

Supplemental data

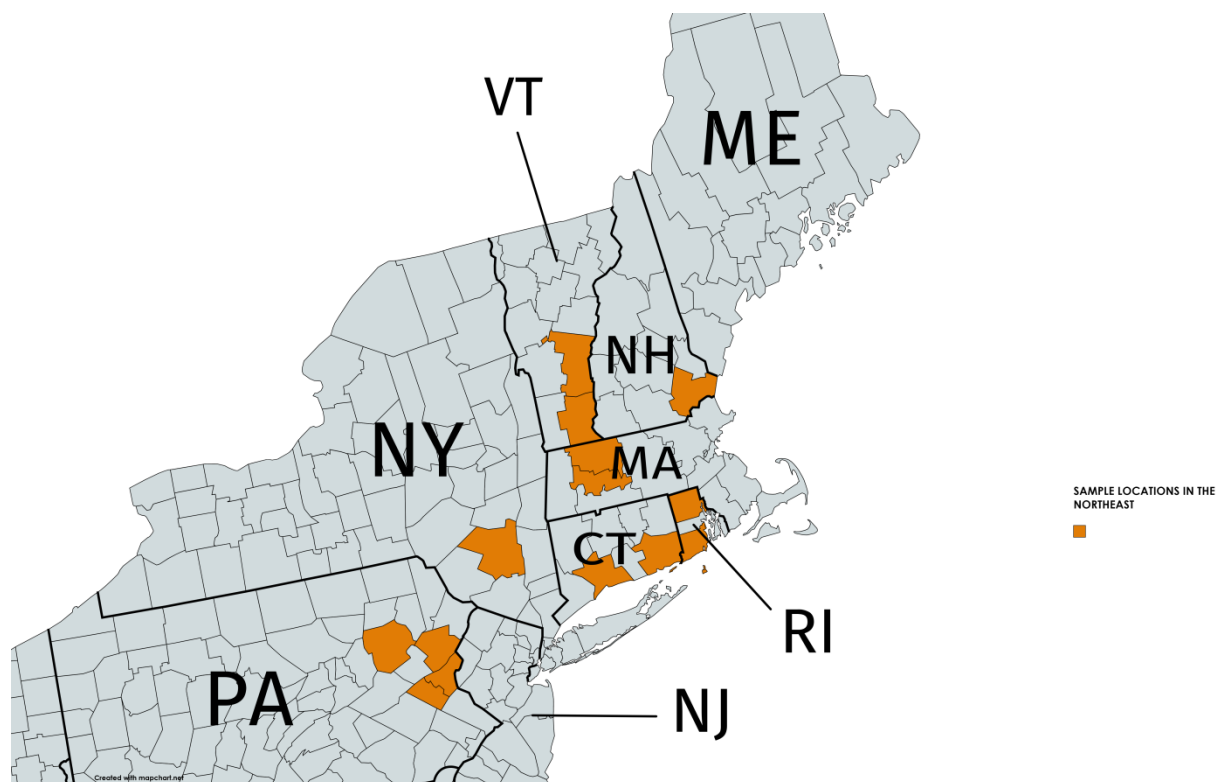


Figure S1. Counties where samples have been collected. Only sites in New York, New Hampshire, Connecticut and Rhode Island are reported in this paper. Exact locations are not given because of concerns about looting and vandalism.

Figure S2. Photos

Table S1. Concentrations relevant to dose rate. U and Th contents are determined from alpha counting, using the pairs technique to separate the U and Th chains. Percentage of total K is determined from flame photometry and converted to ^{40}K by atomic abundance.

Sample	^{238}U (ppm)	^{232}Th (ppm)	K (%)	Measured moisture (%)
UW4076 -- sediment	1.18±0.10	3.95±0.70	0.36±0.02	3.4
Associated rock	0.74±0.07	1.37±0.40	0.88±0.03	
UW4077 -- sediment	1.59±0.10	1.47±0.44	0.77±0.02	7.2
Associated rock 1	0.50±0.06	0.91±0.36	0.38±0.03	
Associated rock 2	0.55±0.06	1.72±0.50	0.20±0.03	
UW4080 -- rock	0.13±0.03	0.67±0.31	0.78±0.03	
Associated rock-bottom*	0.23±0.05	0.12±0.13	0.93±0.05	
UW4081 --sediment	2.28±0.21	12.99±1.42	1.40±0.08	2.9
Associated rock	1.70±0.11	2.32±0.55	1.82±0.11	
UW4083 -- sediment	2.61±0.20	9.88±1.20	2.09±0.11	1.8
Associated rock	1.15±0.16	11.97±1.41	1.17±0.05	
UW4084 -- rock	0.67±0.09	4.78±0.77	1.04±0.10	
UW4087 -- sediment	1.82±0.15	7.61±0.87	1.95±0.04	9.3

UW4088 --sediment	2.31±0.22	14.28±1.61	2.14±0.07	
Associated rock	1.15±0.18	15.41±1.65	3.53±0.16	
UW4089 -- sediment	1.87±0.16	8.96±1.14	1.99±0.09	0.9
Associated rock	1.86±0.13	3.48±0.78	1.72±0.08	
UW4091 -- rock	2.53±0.20	9.76±1.17	3.38±0.51	
Associated rock-bottom	1.81±0.22	17.34±1.79	4.77±0.66	
Associated rock 1	1.22±0.11	3.91±0.77	2.45±0.20	
Associated rock 2	1.42±0.20	15.57±1.66	3.18±0.16	
Associated sediment	5.42±0.30	3.26±0.86	1.67±0.06	
UW4092 -- sediment	1.98±0.15	6.36±0.94	2.68±0.41	5.3
Associated rock	0.55±0.06	1.72±0.50		
UW4095 -- sediment	1.41±0.09	1.85±0.44	2.06±0.22	2.6
Associated rock	1.64±0.18	13.05±1.38	5.40±0.16	
UW4098 -- sediment	1.78±0.15	6.73±0.95	1.48±0.04	
UW4099 -- rock	1.06±0.07	0.20±0.19	1.12±0.04	
UW4100 -- rock	2.29±0.14	2.26±0.56	2.90±0.13	
UW4101 -- sediment	2.06±0.16	7.39±1.02	1.25±0.07	1.4
Associated rock	1.48±0.14	6.57±1.02	2.38±0.08	
UW4102 -- sediment	1.08±0.09	3.77±0.69	1.63±0.18	2.6
Associated rock	0.73±0.10	7.02±0.87	2.09±0.12	

* Bottom refers to the rock directly underneath the one being dated. Some rocks that were dated have no associated bottom rock. This is because it was impossible to collect without damage to the structure.

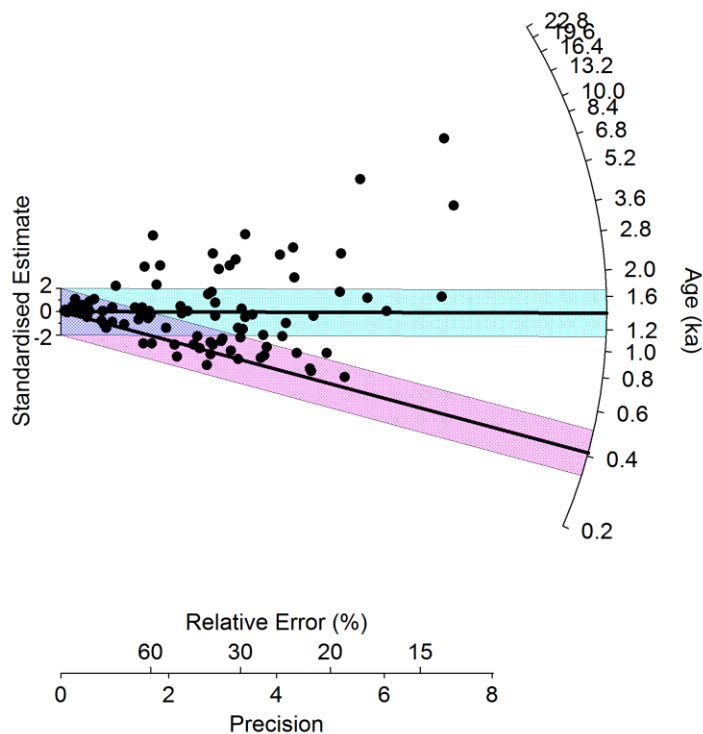
Table S2. Dose rate information

Sample	β dose rate (Gy/ka)		External dose rate (Gy/ka)		Total dose rate (Gy/ka)*		
	β -counting	α -counting/flame photometry	laboratory	dosimeter	quartz	K-feldspar	K-feldspar with dosimeter
UW4076	0.45±0.06	0.57±0.03	0.53±0.05	1.12±0.28	1.49±0.28	1.48±0.18	2.07±0.33
UW4077	1.05±0.12	0.91±0.03	0.50±0.04	0.74±0.28	1.25±0.06	1.82±0.17	2.06±0.36
UW4080	0.53±0.08	0.67±0.03					
UW4081	1.88±0.24	1.81±0.10	1.21±0.18	1.56±0.26	2.78±0.12	3.48±0.23	3.82±0.34
UW4083	2.03±0.25	2.37±0.10	1.16±0.08	1.20±0.16	3.35±0.13	4.02±0.24	3.94±0.28
UW4084	0.97±0.12	1.09±0.08	0.96±0.06	0.49±0.15			2.03±0.25
UW4087	2.24±0.28	2.08±0.05	1.34±0.08	1.50±0.23	3.03±0.11	3.65±0.21	3.81±0.30
UW4088	2.34±0.28	2.49±0.08			3.59±0.14	4.28±0.25	
UW4089	2.11±0.26	2.15±0.08	1.19±0.08	2.43±0.32	4.33±0.34	3.71±0.22	4.95±0.38
UW4091	3.93±0.50	3.42±0.42			5.66±0.48	6.33±0.57	
UW4092	1.45±0.17	2.66±0.34	1.14±0.08	2.63±0.34	3.76±0.36	3.00±0.46	4.50±0.56
UW4095	2.10±0.25	1.95±0.18	1.21±0.08	2.08±0.58	2.94±0.19	3.50±0.28	4.36±0.64
UW4098	1.78±0.22	1.66±0.05	0.90±0.09	1.60±0.27	2.10±0.15	2.70±0.26	3.40±0.36
UW4099	0.87±0.10	1.08±0.04					

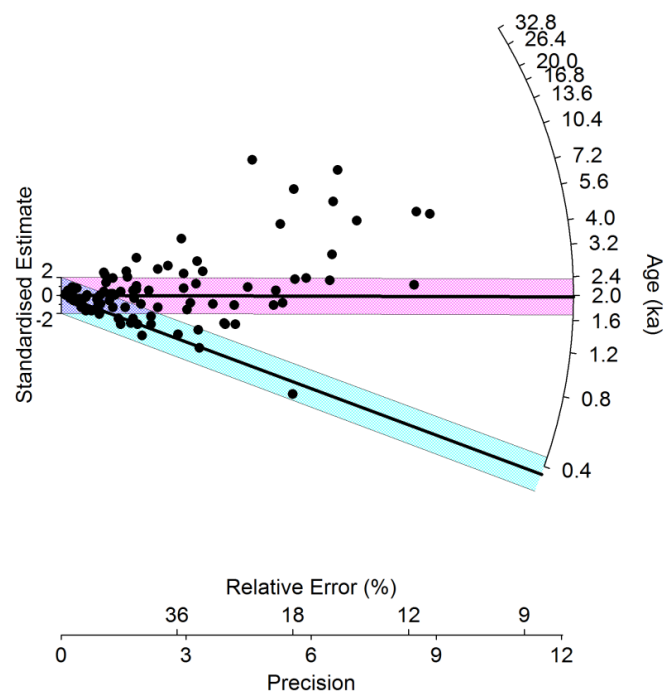
UW4100	2.99±0.39	2.78±0.11					
UW4101	1.49±0.18	1.53±0.07	1.09±0.07	1.40±0.25	2.41±0.10	3.04±0.21	3.36±0.32
UW4102	1.97±0.24	1.60±0.15	0.93±0.07	5.61±0.21	2.34±0.16	2.91±0.26	7.59±0.33

* Total dose rate reflects corrections for moisture content, which are not taken into consideration in the beta dose rates listed. The total dose rate also includes a small alpha contribution. It also depends on whether the dosimeter or laboratory measurements of external dose rate are used. These are distinguished for K-feldspar, but for quartz the total dose rate is based only on laboratory measurements for all samples except UW4076, UW4089, and UW4092 where the dose rate includes dosimetry results.

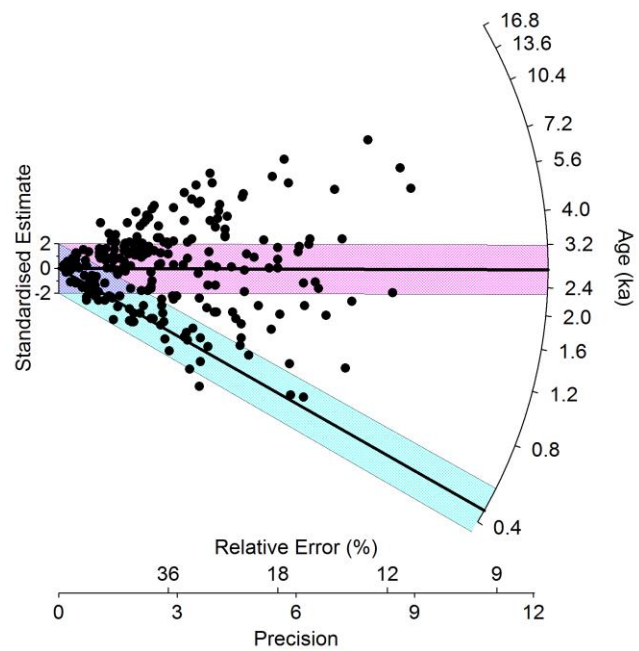
Figure S3. Radial graphs of the age distribution of K-feldspar grains. Radial graphs plot precision on the x-axis (coefficient of variance or its reciprocal) against the age on the y-axis. The age is normalized by the number of standard errors each point is from some reference. The reference line with blue shading represents the age from the central age model. The line with pink shading represents the minimum age model. All points encompassed by the shading are within two standard errors of the reference. Any line drawn from the origin through any point intersects the right axis at the derived age. The ages are calculated using only laboratory based measurements, but the distributions will have identical shape for the ages based on the dosimetry measures.



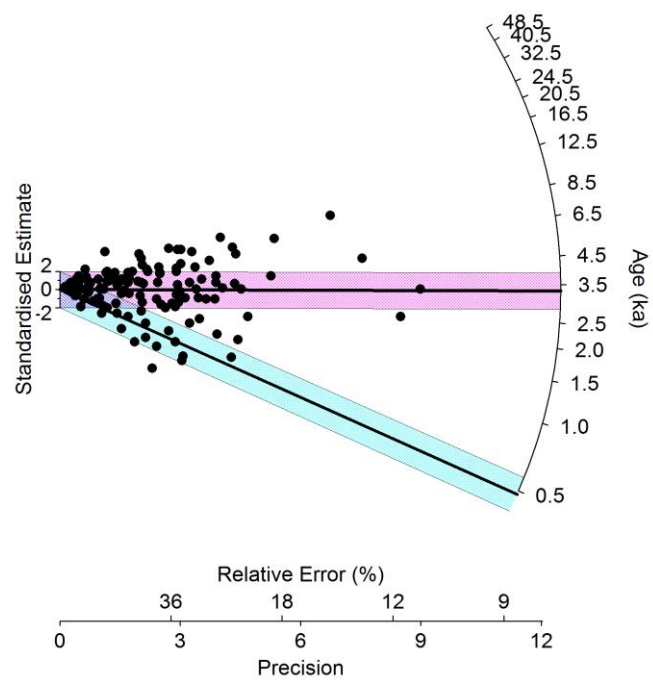
UW4076



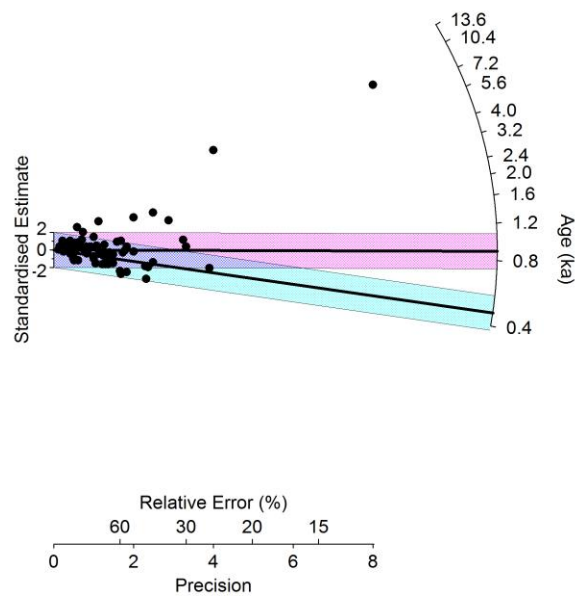
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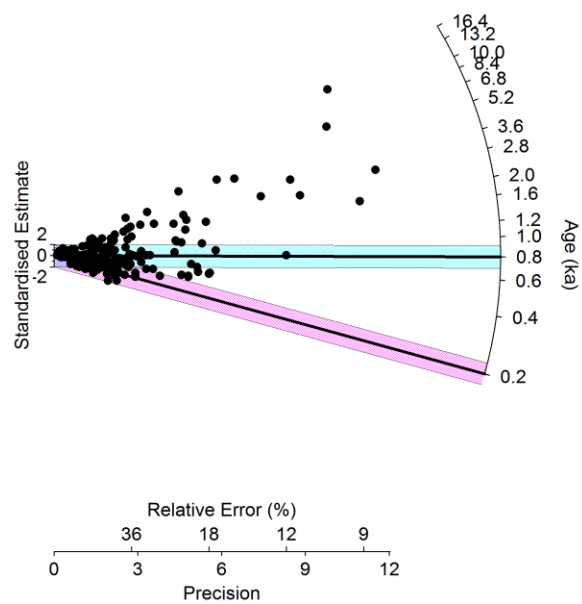
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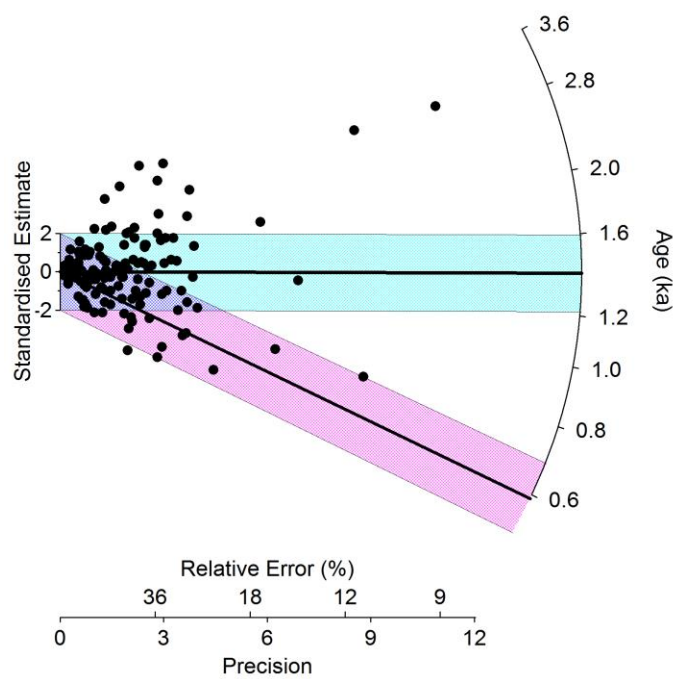
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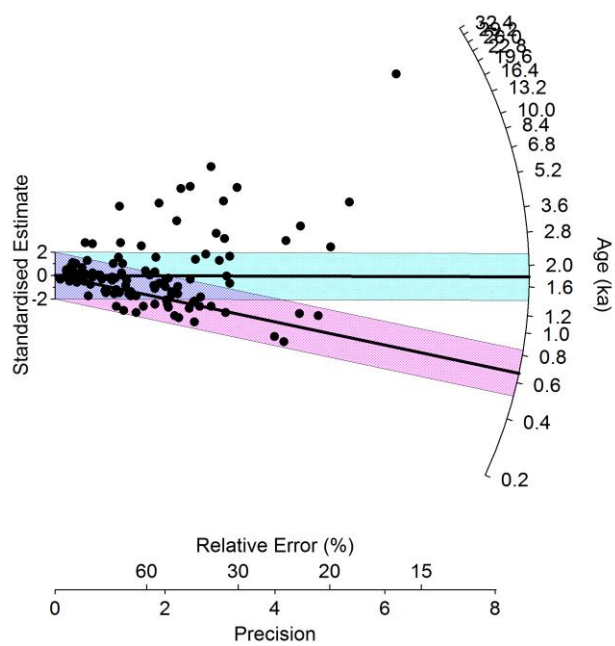
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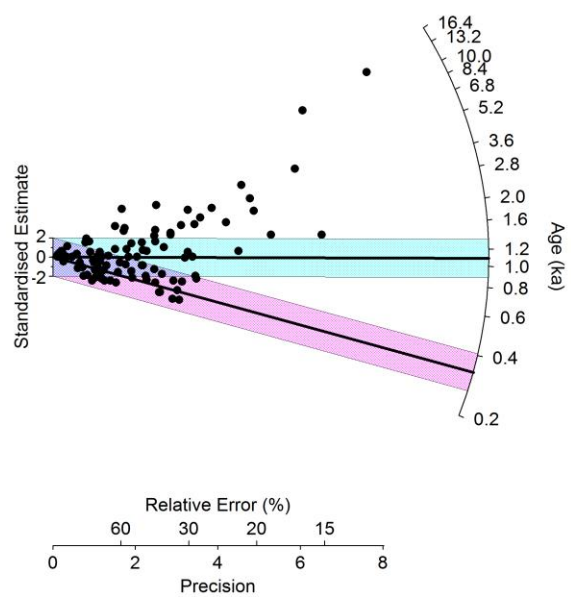
UW4088



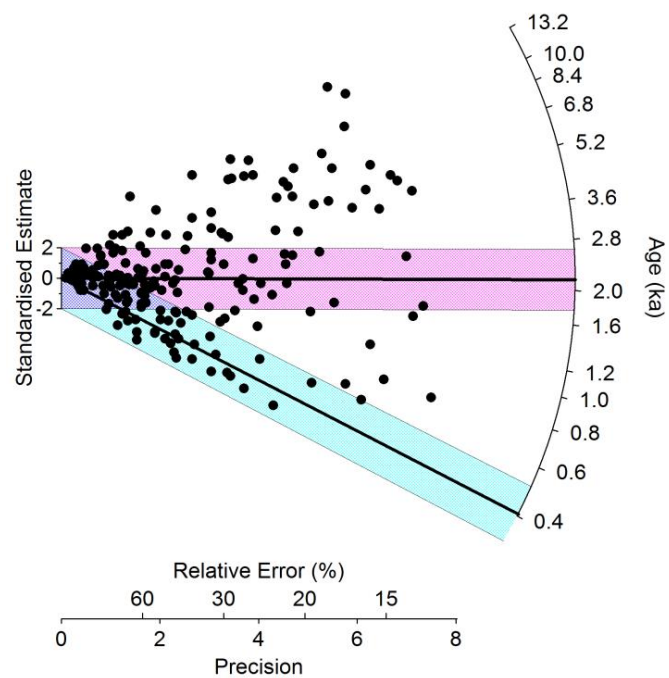
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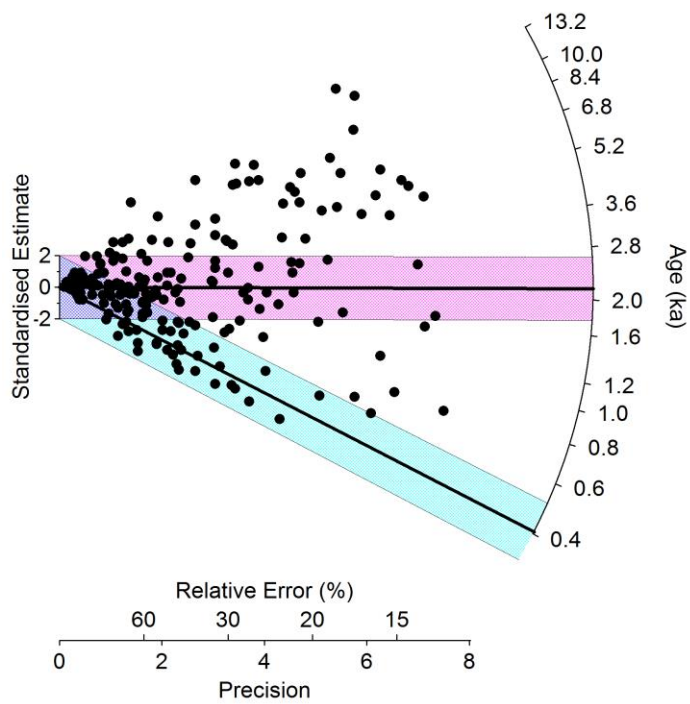
UW4092



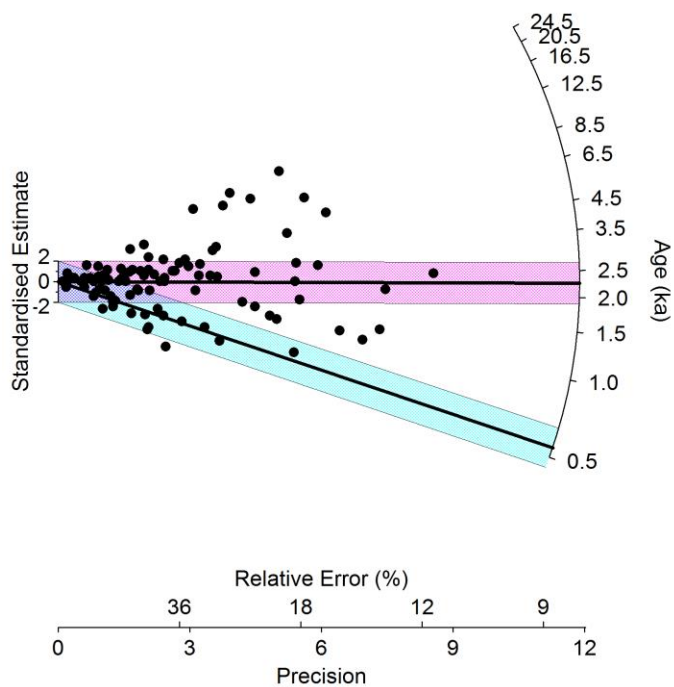
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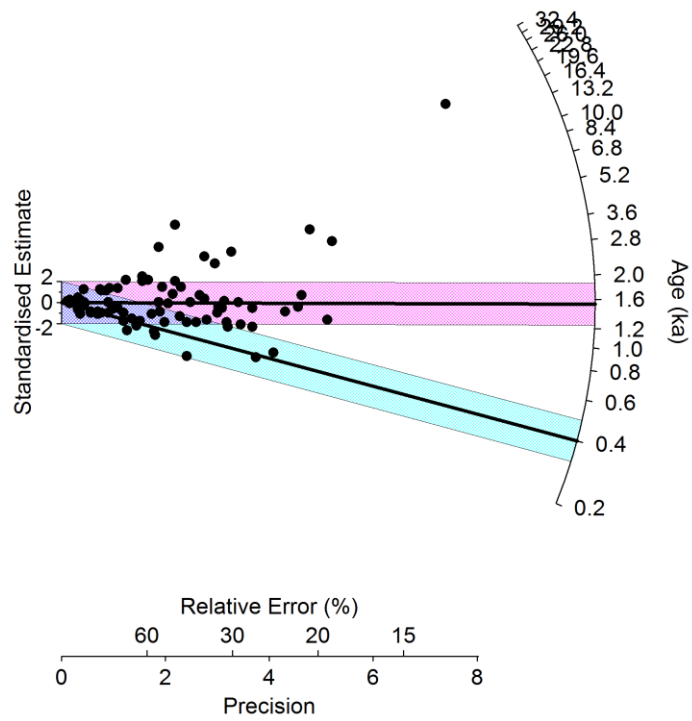
UW4098



UW4098

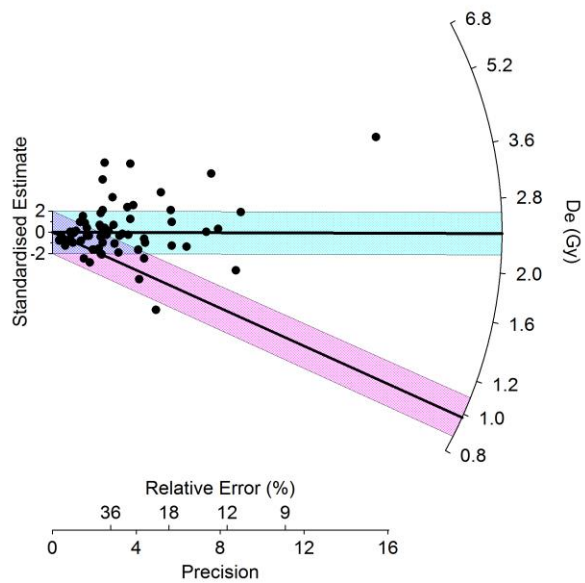


UW4101

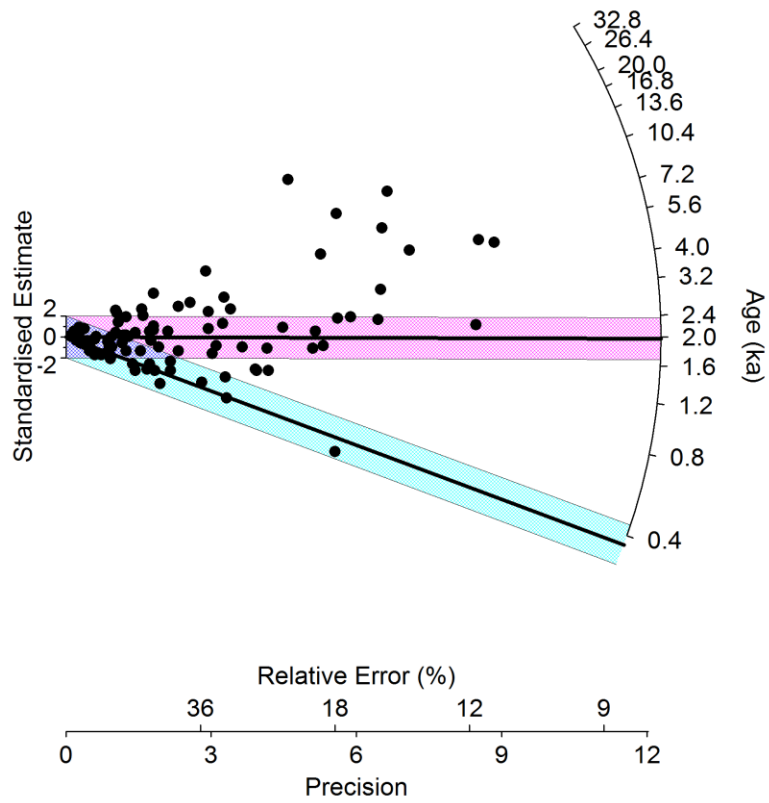


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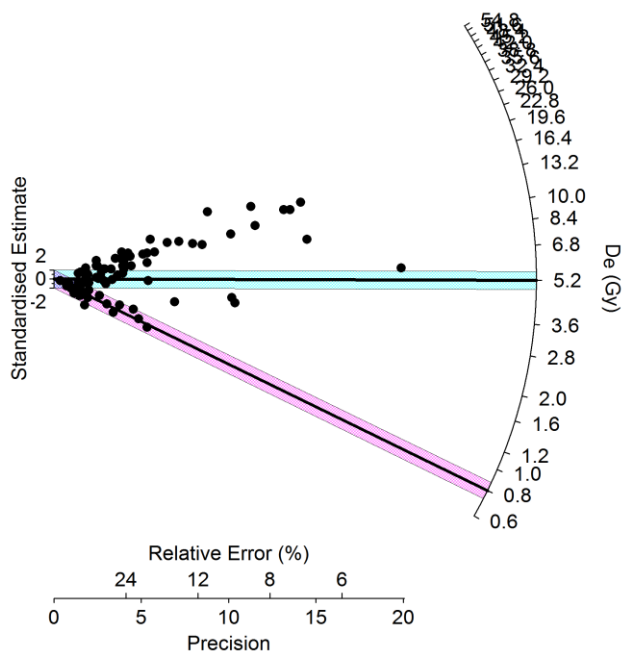
Figure S4. Radial graphs for quartz distributions. See caption for Figure S3 for explanation.



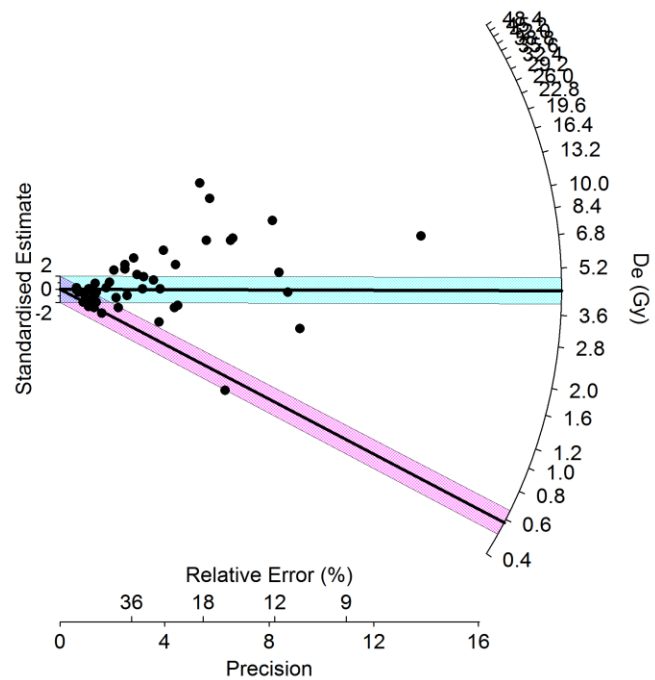
UW4076



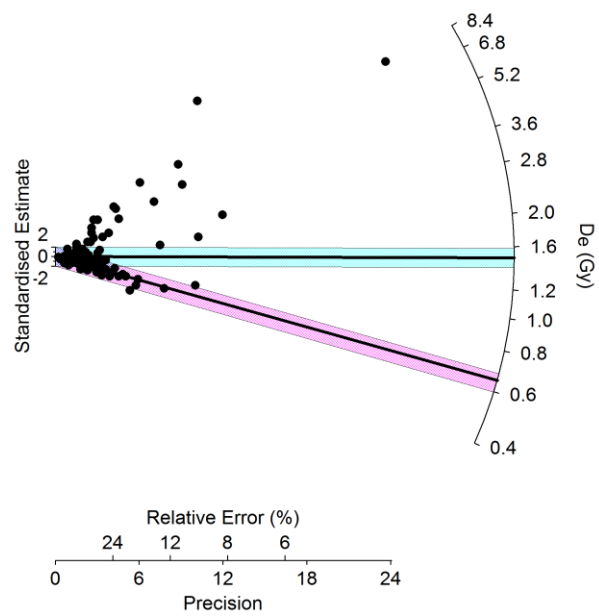
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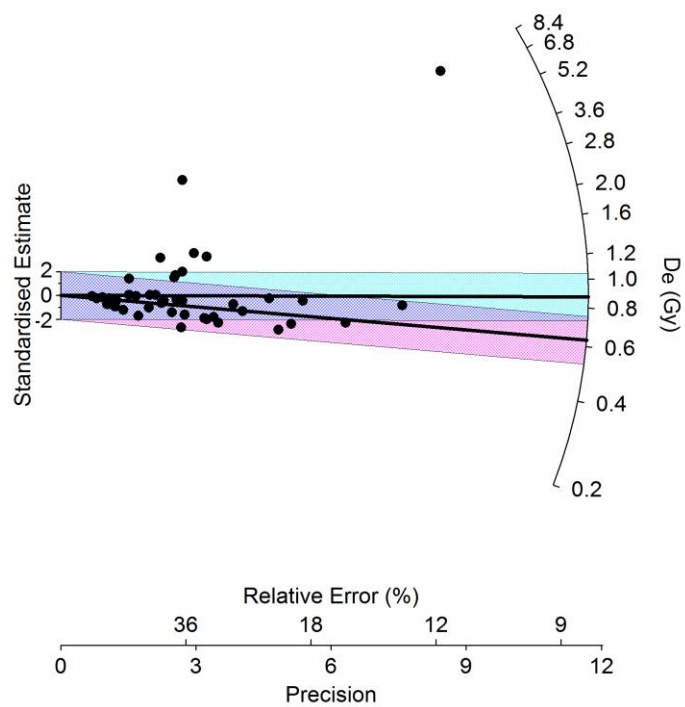
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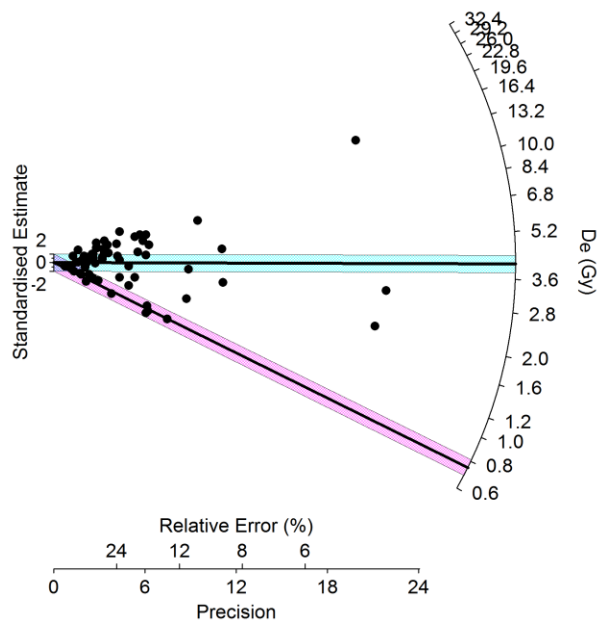
UW4083



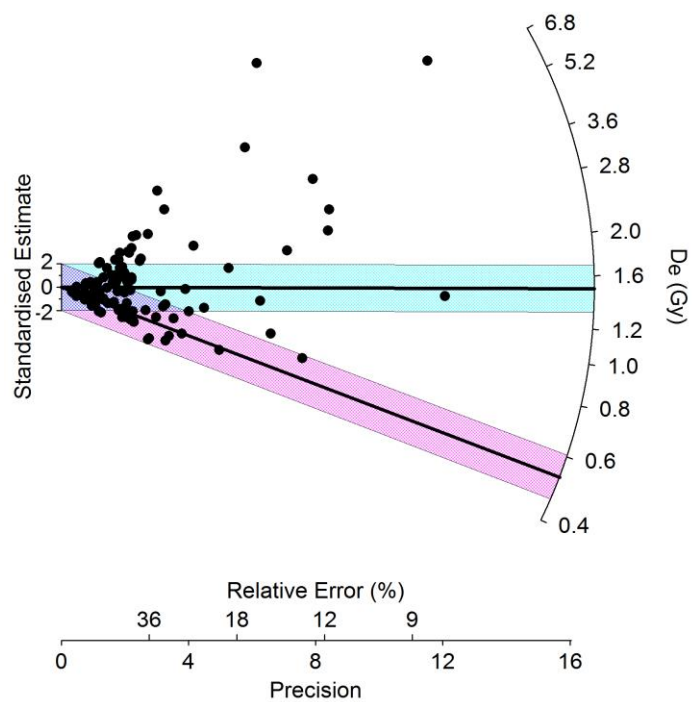
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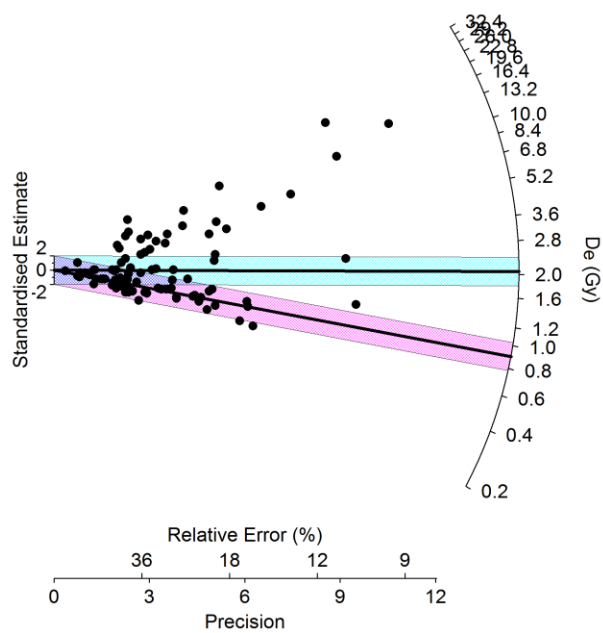
UW4088



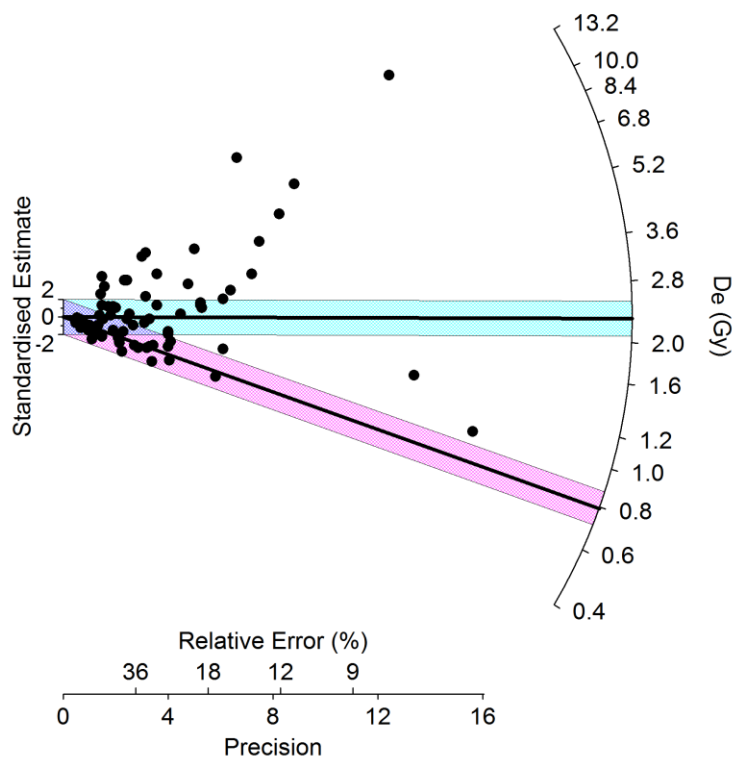
UW4089



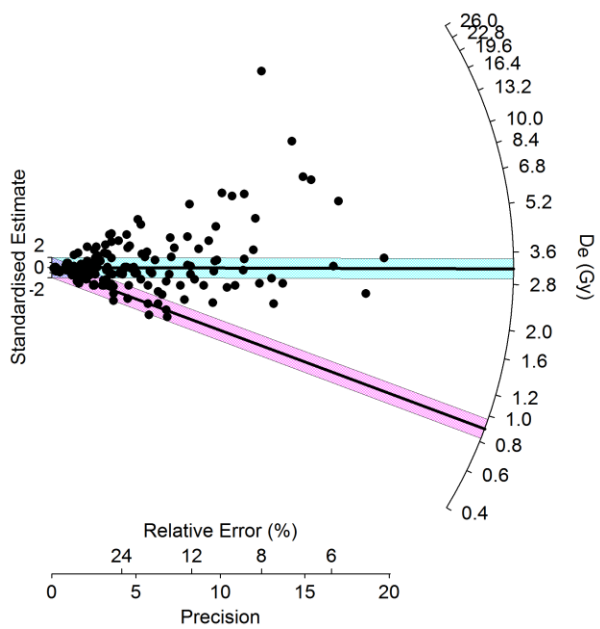
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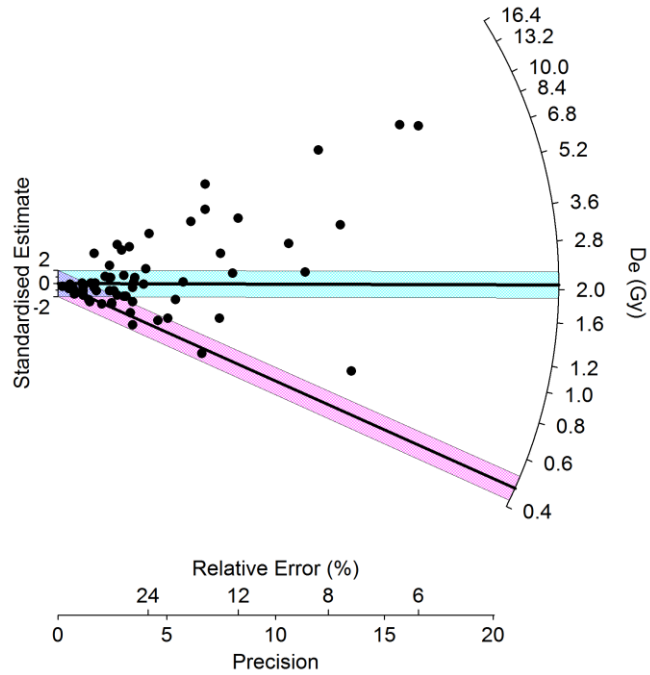
UW4095



UW4098



UW4101



UW4102

Table S3. Depth profile data for UW4084 and UW4091. Slices are listed numerically from top down. Ln/Tn is the luminescence intensity ratio of the natural to the first test dose signal. “no intersect” means the natural signal did not intersect the regeneration curve.

Core	Slice	Slice thickness (mm)	D _e (Gy)	Ln/Tn
UW4084 -- IRSL				
4	1	1.5	2.70±0.24	1.32±0.10
4	2	1	10.5±0.40	4.42±0.12
4	3	1	20.1±1.08	7.18±0.26
4	4	1	17.3±0.69	6.45±0.16
4	5	1.2	No intersect	10.8±0.27
4	6	0.6	No intersect	14.7±0.40
4	7	1	No intersect	21.2±0.66
4	8	0.6	No intersect	24.4±0.70
4	9	0.7	No intersect	24.6±0.65
2	1	1	1.24±0.05	0.65±0.02
2	2	0.6	18.5±0.69	16.2±0.37
2	3	0.8	39.1±3.97	7.03±0.12
2	4	0.6	27.02±1.22	8.68±0.23
2	5	0.5	No intersect	9.06±0.22

2	6	1.1	No intersect	13.4±0.38
UW4091 -- IRSL				
3	1	1	1.29±0.06	0.51±0.01
3	2	1	1.18±0.05	0.51±0.01
3	3	1	1.62±0.06	0.71±0.02
3	4	1	5.10±0.13	2.00±0.04
3	5	1	No intersect	12.6±0.28
3	6	1.4	No intersect	12.2±0.27
3	7	0.9	No intersect	13.9±0.30
3	8	1	17.0±0.45	7.53±0.18
2	1	1.2	0.50±0.06	0.19±0.02
2	2	1	0.66±0.02	0.34±0.01
2	3	0.7	1.41±0.05	0.49±0.01
2	4	1.3	1.82±0.05	0.73±0.02
2	5	0.9	2.05±0.06	0.73±0.02
2	6	1	1.13±0.04	0.58±0.01
2	7	1	3.51±0.10	1.33±0.03
2	8	1	9.78±0.25	3.76±0.08
UW4091 -- OSL				
2	1	1.2	2.20±0.96	0.58±0.15
2	2	1	4.82±0.20	1.45±0.04
2	3	0.7	15.8±1.02	2.06±1.07
2	4	1.3	19.9±0.92	2.68±0.06
2	5	0.9	22.3±1.20	2.68±0.07
2	6	1	9.00±0.50	2.30±0.05
2	7	1	20.9±1.85	2.54±0.06
2	8	1	21.8±1.87	2.86±0.06