

DR2004116

Data Repository Item

Analytical procedure

Data set no 1

The apatite separates were prepared, etched and irradiated by Donelick Analytical Ltd using the external detector method and the irradiation facilities at the Nuclear Radiation Center, Washington State University. The apatites were etched in 5.5N HNO₃ for 20 seconds at 21°C (\pm 1°C) and the micas etched in 48% HF for 15 minutes at 20°C (\pm 1°C). Additional apatite mounts were irradiated by a ²⁵²Cf source to enhance the measurability of natural fission track length distributions. The FT analyses were performed by C.Cederbom at 1600x magnification using an Axioplan microscope with both transmitted and reflected light. A personal zeta value of 121.5 \pm 4.5 (for the CN1 dosimeter) was used for the age calculations.

*Data set no 2 (samples marked with * in Table DR1)*

All samples were prepared, etched and analysed by M Rahn using the the external detector method. The samples were irradiated at the RISØ facility, Copenhagen, Denmark. Apatites were etched for 20s at 21 °C (\pm 2 °C) using 5N HNO₃, tracks in micas were revealed by etching in HF for 45 minutes at 21 °C (\pm 2 °C). A personal zeta value of 343.6 \pm 5.5 (for the CN5 dosimeter) was used for the age calculations.

FT results

Pooled and central FT age

The **pooled age** is based on the total ρ_s and ρ_i values for each sample (ie each grain is regarded as a minor part of one single unit). For over-dispersed FT data (a big spread in single grain FT ages due to eg different provenance), the pooled FT age is geologically insignificant and the precision of the pooled age, which is based on Poisson errors, is likely to be an underestimate¹.

The **central age** is based on the assumption that the the single grain $\log(\rho_s/\rho_i)$ values for each sample are normally distributed. The precision of the central age together with the **age dispersion** better illustrate the spread among the single grain ages for each sample¹. However, some samples in this study are characterized by Poissonian distributions. **Several samples in this study are non- or partially annealed and are therefore reflecting a mixture of different detrital signatures. For these samples neither the pooled nor the central FT age can be regarded as geologically significant, ie they do not represent a specific cooling event but illustrate a general trend of decreasing FT age with depth.**

Detailed compilation of FT results

The apatite FT results are presented in detail in Table DR1 and Figure DR1.

Reference

1. Galbraith, R.F. and Laslett, G.M., 1993, Statistical models for mixed fission track ages: Nuclear Tracks and Radiation Measurements, v. 21, p. 459-470

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TABLE DR1. APATITE FISSION TRACK RESULTS

Sample (depth below surface)	sampling interval or location	ρ_s (N_s) (10^6 t/cm 3)	ρ_i (N_i) (10^6 t/cm 3)	ρ_d (N_d) (10^6 t/cm 3)	Pooled FT age (Ma) $\pm 1\sigma$	$P(\chi^2)$ (%)	Central FT age (Ma) $\pm 1\sigma$	Age dispersion (%)	Peak ages (Ma)	No of grains	Dpar (μ m)
Boswil-1											
B1 (57)	52.5-62.5	0.509 (300)	3.38 (1995)	3.02 (2148)	27.6 ± 2.0	<1	29.8 ± 3.6	45	22.0	25	1.6
B3 (492)	490-495	0.478 (265)	3.12 (1729)	3.03 (2148)	28.1 ± 2.2	<1	33.3 ± 4.8	59	19.0	25	1.4
B158* (840)	800-880	0.334 (208)	2.36 (1473)	1.07 (3313)	25.9 ± 2.0	<1	27.4 ± 3.6	46	7.5, 20.8	20	
B5 (850)	840-860	0.434 (202)	2.93 (1364)	3.03 (2148)	27.3 ± 2.4	27	28.6 ± 2.8	17	20.5	25	1.5
B6 (1092)	1085-1100	0.432 (190)	3.27 (1436)	2.66 (3631)	21.3 ± 1.9	17	21.6 ± 2.0	15	16.3	25	1.4
B159* (1275)	1240-1310	0.451 (343)	3.05 (2324)	1.07 (3313)	27.0 ± 1.7	<1	26.9 ± 2.5	30	17.0, 33.0	26	
B7 (1312)	1300-1325	0.402 (188)	3.22 (1507)	3.04 (2148)	23.0 ± 2.0	86	23.0 ± 2.0	0	20.6	25	1.4
B8 (1507)	1500-1515	0.341 (240)	2.92 (2055)	3.05 (2148)	21.6 ± 1.7	<1	23.4 ± 2.6	36	14.0	25	1.4
B9 (1817)	1810-1825	0.270 (185)	3.97 (2715)	3.05 (2148)	12.6 ± 1.1	<1	14.7 ± 1.9	51	5.3	30	1.3
Hünenberg-1											
H3 (435)	430-440	0.465 (334)	3.66 (2632)	3.07 (2148)	23.6 ± 1.7	14	23.8 ± 1.9	15	18.4	25	1.5
H5 (875)	870-880	0.447 (390)	3.34 (2914)	3.07 (2148)	24.9 ± 1.7	<1	27.7 ± 2.8	32	15.0	25	1.4
H161* (1100)	1060-1140	0.296 (235)	2.15 (1713)	0.996 (4086)	23.4 ± 1.7	<1	23.7 ± 3.2	43	17.0	18	
H7 (1320)	1315-1325	0.492 (143)	3.15 (916)	3.09 (2148)	29.2 ± 2.9	<1	30.4 ± 4.2	43	18.3	25	1.4
H8 (1550)	1545-1555	0.405 (125)	3.82 (1179)	3.09 (2148)	19.9 ± 2.1	16	20.2 ± 2.5	28	11.3	26	1.4
H9 (1807)	1800-1815	0.381 (152)	3.40 (1359)	2.64 (3631)	17.9 ± 1.7	18	18.4 ± 1.9	16	12.5	30	1.4
H10 (1995)	1990-2000	0.218 (96)	4.39 (1933)	3.10 (2148)	9.3 ± 1.1	21	9.5 ± 1.1	16	5.5	30	1.4
H163* (2388)	2388.11- 2388.95	0.0731 (53)	3.47 (2515)	0.999 (4086)	3.6 ± 0.5	5	3.6 ± 0.5	6	2.9	20	
Rigi-Weggis											
R170* (-1780)	Rigi Kulm	0.307 (538)	1.56 (2728)	1.06 (3313)	35.9 ± 1.9	<1	29.3 ± 4.5	89	12.5	40	
R172* (-1060)	Staldí	0.279 (265)	1.79 (1695)	1.06 (3313)	28.5 ± 2.0	<1	26.4 ± 3.6	54	18.0, 65.0	23	
R174* (-440)	Oberarth	0.270 (282)	3.12 (3256)	1.01 (4086)	15.0 ± 1.0	<1	15.8 ± 3.3	94	9.0, 105.5	24	
W137* (620)	620	0.0913 (22)	3.62 (873)	1.12 (3510)	4.8 ± 1.1	77	4.8 ± 1.1	0	5.7	8	
W138* (1485)	1485	0.157 (176)	3.62 (4056)	1.12 (3510)	8.3 ± 0.7	<1	7.8 ± 0.9	47	4.8	40	
W139* (2135)	2135	0.0720 (86)	2.95 (3528)	1.11 (3510)	4.7 ± 0.5	2	4.7 ± 0.6	17	3.6	29	

Note: ρ_s , ρ_i , ρ_d is the density of spontaneous and induced tracks and tracks in the dosimeter, respectivelyNs, Ni and Nd is the number of spontaneous and induced track counts, and the average number of tracks counted in the dosimeter (ie. $(Nd[\text{topp}] + Nd[\text{bottom}]) / 2$), respectively $P(\chi^2)$ is the chi-square probability, a value less than 5% implies that the grains do not represent a single population

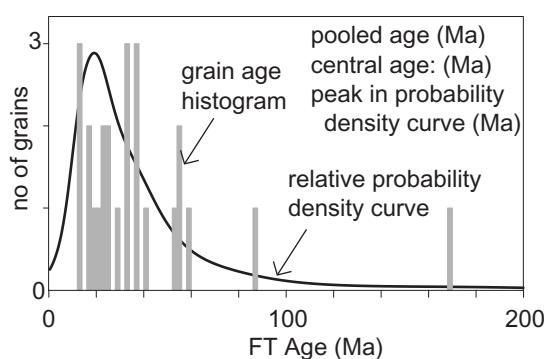
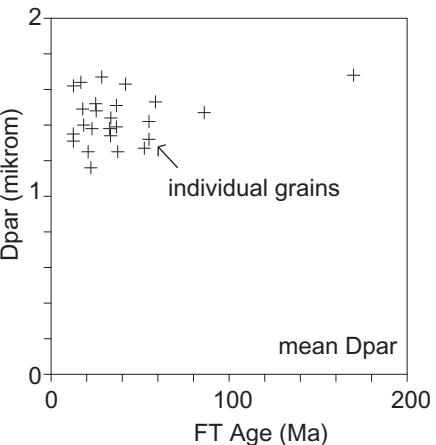
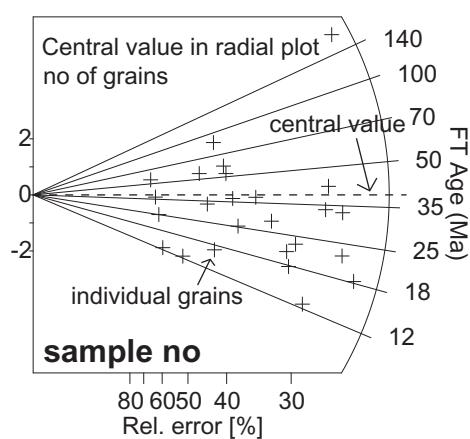
Dpar is the mean etch pit width (see also Fig. 1)

Peak ages are the peaks in the relative probability curve for each grain age distribution (see also Fig. 1).

* Data set no 2

Figure DR1A

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BOSWIL

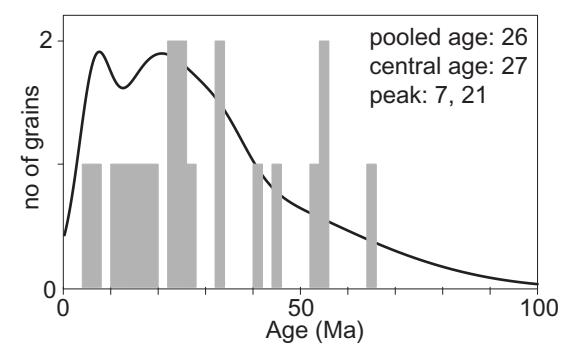
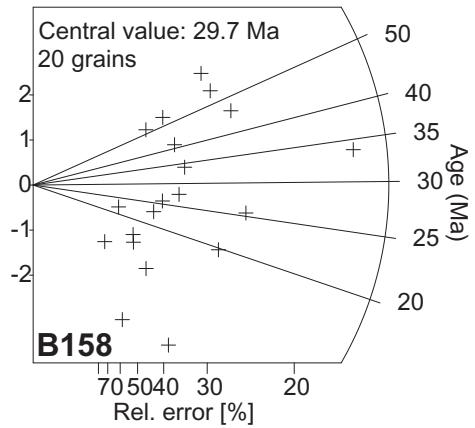
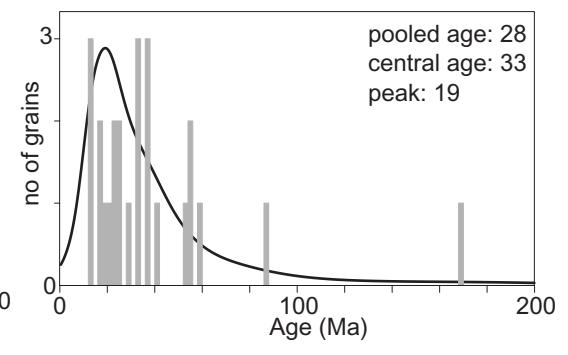
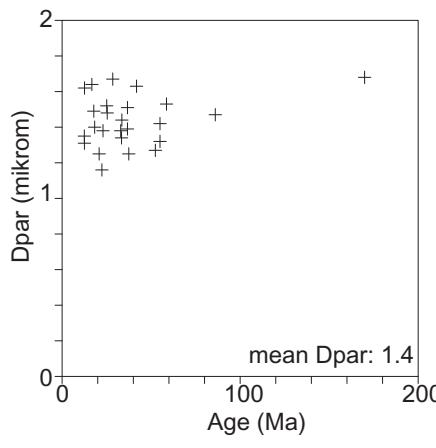
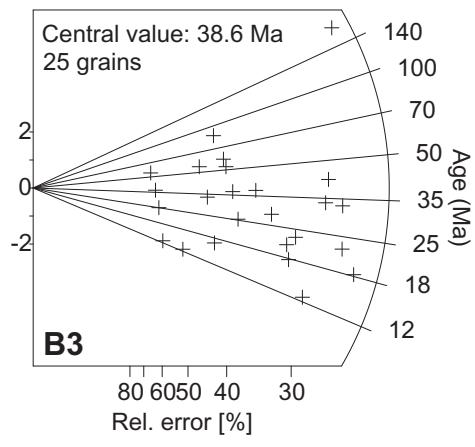
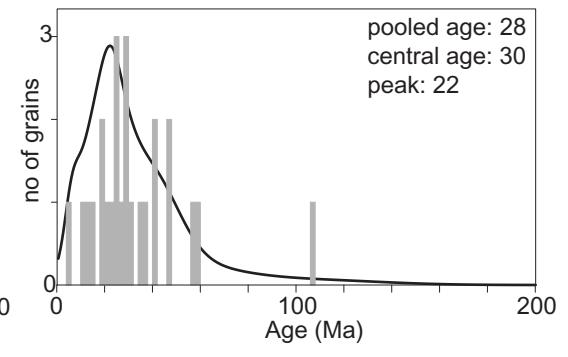
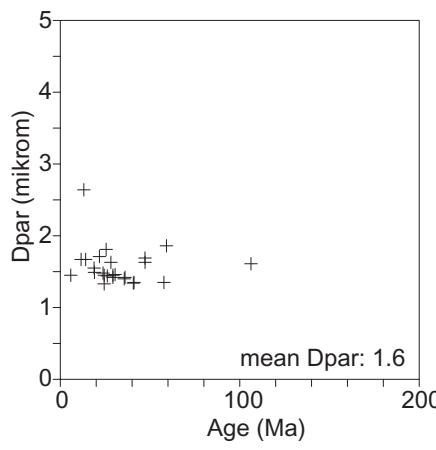
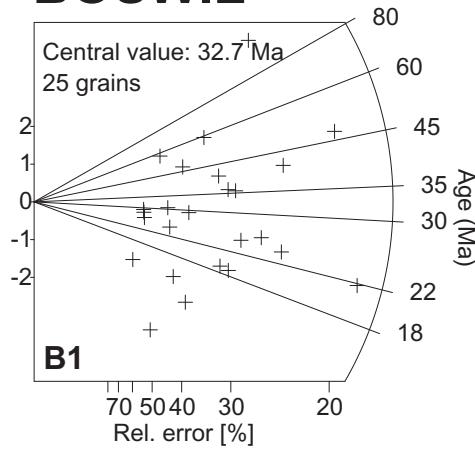


Figure DR1B

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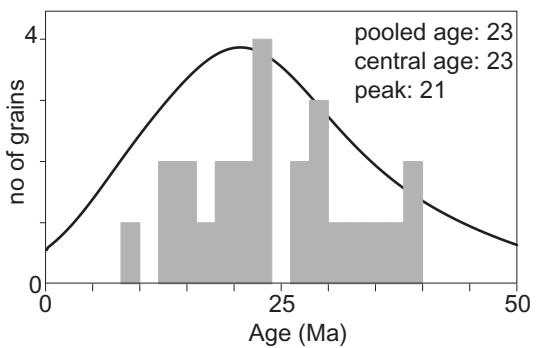
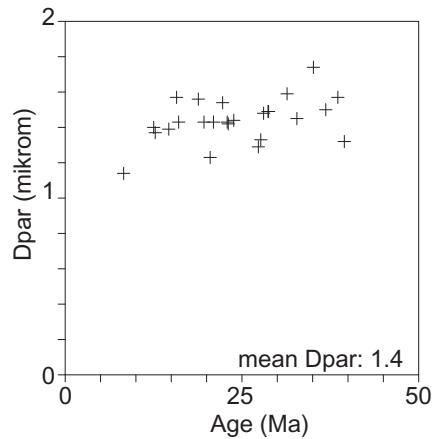
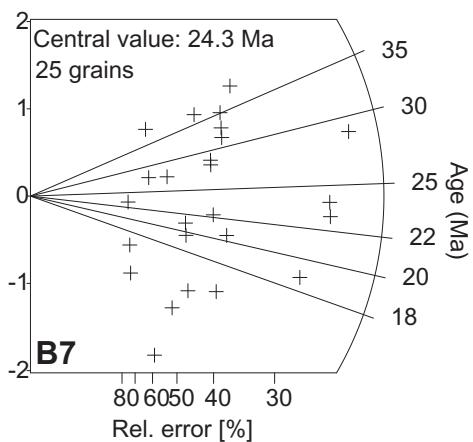
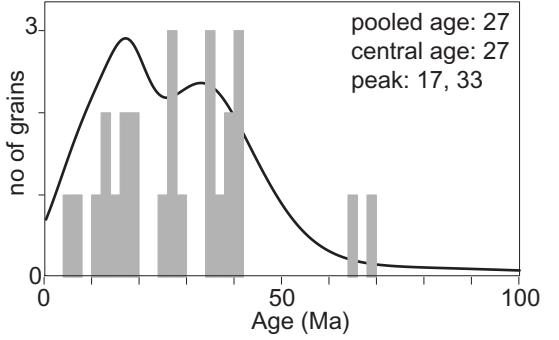
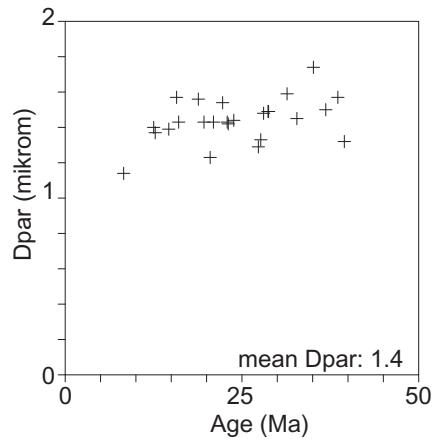
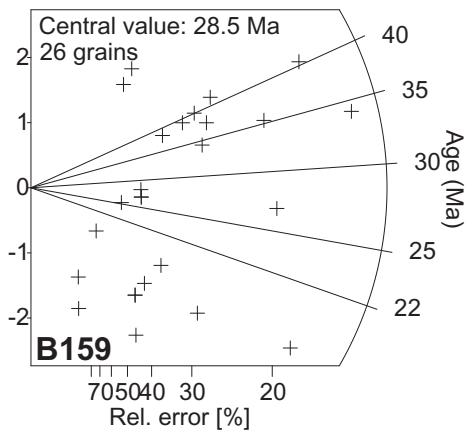
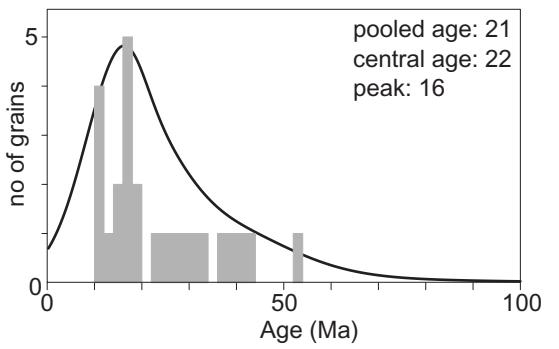
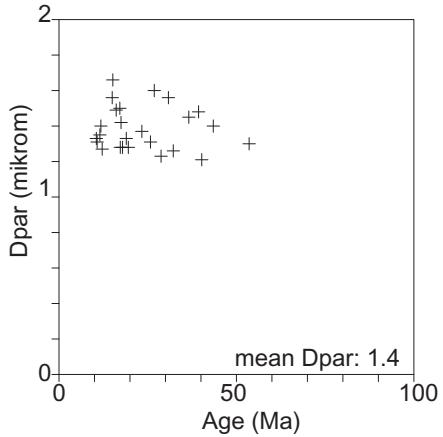
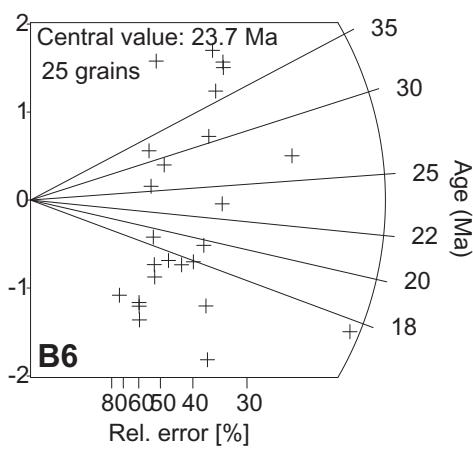
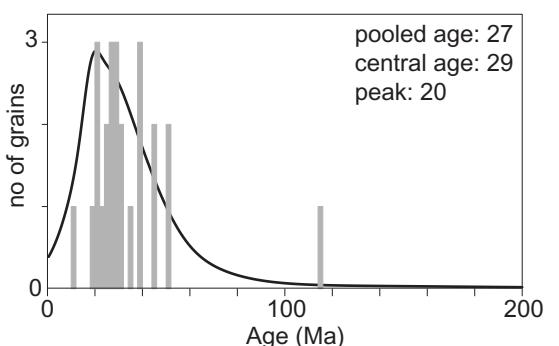
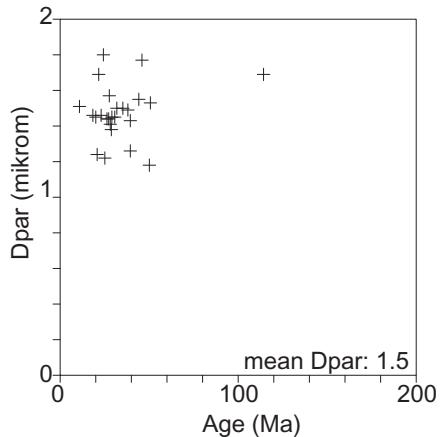
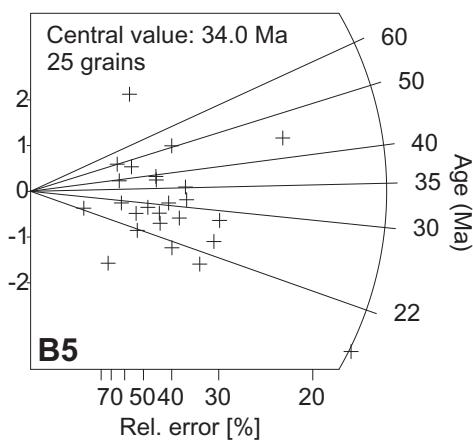
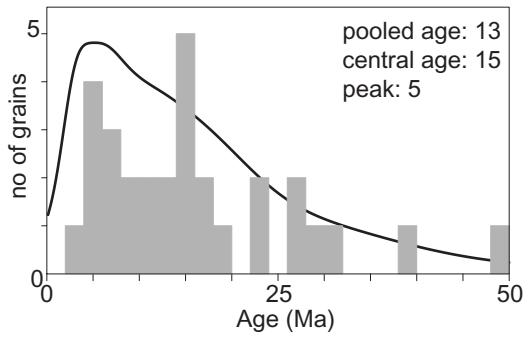
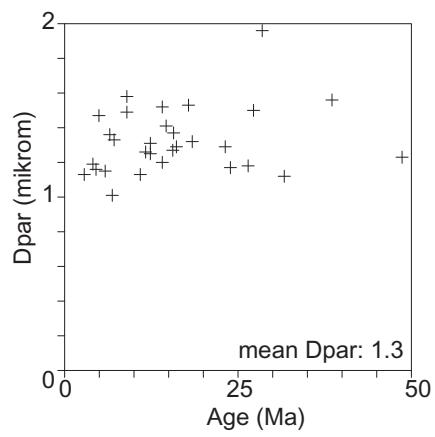
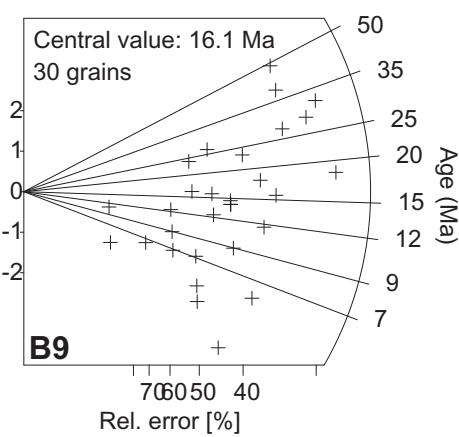
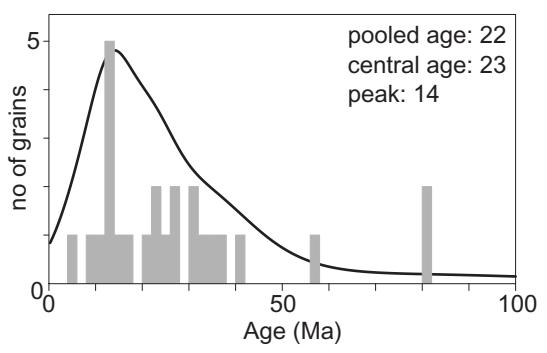
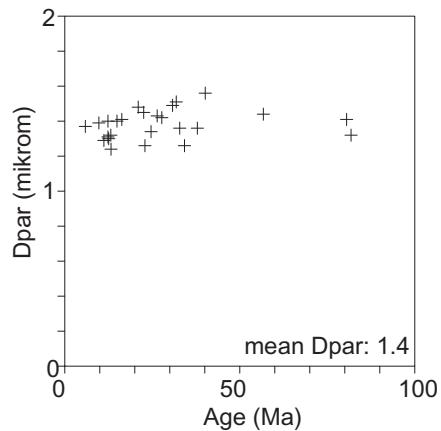
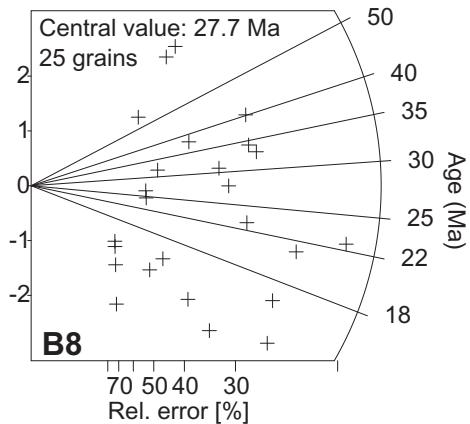


Figure DR1C

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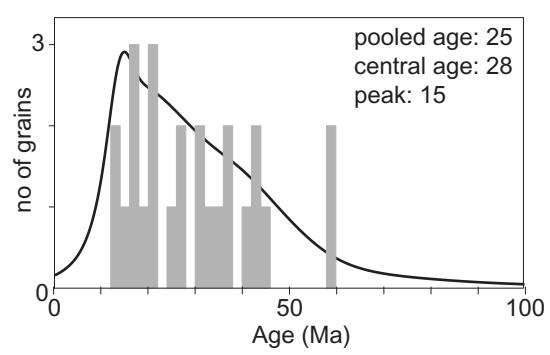
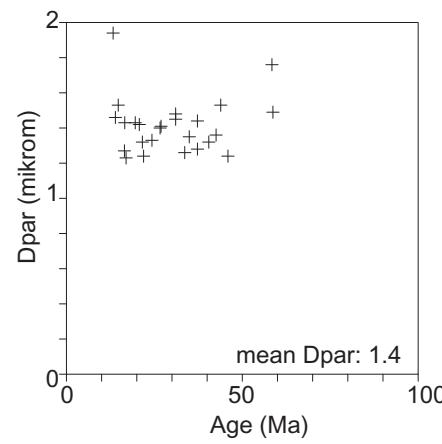
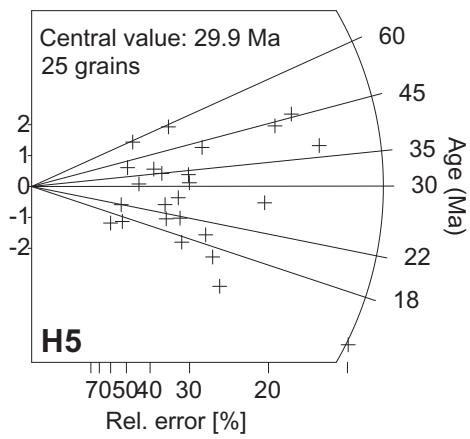
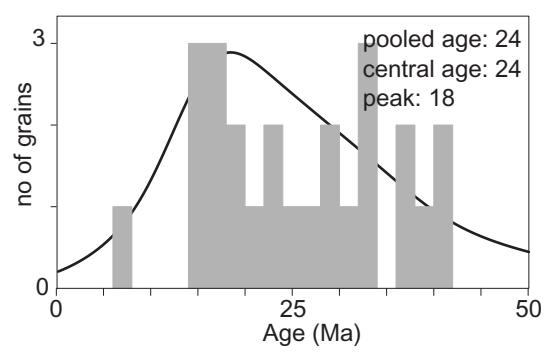
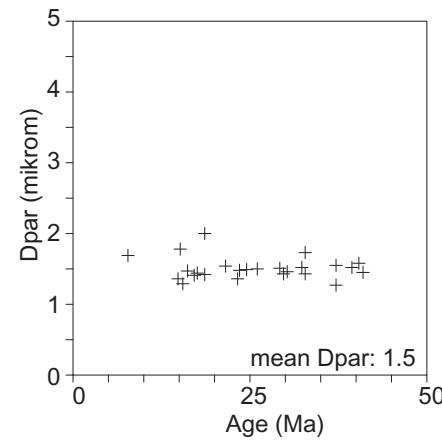
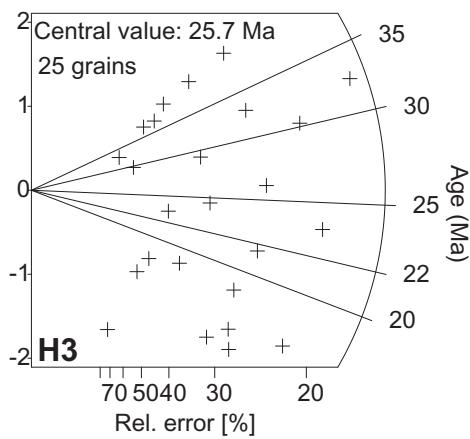


Figure DR1D

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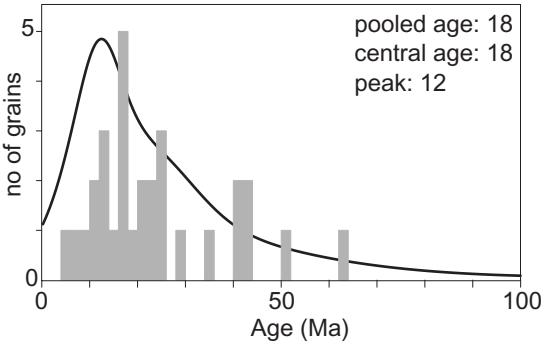
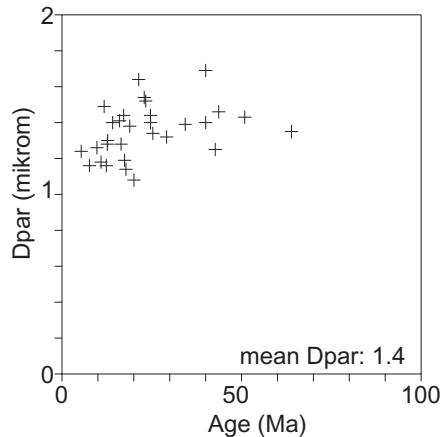
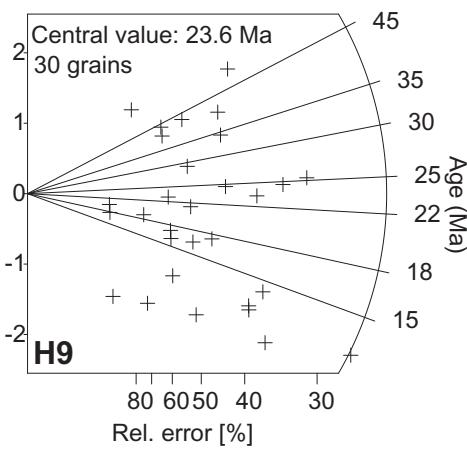
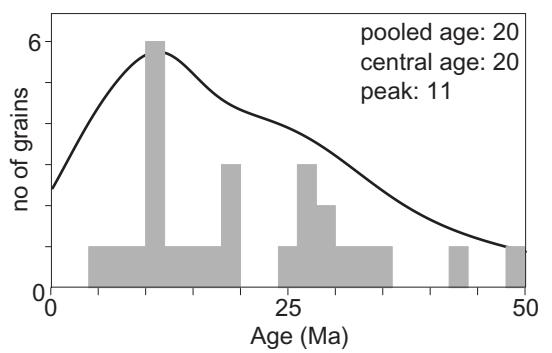
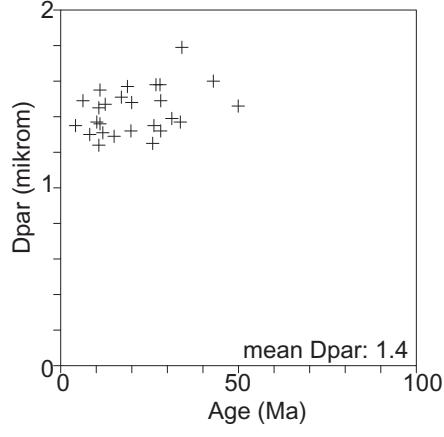
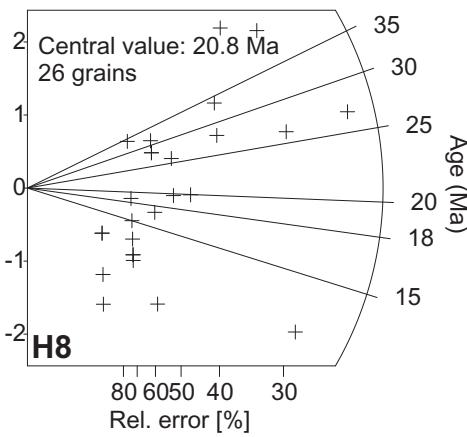
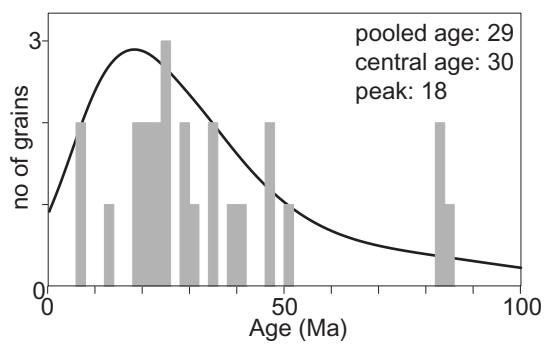
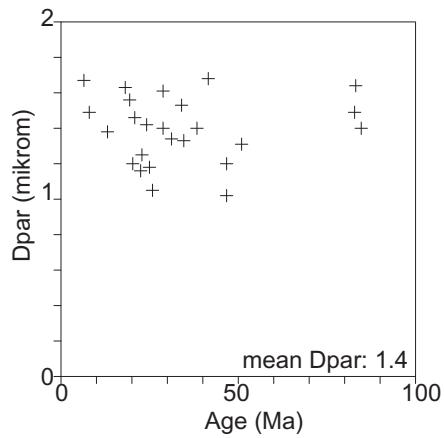
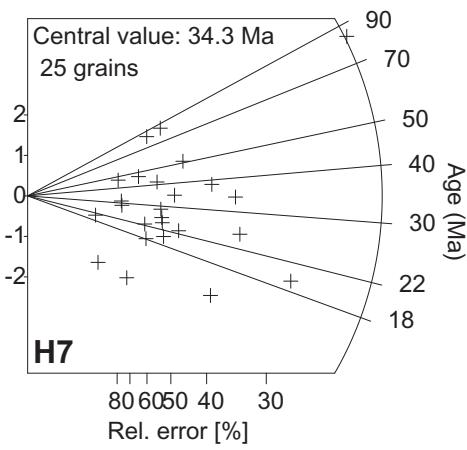
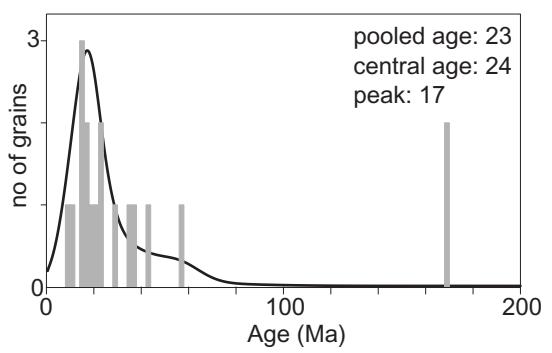
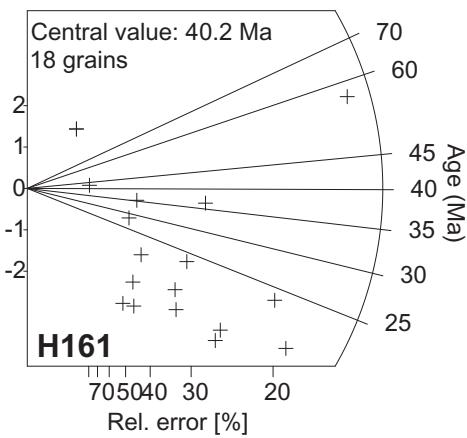


Figure DR1D

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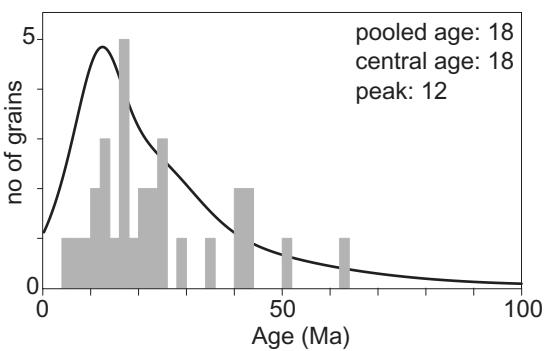
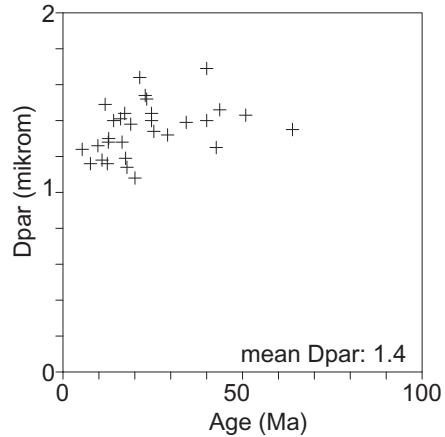
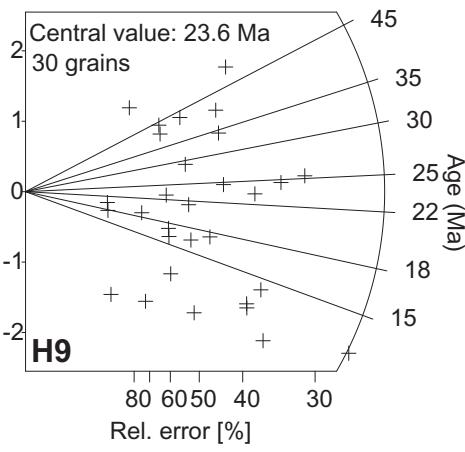
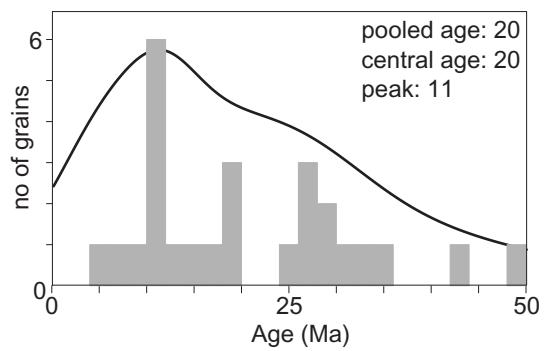
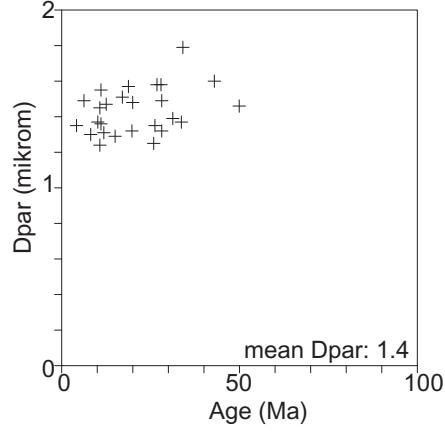
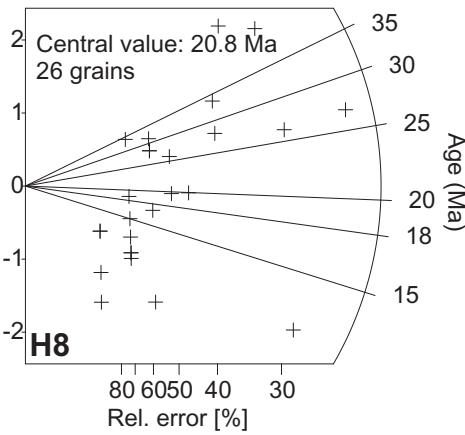
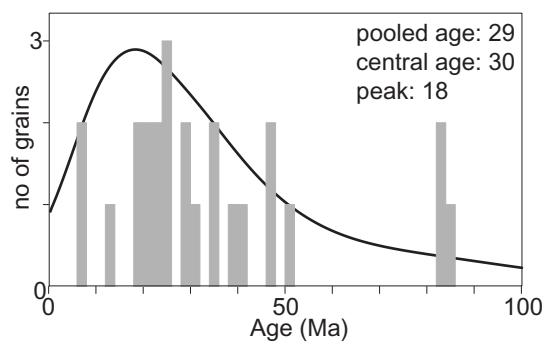
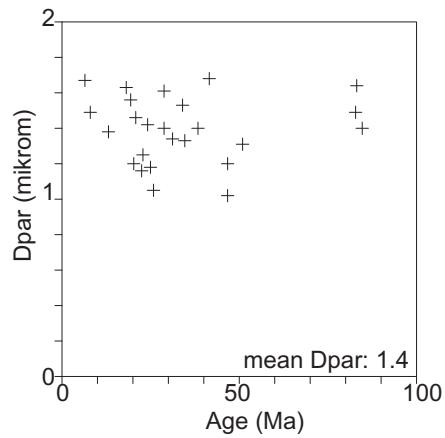
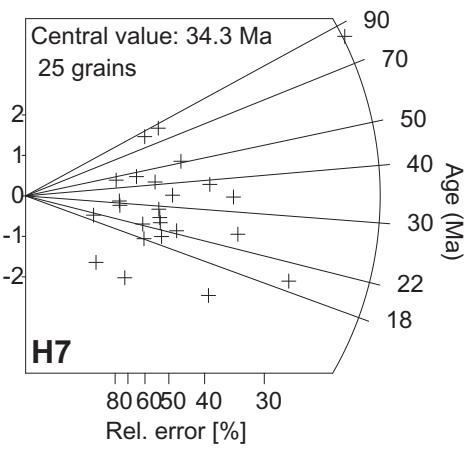
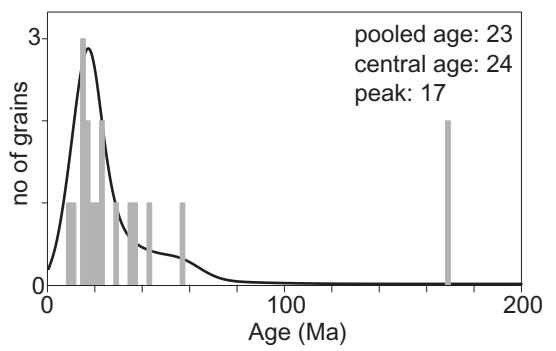
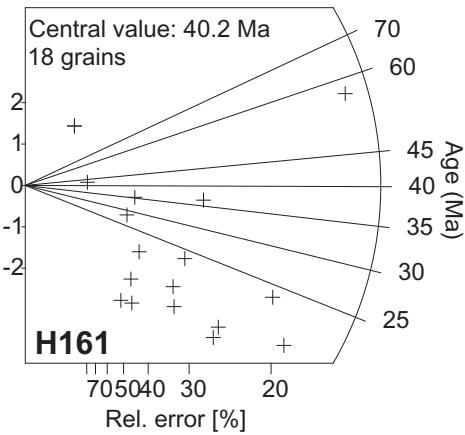
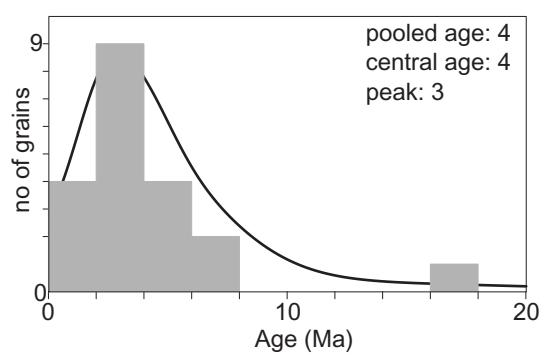
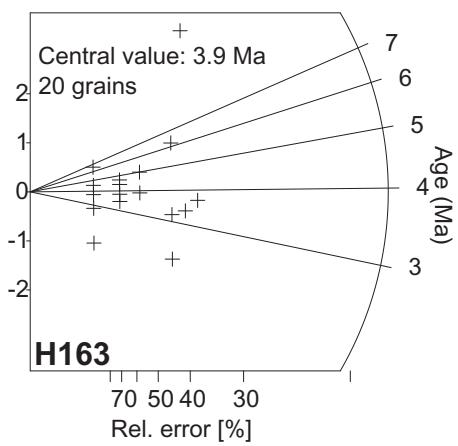
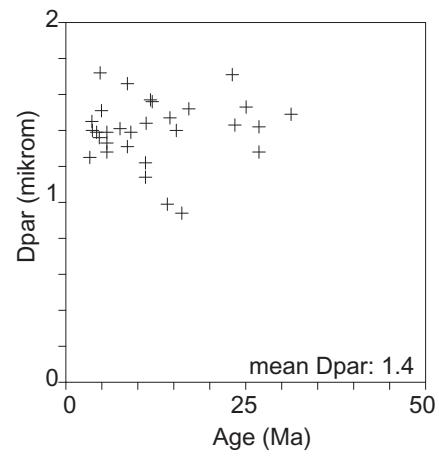
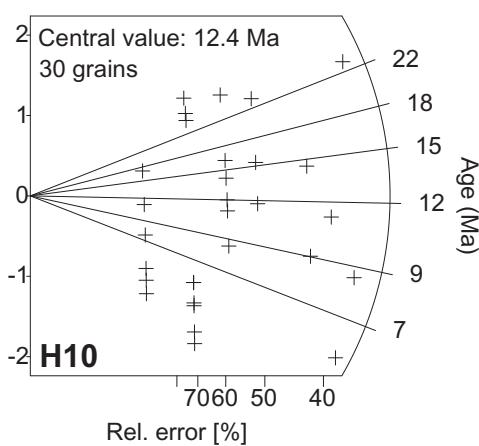


Figure DR1E

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RIGI

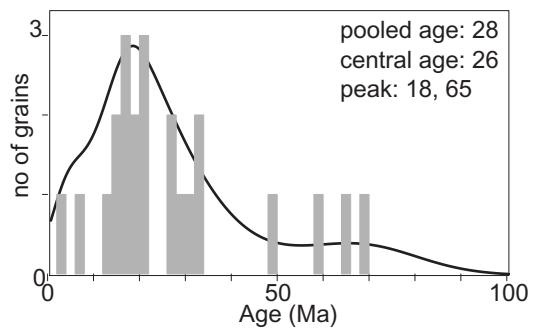
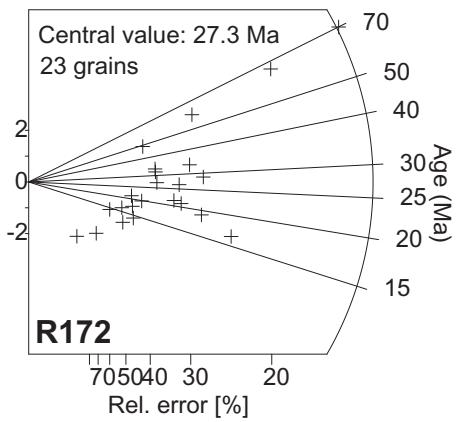
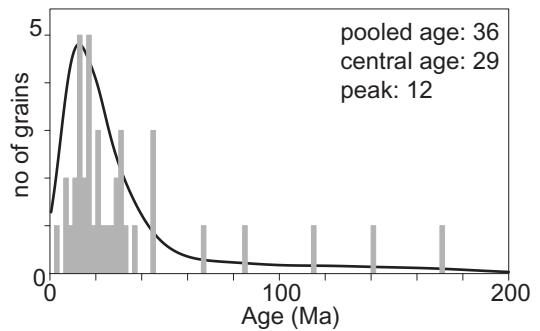
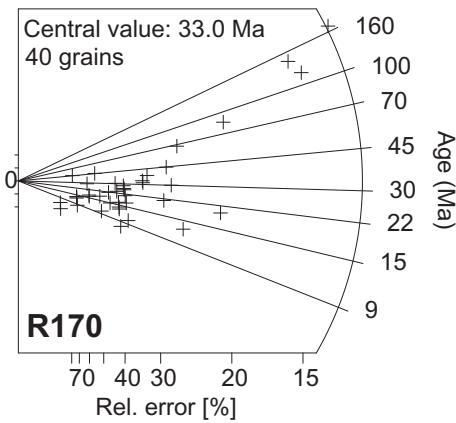
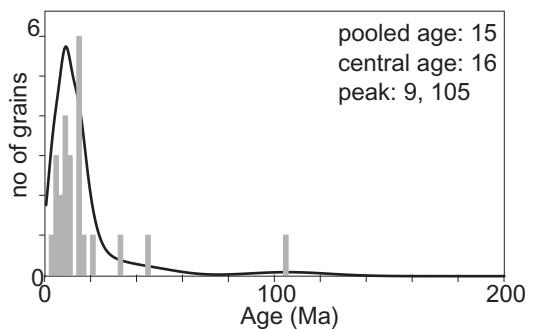
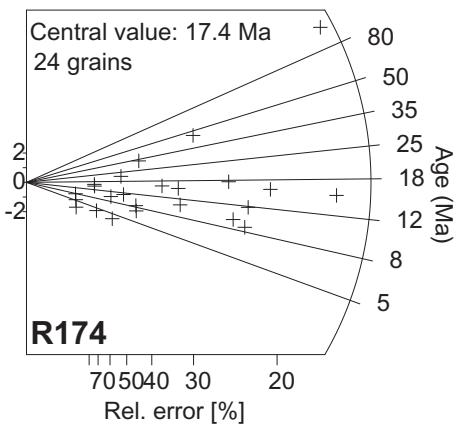


Figure DR1F

Cederbom



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