GEOLOGICAL MAGAZINE

The Exhumation of the Western Greater Caucasus; a Thermochronometric Study

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APPENDIX

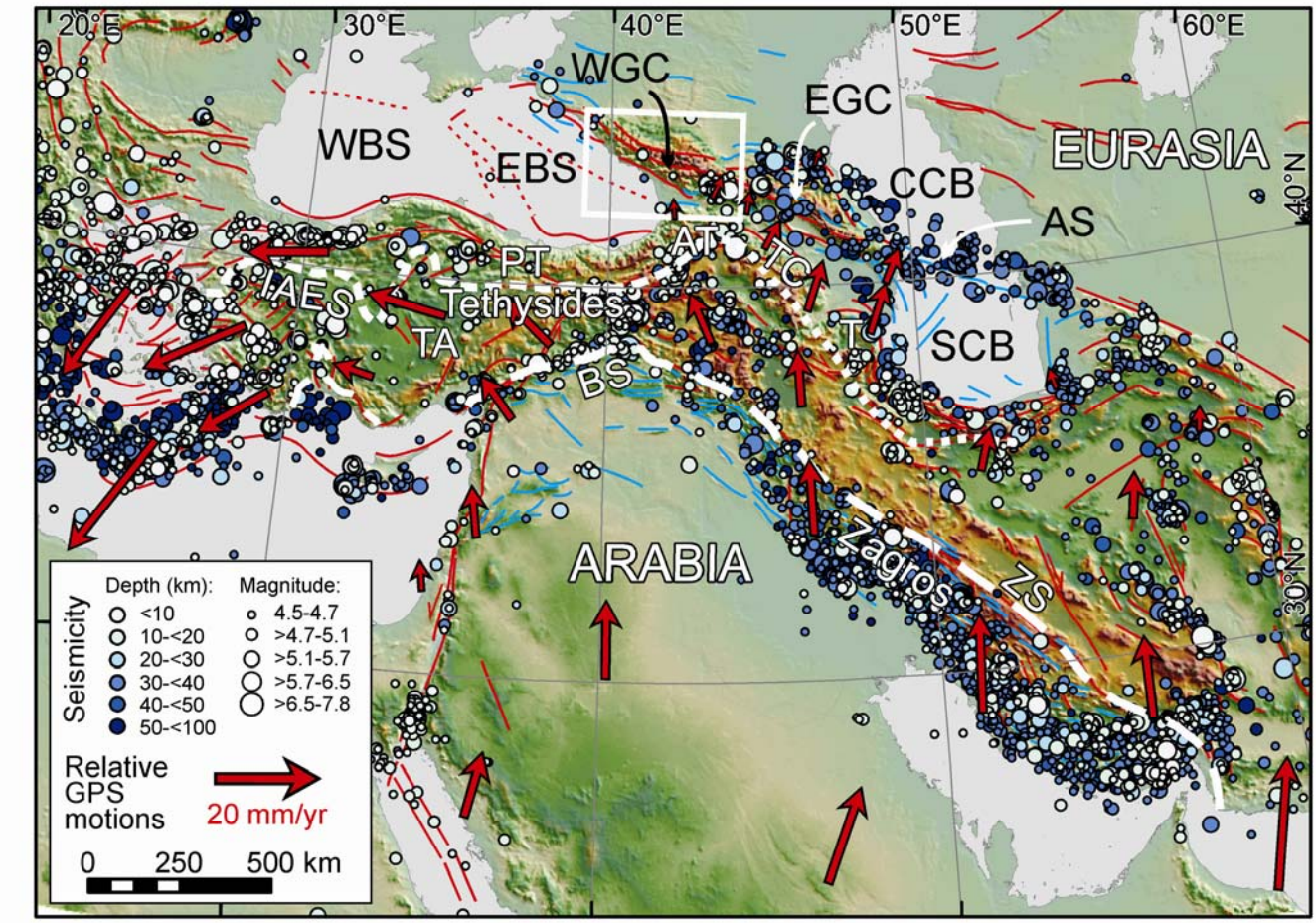


Figure 1. Schematic tectonic map showing the Greater Caucasus at the northern margin of the Arabia–Eurasia collision zone, the current GPS-constrained motion of the region relative to stable Eurasia and the occurrence of instrumentally recorded earthquakes M ≥ 4.5. Structures are extended from Allen *et al.* (2003), GPS motions are taken from Reilinger *et al.* (2006) and the seismicity record from the US National Earthquake Information Center catalogue (1973–June 2009). The study area is highlighted in the box and selected Neotethyan suture zones shown by dashed lines. Abbreviations: AS – Apsheron sill; AT – Adjara–Trialet belt; BS – Bitlis suture; CCB – Central Caspian Basin; EBS - Eastern Black Sea; EGC – eastern Greater Caucasus; IAES – İsmir–Ankara–Erzincan suture; PT – Pontides; SCB – South Caspian Basin; T – Talysh; TA – Taurides–Anatolides; TC – Transcaucasus; WBS – Western Black Sea; WGC – western Greater Caucasus; ZS – Zagros suture.

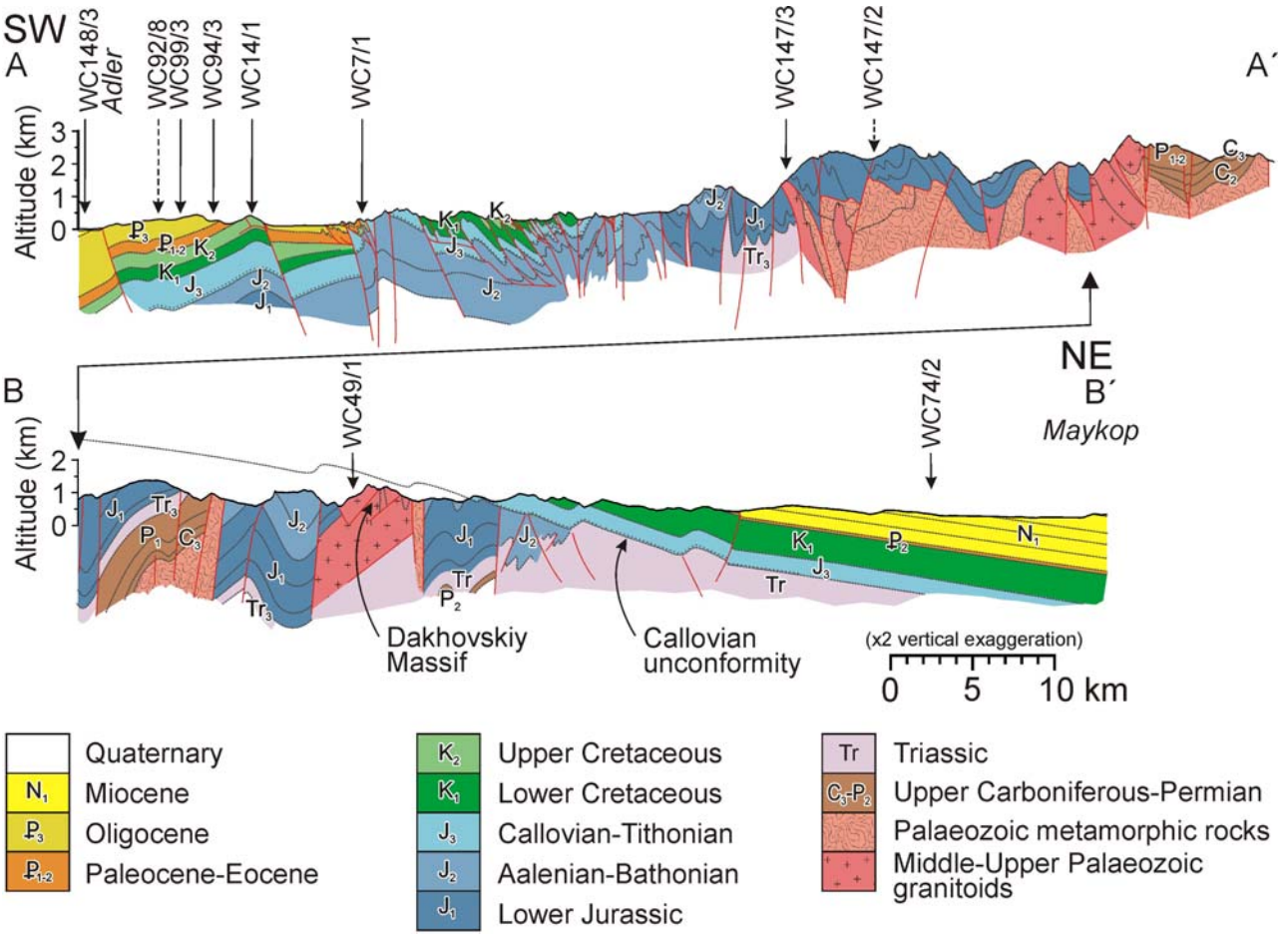


Figure 3. Cross-section through the western Greater Caucasus based on original field observations and the mapping of Melnikov, Srabony'an & Kokarev (1994) and Lavrishchev, Prutskiy & Semenov (2002). For location see Figure 2.

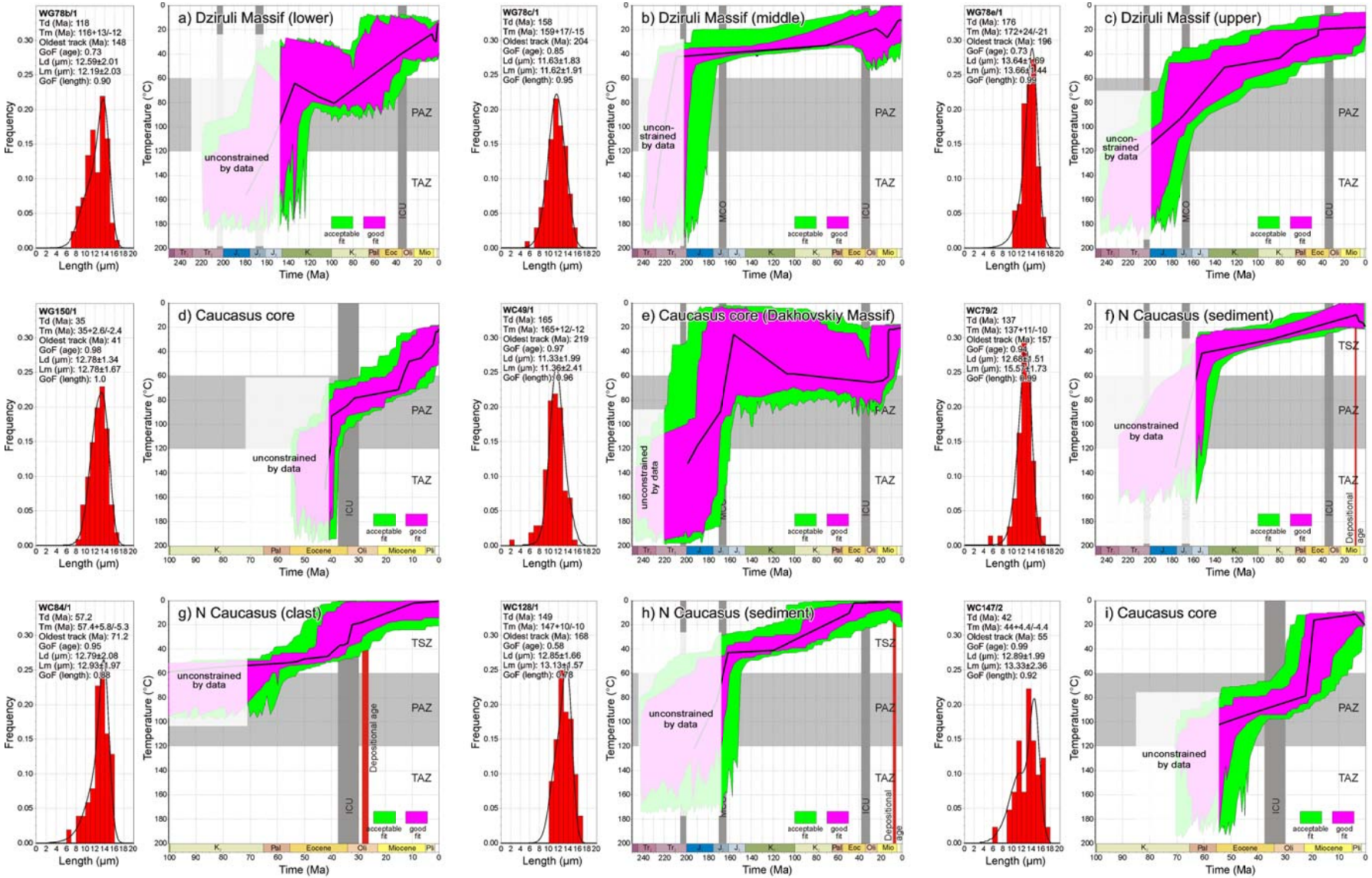
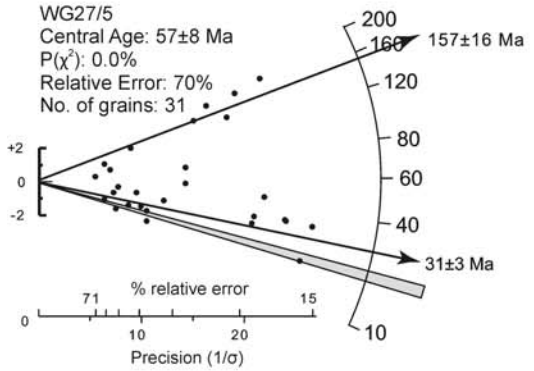
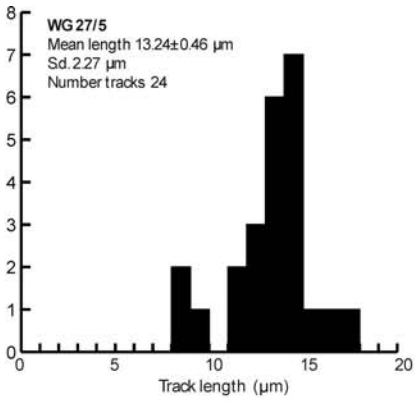


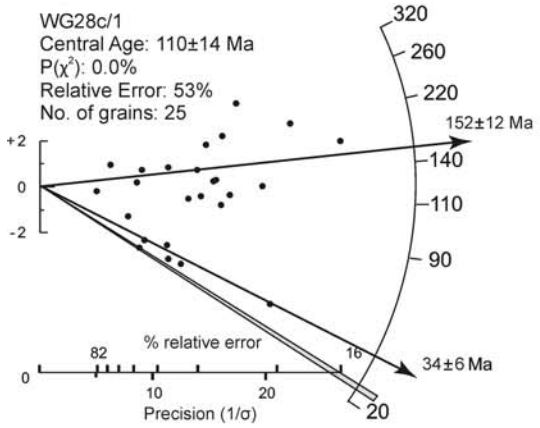
Figure 5. Best-fit thermal models for AFT samples from the Dziruli Massif and western Greater Caucasus listed in alpha-numeric order. One hundred good thermal paths were obtained for each model. The approximate intervals of the ECO (early Cimmerian orogeny), MCO (middle Cimmerian orogeny) and ICU (initial Caucasus uplift) are shown as are the approximate temperature ranges of the apatite TAZ (total annealing zone), PAZ (partial annealing zone) and TSZ (total stability zone). The purple and green shaded areas encompass 1σ (good) and 2σ (acceptable) confidence limits, respectively, and the lines correspond to the most probable thermal histories. Goodness of fit (GoF) gives an indication of the fit between observed and predicted values (values close to 1 are best). The geological timescale is from Gradstein, Ogg and Smith (2004).

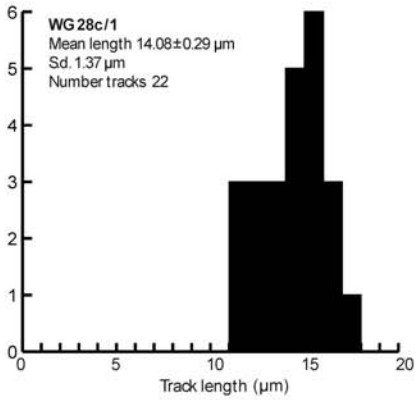
Sample	Mean track length (µm)	S.D.	No. tracks	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Mean Cl wt%
WG27/5	13.24±0.46	2.27	24	0	0	0	0	0	2	1	0	2	3	6	7	1	1	1	
WG28c/1	14.08±0.29	1.37	22	0	0	0	0	0	0	0	0	2	2	6	5	6	1	0	0.0 - 5
WG66c/2	12.96±0.25	1.15	21	0	0	0	0	0	0	1	0	2	10	6	2	0	0	0	0-1.5
WG67/8	13.37±0.35	1.72	24	0	0	0	0	0	0	0	0	3	3	3	5	6	3	1	0.0 - 5
WG78b/1	12.14±0.23	2.05	83	0	0	0	0	0	2	6	6	11	14	9	18	13	3	1	0.75
WG78c/1	11.62±0.19	1.91	102	0	0	0	1	0	3	6	10	16	22	18	15	8	3	0	0.00
WG78e/1	13.66±0.14	1.44	110	0	0	0	0	0	0	0	0	6	7	23	26	30	13	5	0.80
WG137/1	No length data																		
WG141/3	12.30±0.41	1.93	22	0	0	0	0	1	1	1	0	5	4	7	2	1	0	0	0.0 - 5
WG147/2	12.70±0.39	1.75	20	0	0	0	0	1	0	0	1	4	3	8	3	0	0	0	0 -1.9
WG149/1	No data																		
WG150/1	12.73±0.17	1.67	100	0	0	0	0	0	0	1	6	10	15	20	23	17	6	2	<0.05
WG151/1	No data																		
WC7/1	Too few																		
WC14/1	14.36±0.21	1.49	50	0	0	0	0	0	0	0	1	10	13	10	9	5	1	1	
WC39/2	12.39±0.35	1.63	22	0	0	0	0	0	0	2	3	2	11	21	22	21	8	7	1
WC49/1	11.36±0.20	2.00	100	1	0	0	0	2	3	3	11	21	22	21	8	7	1	0	0-0.4
WC74/2	No data																		
WC79/2	12.57±0.20	2.03	74	0	0	1	0	1	0	2	5	12	22	17	10	3	1	0	
WC84/1	12.93±0.20	1.97	101	0	0	0	0	2	0	4	4	6	8	23	25	16	13	0	0-0.4
WC92/8	12.79±0.51	1.62	10	0	0	0	0	0	0	0	1	3	2	2	1	1	0	0	
WC94/3	No data																		
WC99/3	13.18±0.28	1.29	20	0	0	0	0	0	0	0	1	4	3	6	5	1	0	0	
WC120/1	13.43±0.47	1.71	13	0	0	0	0	0	0	0	1	3	1	2	4	1	1	0	
WC123/1	13.75±0.43	1.54	13	0	0	0	0	0	0	0	0	0	0	5	4	1	1	2	
WC128/1	13.12±0.16	1.57	100	0	0	0	0	0	0	0	1	10	13	10	9	5	1	1	
WC133/2	No data																		
WC147/2	13.33±0.37	2.36	40	0	0	0	0	1	0	0	2	3	6	3	9	6	4	6	
WC147/3	14.14±0.21	2.05	100	0	0	0	0	2	1	2	2	5	15	14	15	22	4	5	
WC148/3	None																		
WC149/3	12.99±0.38	1.78	21	0	0	0	0	0	1	0	0	0	0	5	5	3	6	1	

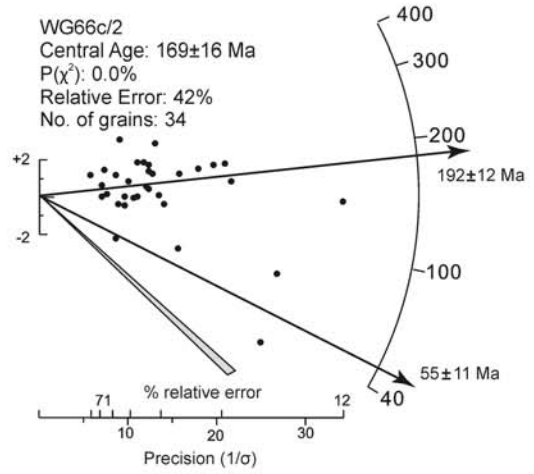
Table A1. Apatite track length data and sample mean composition

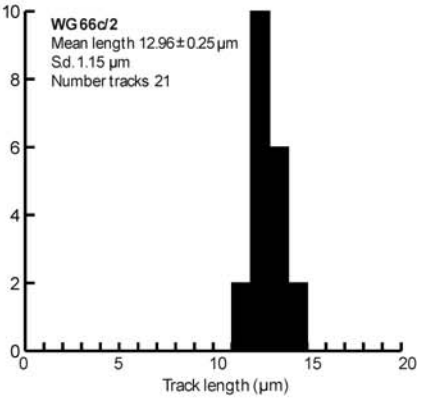

WG27/5
Central Age: 57±8 Ma
P(χ²): 0.0%
Relative Error: 70%
No. of grains: 31
200
160
157±16 Ma
120
80
60
40
31±3 Ma
10
+2
0
-2
% relative error
71
15
0
10
20
Precision (1/σ)

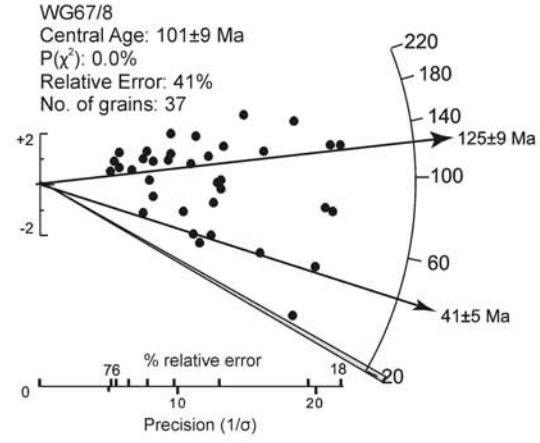

WG 27/5
Mean length 13.24±0.46 µm
Sd. 2.27 µm
Number tracks 24
Track length (µm)

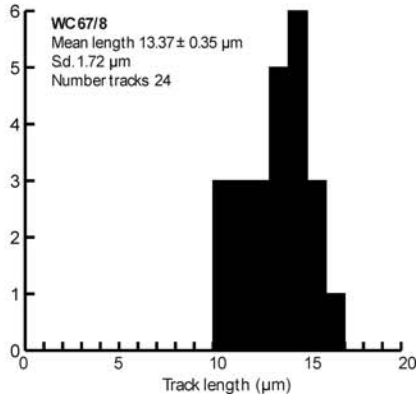

WG28c/1
Central Age: 110±14 Ma
P(χ²): 0.0%
Relative Error: 53%
No. of grains: 25
320
260
220
152±12 Ma
140
110
90
34±6 Ma
20
+2
0
-2
% relative error
82
16
0
10
20
Precision (1/σ)

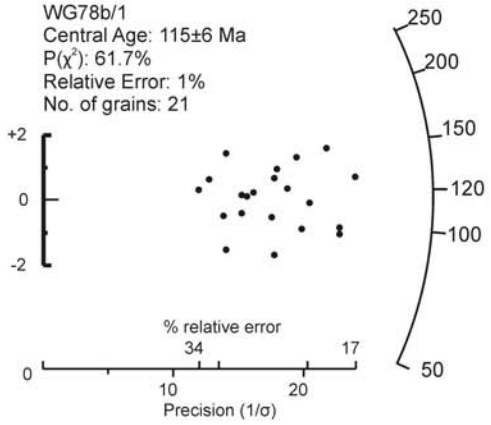

WG 28c/1
Mean length 14.08±0.29 µm
Sd. 1.37 µm
Number tracks 22
Track length (µm)

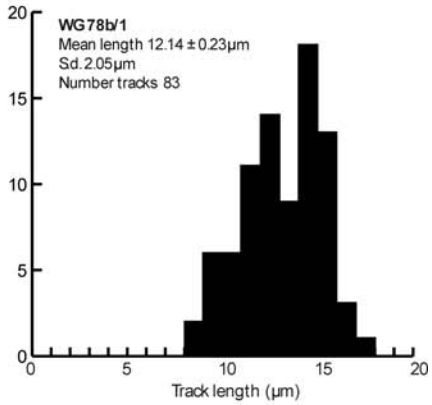

WG66c/2
Central Age: 169±16 Ma
P(χ²): 0.0%
Relative Error: 42%
No. of grains: 34
400
300
200
192±12 Ma
100
55±11 Ma
40
+2
-2
% relative error
71
12
10
20
30
Precision (1/σ)

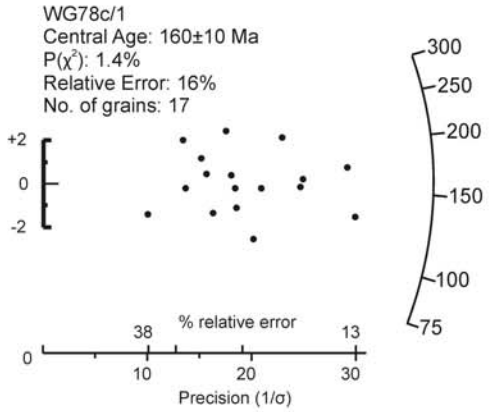

WG 66c/2
Mean length 12.96±0.25 µm
Sd. 1.15 µm
Number tracks 21
Track length (µm)

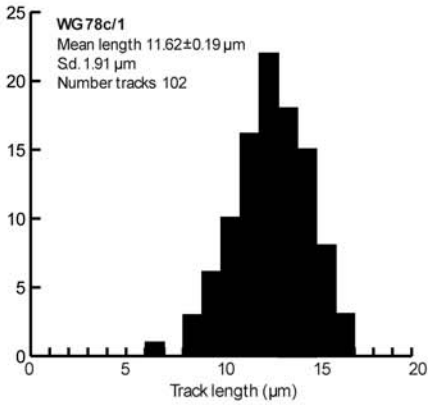

WG67/8
Central Age: 101±9 Ma
P(χ²): 0.0%
Relative Error: 41%
No. of grains: 37
220
180
140
125±9 Ma
100
60
41±5 Ma
20
+2
-2
% relative error
76
18
0
10
20
Precision (1/σ)

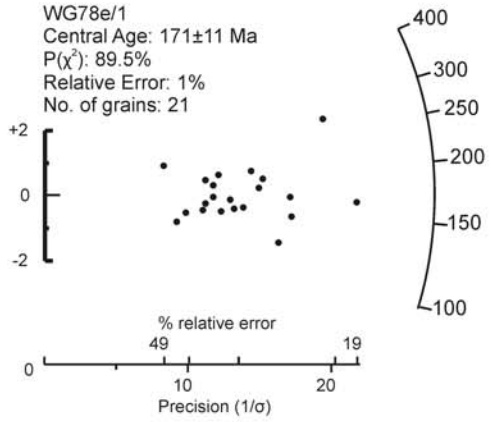

WC 67/8
Mean length 13.37± 0.35 µm
Sd. 1.72 µm
Number tracks 24
Track length (µm)

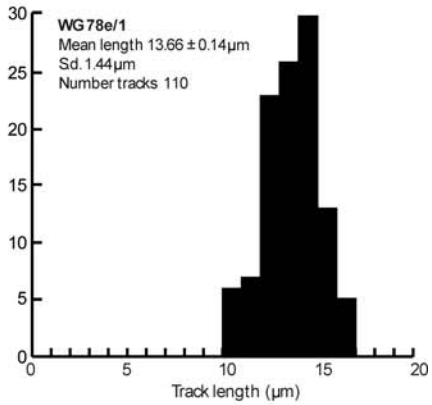


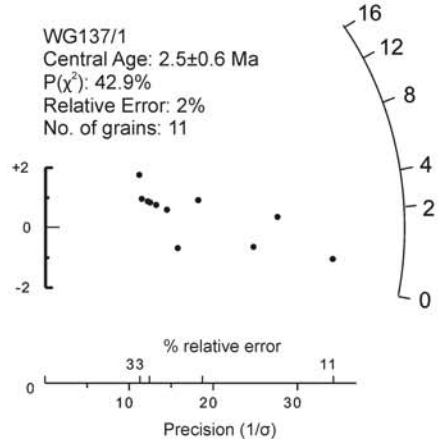




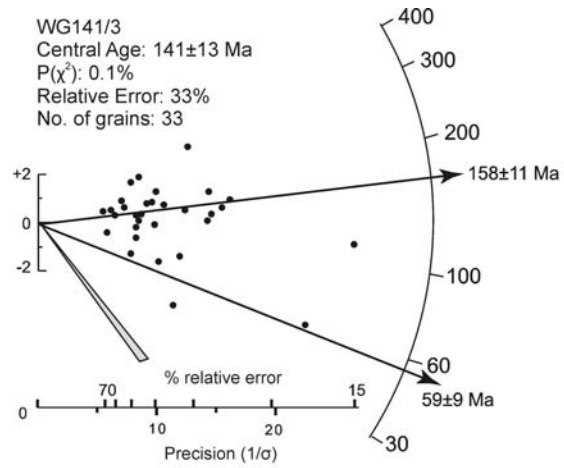


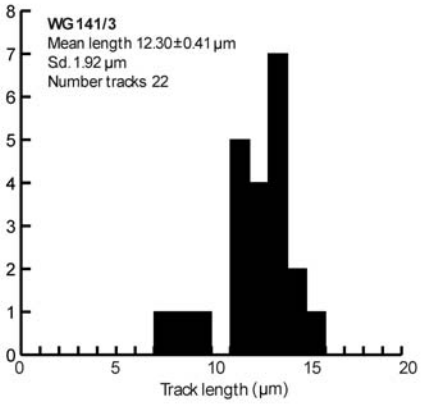


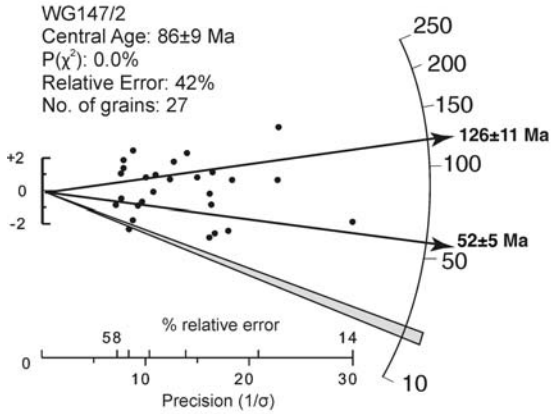


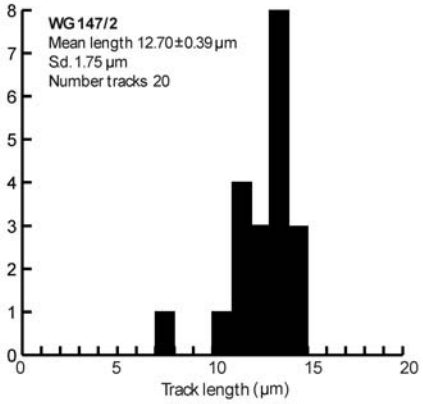


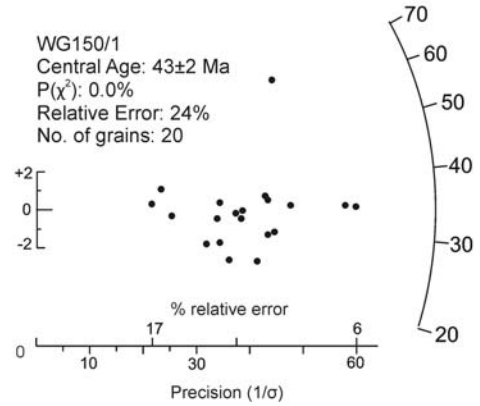
no track length data

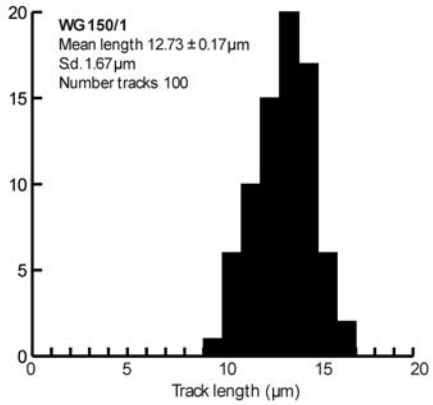

WG141/3
Central Age: 141±13 Ma
P(χ²): 0.1%
Relative Error: 33%
No. of grains: 33
158±11 Ma
59±9 Ma
% relative error
Precision (1/σ)

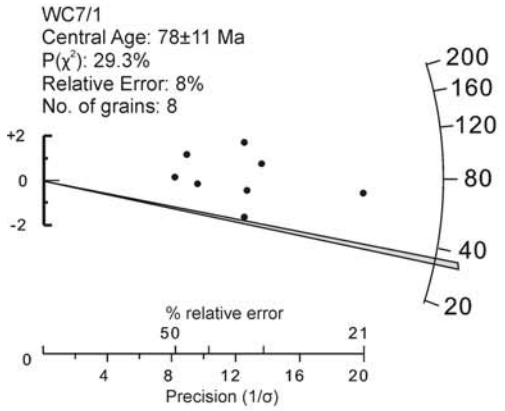

WG141/3
Mean length 12.30±0.41 µm
Sd. 1.92 µm
Number tracks 22
Track length (µm)


WG147/2
Central Age: 86±9 Ma
P(χ²): 0.0%
Relative Error: 42%
No. of grains: 27
126±11 Ma
52±5 Ma
% relative error
Precision (1/σ)


WG147/2
Mean length 12.70±0.39 µm
Sd. 1.75 µm
Number tracks 20
Track length (µm)


WG150/1
Central Age: 43±2 Ma
P(χ²): 0.0%
Relative Error: 24%
No. of grains: 20
% relative error
Precision (1/σ)


WG150/1
Mean length 12.73 ± 0.17 µm
Sd. 1.67 µm
Number tracks 100
Track length (µm)



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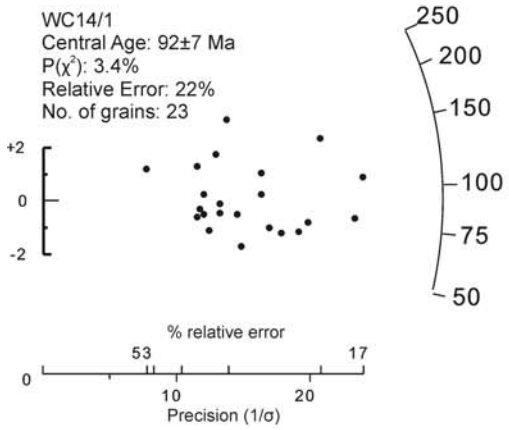
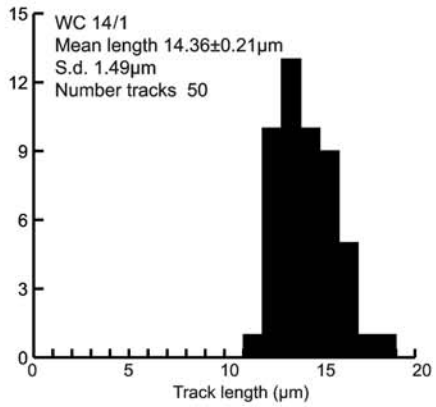
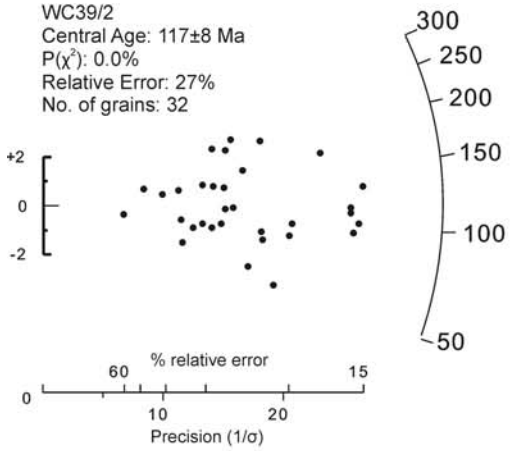
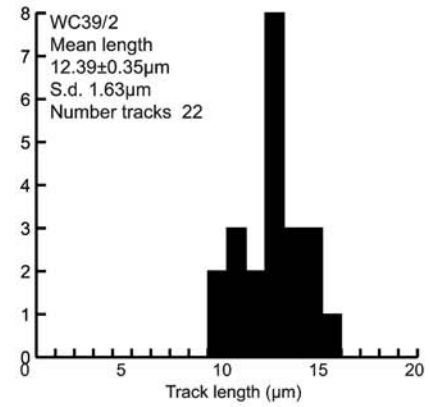
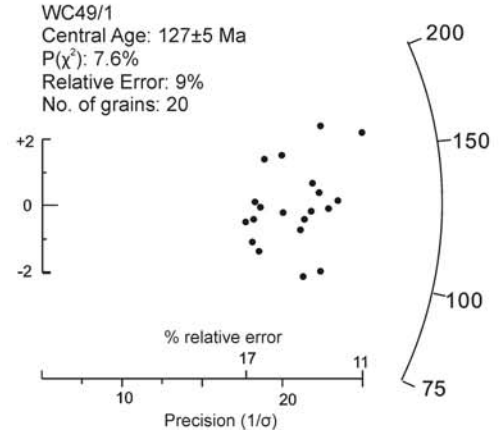
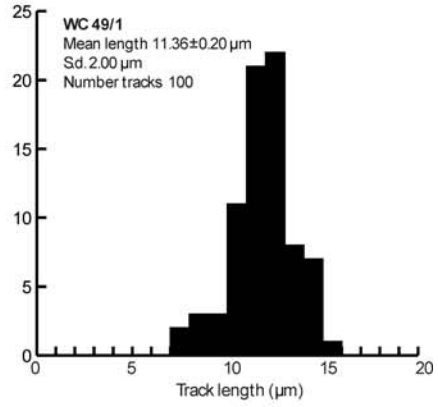


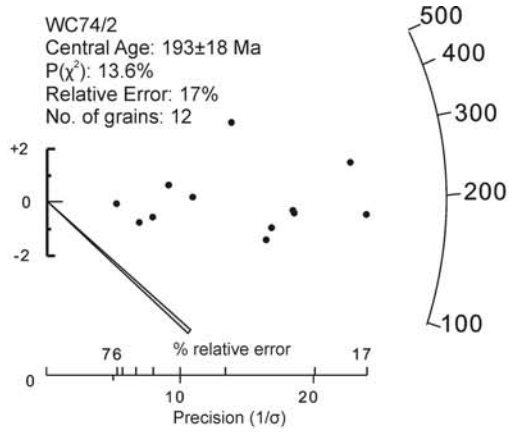




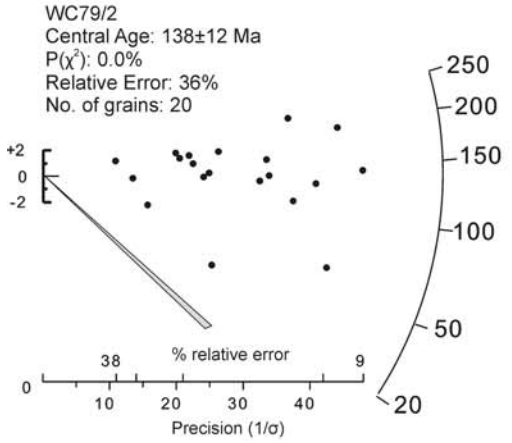


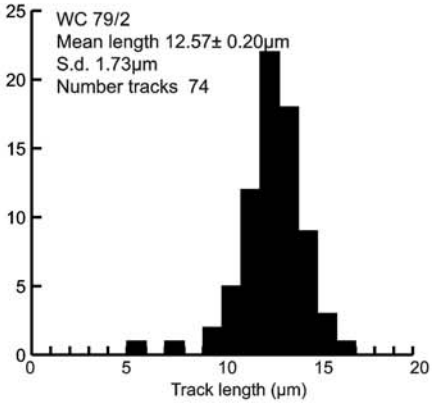


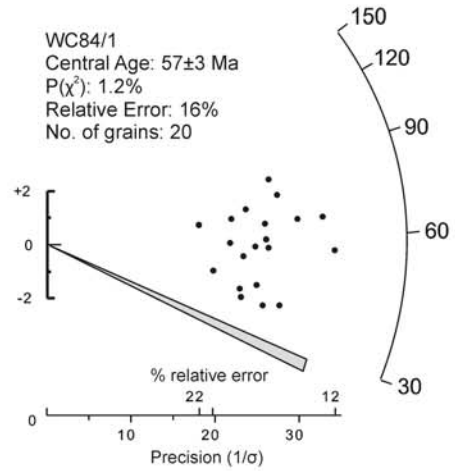


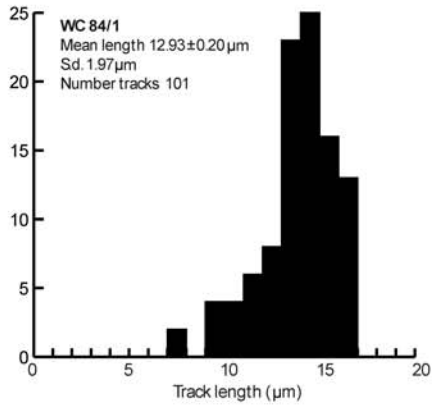


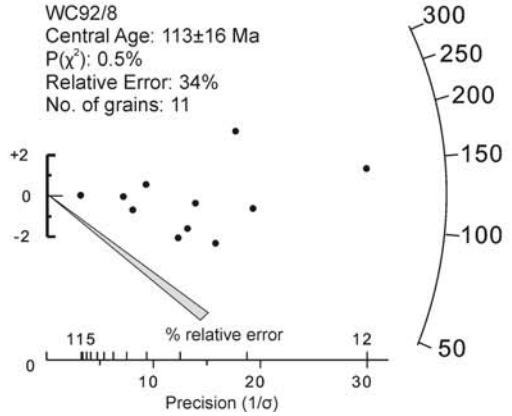
no track length data

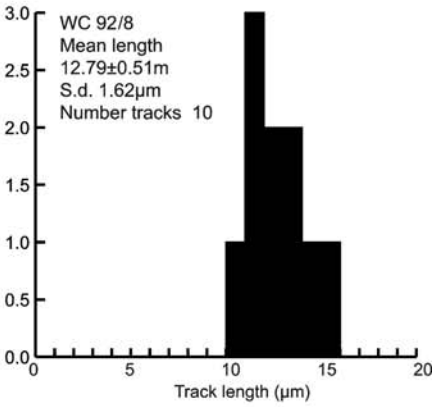


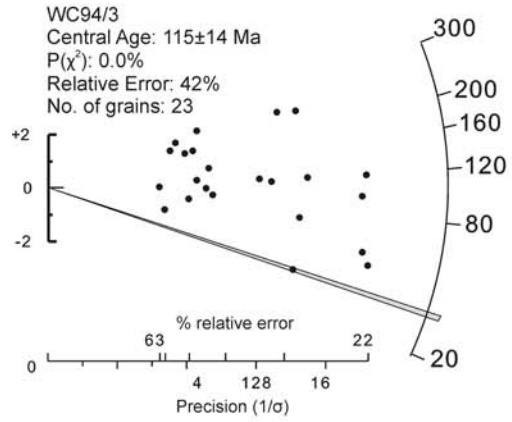












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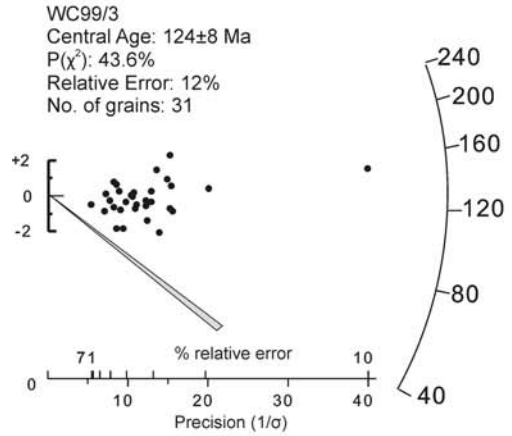

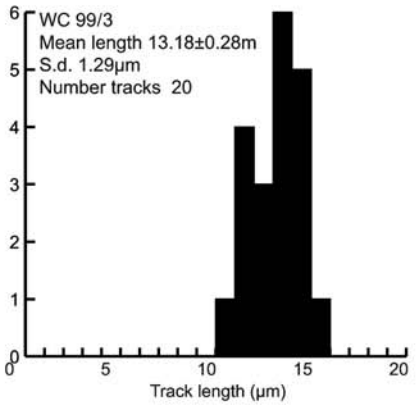

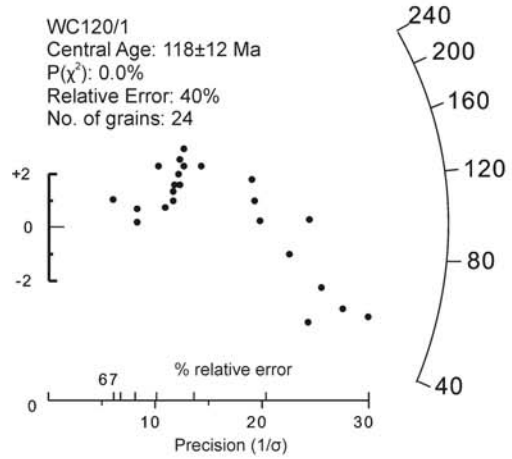

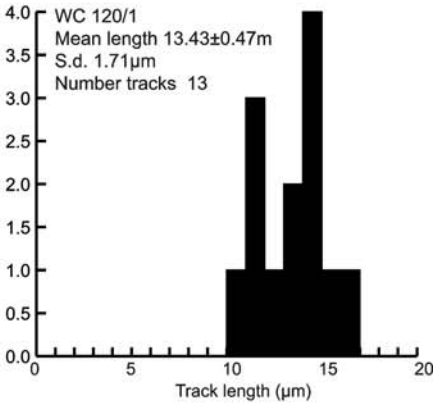

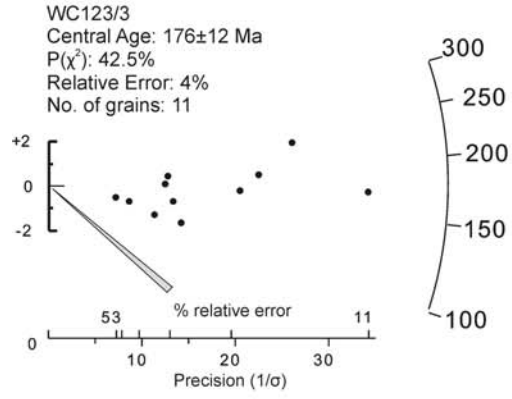

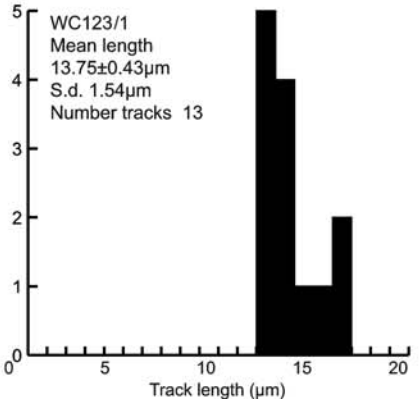

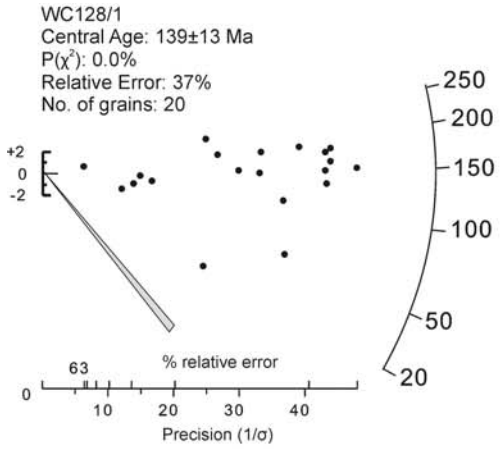

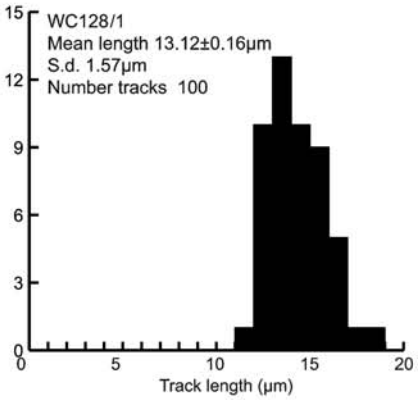

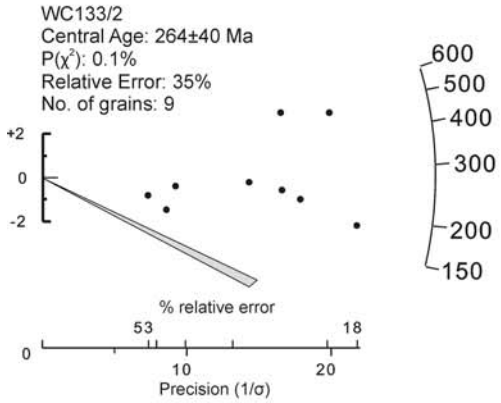

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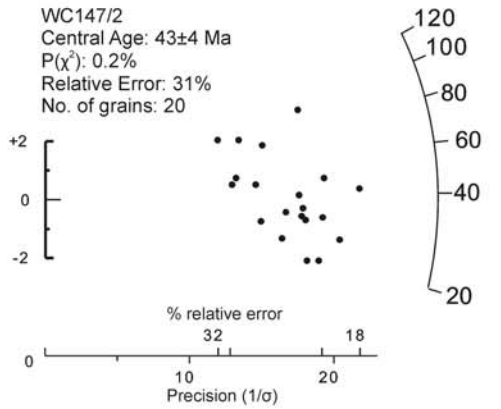

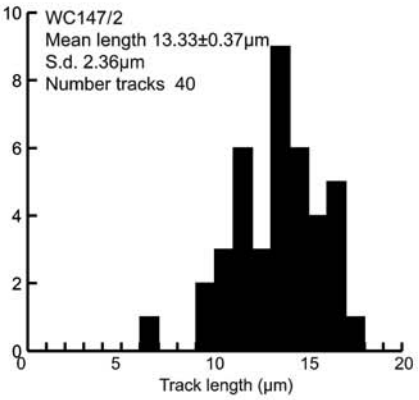

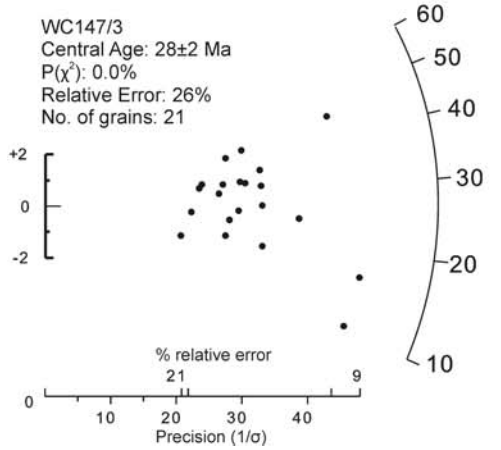

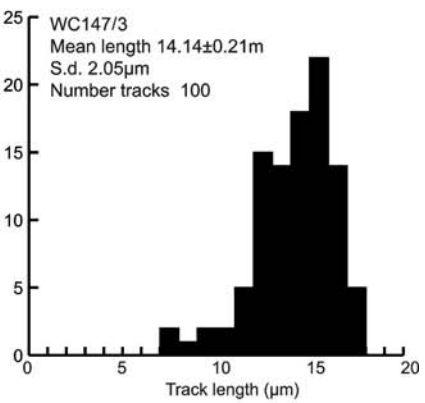

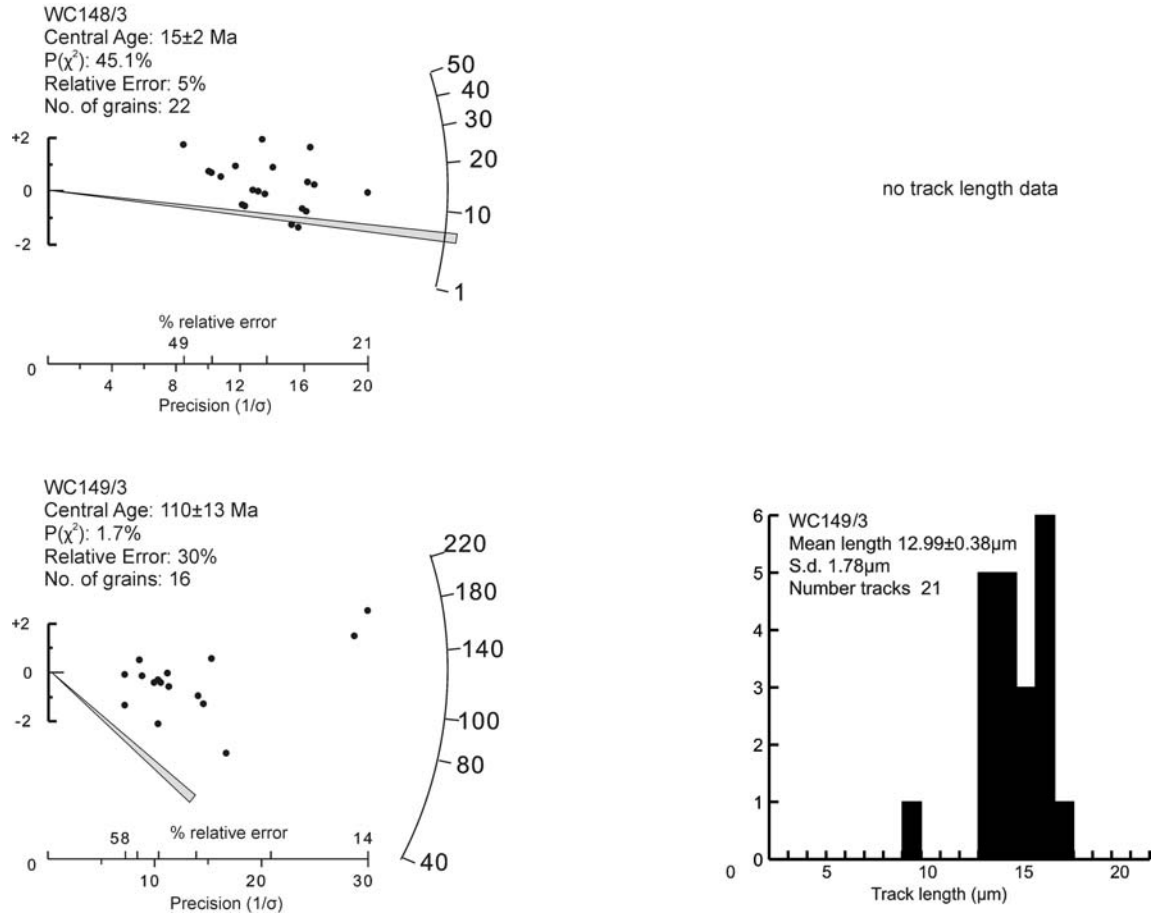

Figure A1. Radial plots of apatite track length distributions