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Summary

The samples were prepared for $^{40}\text{Ar}/^{39}\text{Ar}$ laserprobe step-heat dating by hand picking of whole rock basalt under a binocular microscope.

Of the 12 samples, 11 plateau ages were produced that are considered reliable, 9 of these give ages between 0.470 Ma and 0.835 Ma, with 2 older ages of 1.32 ± 0.14 Ma and 2.556 ± 0.052 Ma from samples LBR-5350 and CLU-2312 respectively.

Sample Preparation

The samples were crushed using a pestle and mortar and the crushate was sieved and washed repeatedly in de-ionised water to remove dust and clay particles from the surfaces of all the size fractions. Using a binocular microscope, whole rock basalt chips were picked, selecting pieces free from alteration. The picked separates were cleaned ultrasonically in acetone and de-ionised water, dried using the hot plate, and packaged in aluminium foil packets of ca. 10mm x 10mm in size prior to irradiation.

Irradiation

Samples were irradiated at the McMaster Nuclear Reactor (McMaster University, Canada) for 4.8 hours. Cadmium shielding was used and the samples were held in position 8B. Neutron flux was monitored using biotite mineral standard GA1550 which has an age of 98.8 ± 0.5 Ma (Renne et al. 1998). Standards were packed for irradiation, either side of the unknown samples and analysed using the single grain fusion method using a 1059nm CSI fibre laser and a MAP215-50 mass spectrometer. The J Values were then calculated by linear extrapolation between the 2 measured J values, the values for each sample are shown in table 1. Results were corrected ^{37}Ar decay, and neutron-induced interference reactions. The following correction factors were used: $(^{39}\text{Ar}/^{37}\text{Ar})\text{Ca} = 0.00065 \pm 0.00000325$, $(^{36}\text{Ar}/^{37}\text{Ar})\text{Ca} = 0.000265 \pm 0.000001325$, and $(^{40}\text{Ar}/^{39}\text{Ar})\text{K} = 0.0085 \pm 0.0000425$; based on analyses of Ca and K salts.

Table 1. J values and associated errors used to correct for each sample

Sample	J Value	Error
1- LBR-5350	0.000189748	0.000001897
2- LBR-4963	0.000191085	0.000001911
3- CLU-2312	0.000192422	0.000001924
4- CLU-2275	0.000193759	0.000001938
5- CLU-1380	0.000195765	0.000001958
6- CLU-1312	0.000197102	0.000001971
7- CCO-2372	0.000198439	0.000001984
8- CCO-2215	0.000199776	0.000001998
9- GU-0001	0.000201781	0.000002018
10- TI-0002	0.000203118	0.000002031
12- BOL-1141	0.000204455	0.000002045
13- BOL-0979	0.000205792	0.000002058

Analysis

The irradiated samples were loaded into an ultra-high vacuum system and mounted on a New Wave Research UP-213 stage. A 1059nm CSI fibre laser was focussed into the sample chamber and was used to step heat the basalt. Extracted gases were cleaned for 300 seconds using two SAES AP-10 getters running at 450°C and room temperature, following which the gases were let into the Nu Instruments Noblesse mass spectrometer for measurement, the mass discrimination value was measured at 295 for $^{40}\text{Ar}/^{36}\text{Ar}$. System blanks were measured before and after every one or two sample analyses. Gas clean-up and inlet is fully automated, with measurement of ^{40}Ar , ^{39}Ar , ^{38}Ar , ^{37}Ar , and ^{36}Ar , each for ten scans, and the final measurements are extrapolations back to the inlet time.

Data Reduction

The system blanks measured before and after every one or two sample analysis were subtracted from the raw sample data. All data corrections were carried out using an Excel macro and ages were calculated using Isoplot (Ludwig, 2003). All ages are reported at the 2σ level and include a 0.5% error on the J value. Plateau criteria of at least 50% of the ^{39}Ar release in at least 3 consecutive steps were used. $^{40}\text{Ar}/^{39}\text{Ar}$ data is presented in Appendix A.

Results

- Sample 1 - LBR-5350 gave a plateau age of 1.32 ± 0.14 Ma, containing 100% of the gas released (figure 1). An inverse isochron correlation plot of the data produced an age within error of the plateau age and a $^{40}\text{Ar}/^{36}\text{Ar}$ ratio within error of the atmospheric ratio (295.5).
- Sample 2 - LBR-4963 produced a plateau age of 0.808 ± 0.031 Ma, containing 93.2% of the ^{39}Ar released (figure 2). The inverse isochron correlation plot produced a poor correlation and large errors on the intercepts.

- Sample 3 - CLU-2312. The step heating spectra produced a plateau with an age of 2.556 ± 0.052 Ma, containing 72.8% of the ^{39}Ar release (figure 3). The inverse isochron correlation plot gives an age within error of the plateau age, at 2.536 ± 0.055 Ma and a $^{40}\text{Ar}/^{36}\text{Ar}$ intercept within error of the atmospheric ratio.
- Sample 4 - CLU-2275 produced a plateau age of 0.470 ± 0.041 Ma (figure 4) containing 96.6% of the ^{39}Ar released. The inverse isochron plot for this data failed to calculate an age.
- Sample 5 - CLU-1380, produced a plateau age of 0.506 ± 0.026 Ma containing 100% of the ^{39}Ar released (figure 5). The inverse isochron correlation plot, calculates an age older than, but within error of the plateau age.
- Sample 6 - CLU-1312. A plateau age of 0.498 ± 0.024 Ma was calculated from sample 6 (figure 6). The inverse isochron correlation plot produces an age within error of this, at 0.46 ± 0.13 Ma.
- Sample 7 - CCO-2372. The step heating release spectra shows more discordance than the other samples dated (figure 7). A plateau age of 4.13 ± 0.12 Ma can be calculated from the data, this plateau contains 51.9% of the gas released, just over the 50% required to meet the statistical criteria for a plateau. The inverse isochron correlation plot shows a poor correlation and results in large errors on the calculated age which does not agree with the step heating age data. The $^{40}\text{Ar}/^{36}\text{Ar}$ intercept, calculated from the inverse isochron plot, is above the atmospheric value of 295.5 and may suggest that this sample contains excess argon. This sample shows discordance and excess argon may be elevating the apparent ages of the step heating data. These problems are often associated with alteration of the basalt and the age data is considered unreliable.
- Sample 8 - CCO-2215. A plateau age of 0.835 ± 0.030 Ma was produced (figure 8) which containing 100% of the ^{39}Ar release. The inverse isochron correlation is of lower precision but within error of the plateau age and with a $^{40}\text{Ar}/^{36}\text{Ar}$ ratio of 280 ± 21 , within error of the atmospheric ratio (of 295.5).
- Sample 9 - GU-0001 produced a step heating release spectra with a concordant portion containing 68.2% of the gas release giving a plateau age of 0.799 ± 0.025 Ma (figure 9). When plotted as an inverse isochron, the data from this sample fail to produce a correlation and age cannot be calculated.
- Sample 10 - TI-0002 produced a plateau age of 0.664 ± 0.038 Ma which contains 71% of the ^{39}Ar released from the step heating (figure 10). The inverse isochron plot of this data fails to produce a correlation and an age cannot be calculated due to many of the points overlapping.
- Sample 12 - BOL-1141 produced a plateau age of 0.510 ± 0.018 Ma, which contains 100% of the ^{39}Ar released (figure 11). The inverse isochron correlation plot produces an age within error of this but with much larger errors due to the small spread of ratios.
- Sample 13 - BOL-0979 produced a plateau age of 0.537 ± 0.031 Ma (figure 12) containing 88.5% of the ^{39}Ar released. The inverse isochron plot failed to produce a correlation.

Conclusions

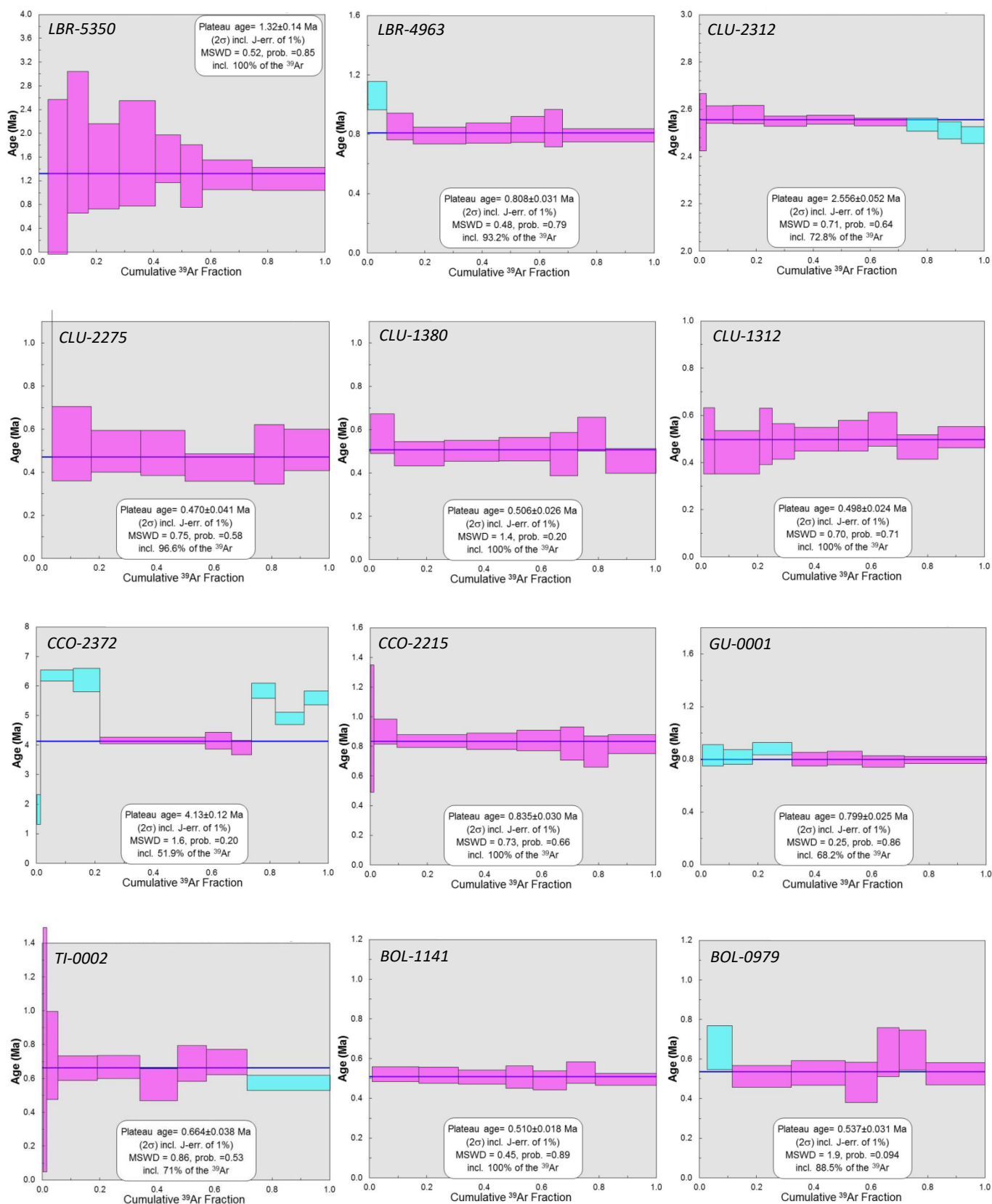
The inverse isochron ages calculated for these samples are generally less precise, with larger errors than the plateau ages. This is associated with the limited spread of ratios on the plots

The inverse isochron ages are in most cases within error of the plateau age and the $^{40}\text{Ar}/^{36}\text{Ar}$ intercepts are within error of the atmospheric ratio (of 295.5) and the plateau ages are taken as the most reliable estimate of the age of these samples. Based on the data above, these are the best estimates of the age of each of the samples:

	Sample	Age
1	LBR – 5350	1.32 ± 0.14 Ma
2	LBR – 4963	0.808 ± 0.031 Ma
3	CLU – 2312	2.556 ± 0.052 Ma
4	CLU – 2275	0.470 ± 0.041 Ma
5	CLU – 1380	0.506 ± 0.026 Ma
6	CLU – 1312	0.498 ± 0.024 Ma
7	CCO – 2372	4.13 ± 0.12 Ma
8	CCO – 2215	0.835 ± 0.030 Ma
9	GU – 0001	0.799 ± 0.025 Ma
10	TI – 0002	0.664 ± 0.038 Ma
12	BOL – 1141	0.510 ± 0.018 Ma
13	BOL – 0979	0.537 ± 0.031 Ma

References

- Ludwig, K.R., 2003, *Users manual for Isoplot/Ex version 3.0: a geochronological toolkit for Microsoft Excel*. Berkeley Geochronology Center Spec. Pub. No. 4, 70 pp. Berkeley, California.
- Renne, P.R., Swisher, C.C., Deino, A.L., Karner, D.B., Owens, T.L., and DePaolo, D.J., 1998, Intercalibration of standards, absolute ages and uncertainties in $^{40}\text{Ar}/^{39}\text{Ar}$ dating: *Chemical Geology*, v. 145, p. 117-152.



Figures 1 to 12. Plateau ages diagrams. Plateau steps are magenta, rejected steps are cyan. Box heights are 2σ .

1 - LBR-5350	40Ar	+/-	39Ar	+/-	38Ar	+/-	37Ar	+/-	36Ar	+/-	40Ar*/39Ar	+/-	Age	+/- (no J error)
step 1	63971.3276	770.6952	645.9606	104.1304	36.7468	2.5621	894.0507	10.7606	205.9774	4.5398	4.8068	2.5173	1.6447	0.8609
step 2	246273.6879	818.4520	1363.5873	103.3953	179.5678	12.1162	3521.3807	10.7729	816.2811	8.2377	3.7127	1.9043	1.2705	0.6514
step 3	253284.4452	822.0606	1492.6686	103.0404	160.5517	2.8030	5307.1677	10.7844	829.8079	8.1468	5.4106	1.7447	1.8512	0.5966
step 4	194178.6545	805.1028	2172.0157	108.7465	148.5415	4.0337	8256.6919	10.7913	626.0263	7.0746	4.2301	1.0529	1.4475	0.3601
step 5	351441.6905	845.8830	2529.2529	103.0404	254.6313	8.7546	13537.5729	10.7985	1147.6268	10.5646	4.8702	1.2941	1.6664	0.4426
step 6	78587.6836	374.4033	1791.5689	14.6987	66.7008	3.0387	15933.5199	8.2759	237.9776	3.3343	4.6134	0.5895	1.5786	0.2016
step 7	121562.6096	379.0907	1533.2664	13.9632	94.8246	3.6166	12576.5811	8.2816	391.8672	3.7904	3.7605	0.7720	1.2868	0.2641
step 8	179644.2236	379.3329	3487.1621	17.0686	147.8695	4.2009	27593.4101	8.2874	562.8877	4.1627	3.8171	0.3696	1.3062	0.1264
step 9	117525.0025	378.3795	5133.4073	17.9016	136.8602	5.2816	53519.6210	8.2901	335.0173	4.7299	3.6092	0.2824	1.2351	0.0966
2 - LBR-4963														
step 1	1918.8663	47.1211	123.2722	6.1607	0.5054	1.0779	209.9054	7.3644	4.8277	1.4005	3.9934	3.3848	1.3761	1.1660
step 2	37437.5070	55.2745	3825.9723	16.7003	79.7926	3.2310	7242.6377	7.3691	86.7640	1.7724	3.0839	0.1383	1.0628	0.0477
step 3	41931.5926	59.1676	5415.9741	17.6644	97.5076	3.3272	12048.0322	7.3714	96.4906	2.3878	2.4776	0.1310	0.8539	0.0451
step 4	115810.4103	188.4285	10763.3070	24.3084	225.7351	5.2987	38628.0843	4.3427	308.0836	2.8803	2.3015	0.0812	0.7932	0.0280
step 5	109813.6973	190.1458	9178.9473	21.3393	197.7114	4.4173	40547.5369	4.3441	298.5749	2.9777	2.3516	0.0982	0.8105	0.0338
step 6	92805.2388	182.9817	6788.8157	18.3820	154.6750	3.8346	33507.1383	4.3469	258.4406	2.8802	2.4210	0.1284	0.8344	0.0442
step 7	48656.7246	177.9103	3708.9836	13.5012	83.1144	3.5455	23912.0490	4.3497	133.9833	2.2056	2.4440	0.1824	0.8423	0.0628
step 8	215912.6194	203.4321	18623.6870	27.2882	378.8648	5.5939	123552.7175	4.3525	585.5785	3.9611	2.3021	0.0639	0.7934	0.0220
3 - CLU-2312														
step 1	2522.2963	270.3445	232.2961	11.8166	1.8691	1.3511	66.7103	8.5331	2.1073	2.1097	8.1774	2.9547	2.8365	1.0241
step 2	43639.4583	273.3839	4051.3051	17.8979	66.0334	2.9525	715.7494	8.5360	47.0353	2.1800	7.3410	0.1758	2.5466	0.0609
step 3	153320.1265	279.8058	16415.1727	31.1103	223.7670	5.6317	1009.2895	8.5415	105.7575	2.7202	7.4363	0.0537	2.5796	0.0186
step 4	210394.5935	286.0987	19019.5219	32.0481	284.8187	6.2200	2123.0241	8.5470	233.4624	3.3837	7.4348	0.0561	2.5791	0.0194
step 5	215342.6004	283.5351	26133.4272	37.7443	349.8738	6.4166	2037.7736	8.5528	78.3850	2.3172	7.3538	0.0303	2.5510	0.0105
step 6	226336.5463	295.3754	29039.1435	43.5254	381.9009	6.6134	1959.7244	8.5615	41.5057	2.1981	7.3718	0.0269	2.5573	0.0093
step 7	249349.9795	295.3760	32044.6890	41.5911	415.9297	6.2200	2442.1076	8.5674	47.2778	2.1595	7.3453	0.0239	2.5481	0.0083
step 8	146285.2671	284.4721	19120.0918	31.1104	245.7856	5.2411	1581.8073	8.5758	22.0058	2.2252	7.3108	0.0393	2.5361	0.0136
step 9	107260.8966	279.0245	14210.6998	27.4046	183.7331	4.0805	1328.5309	8.5814	14.6729	2.2457	7.2428	0.0525	2.5125	0.0182
step 10	105259.2101	281.4574	14010.2587	32.9898	177.7280	4.5616	1409.2987	8.5842	15.6515	2.1123	7.1829	0.0517	2.4918	0.0179

4 - CLU-2274	40Ar	+/-	39Ar	+/-	38Ar	+/-	37Ar	+/-	36Ar	+/-	40Ar*/39Ar	+/-	Age	+/- (no J error)
step 1	2987.2084	603.8520	82.8050	22.2474	1.9359	1.9560	109.4100	16.2604	6.9281	3.1715	11.3513	13.8050	3.9635	4.8150
step 2	36477.8835	606.5710	1965.3979	34.8787	49.7965	2.7399	3320.5917	16.2656	101.4772	3.2527	3.3028	0.5813	1.1542	0.2031
step 3	140000.9308	624.4052	8098.7336	50.1757	221.0415	9.3960	16643.1781	16.2760	431.9467	6.4147	1.5262	0.2466	0.5334	0.0862
step 4	91300.1620	619.5657	10256.7627	58.4132	214.0355	5.1555	26183.2636	16.2919	259.4186	4.3347	1.4275	0.1390	0.4989	0.0486
step 5	82794.7828	615.3405	9192.3342	58.4132	190.0152	4.8770	29807.9360	16.3024	236.4580	4.1328	1.4057	0.1490	0.4913	0.0521
step 6	82650.6674	613.4626	14346.4312	54.7220	285.0957	9.0040	54435.4778	16.3185	220.9317	3.9438	1.2104	0.0919	0.4231	0.0321
step 7	41650.5013	604.8142	6202.6174	29.7699	139.9728	4.1489	35789.0061	16.3292	111.8731	3.6098	1.3852	0.1978	0.4841	0.0691
step 8	58251.4688	605.9050	9375.3152	34.1082	215.0364	4.9695	72018.2162	16.3346	151.2723	3.8842	1.4453	0.1385	0.5052	0.0484
5 - CLU-1380														
step 1	484.3252	298.7504	175.9937	10.1652	2.6185	0.9773	155.9703	7.0909	0.5962	1.6827	1.7510	3.2976	0.6183	1.1642
step 2	18054.1615	300.3099	4873.7265	18.4872	67.0130	3.2043	5508.6986	7.0932	33.8777	1.8922	1.6503	0.1304	0.5828	0.0460
step 3	42850.2905	308.9467	10269.5136	44.0572	152.4854	10.0404	12889.7418	7.0978	96.8217	2.5730	1.3866	0.0801	0.4896	0.0283
step 4	45446.1805	302.7146	11267.9175	28.5769	156.4888	4.4759	18368.2917	7.1001	99.3699	2.4208	1.4273	0.0690	0.5040	0.0244
step 5	43750.1125	301.4656	10460.0313	25.7496	145.4794	4.1809	28087.6929	7.1047	96.7943	2.4962	1.4481	0.0763	0.5114	0.0269
step 6	26962.4329	300.7906	5664.1765	19.3626	80.8247	3.3013	22624.4343	7.1093	64.7420	2.4961	1.3826	0.1407	0.4882	0.0497
step 7	27061.9210	300.1979	5741.1610	20.2497	94.4362	3.9846	27508.4911	7.1163	59.6477	1.9029	1.6436	0.1112	0.5804	0.0393
step 8	53166.8963	303.0590	10335.0139	23.8897	172.5023	4.6730	66285.0510	7.1186	134.6720	2.6528	1.2938	0.0814	0.4569	0.0287
6 - CLU-1312														
step 1	5502.2988	496.1578	973.1758	61.7266	17.2634	1.8481	607.0444	7.4931	16.8391	1.7780	0.5408	0.7434	0.1923	0.2643
step 2	29685.5869	495.1050	4669.2212	41.5385	74.6344	3.1357	3869.5692	7.5597	78.5371	2.6306	1.3874	0.1978	0.4933	0.0703
step 3	220285.7538	539.2442	19078.3210	75.4741	370.1847	12.0188	16107.2005	7.6641	664.7941	8.1511	1.2495	0.1295	0.4443	0.0460
step 4	38994.4514	485.4906	5478.8079	41.0648	93.5505	3.2348	6884.7456	7.6721	105.2380	2.6306	1.4413	0.1676	0.5124	0.0596
step 5	62900.1296	485.4907	9573.8248	41.5387	160.0067	3.8303	10992.2384	7.6772	168.1496	3.0529	1.3800	0.1072	0.4906	0.0381
step 6	152175.6090	488.9716	18470.2497	47.1949	343.1618	5.6231	26811.1313	7.6797	426.9576	4.1220	1.4082	0.0712	0.5007	0.0253
step 7	111155.5101	488.5001	12662.1183	44.1737	231.0669	4.5267	22557.1834	7.6846	314.0848	3.5271	1.4487	0.0910	0.5151	0.0324
step 8	143211.4505	489.9675	12459.6701	43.0693	248.0813	5.5234	25749.8212	7.6896	420.2388	3.9485	1.5274	0.1017	0.5430	0.0362
step 9	142168.8789	490.3158	17261.7360	47.8393	314.1372	6.1221	36458.2836	7.6945	404.4011	3.9487	1.3132	0.0734	0.4669	0.0261
step 10	184217.0722	495.1058	19962.9197	47.1950	372.1864	7.4202	42449.8924	7.6973	526.8133	3.9488	1.4298	0.0636	0.5084	0.0226

7 - CCO-2372

	40Ar	+/-	39Ar	+/-	38Ar	+/-	37Ar	+/-	36Ar	+/-	40Ar*/39Ar	+/-	Age	+/- (no J error)
step 1	1516.1394	349.1263	83.7943	10.5972	0.7864	1.7754	117.1691	8.6094	4.6261	1.8630	1.7797	7.7830	0.6370	2.7853
step 2	34743.4606	350.5618	1132.1467	12.5690	29.9611	1.8131	1042.4069	8.6151	97.9809	2.4506	5.1143	0.7129	1.8300	0.2550
step 3	973961.3345	738.1025	9532.6163	26.9693	657.8928	8.0499	9026.4743	8.6236	2720.8651	7.9753	17.8278	0.2639	6.3711	0.0942
step 4	750598.1008	791.6263	7799.5925	48.1379	500.7597	12.1049	8712.5542	8.6265	2080.9483	14.0984	17.3955	0.5542	6.2169	0.1977
step 5	1938705.9498	2111.2726	30696.5637	43.0382	1444.3455	13.0423	36838.1756	8.0442	5350.5379	13.5331	11.6502	0.1482	4.1660	0.0529
step 6	448380.1224	937.8018	7630.0405	25.4515	327.3997	9.0528	11315.4944	8.0575	1217.3014	9.7541	11.6209	0.3991	4.1555	0.1426
step 7	317173.4171	927.8521	5828.0628	22.4330	250.3345	5.0851	9176.2615	8.0629	856.8683	6.0194	10.9760	0.3468	3.9251	0.1239
step 8	624684.0480	968.4885	6969.6364	24.6705	421.4794	6.6671	10041.4673	8.0681	1727.6390	7.5962	16.3806	0.3555	5.8547	0.1269
step 9	589612.9739	955.9752	8349.9104	24.6705	418.4768	6.2707	13600.0167	8.0764	1606.6960	7.4231	13.7528	0.2894	4.9168	0.1033
step 10	629691.8412	971.8498	7047.6114	26.2476	435.4912	6.5679	13393.7870	8.0818	1756.7506	7.0812	15.6893	0.3325	5.6080	0.1187

8 - CCO-2215

step 1	239.5487	199.8978	100.7938	5.4364	0.6506	0.8119	239.0273	8.6020	-1.2008	0.9110	5.8972	3.3417	2.1242	1.2030
step 2	3961.8850	200.5292	567.2066	7.3901	13.2412	1.5079	1021.6676	8.6049	8.4918	0.9221	2.5609	0.5974	0.9227	0.2152
step 3	23476.8899	206.0405	3864.7470	37.3052	47.3701	1.6955	7138.4542	8.6104	46.7708	1.3379	2.4985	0.1178	0.9003	0.0425
step 4	65982.4926	206.5662	11667.7979	28.3614	167.4718	4.2403	26182.2833	8.6188	131.6242	2.2341	2.3216	0.0596	0.8365	0.0215
step 5	50383.6464	202.5039	8420.8692	19.4857	125.4362	3.0538	26983.9963	8.6215	104.4117	2.0472	2.3192	0.0759	0.8357	0.0274
step 6	44683.3539	203.9037	7318.5800	18.5080	115.4277	3.6459	27163.6264	8.6327	93.3641	2.2341	2.3357	0.0946	0.8416	0.0341
step 7	31890.6161	203.6893	3912.8338	15.5934	68.9884	2.4658	25655.3196	8.6356	77.7638	1.9547	2.2775	0.1568	0.8206	0.0565
step 8	34093.2377	203.4799	4041.9050	18.5080	67.7874	2.9555	27481.5351	8.6419	86.2799	1.8631	2.1271	0.1455	0.7665	0.0524
step 9	57699.7666	206.3009	7964.7551	19.4862	130.4404	3.1523	50450.5157	8.6503	134.1931	2.2348	2.2657	0.0870	0.8164	0.0314

9 - GU-0001

step 1	4610.3508	79.2923	288.5226	5.5650	5.6598	1.2840	342.3093	6.1401	8.7426	1.7095	7.0251	1.7774	2.5555	0.6461
step 2	3328.4964	79.5639	251.5088	5.2225	4.0584	1.2283	249.3619	6.1440	8.7673	1.7154	2.9334	2.0410	1.0675	0.7426
step 3	76472.1856	301.3107	8735.9130	27.2063	178.7634	3.5547	14388.9694	7.2318	191.1069	3.1721	2.2894	0.1129	0.8332	0.0411
step 4	88562.5435	301.9248	12275.6485	29.1311	237.8134	4.8149	25759.6423	7.2344	206.0937	3.0038	2.2534	0.0766	0.8201	0.0279
step 5	123385.7546	309.3041	16472.6706	33.0091	300.8668	5.5998	43352.5039	7.2390	282.4316	3.4315	2.4238	0.0645	0.8821	0.0235
step 6	111379.8947	304.9128	14769.4924	32.0367	271.8422	4.3273	42982.5464	7.2437	266.5296	3.3444	2.2086	0.0702	0.8038	0.0255
step 7	105371.4286	305.9378	14568.9198	29.1314	258.8312	4.6196	43249.1590	7.2484	246.4590	3.2580	2.2337	0.0695	0.8130	0.0253
step 8	131388.2416	308.4222	17766.6565	28.1679	320.8837	5.4031	56646.9450	7.2509	314.9086	3.4318	2.1576	0.0598	0.7852	0.0217
step 9	231416.3489	322.7001	34368.7014	44.7815	602.1218	7.9732	104943.6491	7.2579	528.1099	4.1510	2.1927	0.0370	0.7980	0.0135

10 - TI-0002	40Ar	+/-	39Ar	+/-	38Ar	+/-	37Ar	+/-	36Ar	+/-	40Ar*/39Ar	+/-	Age	+/- (no J error)
step 1	663.6376	292.2124	25.0223	7.6466	1.0418	1.3276	43.0875	13.2996	2.7886	1.7012	-6.4098	-23.3201	-2.3503	8.5566
step 2	4004.4439	292.3824	595.7128	9.3352	8.4180	1.3833	747.3416	13.3083	9.3020	1.7223	2.1079	0.9858	0.7723	0.3611
step 3	8491.9783	292.0733	1780.1355	12.5370	25.2323	2.2318	2225.1610	13.3125	16.6103	1.8884	2.0131	0.3541	0.7375	0.1297
step 4	25383.8284	297.3592	6102.6985	36.8511	86.9846	3.3153	11673.2433	13.3211	48.6066	1.7681	1.8059	0.0991	0.6616	0.0363
step 5	26982.2817	294.8430	6599.4920	18.6264	92.6894	3.1288	18158.2856	13.3295	50.4881	1.8005	1.8279	0.0923	0.6697	0.0338
step 6	27789.6847	293.8066	5881.9748	19.5471	88.0855	3.2218	27523.2314	13.3335	63.3063	2.3569	1.5442	0.1286	0.5658	0.0471
step 7	22712.1864	413.3798	4488.2260	15.4833	71.4025	3.3671	28704.2723	4.4074	48.2134	1.6726	1.8861	0.1437	0.6910	0.0526
step 8	29007.3631	413.7195	6303.1532	19.3983	103.4296	3.6621	42164.6510	4.4088	57.4464	1.7008	1.9089	0.1034	0.6994	0.0379
step 9	46179.7913	414.8521	12950.9759	23.3458	189.5025	4.0566	81597.7296	4.4115	87.3966	2.3421	1.5716	0.0624	0.5758	0.0228
12 - BOL-1141														
step 1	2521.4322	283.4207	333.8863	5.7356	5.3912	1.2234	175.2093	8.3934	4.9202	2.2361	3.1972	2.1541	1.1789	0.7940
step 2	3451.2114	283.5481	545.2005	7.0080	10.6957	1.0361	341.2958	8.3988	7.9762	2.1078	2.0070	1.2555	0.7401	0.4629
step 3	84553.0121	292.9622	19000.1755	27.7311	394.1300	5.9808	14037.4672	7.8301	194.9051	3.0911	1.4189	0.0505	0.5233	0.0186
step 4	59135.5123	290.5217	15994.7137	30.6709	297.0478	5.6846	13189.1104	7.8352	124.1299	2.8062	1.4039	0.0550	0.5178	0.0203
step 5	65418.9357	288.3171	19195.2516	34.6083	336.0808	5.3888	22240.2123	7.8378	131.7313	2.9454	1.3801	0.0478	0.5090	0.0176
step 6	42649.2797	287.6891	11081.2281	22.8699	185.9537	4.7008	18820.8095	7.8429	92.6375	2.6749	1.3784	0.0760	0.5084	0.0280
step 7	50942.9066	288.1546	13481.0132	25.7799	230.9918	5.4873	26563.8456	7.8479	111.5856	2.7396	1.3329	0.0638	0.4916	0.0235
step 8	47352.1355	288.4816	11676.7283	23.8374	206.9715	4.7988	27605.8806	7.8556	103.3094	2.7397	1.4408	0.0737	0.5314	0.0272
step 9	95421.2358	292.4900	24879.1758	36.5833	409.1427	5.4873	64598.7633	7.8581	209.5063	3.3214	1.3470	0.0412	0.4968	0.0152
13 - BOL-0979														
step 1	6387.4166	265.2785	693.7579	10.5980	12.0152	1.2336	771.9628	15.6384	16.4079	2.4041	2.2182	1.0936	0.8233	0.4058
step 2	10091.1753	265.6263	989.0396	10.7391	14.2170	1.5727	1245.8407	15.6435	24.1824	2.5492	2.9779	0.8083	1.1053	0.2999
step 3	34294.8026	272.1034	5383.9833	38.8216	84.8769	3.2645	7140.1826	15.6536	83.7204	2.5493	1.7748	0.1493	0.6588	0.0554
step 4	66686.6921	269.9193	12789.3927	28.0938	193.3687	5.0082	21578.6460	15.6639	165.8942	3.0821	1.3812	0.0743	0.5127	0.0276
step 5	59885.3871	269.5249	11583.7082	26.1696	184.3611	3.8398	26635.4205	15.6689	146.5541	3.2156	1.4312	0.0853	0.5313	0.0317
step 6	35684.3148	267.6136	6888.8015	19.5612	111.2992	3.8398	19761.8350	15.6790	90.3756	3.0821	1.3033	0.1378	0.4838	0.0512
step 7	23582.7992	266.5013	4657.2212	15.9413	65.9609	1.5727	15336.0488	15.6943	52.7484	2.4682	1.7168	0.1668	0.6373	0.0619
step 8	28381.3958	266.6275	5776.6179	18.6413	93.5842	2.7933	19710.9338	15.6994	61.9891	2.4843	1.7421	0.1353	0.6467	0.0502
step 9	53665.5098	270.5375	12676.2926	25.2124	199.3738	4.0332	41447.6939	15.7149	120.6289	3.0825	1.4215	0.0750	0.5277	0.0278