	1.198	2.824	-	99.8	852.5	1.2
44	157.7	0.0104	0.0054	1.189	1.353	94.2	99.8	859.9	2.2
19	157.8	0.0115	-0.0012	1.310	1.513	-	99.8	860.1	1.8
55	166.6	0.0123	0.0062	0.8116	1.126	82.3	99.9	898.6	2.8
46	169.3	0.0151	0.0026	1.530	3.014	194.0	99.7	909.22	0.94
31	173.2	0.0117	0.0064	0.6235	2.187	79.9	99.9	927.0	1.5
11	174.7	0.0138	0.0032	0.6953	7.111	157.6	99.9	933.30	0.61
67	183.3	0.0137	-0.0027	0.5444	3.213	-	99.9	968.9	1.4
39	187.6	0.0120	0.0065	0.7228	0.803	78.4	99.9	986.4	4.0
60	187.9	0.0143	-0.0046	0.5896	2.270	-	99.9	987.7	1.5
04	188.5	0.0105	-0.0085	1.316	1.333	-	99.8	989.2	2.1
63	193.6	0.0022	-0.0192	1.700	0.692	-	99.7	1009.2	4.0
61	204.0	-0.0051	0.0117	0.8671	0.492	43.5	99.9	1051.7	6.2
23	205.8	0.0149	0.0018	1.241	4.440	276.0	99.8	1058.4	1.0
47	215.1	0.0076	0.0111	0.7642	0.758	46.1	99.9	1095.1	3.6
73	222.3	0.0057	0.0170	0.4620	1.018	30.0	99.9	1122.6	3.0
03	224.4	0.0129	0.0050	0.4025	4.539	102.3	99.9	1130.69	0.96
53	228.6	0.0181	-0.0002	3.195	0.825	-	99.6	1143.4	5.4
54	236.9	0.0114	0.0026	0.1764	4.226	195.4	100.0	1177.4	1.1
57	244.9	0.0166	0.0113	0.8158	1.226	45.2	99.9	1205.6	2.7
27	249.3	0.0054	0.0064	0.8456	0.882	79.2	99.9	1221.4	3.1
16	251.6	0.0183	-0.0002	1.051	2.231	-	99.9	1229.4	1.7
25	254.3	0.0216	0.0086	2.152	3.076	59.4	99.8	1237.9	1.2
35	257.7	0.0122	-0.0035	2.738	2.339	-	99.7	1249.5	1.8
30	260.8	0.0135	-0.0154	2.585	0.644	-	99.7	1260.4	5.2
21	261.0	0.0070	0.0108	1.723	0.927	47.1	99.8	1261.9	4.6
13	266.0	0.0139	-0.0096	0.3836	0.968	-	100.0	1280.8	3.5
29	266.2	0.0101	-0.0072	0.7158	1.032	-	99.9	1281.2	3.8
20	268.7	0.0132	0.0012	0.9156	5.378	430.0	99.9	1289.5	1.1
34	271.1	0.0158	0.0162	0.4465	2.490	31.5	100.0	1298.4	2.0
65	272.6	0.0101	0.0220	0.3473	1.040	23.2	100.0	1303.6	2.8
49	275.2	0.0160	0.0199	0.8240	1.147	25.7	99.9	1312.1	3.7
33	282.0	0.0138	-0.0068	1.429	1.251	-	99.9	1334.5	3.4
52	285.5	0.0131	0.0015	0.5078	2.973	331.8	99.9	1346.9	1.6

Browns Park FM. (John Weller Mesa) Tbp 7912-2, San/Micro, J=0.0038074±0.02%, IC=1.03888±0.00120, Lab#=63184

47	2.530	0.0123	0.0086	0.4309	8.931	59.3	95.0	16.619	0.048
50	3.778	0.0121	0.0302	1.312	1.321	16.9	89.8	23.44	0.33
70	4.129	0.0134	0.0115	0.7837	2.797	44.5	94.4	26.91	0.20
78	3.965	0.0129	0.0116	0.0445	5.338	44.1	99.7	27.29	0.12
03	3.991	0.0127	0.0116	0.0688	5.830	43.9	99.5	27.420	0.039
ID	$^{40}Ar/^{39}Ar$	$^{38}Ar/^{39}Ar$	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{39}Ar$ (x 10^{-3})	$^{39}Ar_K$ (x 10^{-15} mol)	K/Ca	$^{40}Ar^*$ (%)	Age (Ma)	±1σ (Ma)

Browns Park FM. (John Weller Mesa) Tbp 7912-2, San/Micro, J=0.0038074±0.02%, IC=1.03888±0.00120, Lab#=63184 (continued)

02	4.089	0.0126	0.0078	0.2857	6.213	65.3	97.9	27.645	0.036
62	4.136	0.0103	0.0109	0.3651	0.830	47.0	97.4	27.81	0.60

27	4.161	0.0125	0.0115	0.4487	2.379	44.3	96.8	27.81	0.14
63	4.207	0.0131	0.0190	0.6023	3.405	26.9	95.8	27.82	0.15
64	4.243	0.0128	0.0074	0.5598	7.043	68.7	96.1	28.150	0.073
61	4.241	0.0133	0.0073	0.5182	3.005	70.1	96.4	28.22	0.16
40	4.263	0.0135	0.0084	0.5884	3.557	60.9	95.9	28.23	0.11
48	4.567	0.0129	0.0186	1.468	2.244	27.4	90.5	28.53	0.19
26	4.309	0.0124	0.0222	0.4973	2.177	23.0	96.6	28.74	0.15
67	4.828	0.0138	0.0404	2.242	2.471	12.6	86.3	28.77	0.22
49	4.924	0.0129	0.0071	2.315	4.963	72.1	86.1	29.264	0.089
59	4.326	0.0126	0.0041	0.0303	4.297	123.0	99.8	29.79	0.11
52	4.439	0.0128	0.0068	0.3830	3.594	74.9	97.5	29.85	0.12
17	4.652	0.0131	0.0083	0.9246	2.836	61.2	94.1	30.21	0.10
16	4.472	0.0130	0.0063	0.0162	6.225	80.6	99.9	30.817	0.045
05	4.816	0.0124	0.0206	0.5320	2.022	24.7	96.8	32.14	0.11
76	6.892	0.0133	0.0376	7.528	1.974	13.6	67.7	32.21	0.31
77	4.775	0.0124	0.0091	0.2847	4.280	56.0	98.3	32.36	0.14
14	5.196	0.0109	0.0284	0.8495	1.685	18.0	95.2	34.10	0.16
15	4.963	0.0126	0.0176	0.0507	3.695	29.0	99.7	34.118	0.072
74	5.293	0.0097	0.0089	1.066	1.000	57.3	94.0	34.32	0.57
65	5.150	0.0131	0.0072	0.4346	5.420	71.4	97.5	34.613	0.095
42	5.091	0.0129	0.0073	0.0798	3.778	70.0	99.5	34.928	0.100
73	5.185	0.0123	0.0099	0.2801	1.896	51.3	98.4	35.17	0.30
08	5.259	0.0128	0.0083	0.4110	4.457	61.5	97.7	35.408	0.056
58	5.293	0.0130	0.0081	0.2560	3.817	63.1	98.6	35.96	0.12
18	7.122	0.0134	0.0052	2.993	3.364	98.2	87.6	42.911	0.090
68	6.840	0.0117	0.0135	0.7687	1.868	37.8	96.7	45.47	0.29
06	13.92	0.0128	0.0023	0.3387	3.616	223.9	99.3	93.82	0.16
34	25.62	0.0119	0.0142	0.1219	3.286	36.1	99.9	170.12	0.29
30	27.04	0.0108	0.0064	0.9988	1.975	79.5	98.9	177.45	0.42
09	38.99	0.0063	-0.0072	0.7502	1.173	-	99.4	251.98	0.64
29	50.70	0.0172	0.0064	1.885	1.119	79.3	98.9	319.8	1.1
66	87.32	0.0123	0.0028	1.158	5.397	181.9	99.6	523.58	0.61
60	88.80	0.0106	0.0044	1.883	0.940	114.7	99.4	530.2	1.6
24	90.08	0.0128	0.0045	0.8920	3.601	112.7	99.7	538.38	0.66
07	98.09	0.0131	0.0044	0.5946	5.175	117.0	99.8	579.94	0.67
71	113.6	0.0138	0.0090	1.705	2.347	56.8	99.6	655.3	1.3
69	118.5	0.0135	-0.0039	0.6451	3.059	-	99.8	680.74	0.96
32	133.8	0.0140	0.0191	8.170	6.386	26.7	98.2	742.69	0.67
20	135.1	0.0140	0.0033	1.435	5.576	156.8	99.7	757.86	0.65
51	138.8	0.0133	0.0059	1.249	3.116	86.0	99.7	775.1	1.1
04	150.7	0.0132	0.0035	0.7091	7.607	147.4	99.9	829.06	0.67
38	162.1	0.0131	0.0028	1.154	11.770	182.9	99.8	878.55	0.50
33	164.4	0.0134	0.0016	2.133	7.364	309.5	99.6	886.98	0.63
11	181.1	0.0135	0.0063	1.093	7.234	81.0	99.8	958.83	0.82
13	187.2	0.0150	0.0062	1.259	0.935	81.8	99.8	983.4	4.5
53	187.2	0.0129	0.0010	0.9870	4.561	515.0	99.8	983.92	0.78
25	187.8	0.0120	0.0023	0.3767	7.075	226.3	99.9	986.83	0.59
39	196.0	0.0127	0.2158	2.713	2.075	2.4	99.6	1017.3	1.8
37	203.8	0.0158	0.0200	7.459	2.924	25.5	98.9	1042.8	1.4
41	208.4	0.0132	0.0181	0.7268	1.795	28.2	99.9	1068.2	2.3
75	214.5	0.0126	0.0048	1.775	6.309	105.2	99.8	1090.86	0.93
35	224.1	0.0144	0.0110	1.043	3.002	46.5	99.9	1128.2	1.6
ID	$^{40}Ar/^{39}Ar$	$^{38}Ar/^{39}Ar$	$^{37}Ar/^{39}Ar$	$^{36}Ar/^{39}Ar$ (x 10^{-3})	$^{39}Ar_K$ (x 10^{-15} mol)	K/Ca	$^{40}Ar^*$ (%)	Age (Ma)	±1σ (Ma)

Browns Park FM. (John Weller Mesa) Tbp 7912-2, San/Micro, J=0.0038074±0.02%, IC=1.03888±0.00120, Lab#=63184 (continued)

22	229.6	0.0137	0.0023	0.7662	11.502	224.9	99.9	1148.96	0.71
46	230.1	0.0041	0.0163	0.9918	1.072	31.2	99.9	1150.6	3.3

72	234.8	0.0118	0.0019	0.6259	4.701	267.9	99.9	1168.5	1.1
45	263.3	0.0066	-0.0122	1.783	1.146	-	99.8	1269.1	3.4
23	269.0	0.0149	0.0023	0.8122	2.358	220.7	99.9	1289.8	2.0
44	290.2	0.0145	0.0270	4.680	3.625	18.9	99.5	1357.9	1.4

Bishop Conglomerate, Bitter Creek, WY, BC71112-1, San/Micro, J=0.0038014±0.02%, IC=1.04197±0.0012000, Lab#=63185

34	4.738	0.0103	0.0071	0.1891	0.725	72.3	98.8	32.240	0.079
67	4.836	0.0103	-0.0033	0.1459	0.724	-	99.1	32.994	0.078
39	4.860	0.0094	0.0045	0.2226	0.658	113.3	98.6	33.009	0.084
38	4.893	0.0077	0.0130	0.2660	0.545	39.2	98.4	33.15	0.10
54	4.884	0.0097	0.0087	0.1928	0.884	58.8	98.8	33.235	0.063
37	4.887	0.0090	0.0065	0.1180	0.901	78.5	99.3	33.406	0.062
51	4.898	0.0108	0.0032	0.1134	1.059	157.8	99.3	33.489	0.052
05	4.876	0.0130	0.0026	0.0153	2.981	196.0	99.9	33.531	0.022
15	4.941	0.0089	0.0156	0.1949	0.996	32.8	98.9	33.626	0.059
45	5.082	0.0096	0.0029	0.0991	1.198	176.2	99.4	34.771	0.047
74	5.219	0.0107	0.0019	0.4501	0.659	269.7	97.4	34.997	0.090
59	5.155	0.0085	0.0113	0.1152	0.693	45.1	99.4	35.241	0.079
49	5.249	0.0128	0.0059	0.4030	1.884	86.5	97.7	35.302	0.033
43	5.154	0.0099	0.0081	0.0629	0.951	63.4	99.6	35.340	0.059
55	5.166	0.0096	0.0577	0.0840	0.631	8.8	99.6	35.409	0.088
62	5.197	0.0088	0.0071	0.0621	1.135	71.9	99.7	35.636	0.049
07	5.258	0.0112	0.0029	0.2447	1.371	173.2	98.6	35.681	0.047
41	5.338	0.0089	0.0029	0.4789	0.917	175.2	97.3	35.750	0.065
66	5.251	0.0082	0.0064	0.1669	0.891	80.1	99.1	35.788	0.064
25	5.301	0.0091	0.0105	0.3345	0.987	48.5	98.1	35.799	0.061
58	5.273	0.0095	0.1985	0.0838	0.657	2.6	99.8	36.219	0.085
68	5.551	0.0083	-0.0049	0.9050	0.637	-	95.2	36.344	0.094
50	5.456	0.0076	0.0080	0.2652	0.892	64.2	98.6	36.991	0.065
26	5.524	0.0092	0.0122	0.3759	0.525	41.9	98.0	37.23	0.11
02	5.594	0.0126	0.0132	0.1344	4.330	38.5	99.3	38.202	0.017
21	5.731	0.0086	0.0100	0.5316	0.567	51.1	97.3	38.33	0.10
44	5.782	0.0080	0.2531	0.1811	0.558	2.0	99.4	39.521	0.100
73	5.897	0.0105	0.0054	0.2139	0.705	94.0	98.9	40.099	0.083
06	5.907	0.0124	0.0097	0.0503	2.519	52.6	99.8	40.500	0.026
53	6.349	0.0093	-0.0012	0.5226	0.582	-	97.6	42.55	0.10
16	6.730	0.0092	0.0055	0.3548	0.797	93.3	98.4	45.474	0.077
52	6.961	0.0088	0.0016	0.4932	0.553	325.1	97.9	46.76	0.11
40	6.861	0.0102	0.0056	0.0900	1.508	90.5	99.6	46.900	0.041
31	7.013	0.0068	0.0199	0.1473	0.560	25.6	99.4	47.82	0.11
30	7.218	0.0084	0.0128	0.4996	0.987	39.8	98.0	48.502	0.064
76	7.311	0.0116	0.0061	0.0971	1.761	83.3	99.6	49.936	0.037
57	10.05	0.0096	-0.0050	0.1353	0.766	-	99.6	68.32	0.38
20	10.52	0.0140	-0.0047	0.3376	1.784	-	99.0	71.05	0.22
47	14.50	0.0123	-0.0110	0.1453	0.727	-	99.7	97.86	0.46
17	14.84	0.0122	-0.0066	0.3476	1.699	-	99.3	99.75	0.27
04	23.04	0.0155	0.0030	0.7139	1.530	170.0	99.1	152.26	0.51
14	98.55	0.0133	0.0062	0.5140	2.052	82.5	99.8	581.62	1.00
42	131.9	0.0192	0.0319	3.308	1.003	16.0	99.3	739.6	2.7
63	182.2	0.0100	-0.0053	0.4396	1.079	-	99.9	962.6	3.0

Notes:

Isotopic ratios corrected for blank, radioactive decay, and mass discrimination, not corrected for interfering reactions.
Errors quoted for individual analyses include analytical error only, without interfering reaction or J uncertainties.
Isotopic abundances after Steiger and Jäger (1977).
Ages calculated relative to FC-2 Fish Canyon Tuff sanidine interlaboratory standard at 28.201 Ma (Kuiper et al., 2008)
- no detectable 37Ar above blank.

Decay Constant (LambdaK (total)) = 5.463e-10/a (Min et al., 2000)
San/Micro = Sanidine/Microcline

Correction factors:

$(^{39}Ar/^{37}Ar)_{Ca}$ = 0.0007064 ± 4e-06

$(^{36}Ar/^{37}Ar)_{Ca}$ = 0.0002731±4.9e-07

$(^{40}Ar/^{39}Ar)_{K}$ = 0.008081 ± 0.00041

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