

GSA Data Repository Item 2017236

Chapman, J.B., Carrapa, B., Ballato, P., DeCelles, P.G., Worthington, J., Oimahmadov, I., Gadoev, M., and Ketcham, R., 2017, Intracontinental subduction beneath the Pamir Mountains: Constraints from thermokinematic modeling of shortening in the Tajik fold-and-thrust belt: GSA Bulletin, doi:10.1130/B31730.1.

DATA REPOSITORY

Supplementary Information

Table DR1. Flexural parameters for modeling .

Table DR2. Apatite (U-Th)/He (AHe) data for individual aliquots.

Table DR3. Apatite fission track (AFT) data for samples analyzed.

Figure DR1. Bottom hole temperature plotted against well-depth to estimate modern geothermal gradient.

Figure DR2. Apatite (U-Th)/He (AHe) ages for individual aliquots of each sample plotted against effective uranium concentration (eU).

File DR1. Matlab script for modeling plate flexure with spatially variable flexural rigidity using a centered-difference approach.

Table DR1. Flexural modeling parameters

Node spacing	5	km
Youngs modulus	7.00E+10	Pa
Poissons ratio	0.25	
gravity	9.8	m/s ²
mantle density	3300	kg/m ³
basin fill density	2700	kg/m ³
load density	2700	kg/m ³
load width	200	km

Time Steps (Ma)	Load height (m)
0	2000
2	1700
4	1400
6	1100
8	800
10	667
12	534
14	400
16	267
18	134
20	0

Table DR2. Apatite (U-Th)/He (AHe) data for individual aliquots.

Lab. Ref.	Sample Name	Raw Age (Ma)	Corr. Age (Ma)	1 σ (Ma)	eU (ppm)	U (ppm)	Th (ppm)	nmol 4He/g (Ca)	mass ap (g)	Ft 238U	Ft 235U	Ft 232Th	Ft 147Sm
14C159	14-10-Ap2	2.01	2.90	0.16	39.50	37.93	6.67	0.43	1.62E-06	0.693	0.652	0.652	0.900
14C160	14-10-Ap3	1.96	3.11	0.11	27.03	23.35	15.67	0.29	1.39E-06	0.638	0.591	0.591	0.881
14C161	14-10-Ap4	1.87	3.07	0.18	93.87	55.05	165.20	0.95	9.37E-07	0.628	0.580	0.580	0.878
14C162	14-10-Ap5	2.25	3.11	0.10	16.91	12.41	19.16	0.21	2.77E-06	0.732	0.696	0.696	0.914
14C163	14-03-Ap1	6.42	9.73	0.26	57.91	51.73	26.28	2.01	1.53E-06	0.666	0.622	0.622	0.891
14C164	14-03-Ap2	2.78	3.72	0.13	7.99	5.37	11.13	0.12	5.12E-06	0.757	0.723	0.723	0.922
14C165	14-03-Ap3	5.55	7.24	0.23	2.33	1.42	3.88	0.07	6.72E-06	0.776	0.745	0.745	0.928
14C167	14-03-Ap5	8.19	10.16	0.16	31.88	17.14	62.72	1.42	1.01E-05	0.818	0.793	0.793	0.942
14C169	14-05-Ap2	1.05	1.47	0.06	38.90	19.80	81.29	0.22	3.22E-06	0.730	0.694	0.694	0.913
14C170	14-05-Ap3	1.26	1.78	0.13	12.44	5.34	30.20	0.09	2.54E-06	0.726	0.689	0.689	0.912
14C172	14-05-Ap4	0.71	1.06	0.10	20.08	8.23	50.41	0.08	2.01E-06	0.695	0.654	0.654	0.901
14C173	14-05-Ap5	0.79	1.04	0.05	38.12	15.88	94.62	0.16	4.49E-06	0.772	0.740	0.740	0.927
14C174	14-08-Ap1	0.88	1.27	0.05	40.16	20.58	83.32	0.19	2.33E-06	0.712	0.673	0.673	0.907
14C175	14-08-Ap2	1.89	2.78	0.11	22.08	20.42	7.07	0.23	1.86E-06	0.682	0.640	0.640	0.897
14C176	14-08-Ap3	2.11	3.23	0.22	20.13	14.24	25.10	0.23	1.72E-06	0.665	0.621	0.621	0.891
14C178	14-08-Ap5	1.34	1.98	0.60	1.72	0.71	4.29	0.01	2.11E-06	0.701	0.661	0.661	0.903
14C179	SHSH95-Ap1	2.53	3.55	0.23	26.40	24.85	6.59	0.36	2.76E-06	0.715	0.677	0.677	0.908
14C180	SHSH95-Ap2	3.52	4.89	0.14	10.44	6.94	14.88	0.20	2.77E-06	0.732	0.695	0.695	0.914
14C181	SHSH95-Ap3	4.63	7.02	0.17	74.39	33.20	175.30	1.88	1.86E-06	0.683	0.641	0.641	0.897
14C182	SHSH95-Ap4	2.66	3.44	0.17	6.44	5.51	3.95	0.09	5.44E-06	0.778	0.747	0.747	0.929
14C183	SHSH95-Ap5	4.48	6.02	0.17	27.17	23.57	15.33	0.66	3.21E-06	0.750	0.715	0.715	0.920
14C185	DS-13-08-Ap1	2.22	2.76	0.08	27.09	22.85	18.05	0.33	7.23E-06	0.808	0.781	0.781	0.939
14C186	DS-13-08-Ap2	1.84	2.30	0.15	10.64	6.87	16.05	0.11	6.58E-06	0.811	0.784	0.784	0.940
14C187	DS-13-08-Ap3	4.03	4.87	0.09	37.45	34.27	13.54	0.82	1.63E-05	0.831	0.807	0.807	0.946
14C188	DS-13-08-Ap4	4.44	5.62	0.08	147.38	53.14	401.01	3.56	6.39E-06	0.808	0.781	0.781	0.939
14C190	14-11-Ap1	6.95	10.49	0.19	142.66	98.21	189.15	5.37	1.37E-06	0.676	0.633	0.633	0.895
14C191	14-11-Ap2	2.73	3.89	0.23	24.01	12.59	48.63	0.36	1.72E-06	0.718	0.680	0.680	0.909
14C192	14-11-Ap3	5.11	6.99	0.23	9.80	9.13	2.87	0.27	1.83E-06	0.734	0.698	0.698	0.914

14C193	14-11-Ap4	9.51	13.50	0.33	30.68	28.29	10.19	1.59	2.37E-06	0.706	0.667	0.667	0.905
14C194	14-11-Ap5	10.11	15.07	0.33	51.78	29.42	95.16	2.84	2.23E-06	0.689	0.648	0.648	0.899
14C195	14-07-Ap1	2.87	3.86	0.08	72.78	55.87	71.97	1.13	3.82E-06	0.753	0.719	0.719	0.921
14C196	14-07-Ap2	2.11	3.15	0.11	25.31	19.25	25.77	0.29	1.75E-06	0.678	0.635	0.635	0.895
14C197	14-07-Ap3	2.30	3.43	0.18	16.65	7.65	38.29	0.21	1.68E-06	0.692	0.651	0.651	0.900
14C322	14-07-Ap4	2.63	3.63	0.20	12.60	9.20	14.44	0.18	2.02E-06	0.733981677	0.697792189	0.697792189	0.914393742
14C323	14-07-Ap5	1.32	1.79	0.08	31.98	22.31	41.15	0.23	2.66E-06	0.744619619	0.709710052	0.709710052	0.917950322
14C324	DS-13-01-Ap1	6.22	8.85	0.27	45.69	22.46	98.85	1.55	3.08E-06	0.721494868	0.683824194	0.683824194	0.910192587
14C325	DS-13-01-Ap2	2.24	3.24	0.15	20.33	3.15	73.12	0.25	2.32E-06	0.721019367	0.683292748	0.683292748	0.910032041
14C326	DS-13-01-Ap3	1.43	2.23	0.12	23.90	10.32	57.80	0.19	1.52E-06	0.667465637	0.623665032	0.623665032	0.891685468
14C328	DS-13-01-Ap5	8.31	10.51	0.18	110.15	66.98	183.73	4.97	2.54E-06	0.801982259	0.774245114	0.774245114	0.93677113
14A136	IS-13-01-Ap1	1.47	2.43	0.12	30.24	20.00	43.58	0.24	1.00E-06	0.620270021	0.571519576	0.571519576	0.875081618
14A137	IS-13-01-Ap2	3.29	5.17	0.20	62.82	55.37	31.71	1.12	1.35E-06	0.643261316	0.59687207	0.59687207	0.883221129
14A138	IS-13-01-Ap3	1.78	2.60	0.15	32.87	24.57	35.36	0.32	1.94E-06	0.697052423	0.65655092	0.65655092	0.901886324
14A139	IS-13-01-Ap4	1.57	2.65	0.14	65.07	43.28	92.75	0.55	9.61E-07	0.610900074	0.561215945	0.561215945	0.871736645
14A140	IS-13-01-Ap5	3.44	5.20	0.18	54.23	32.23	93.59	1.01	1.63E-06	0.67920014	0.636690751	0.636690751	0.895750445
14A141	IS-13-03-Ap1	2.31	3.51	0.15	18.02	9.84	34.79	0.23	1.82E-06	0.676465723	0.63365339	0.63365339	0.894805463
14A142	IS-13-03-Ap2	1.45	2.44	0.12	27.09	17.80	39.52	0.21	9.04E-07	0.613051168	0.563579886	0.563579886	0.872505986
14A143	IS-13-03-Ap3	2.90	4.87	0.32	81.45	71.12	43.97	1.28	9.14E-07	0.603030736	0.552575695	0.552575695	0.868914951
14A144	IS-13-03-Ap4	1.94	2.80	0.11	18.37	10.20	34.75	0.20	2.08E-06	0.709789226	0.670751329	0.670751329	0.906228319
14A145	IS-13-03-Ap5	2.57	3.85	0.27	29.53	17.34	51.85	0.41	2.25E-06	0.684779418	0.642891978	0.642891978	0.897674329
14A146	IS-13-04-Ap1	8.86	12.54	0.19	55.90	35.49	86.84	2.68	4.58E-06	0.720544809	0.682762392	0.682762392	0.909871773
14A147	IS-13-04-Ap2	15.21	22.16	0.53	9.94	6.98	12.61	0.82	2.21E-06	0.698895452	0.658604157	0.658604157	0.902516454
14A148	IS-13-04-Ap3	8.47	11.77	0.19	42.30	35.48	29.00	1.94	2.98E-06	0.726269204	0.689162125	0.689162125	0.911802272
14A150	IS-13-04-Ap4	8.03	10.99	0.27	15.49	10.31	22.02	0.67	3.36E-06	0.742745105	0.707608816	0.707608816	0.917325121
14A151	IS-13-04-Ap5	9.28	12.50	0.32	78.91	70.78	34.61	3.96	3.58E-06	0.746630624	0.711964847	0.711964847	0.918620331
14A152	IS-13-05-Ap1	1.69	2.71	0.11	28.12	13.53	62.07	0.26	1.02E-06	0.646799767	0.600782513	0.600782513	0.884465235
14A153	IS-13-05-Ap2	2.99	5.21	0.13	126.71	71.78	233.76	2.05	7.51E-07	0.596872041	0.545822273	0.545822273	0.866698727
14A154	IS-13-05-Ap3	1.48	2.70	0.15	44.17	26.80	73.90	0.36	5.52E-07	0.567933741	0.514194587	0.514194587	0.856192182
14A155	IS-13-05-Ap4	1.47	2.64	0.19	31.64	11.65	85.05	0.25	7.17E-07	0.587811494	0.535900792	0.535900792	0.863425634
14A156	IS-13-05-Ap5	1.50	2.48	0.09	39.33	22.64	71.04	0.32	1.03E-06	0.626614388	0.578505675	0.578505675	0.877337359

14A157	IS-13-06-Ap1	3.29	5.41	0.25	13.60	9.33	18.17	0.24	1.09E-06	0.623259469	0.574810457	0.574810457	0.876145435
14A158	IS-13-06-Ap2	57.56	84.40	1.71	32.33	28.41	16.69	10.11	1.96E-06	0.686553488	0.644864881	0.644864881	0.898284881
14A159	IS-13-06-Ap3	7.04	12.23	0.44	89.11	75.91	56.19	3.39	7.25E-07	0.584820524	0.532629343	0.532629343	0.862341855
14A160	IS-13-06-Ap4	9.71	16.71	0.47	64.24	32.67	134.35	3.39	8.07E-07	0.606209585	0.556064483	0.556064483	0.870056151
14A161	IS-13-06-Ap5	6.05	10.26	1.18	50.71	42.88	33.31	1.66	6.28E-07	0.599246077	0.548424659	0.548424659	0.867553853
14A163	IS-13-07-Ap1	5.94	7.24	0.13	30.90	24.07	29.06	1.00	1.10E-05	0.825263278	0.800559705	0.800559705	0.944237745
14A164	IS-13-07-Ap2	177.81	216.56	14.64	1.08	0.52	2.38	1.08	1.21E-05	0.828965903	0.804750964	0.804750964	0.94541609
14A165	IS-13-07-Ap3	4.02	4.69	0.07	40.44	25.12	65.18	0.88	1.99E-05	0.865709043	0.846431335	0.846431335	0.956973338
14A166	IS-13-07-Ap4	3.88	4.75	0.10	23.34	20.00	14.21	0.49	7.25E-06	0.820590962	0.795273174	0.795273174	0.942747217
14A167	IS-13-07-Ap5	9.70	13.74	0.32	38.55	25.43	55.83	2.03	2.52E-06	0.719382379	0.681463424	0.681463424	0.909479021

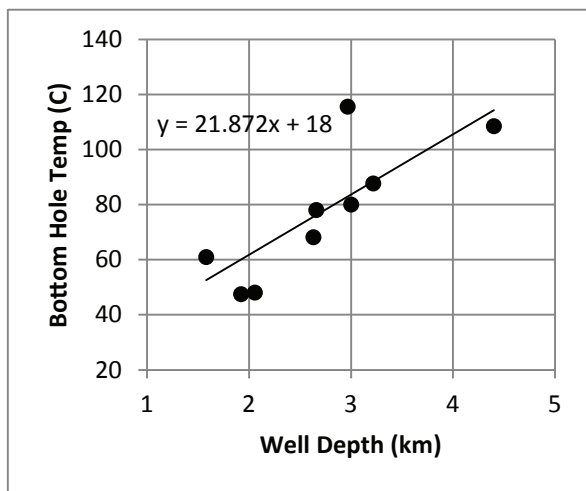
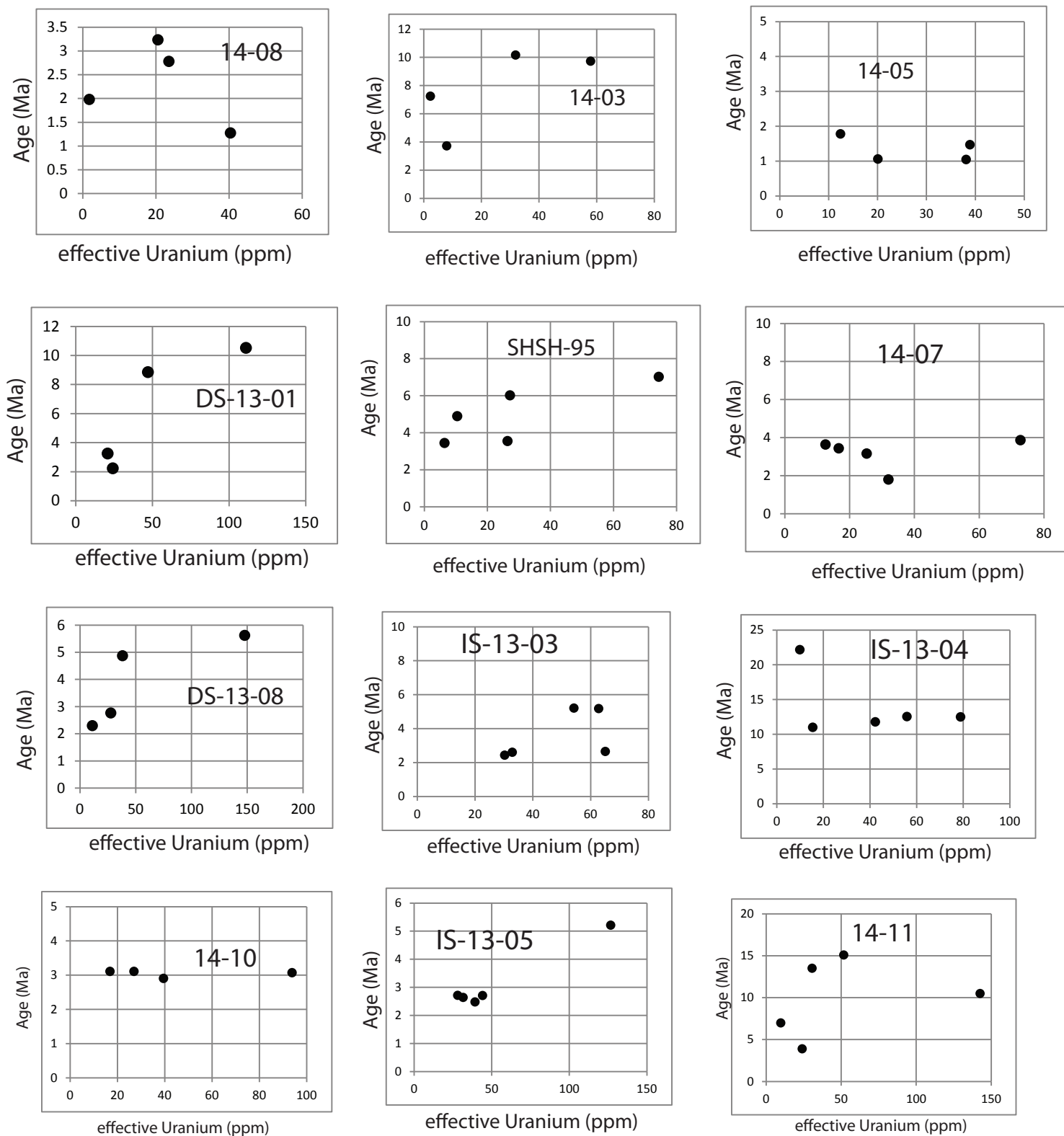


Figure S1



Supplementary Figure S2

Table DR3. AFT data

Sample Number	IS_13_03	Mineral	Apatite
Position (#)	31	Glass (U ppm)	11
Area of Graticule Square	3.94761E-07	Irradiation	UA-15-1
No. of Crystals	20	Analyst	JBC
Zeta Factor ± Error	347.9 35.9		
Rho d (% Relative Error)	1511467.675 1.702513		
N d	3450		

N s	N i	N g	p s	p i	p s / p i	U ppm	Age (Ma)	Age error	"-95%"	50% Age	" +95%"	
	0	5	32	0	395809.1	0	2.880578	0	0	0	38.97767	212.211
	2	51	80	63329.46	1614901	0.039215686	11.75276	10.30234	7.504082	1.215731	13.86214	39.08424
	4	42	100	101327.1	1063935	0.095238095	7.742993	24.99147	13.33589	6.518006	29.40747	68.64818
	2	18	75	67551.42	607962.8	0.111111111	4.424567	29.14732	21.93795	3.286427	39.67728	120.8785
	1	12	80	31664.73	379976.7	0.083333333	2.765355	21.87283	22.88061	0.512521	37.72119	146.4082
	2	20	100	50663.57	506635.7	0.1	3.68714	26.23851	19.65154	2.97887	35.65348	107.3343
	2	18	75	67551.42	607962.8	0.111111111	4.424567	29.14732	21.93795	3.286427	39.67728	120.8785
	0	7	75	0	236430	0	1.720665	0	0	0	27.30927	138.9249
	1	12	100	25331.78	303981.4	0.083333333	2.212284	21.87283	22.88061	0.512521	37.72119	146.4082
	1	16	80	31664.73	506635.7	0.0625	3.68714	16.41158	17.00352	0.391842	28.11099	104.9161
	0	6	60	0	253317.8	0	1.84357	0	0	0	32.11756	168.044
	3	16	100	75995.35	405308.5	0.1875	2.949712	49.10992	31.32164	9.198394	61.33384	169.9623
	3	63	90	84439.28	1773225	0.047619048	12.90499	12.50785	7.506215	2.514166	15.38837	38.18421
	0	17	100	0	430640.3	0	3.134069	0	0	0	10.9324	50.46656
	0	12	60	0	506635.7	0	3.68714	0	0	0	15.6151	74.12802
	1	22	85	29802.1	655646.1	0.045454545	4.771592	11.93984	12.27188	0.289568	20.33805	73.51438
	0	6	60	0	253317.8	0	1.84357	0	0	0	32.11756	168.044
	1	32	90	28146.43	900685.6	0.03125	6.554915	8.211012	8.382427	0.201788	13.92185	48.9993
	0	8	32	0	633294.6	0	4.608924	0	0	0	23.75246	118.3295
	0	4	80	0	126658.9	0	0.921785	0	0	0	49.55534	286.6205

	23	387	1554	37492.34	630849.4	0.059431525	4.591129	15.60682	3.726089	9.779948	16.07303	23.74981

Pooled Ratio	0.059431525 ±	0.014189
Mean Ratio	0.053247254 ±	0.012246
Pooled Age	15.6068173 ±	3.726089 1 S.E.
Mean Crystal Age	13.98457781 ±	3.218928 1 S.E.
Binomial Age	16.07303222 +	7.676778 "+95%"
	-	6.293084 "-95%"
Central Age	16.6591682 ±	4.13397
Age Dispersion	0.002661583 %	
Chi-squared	10.91143169 with	19 degrees of freedom
P (Chi-Sq)	92.67816756 %	

Table DR3. AFT data

Sample Number	IS-13-04	Mineral	Apatite
Position (#)	33	Glass (U ppm)	11
Area of Graticule Square	6.4E-07	Irradiation	UA-15-1
No. of Crystals	20	Analyst	JBC
Zeta Factor ± Error	347.9 35.9	Count Date	
Rho d (% Relative Error)	1533112 1.702513	Locality	
N d	3450	Rock Type	

N s	N i	N g	Rho s	Rho i	Rho s / Rho i	U ppm	Age (Ma)	Age error	"-95%"	50% Age	" +95%"
1	32	100	25331.78	810617.1	0.03125	5.816137	8.328516	8.502384	0.204677	14.12099	49.69826
1	11	100	25331.78	278649.6	0.090909091	1.999297	24.19859	25.401	0.563225	41.83478	164.6837
2	29	100	50663.57	734621.7	0.068965517	5.270874	18.36587	13.56367	2.126211	24.83084	72.29526
1	26	100	25331.78	658626.4	0.038461538	4.725612	10.24895	10.49905	0.250182	17.41795	62.13565
3	37	100	75995.35	937276	0.081081081	6.724909	21.5869	13.15382	4.263935	26.65374	67.93026
1	29	100	25331.78	734621.7	0.034482759	5.270874	9.189473	9.395853	0.225154	15.59715	55.22697
2	56	100	50663.57	1418580	0.035714286	10.17824	9.517427	6.920912	1.125683	12.79872	35.94827
1	74	100	25331.78	1874552	0.013513514	13.44982	3.602841	3.646623	0.09004	6.073452	20.67753
1	14	100	25331.78	354645	0.071428571	2.54456	19.02082	19.78867	0.450489	32.67491	124.0014
2	19	100	50663.57	481303.9	0.105263158	3.453332	28.01113	21.02832	3.169837	38.09416	115.3212
2	31	100	50663.57	785285.3	0.064516129	5.634383	17.18255	12.66386	1.994865	23.21429	67.26523
2	30	100	50663.57	759953.5	0.066666667	5.452629	17.75451	13.09835	2.058445	23.99537	69.68989
2	40	100	50663.57	1013271	0.05	7.270172	13.32047	9.75162	1.560955	17.95431	51.21492
2	20	100	50663.57	506635.7	0.1	3.635086	26.61346	19.93237	3.021517	36.1626	108.8584
3	47	100	75995.35	1190594	0.063829787	8.542452	17	10.2783	3.388154	20.95139	52.66691
2	36	100	50663.57	911944.2	0.055555556	6.543154	14.79882	10.86193	1.728004	19.96485	57.29297
1	18	100	25331.78	455972.1	0.055555556	3.271577	14.79882	15.28292	0.355589	25.29087	93.16038
2	36	100	50663.57	911944.2	0.055555556	6.543154	14.79882	10.86193	1.728004	19.96485	57.29297
3	25	100	75995.35	633294.6	0.12	4.543857	31.923	19.78895	6.181644	39.58081	104.0353
2	46	100	50663.57	1165262	0.043478261	8.360697	11.58457	8.454972	1.363274	15.5981	44.18099

36	656	2000	45597.21	830882.5	0.054878049	5.961541	14.61855	2.93248	10.15187	14.89674	20.44123

Pooled Ratio	0.054878 ±	0.011009
Mean Ratio	0.062311 ±	0.00606
Pooled Age	14.61855 ±	2.93248 1 S.E.
Mean Crystal Age	16.59611 ±	1.616013 1 S.E.
Binomial Age	14.89674 +	5.544496 "+95%"
	-	4.744865 "-95%"
Central Age	14.61855 ±	2.93248
Age Dispersion	0.006663 %	
Chi-squared	7.620875 with	19 degrees of freedom
P (Chi-Sq)	99.00958 %	

Table DR3. AFT data

Sample Number	jbc_14_011		Mineral	Apatite
Position (#)	25		Glass (U ppm)	11
Area of Graticule Square	3.94761E-07		Irradiation	UA-15-1
No. of Crystals	20		Analyst	JBC
Zeta Factor ± Error	347.9	35.9	Count Date	
Rho d (% Relative Error)	1450000	1.702513	Locality	
N d	3450		Rock Type	

N s	N i	N g	Rho s	Rho i	Rho s / Rho i	U ppm	Age (Ma)	Age error	"-95%"	50% Age	
	1	11	100	25331.78	810617.1	0.03125	5.816137	8.328516	8.502383983	0.204677	14.12099
	1	11	40	25331.78	278649.6	0.090909091	1.999297	24.19859	25.40100084	0.563225	41.83478
	1	27	100	50663.57	734621.7	0.068965517	5.270874	18.36587	13.5636724	2.126211	24.83084
	3	50	100	25331.78	658626.4	0.038461538	4.725612	10.24895	10.49905086	0.250182	17.41795
	3	56	100	75995.35	937276	0.081081081	6.724909	21.5869	13.15382259	4.263935	26.65374
	2	31	100	25331.78	734621.7	0.034482759	5.270874	9.189473	9.395852981	0.225154	15.59715
	1	21	50	50663.57	1418580	0.035714286	10.17824	9.517427	6.920912024	1.125683	12.79872
	3	53	80	25331.78	1874552	0.013513514	13.44982	3.602841	3.64662288	0.09004	6.073452
	1	17	70	25331.78	354645	0.071428571	2.54456	19.02082	19.78866562	0.450489	32.67491
	3	56	80	50663.57	481303.9	0.105263158	3.453332	28.01113	21.02831777	3.169837	38.09416
	2	51	90	50663.57	785285.3	0.064516129	5.634383	17.18255	12.66385562	1.994865	23.21429
	1	14	90	50663.57	759953.5	0.066666667	5.452629	17.75451	13.09834837	2.058445	23.99537
	1	17	100	50663.57	1013271	0.05	7.270172	13.32047	9.751619955	1.560955	17.95431
	2	57	100	50663.57	506635.7	0.1	3.635086	26.61346	19.93236862	3.021517	36.1626
	3	88	90	75995.35	1190594	0.063829787	8.542452	17	10.27829511	3.388154	20.95139
	2	39	96	50663.57	911944.2	0.055555556	6.543154	14.79882	10.86193034	1.728004	19.96485
	1	15	20	25331.78	455972.1	0.055555556	3.271577	14.79882	15.28291697	0.355589	25.29087
	1	27	80	50663.57	911944.2	0.055555556	6.543154	14.79882	10.86193034	1.728004	19.96485
	1	51	75	75995.35	633294.6	0.12	4.543857	31.923	19.78895035	6.181644	39.58081
	2	33	80	50663.57	1165262	0.043478261	8.360697	11.58457	8.454971924	1.363274	15.5981
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
	35	725	1641	45597.21	830882.5	0.054878049	5.961541	14.61855	2.932479904	10.15187	14.89674

Pooled Ratio	0.048275862 ±	0.009762
Mean Ratio	0.054370331 ±	0.004042
Pooled Age	12.16501449 ±	2.459888 1 S.E.
Mean Crystal Age	13.69912662 ±	1.019473 1 S.E.
Binomial Age	12.40239946 +	4.668466 "+95%"
	-	3.993385 "-95%"
Central Age	12.16501449 ±	2.459888
Age Dispersion	2.92715E-07 %	
Chi-squared	3.233531037 with	19 degrees of freedom
P (Chi-Sq)	99.99801802 %	

Table DR3. AFT data

Sample Number	jbc_14_007		Mineral	Apatite
Position (#)	22		Glass (U ppm)	11
Area of Graticule Square	3.94761E-07		Irradiation	UA-15-1
No. of Crystals	9		Analyst	JBC
Zeta Factor ± Error	347.9	35.9		
Rho d (% Relative Error)	1414069.996	1.702513		
N d	3450			

N s	N i	N g	Rho s	Rho i	Rho s / Rho i	U ppm	Age (Ma)	Age error	"-95%"	50% Age	" +95%"	
	2	66	80	63329.46	2089872	0.03030303	16.25704	7.449557	5.403315	0.884189	10.00933	27.95238
	1	36	100	25331.78	911944.2	0.027777778	7.093981	6.829089	6.960031	0.168369	11.56599	40.44983
	1	26	100	25331.78	658626.4	0.038461538	5.123431	9.453737	9.684428	0.230756	16.06718	57.33239
	2	100	100	50663.57	2533178	0.02	19.7055	4.917673	3.549382	0.587657	6.596427	18.21571
	0	20	100	0	506635.7	0	3.941101	0	0	0	8.668546	39.62457
	1	49	100	25331.78	1241257	0.020408163	9.655697	5.017995	5.096036	0.124583	8.478223	29.24327
	1	53	80	31664.73	1678231	0.018867925	13.0549	4.639415	4.708048	0.115352	7.834645	26.94539
	0	16	80	0	506635.7	0	3.941101	0	0	0	10.88116	50.45093
	1	33	100	25331.78	835948.8	0.03030303	6.502816	7.449557	7.601619	0.183231	12.62725	44.37151
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
	9	399	840	27141.2	1203260	0.022556391	9.360114	5.545978	1.95731	2.518053	5.962856	10.63063

Pooled Ratio	0.022556391 ±	0.007961
Mean Ratio	0.020680163 ±	0.004427
Pooled Age	5.545977776 ±	1.95731 1 S.E.
Mean Crystal Age	5.084848272 ±	1.088786 1 S.E.
Binomial Age	5.962855594 +	4.667777 " +95%"
	-	3.444803 "-95%"

Central Age	5.545977776 ±	1.95731
-------------	---------------	---------

Age Dispersion	1.41562E-09 %	
Chi-squared	1.460402959 with	8 degrees of freedom
P (Chi-Sq)	99.33460376 %	

Table DR3. AFT data

Sample Number	jbc_14_005		Mineral	Apatite
Position (#)	21		Glass (U ppm)	11
Area of Graticule Squared	3.95E-07		Irradiation	UA-15-1
No. of Crystals	20		Analyst	JBC
Zeta Factor ± Error	347.9	35.9	Count Date	40949
Rho d (% Relative Error)	1403248	1.702513	Locality	
N d	3450		Rock Type	

N s	N i	N g	Rho s	Rho i	Rho s / Rho i	U ppm	Age (Ma)	Age error	"-95%"	50% Age	" +95%"
2	112	100	50663.57	2837160	0.017857	22.24037	4.357366	3.141739	0.52144	5.842823	16.09709
0	14	100	0	354645	0	2.780046	0	0	0	12.37755	57.9793
0	8	40	0	506635.7	0	3.971495	0	0	0	22.05471	109.9291
2	102	60	84439.28	4306403	0.019608	33.75771	4.7844	3.452541	0.571879	6.417257	17.71348
0	10	100	0	253317.8	0	1.985747	0	0	0	17.49578	84.69932
0	5	100	0	126658.9	0	0.992874	0	0	0	36.19472	197.2469
1	76	100	25331.78	1925216	0.013158	15.09168	3.210976	3.249432	0.080272	5.41233	18.41616
1	72	100	25331.78	1823888	0.013889	14.29738	3.389317	3.431133	0.084671	5.714299	19.47034
1	44	100	25331.78	1114598	0.022727	8.737289	5.545228	5.637796	0.137369	9.376136	32.48198
0	17	100	0	430640.3	0	3.375771	0	0	0	10.15026	46.8663
1	45	100	25331.78	1139930	0.022222	8.935863	5.422052	5.511218	0.134382	9.166353	31.72511
0	13	100	0	329313.2	0	2.581472	0	0	0	13.35428	62.9501
0	26	100	0	658626.4	0	5.162943	0	0	0	6.5916	29.74037
0	11	70	0	398070.9	0	3.12046	0	0	0	15.85669	75.96035
0	7	100	0	177322.5	0	1.390023	0	0	0	25.35779	129.0769
0	9	40	0	569965.1	0	4.467932	0	0	0	19.51262	95.69175
3	191	100	75995.35	4838371	0.015707	37.92778	3.832813	2.265926	0.783676	4.699388	11.36469
0	11	50	0	557299.2	0	4.368644	0	0	0	15.85669	75.96035
0	2	20	0	253317.8	0	1.985747	0	0	0	100.3228	796.2646
1	39	100	25331.78	987939.5	0.025641	7.744415	6.25581	6.369198	0.154546	10.5877	36.88063

12	814	1680	18094.13	1227385	0.014742	9.621419	3.597448	1.111722	1.851389	3.799274	6.317285
----	-----	------	----------	---------	----------	----------	----------	----------	----------	----------	----------

Pooled Ratio	0.014742 ±	0.004556
Mean Ratio	0.00754 ±	0.002204

Pooled Age	3.597448 ±	1.111722 1 S.E.
Mean Crystal Age	1.840325 ±	0.538085 1 S.E.
Binomial Age	3.799274 +	2.518011 "+95%"
	-	1.947886 "-95%"

Central Age	3.597448 ±	1.111722
-------------	------------	----------

Age Dispersion	2.01E-09 %	
Chi-squared	2.881503 with	19 degrees of freedom
P (Chi-Sq)	99.99922 %	

Table DR3. AFT data

Sample Number	SHSH_95-1		Mineral	Apatite
Position (#)	17		Glass (U ppm)	11
Area of Graticule Square	3.94761E-07		Irradiation	UA-15-1
No. of Crystals	20		Analyst	JBC
Zeta Factor ± Error	347.9	35.9	Count Date	40942
Rho d (% Relative Error)	1359960.175	1.702513	Locality	
N d	3450		Rock Type	

N s	N i	N g	Rho s	Rho i	Rho s / Rho i	U ppm	Age (Ma)	Age error	"-95%"	50% Age	" +95%"	
	0	34	100	0	861280.6	0	6.966444	0	0	0	4.870433	21.75279
	0	19	100	0	481303.9	0	3.893013	0	0	0	8.783599	40.27449
	1	35	100	25331.78	886612.4	0.028571429	7.17134	6.755461	6.88762113	0.166426	11.44442	40.08796
	0	6	90	0	168878.6	0	1.365969	0	0	0	28.90534	151.3957
	0	16	50	0	810617.1	0	6.556653	0	0	0	10.46513	48.52766
	0	16	75	0	540411.4	0	4.371102	0	0	0	10.46513	48.52766
	0	29	95	0	773286	0	6.254702	0	0	0	5.719867	25.69298
	0	13	64	0	514551.8	0	4.161938	0	0	0	12.94274	61.01736
	0	9	100	0	227986	0	1.844059	0	0	0	18.91157	92.76096
	0	43	72	0	1512870	0	12.23681	0	0	0	3.843114	17.04617
	1	59	100	25331.78	1494575	0.016949153	12.08883	4.008331	4.063837515	0.099842	6.764744	23.18325
	0	14	90	0	394050	0	3.187262	0	0	0	11.99608	56.19851
	0	28	100	0	709289.9	0	5.737072	0	0	0	5.926592	26.65858
	0	20	100	0	506635.7	0	4.097908	0	0	0	8.337056	38.1128
	0	26	64	0	1029104	0	8.323876	0	0	0	6.388361	28.82498
	0	28	90	0	788099.9	0	6.374524	0	0	0	5.926592	26.65858
	0	20	100	0	506635.7	0	4.097908	0	0	0	8.337056	38.1128
	1	36	100	25331.78	911944.2	0.027777778	7.376235	6.567905	6.693838962	0.161927	11.12379	38.90666
	0	42	80	0	1329919	0	10.75701	0	0	0	3.935345	17.46612
	0	26	90	0	731807.1	0	5.919201	0	0	0	6.388361	28.82498
*****	*****											
	3	519	1760	4317.918	746999.7	0.005780347	6.042087	1.367283	0.804490475	0.281075	1.674626	4.017211
Pooled Ratio			0.0058	±	0.0034							
Mean Ratio			0.0037	±	0.0021							
Pooled Age			1.37	±	0.80	1 S.E.						
Mean Crystal Age			0.87	±	0.49	1 S.E.						
Binomial Age			1.67	+	2.34	" +95%"						
				-	1.39	" -95%"						
Central Age			1.37	±	0.80							
Age Dispersion			0.28	%								
Chi-squared			9.491	with	19	degrees of freedom						
P (Chi-Sq)			96.44	%								

Table DR3. AFT data

Sample Number	jbc_14_003-2		Mineral	Apatite
Position (#)	20		Glass (U ppm)	11
Area of Graticule Square	3.94761E-07		Irradiation	UA-15-1
No. of Crystals	20		Analyst	JBC
Zeta Factor ± Error	347.9	35.9	Count Date	
Rho d (% Relative Error)	1392426.068	1.702513	Locality	
N d	3450		Rock Type	

N s	N i	N g	Rho s	Rho i	Rho s / Rho i	U ppm	Age (Ma)	Age error	"-95%"	50% Age	" +95%"
0	10	100	0	253317.8	0	2.001181	0	0	0	17.36103	84.05035
0	12	100	0	303981.4	0	2.401417	0	0	0	14.38664	68.3206
0	3	100	0	75995.35	0	0.600354	0	0	0	62.6507	402.4268
1	19	90	28146.43	534782.1	0.052631579	4.224715	12.73544	13.134	0.306801	21.74539	79.69806
1	15	50	50663.57	759953.5	0.066666667	6.003542	16.12731	16.7414	0.38356	27.66377	104.1111
2	18	75	67551.42	607962.8	0.111111111	4.802834	26.85648	20.21374	3.027653	36.56119	111.44
2	24	95	53330.07	639960.8	0.083333333	5.055614	20.15284	14.9811	2.311661	27.31172	80.79113
1	19	64	39580.91	752037.3	0.052631579	5.941005	12.73544	13.134	0.306801	21.74539	79.69806
0	10	100	0	253317.8	0	2.001181	0	0	0	17.36103	84.05035
2	23	72	70366.06	809209.7	0.086956522	6.39266	21.02763	15.65699	2.406506	28.51401	84.67843
0	10	100	0	253317.8	0	2.001181	0	0	0	17.36103	84.05035
0	23	90	0	647367.8	0	5.114128	0	0	0	7.406368	33.60697
1	35	100	25331.78	886612.4	0.028571429	7.004132	6.916646	7.051959	0.170399	11.71738	41.04192
0	8	100	0	202654.3	0	1.600945	0	0	0	21.88491	109.0884
1	24	64	39580.91	949941.9	0.041666667	7.504428	10.0843	10.34614	0.245411	17.15697	61.5948
1	42	90	28146.43	1182150	0.023809524	9.338843	5.764387	5.863681	0.142652	9.75017	33.84701
0	16	100	0	405308.5	0	3.201889	0	0	0	10.71475	49.68169
0	32	100	0	810617.1	0	6.403778	0	0	0	5.301583	23.7267
1	10	80	31664.73	316647.3	0.1	2.501476	24.17586	25.48161	0.558099	41.92564	168.051
1	23	90	28146.43	647367.8	0.043478261	5.114128	10.52239	10.80489	0.255642	17.91293	64.52864

14	376	1760	20150.28	541179	0.037234043	4.27525	9.012248	2.627906	4.881226	9.450343	15.30433
----	-----	------	----------	--------	-------------	---------	----------	----------	----------	----------	----------

Pooled Ratio	0.037234043 ±	0.010857
Mean Ratio	0.034542834 ±	0.008581
Pooled Age	9.012248461 ±	2.627906 1 S.E.
Mean Crystal Age	8.361281749 ±	2.078126 1 S.E.
Binomial Age	9.450343008 +	5.853988 "+95%"
	-	4.569117 "-95%"

Central Age	9.01224867 ±	2.627907
-------------	--------------	----------

Age Dispersion	0.096576826 %
Chi-squared	11.48237691 with 19 degrees of freedom
P (Chi-Sq)	90.65445647 %