

**Supplementary data for: Pleistocene glass in the Australian desert: The case for an impact origin,
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Appendix Table A: Orientation of planar microstructures in quartz within clasts in Edeowie glass, measured as the angle between the pole to the set and the c-axis. Total data set comprising 95 sets in 61 grains. Measurements were carried out on thin sections using a universal stage attached to a petrological microscope. Set orientations are tabulated in 5 degree bins and have not been uniquely indexed. All measurements done at School of Earth Sciences, University of Tasmania.

Polar angle with c-axis	No. of sets	Percentage
0-4.9°	2	2.1%
5-9.9°	0	0.0%
10-14.9°	0	0.0%
15-19.9°	1	1.1%
20-24.9°	21	22.1%
25-29.9°	6	6.3%
30-34.9°	23	24.2%
35-39.9°	4	4.2%
40-44.9°	3	3.2%
45-49.9°	7	7.4%
50-54.9°	6	6.3%
55-59.9°	2	2.1%
60-64.9°	2	2.1%
65-69.9°	6	6.3%
70-74.9°	4	4.2%
75-79.9°	1	1.1%
80-84.9°	3	3.2%
85-90°	4	4.2%
Total	95	100.0%

Appendix Table B: Number of measured planar microstructure sets per grain versus number of grains. Multiple sets were commonly only evident after tilting on universal stage.

Sets per grain	No. of grains	Percentage
1	32	52.5%
2	24	39.3%
3	5	8.2%
Total	61	100.0%

Appendix Table C: Indexed planar microstructure sets restricted to 63 sets in 29 multi-set grains. Indexing was carried out using stereonet plots and a template following methods detailed in Engelhardt and Bertsch (1969) and Stöffler and Langenhorst (1994). Template allows for 5° error in measurement.

Symbol	Miller-Bravais index	Polar angle with c-axis	No. of sets	Percentage
c	(0001)	0.00°	2	3.2%
ω	{10 $\bar{1}$ 3}	23.95°	16	25.4%
π	{10 $\bar{1}$ 2}	32.42°	14	22.2%
ξ	{11 $\bar{1}$ 2}	47.73°	9	14.3%
r,z	{10 $\bar{1}$ 1},{01 $\bar{1}$ 1}	51.79°	3	4.8%
s	{11 $\bar{2}$ 1}	65.56°	4	6.3%
ρ	{21 $\bar{3}$ 1}	73.71°	3	4.8%
χ	{51 $\bar{6}$ 1}	82.07°	2	3.2%
m,a	{10 $\bar{1}$ 0},{11 $\bar{2}$ 0}	90.00°	2	3.2%
Unindexed			8	12.7%
Total			63	100.0%

Combined measurements from grains within separate sandstone or quartzite clasts and from isolated quartz grains in several separate samples, so overall distribution pattern cannot be used to imply specific shock pressures.

Appendix Table D: $^{40}\text{Ar}/^{39}\text{Ar}$ analytical data. Analytical procedures are detailed in Kelley (1995). The samples were over irradiated leading to low $^{40}\text{Ar}/^{39}\text{Ar}$ ratios but the irradiation corrections were constrained by analysis of salts and samples were Cd shielded, leading to a $(^{40}\text{Ar}/^{39}\text{Ar})_{\text{K}}$ correction factor of 0.0087. The J value for the three samples was measured using the international standard GA1550 (Renne et al., 1998). Two samples of PG4 contained lithic fragments yielding older ages, and one contained very little potassium, yielding an age with high errors; these were excluded from the final mean age but are shown here for completeness.

TLD1: Australasian tektite from Thailand (analyzed for comparison).

PG4: Slab-type glass from southern locality.

VG1: Highly vesicular (scoriaceous) melt from northern locality.

Sample Analysis no.	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{38}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	^{39}Ar (10^{-12} cc STP)	% atmos	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	\pm (1σ)	comment
TLD1										
uncrushed										
1	0.046	0.0135	0.0903	2.9771E-05	0.59	19.1	0.046	0.98	1.97	
2	0.071	0.0124	0.1533	0	0.70	0.0	0.071	1.51	1.32	
3	0.057	0.0135	0.1462	1.3480E-05	0.63	7.0	0.057	1.20	1.60	
4	0.028	0.0127	0.1417	0	1.61	0.0	0.028	0.59	0.30	
5	0.024	0.0132	0.1549	0	1.47	0.0	0.024	0.52	0.53	
6	0.038	0.0123	0.1095	7.4191E-06	1.32	5.8	0.038	0.80	0.55	
7	0.020	0.0126	0.1216	4.3851E-06	1.57	6.3	0.020	0.43	0.30	
8	0.033	0.0122	0.2432	0	1.33	0.0	0.033	0.70	0.54	
9	0.030	0.0125	0.2474	4.1107E-06	1.66	4.1	0.030	0.62	0.44	
10	0.026	0.0131	0.2237	6.1542E-06	1.52	7.0	0.026	0.55	0.51	
11	0.026	0.0128	0.2478	3.0768E-06	1.92	3.5	0.026	0.55	0.39	
12	0.064	0.0123	0.2103	0	1.26	0.0	0.064	1.35	0.57	
13	0.029	0.0119	0.2174	6.3020E-06	1.11	6.4	0.029	0.61	0.63	
14	0.065	0.0124	0.2153	1.8687E-06	1.39	0.9	0.065	1.37	0.33	
					mean 4.3			mean age 0.73	0.24	(2 σ)
PG4 uncrushed										
1	14.691	0.0235	0.6012	0.0499	0.74	100.4	N/A	N/A	3.24	
2	13.226	0.0209	0.1767	0.0450	1.21	100.2	N/A	N/A	1.84	
3	6.867	0.0183	1.0077	0.0230	1.18	99.0	0.067	1.41	2.15	
4	10.901	0.0193	0.2232	0.0360	1.27	97.6	0.257	5.44	1.50	
5	21.142	0.0263	0.1633	0.0716	1.26	100.1	N/A	N/A	4.56	
					mean 99.6			no mean age		
PG4 crushed										
1	0.729	0.0133	0.2341	0.0023	588	94.7	0.039	0.82	0.10	
2	0.472	0.0122	0.2026	0.0016	98	98.4	0.007	0.16	0.38	excluded
3	0.490	0.0128	0.2602	0.0011	800	63.5	0.179	3.78	0.11	excluded
4	0.338	0.0125	0.3041	0.0010	1146	90.4	0.032	0.69	0.05	
5	0.492	0.0130	0.2833	0.0013	1275	78.4	0.107	2.25	0.03	excluded
6	0.337	0.0124	0.1478	0.0010	886	91.1	0.030	0.64	0.09	
7	0.399	0.0129	0.2119	0.0012	680	89.4	0.042	0.90	0.12	
8	0.300	0.0128	0.2067	0.0009	1590	89.8	0.031	0.65	0.02	
					mean 91.1			mean age 0.67	0.07	(2 σ)

Appendix Table D continued: $^{40}\text{Ar}/^{39}\text{Ar}$ analytical data.

Sample Analysis no.	$^{40}\text{Ar}/^{39}\text{Ar}$	$^{38}\text{Ar}/^{39}\text{Ar}$	$^{37}\text{Ar}/^{39}\text{Ar}$	$^{36}\text{Ar}/^{39}\text{Ar}$	^{39}Ar (10^{-12} cc STP)	% atmos	$^{40}\text{Ar}^*/^{39}\text{Ar}$	Age (Ma)	\pm (2σ)	comments
VG1 uncrushed										
1	49.908	0.0466	0.0915	0.1680	1.8	99.5	0.250	5.27	2.93	
2	14.039	0.0240	0.0433	0.0474	1.3	99.8	0.030	0.64	1.83	
3	63.152	0.0545	0.0256	0.2137	2.0	100	-0.011	-0.24	12.11	
						mean 99.8		no mean age		
VG1 crushed										
1	0.767	0.0133	0.0743	0.0024	44.6	94.3	0.044	0.92	0.83	
2	0.195	0.0126	0.0490	0.0006	80.1	87.5	0.024	0.51	0.73	
3	0.242	0.0131	0.0428	0.0006	59.4	77.8	0.054	1.14	0.99	
4	0.128	0.0142	0.0276	0.0002	55.2	52.9	0.060	1.27	1.06	
5	0.111	0.0129	0.0393	0.0002	110.9	60.3	0.044	0.93	0.34	
6	0.426	0.0146	0.0518	0.0012	31.4	83.6	0.070	1.48	1.18	
7	0.276	0.0129	0.0249	0.0007	52.1	77.7	0.062	1.30	0.71	
8	0.082	0.0121	0.0271	0.0001	61.6	49.1	0.042	0.89	0.60	
9	0.159	0.0124	0.0231	0.0005	64.0	85.4	0.023	0.49	0.59	
10	0.087	0.0133	0.0274	0.0001	79.2	36.0	0.056	1.18	0.47	
11	0.101	0.0124	0.0194	0.0003	110.6	88.9	0.011	0.24	0.34	
						mean 72.1		mean age 0.78	0.33	(2σ)

X-Ray Fluorescence Analysis

Undertaken at the School of Earth Sciences, University of Tasmania.

Instrument Philips PW1480 X-Ray Spectrometer

X-Ray Tubes: 3kW max. ScMo anode side window.

Elements analyzed: Majors, S, Y, Rb, U, Th, Cu, Pb, Zn, Ni, Co, Ga

3kW max. Au anode side window.

Elements analyzed: Nb, Zr, Sr, Ba, Cr, V, Sc, La, Ce, Nd

Crystals: LiF 200, LiF 220, PX-1 (for Na and Mg), PE002, Ge111

Collimators: Coarse (0.7 mm) and fine (0.3 mm) with auxiliary (0.14 mm)

Detectors: Gas flow proportional counter with P10 gas (10% methane in Ar) and Scintillation Counter.

Sample Changer: Philips 30 position sample holder.

Sample Preparation: All samples ground in an agate swing mill.

Major Elements: Fusion discs prepared at 1100°C in 5% Au/95%Pt crucibles. 0.77g sample, 4.125g Norrish Flux (Lithium borates/La₂O₃ mix), 0.055g LiNO₃ for silicates. Platinum/gold moulds used for cooling.

Trace Elements: Pressed powder pills (3.5 tonnes/cm²) with 10 grams sample. Binder: PVP-MC.

Corrections: Corrections for mass absorption were calculated using Philips X40 software with De Jongh's calibration model and Philips (or CSIRO) alpha coefficients. Compton scattering also used for many trace elements.

Calibration and blanks: Pure element oxide mixes in pure silica, international and Tasmanian standard rocks, and pure silica blanks were run during analysis.

References

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