Supplement 1: Varsche Rivier 003: A Middle and Later Stone Age Site with Still Bay and Howiesons Poort Assemblages in Southern Namaqualand, South Africa

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SUPPLEMENT

This supplement contains additional information on the geoarchaeology, luminescence dating, use-wear analysis on the Middle Stone Age lithics, the Later Stone Age lithic assemblages, and the Middle Stone Age pigments.

GEOARCHAEOLOGY

This section contains one table (Table S1) highlighting the details of the analysis of the micromorphology of the sediments from the Main Excavation and from TP-III: Inside the Shelter. The sample numbers (Sample No) are recorded as the site name, the year the sample was taken, and the micromorphology block (MiMo) number. Therefore, sample VR3-11-1 is from VR003, taken in 2011, from sample block (MiMo) 1. A and B indicate that two samples or slides were taken from the same block.

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TABLE S1. OVERVIEW OF THE RESULTS OF THE MICROMORPHOLOGICAL ANALYSIS OF EACH HORIZON*.

GH	Sample No	Microstructure	Coarse Components**	Fine Material
Main Area				
2 & 3	VR3-11-1	Thick, globular coating of fine material on all coarse grains (thickness 10–140μm but generally ~30μm; irregular pattern of coating, often one side more heavily coated and elongated coarse grains with tendency for thicker coating on longer sides; clear borders) besides quartz chips (only with thin coating) and gypsum (none); fine material also in globular form (diameter 25–200μm, but dominantly ~60μm) but probably coarse-grained nuclei not visible; coating homogenous, in some case with several lamina, clayish and calcareous, occasionally incorporating silt sized grains, red iron and amorphous organic staining Locally crust formation (dense, grayish dark brown to grey; calcareous; incorporating silt and sand sized grains), often associated with bones Thin dark red iron coating of all natural quartz grains Iron staining Bones with recrystallisation and manganese staining Complex packing voids Micro-granular to spongy microstructure	Sparry limestone fragments (angular, not size sorted); calcite crystals (medium to very coarse sand sized); quartz grains (round to subangular, medium sand to coarse silt sized; dark red coating); bone fragments, angular (spongy and cortical); limestone pendants, angular, with clay component; lenticular gypsum (sand sized, single crystals in matrix and accumulations in voids); ostrich eggshell fragments; angular quartz chips (possible microdebitage)	Calcareous, clayish Calcitic crystallitic to speckled, sometimes cross-striated b-fabric; enaulic and chitonic; gray to brownish grey in PPL, grey to yellowish (iron staining) in XPL Crust calcitic crystallitic
4	VR3-11-3 VR3-11-4A VR3-11-4B	Thick, globular coating of fine material on all coarse grains (thickness of coating 20–300μm, but dominantly ~30μm; coating mostly equally expressed on all side, but some fraction with more intense coating on two adjacent sides; clear borders) besides gypsum; fine material also in globular form (diameter 10–115μm, but dominantly 20–50μm) but probably coarse nuclei not visible; coating on coarse grains and fine material spheres homogenous, in some case with several lamina, clayish and calcareous, occasionally incorporating silt sized grains Thin dark red coating on quartz grains Rounded, transported soil aggregates, also coated Locally very dense microstructure in association with large bone fragments Complex packing voids Micro-granular to spongy microstructure	Sparry limestone fragments (angular, not size sorted); calcite crystals (medium to very coarse sand sized); quartz grains (round to subangular, medium sand to coarse silt sized, dark red coating); bone fragments (angular; recrystallization and manganese staining, some burnt; spongy and cortical); lenticular gypsum (single crystals in matrix and accumulations in voids); ostrich eggshell fragments; soil aggregates; limestone pendants with clay component	Calcareous, clayish Calcitic crystallitic to speckled, sometimes cross-striated b-fabric; enaulic and chitonic; gray to brownish grey in PPL, grey to yellowish (iron staining) in XPL Soil aggregates with cross-striated b-fabric
5	VR3-11-4A VR3-11-4B VR3-11-6	Thick, globular coating on all coarse grains (thickness of 15–200μm, but dominantly ~30μm; clear borders), but gypsum; fine material also in globular form (diameter 10–100μm, but dominantly 20–40μm) but possible coarse nuclei not visible; coating on coarse grains and fine material spheres homogenous, in some case with several lamina, clayish and calcareous, occasionally incorporating silt sized grains Thin dark red iron coating of quartz grains Dark grey to grey dense crust incorporating coated coarse grains, coated bones and globular fine material Complex packing voids, vughs, channels Micro-granular to spongy microstructure Bone with recrystallisation and manganese staining	Sparry limestone fragments; calcite crystals (medium to very coarse sand sized); quartz grains (rounded to subangular; medium sand to coarse silt sized), bone fragments (many reddened with black edges; spongy and cortical); round soil aggregates; gypsum (single crystals in matrix and accumulations in voids); ostrich eggshell; quartz and quartzite microdebitage; charcoal	Calcareous, clayish Calcitic crystallitic to speckled, sometimes cross-striated b-fabric; enaulic and chitonic; gray to brownish grey in PPL, grey to yellowish (iron staining) in XPL Crust calcitic crystallitic b-fabric of the crust Grayish white Soil aggregates with a striated to cross-striated b-fabric

TABLE S1. OVERVIEW OF THE RESULTS OF THE MICROMORPHOLOGICAL ANALYSIS OF EACH HORIZON (continued)*.

GH	Sample No	Microstructure	Coarse Components**	Fine Material
Main Area				
6	VR3-11-4B, VR3-11-5 VR3-11-7	Typic, thick, globular; coatings on all coarse grains (thickness of 10–150µm, but dominantly 20–30µm; borders less well-defined than in upper units), but on microdebitage and gypsum; fine material also tending to be in globular form (diameter 10–125µm, but dominantly 20µm) but probably coarse nuclei not visible; coating on coarse grains and fine material spheres homogenous, in some case with several lamina, clayish and calcareous, occasionally incorporating silt sized grains Thin red iron coating of quartz grains Fine material denser than in the above units Rounded pieces of calcareous crust present Matrix with amorphous black spot and red iron local domains Iron oxide coatings Complex packing voids, vughs, channels, burrows, rhizolith Micro-granular to spongy microstructure	Calcite crystals (medium to very coarse sand sized); quartz grains (rounded to subangular; medium sand to coarse silt sized), bone fragments (many reddened, blackened edges and cracks; with recrystallisation and manganese staining; spongy and cortical; mainly sand-sized); round soil aggregates; very few lenticular gypsum; ostrich eggshell; quartzite, quartz, silcrete microdebitage; charcoal; mica; sparry limestone fragments; limestone pendants with clay component; char	Calcareous, clayish Calcitic crystallitic to speckled, sometimes cross-striated b-fabric; enaulic and chitonic; gray to brownish grey in PPL, grayish white to light grayish brown (iron staining) in XPL Soil aggregates with cross-striated b-fabric
TP-III: Inside the Shelter				
6 & 7	VR3-11-8	Passage feature Thin coatings of some coarser grains (thickness 20–30µm; calcareous und clayish; globular) Thin dark red coatings of quartz grains Many amorphous black spots and local red iron domains (less red iron domains than in the lower GH 8 and 9) Spongy to micro-granular microstructure, but some vughs and channels as well	Sparry limestone fragments; single calcite crystals (medium to very coarse sand sized); quartz grains; gypsum (single crystals in matrix and accumulations in voids), bone fragments (spongy and cortical; mostly sand sized, many burnt; recrystallisation and manganese staining); ostrich eggshell; char; round soil aggregates; mollusk fragment; charcoal; possible wood ash; clay-rich spelothem; halite	Calcareous, less so clayish Calcitic crystallitic b-fabric to speckled; porphyric to slightly chitonic; light yellowish brown to grayish brown to in PPL, yellowish to gray in XPL
8	VR3-11-10	Thin coatings on some coarse grains (bones, calcite crystals, quartz; thickness 20–30µm; calcareous und clayish) Thin dark red coatings of quartz grains Many amorphous black spots and local red iron domains Spongy to micro-granular microstructure Varying ration of fine to coarse material Passage feature	Sparry limestone fragments; single calcite crystals (medium to very coarse sand sized); lenticular gypsum (single crystals in matrix and accumulations in voids); quartz grains (round to subangular; medium sand to medium silt size); bone fragments (spongy and cortical; mostly sand sized; many burnt; recrystallization and manganese staining); limestone pendants with clay component; round soil aggregates; charcoal; quartz microdebitage	Calcareous, less so clayish Calcitic crystallitic b-fabric to speckled; porphyric to slightly chitonic; light yellowish brown grayish brown in PPL, yellowish to gray in XPL Soil aggregates with striated to cross-striated b-fabric

TABLE S1. OVERVIEW OF THE RESULTS OF THE MICROMORPHOLOGICAL ANALYSIS OF EACH HORIZON (continued)*.

GH	Sample No	Microstructure	Coarse Components**	Fine Material
TP-III: Inside the Shelter				
9	VR3-11-11	Thin coatings on some coarse grains (bones, calcite crystals, quartz; thickness 20–30µm; calcareous und clayish) Thin dark red coatings of quartz grains Many amorphous black spots and local red iron domains Spongy to micro-granular microstructure Some plant tissue (spores associated with a degrading root)	Sparry limestone fragments; single calcite crystals (medium to very coarse sand sized); lenticular and epigranular gypsum (single crystals in matrix and accumulations in voids; very coarse sand to coarse silt size); quartz grains (round to subangular; medium sand to medium silt size); bone fragments (spongy and cortical; mostly sand sized; many burnt; recrystallization and manganese staining); clayish aggregates; ostrich eggshell; quartz and silcrete microdebitage; limestone pendants with clay component	Clayish Speckled and dotted, sometimes cross-striated b-fabric Channel with calcareous component Porphyric, slightly chitonic; brownish gray to gray to in PPL, yellowish brown, grey and brown in XPL Soil aggregates with cross-striated b-fabric

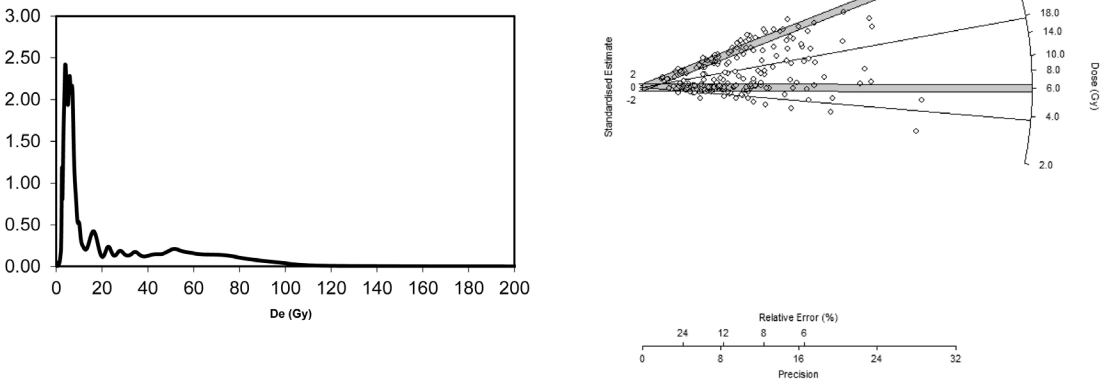
*Geological Horizons 5 to 6 of the Main Area are represented in samples from the upslope and downslope part of the excavation area. No substantial difference was evident in the upslope and downslope parts, and therefore these are presented as one. Furthermore, no micromorphological difference was observed from Geological Horizon 2 to Geological Horizon 3 from the Main Area on the slope, and also from Geological Horizon 6 to 7 in TP-III. Accordingly, Geological Horizons 2 and 3 from the Main Area are presented as one, and the Geological Horizons 6 and 7 in TP- III are presented as one.

**Coarse meaning >10µm; listed according to frequency, starting with the highest.

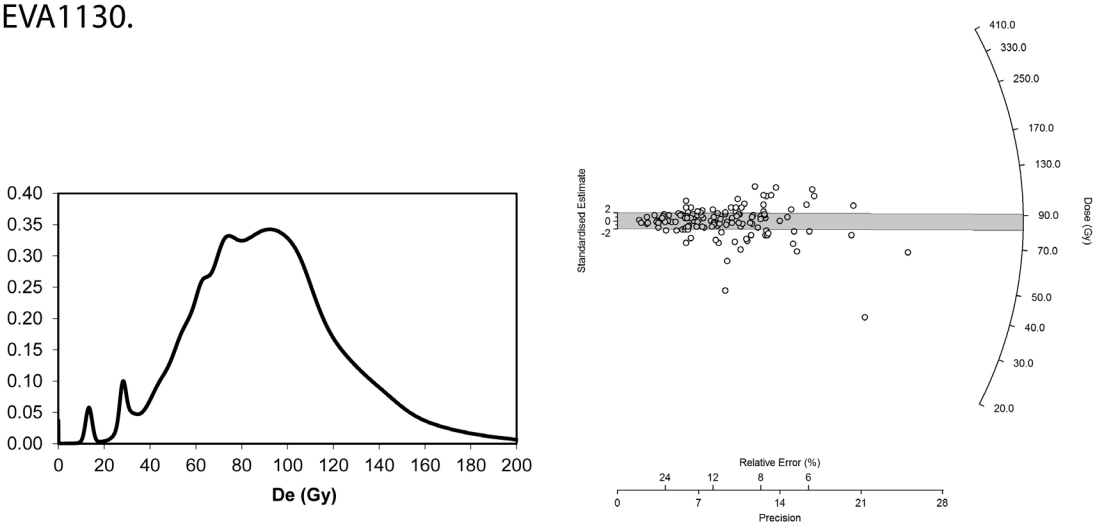
LUMINESCENCE DATING

This section contains additional data relevant to the luminescence dating component of this study, including information pertaining to luminescence characteristics and radial plots for the single grain measurements on each sample.

EVA1129.



EVA1130.



EVA1131.

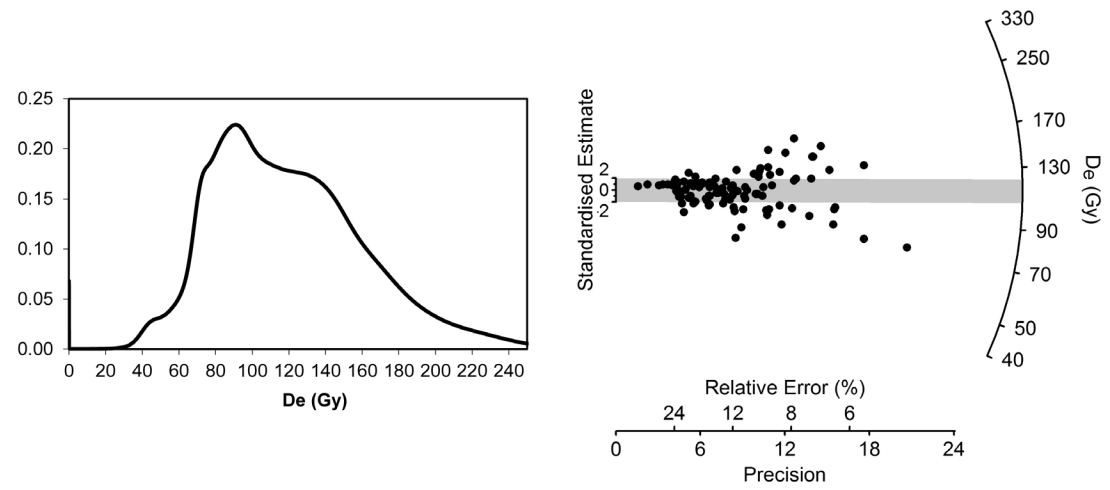


Figure S1. Radial plots and probability density functions illustrating the dose distributions of each of the luminescence dating samples.

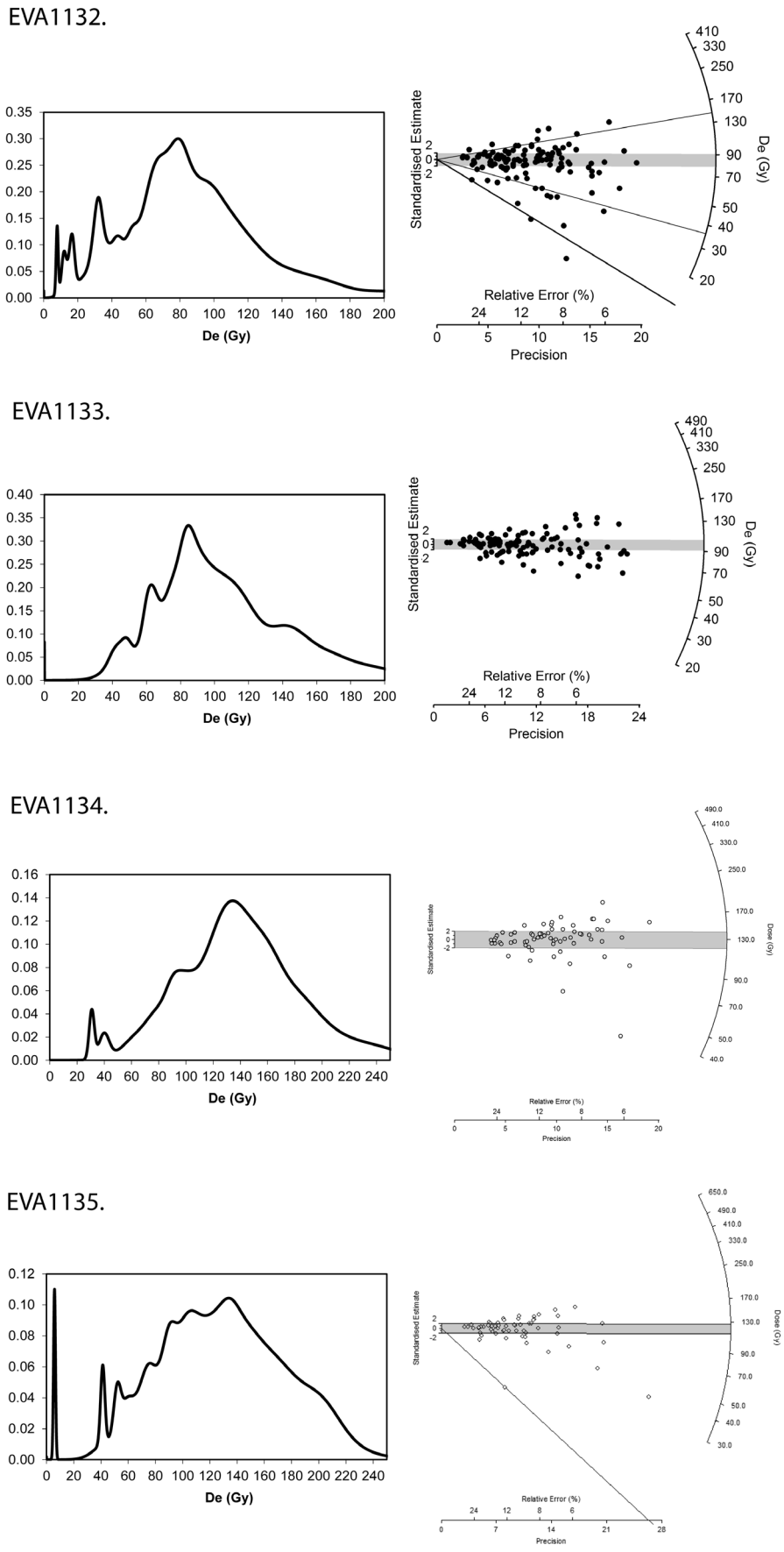


Figure S1 (continued). Radial plots and probability density functions illustrating the dose distributions of each of the luminescence dating samples.

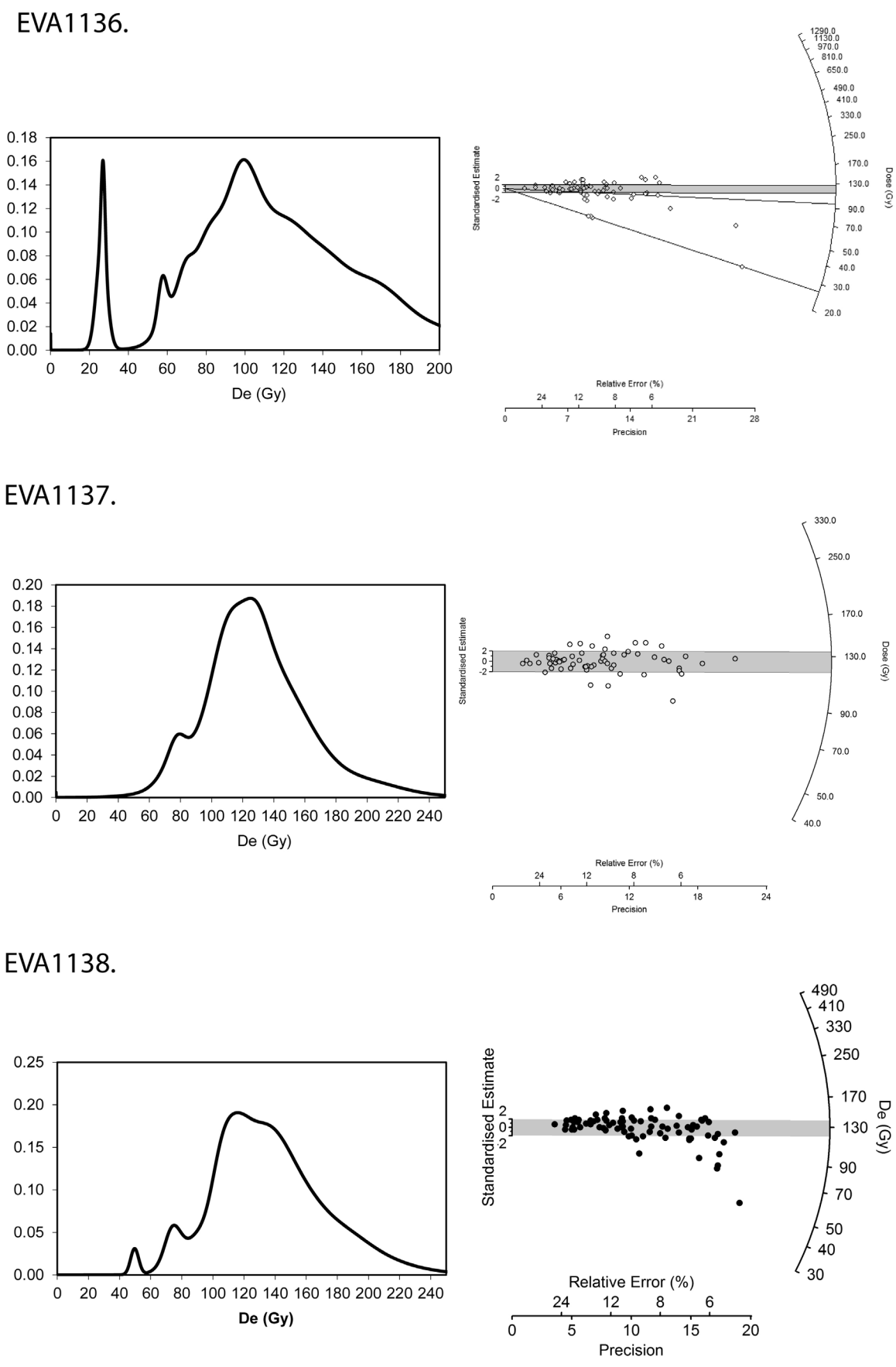


Figure S1 (continued). Radial plots and probability density functions illustrating the dose distributions of each of the luminescence dating samples.

TABLE S2. RESULTS FORM FINITE MIXTURE MODEL ANALYSES
(the equivalent doses used for age calculation are highlighted in italics).

Sample Code	Number of Components	De (Gy)	% Population	BIC
OSL1-EVA1129	4	3.8±0.3	10	571[1]
		6.2±0.6	*40*	
		17.2±1.9	13	
		56.4±2.3	*37*	
OSL4-EVA1132	4	12.7±0.3	5	199[1]
		36.1±1.4	12	
		85.2±6.8	*71*	
		146±12	12	
OSL7-EVA1135	2	5.9±3.0	2	89
		121±9	*98*	
OSL8-EVA1136	3	26.7±4.0	6	80
		96.2±57.7	21	
		121±21	*73*	

[1]This was the lowest value achieved with the model given a reasonable number of components. It suggests that the sediments are inherently unsuitable for dating.

ANALYSIS OF USE-WEAR ON MSA LITHICS

In this section, data for the microwear analysis are summarized for each of the artifacts examined in the study.

TABLE S3. SUMMARY OF DATA COLLECTED FROM STONE ARTIFACTS SUBMITTED FOR USE-WEAR ANALYSIS.

Context	Layer	Inventory	Type	Material	Preservation	Use-Wear	Motion	Worked Material
VR003-325	2	41	backed	silcrete	good	no	-	-
VR003-402	4	25	backed	quartz	weathered	no	-	-
VR003-402	4	26	backed	chert	weathered	no	-	-
VR003-402	4	24	notch-single	silcrete	good	no	-	-
VR003-403	4	35	notch-multiple	quartz	weathered	no	-	-
VR003-416	4	33	blade	quartz	good	no	-	-
VR003-433	4	39	blade	hornfels	good	no	-	-
VR003-442	4	16	backed	quartz	good	no	-	-
VR003-442	4	17	backed	quartz	good	no	-	-
VR003-442	4	15	scraper	quartz	good	yes	scrape	wood
VR003-451	4	14	endscraper	silcrete	good	no	-	-
VR003-469	4	37	blade	chert	good	yes	cut	bone
VR003-486	4	34	notch-single	quartz	good	no	-	-
VR003-492	4	11	flake	quartz	good	yes	cut	hard
VR003-499	4	9	notch-single	quartz	good	no	-	-
VR003-499	4	10	notch-single	quartz	good	no	-	-
VR003-520	4	32	blade	quartz	good	yes	cut	animal soft
VR003-535	4	45	backed	quartz	good	no	-	-
VR003-563	4	44	blade	silcrete	good	no	-	-
VR003-571	4	22	backed	chert	weathered	no	-	-
VR003-571	4	23	backed	quartz	weathered	no	-	-
VR003-573	4	13	endscraper	quartz	weathered	no	-	-
VR003-582	4	40	blade	silcrete	good	no	-	-
VR003-590	4	36	backed	chert	good	no	-	-
VR003-591	4	27	backed	quartz	weathered	no	-	-
VR003-591	4	28	backed	quartz	weathered	no	-	-
VR003-603	4	12	flake	quartz	weathered	no	-	-
VR003-619	4	20	blade	silcrete	good	no	-	-
VR003-619	4	21	blade	rock crystal	good	no	-	-
VR003-619	4	18	notch-single	silcrete	good	yes	scrape	wood
VR003-619	4	19	endscraper	quartz	good	yes	scrape	hard
VR003-642	4	30	point	quartz	good	no	-	-
VR003-598	5	1	notch-single	chert	good	yes	scrape	wood
VR003-598	5	4	notch-single	silcrete	weathered	no	-	-
VR003-723	III-15	43	backed	quartz	weathered	no	-	-
VR003-916	III-18	29	point	quartz	weathered	no	-	-
VR003-928	III-18	8	endscraper	chert	good	yes	scrape	bone
VR003-938	III-18	6	backed	chert	good	yes	cut	soft
VR003-938	III-18	5	notch-single	silcrete	good	yes	scrape	wood
VR003-938	III-18	7	endscraper	quartz	good	yes	scrape	hard
VR003-958	III-19	31	backed	rock crystal	good	no	-	-
VR003-963	III-20	38	backed	silcrete	good	yes	cut	hard
VR003-973	III-20	42	blade	quartz	weathered	no	-	-
VR003-978	III-20	3	blade	quartz	weathered	no	-	-
VR003-978	III-20	2	notch-single	silcrete	good	yes	scrape	wood

LATER STONE AGE LITHIC ASSEMBLAGES

Expanded data on artifacts and raw material types are presented in Table S4.

TABLE S4. THE LATER STONE AGE LITHIC ASSEMBLAGES BY ARTIFACT TYPE AND MATERIAL, ALL FROM TP-III: INSIDE THE ROCKSHELTER*.

Material	Type	Layer														
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Quartz	bipolar core	4	1	-	4	-	-	-	3	3	2	-	-	-	4	5
	bipolar bladelet core	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	single platform core	-	1	-	-	-	1	-	-	1	2	1	-	-	-	-
	single platform bladelet core	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	irregular core	2	-	-	1	-	-	-	1	-	-	1	1	-	-	1
	blade	5	2	-	-	-	1	-	-	2	-	4	-	-	-	1
	bladelet	9	1	2	2	-	2	-	2	3	5	4	1	2	4	20
	edge-damaged flake	1	-	2	1	-	1	-	-	1	-	3	-	-	1	8
	flake	152	7	34	33	5	26	24	31	39	35	106	8	16	38	164
	chunk	61	10	6	11	1	12	5	7	14	12	35	1	5	10	65
	chip	168	25	38	54	7	24	35	17	68	39	144	9	37	97	325
	triangle	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	segment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	backed bladelet	*2**	-	-	1**	-	-	-	-	-	-	-	-	-	1	1**
	backed point	-	-	-	-	-	-	-	-	-	1**	-	-	-	-	-
	curve-backed bladelet	1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	curve-backed bladelet fragment	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	backed point fragment	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	backed bladelet fragment	-	-	-	1**	-	-	-	-	-	-	-	-	-	-	-
	miscellaneous backed piece	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
	notched piece	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
	miscellaneous retouched piece	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Silcrete	bipolar core	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	blade	1	-	-	-	-	-	-	-	-	-	2	-	-	-	1
	bladelet	-	-	-	-	-	-	1	-	-	1	5	-	1	-	3
	edge-damaged flake	-	-	-	-	-	-	1	-	-	-	2	1	-	-	-
	flake	18	3	6	2	-	7	6	2	4	6	13	-	7	2	20
	chunk	4	1	-	-	-	1	1	-	1	2	5	-	2	-	12
	chip	2	2	-	2	-	1	1	-	-	-	1	-	-	-	8
	scraper fragment	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	miscellaneous retouched piece	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE S4. THE LATER STONE AGE LITHIC ASSEMBLAGES BY ARTIFACT TYPE AND MATERIAL, ALL FROM TP-III: INSIDE THE ROCKSHELTER (continued)*.

Material	Type	Layer														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CCS	irregular core	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	edge-damaged flake	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	flake	6	1	1	1	-	1	1	1	3	6	2	-	-	5	3
	chunk	1	-	-	-	-	1	-	-	-	2	1	-	-	-	-
	chip	-	-	2	1	-	-	1	-	1	-	-	-	-	-	3
	sidescraper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	denticulate	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
	adze	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	miscellaneous retouched piece	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Quartzite	bipolar core	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
	edge-damaged flake	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
	blade	-	1	-	1	-	-	-	-	-	-	-	-	-	1	-
	bladelet	2	-	-	2	-	-	1	-	-	-	-	-	-	-	1
	flake	14	4	3	2	-	2	2	1	3	3	7	1	1	2	15
	chunk	1	-	-	-	-	-	-	2	-	-	1	-	-	-	-
	chip	4	1	-	-	-	-	-	-	-	-	-	-	1	1	2
	large endscraper	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
	upper grindstone fragment	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
FGBR	bipolar core	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	edge-damaged flake	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1
	blade	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
	bladelet	-	-	1	1	1	-	-	-	-	1	-	-	-	-	1
	flake	8	1	1	4	-	4	1	-	3	2	6	3	3	5	6
	chunk	3	-	-	-	-	-	1	-	-	1	-	-	-	1	2
	chip	1	-	1	2	-	2	1	-	1	1	-	-	2	1	1
	backed scraper	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
	notched piece	-	-	-	-	-	1	-	-	-	-	-	-	-	-	
	miscellaneous retouched piece	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
Other	edge-damaged chunk	-	-	-	-	-	-	-	-	-	-	1	-	-	-	
	blade	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
	bladelet	-	-	1	-	-	-	-	-	-	1	-	-	-	-	
	flake	4	1	-	3	-	-	1	1	-	1	1	1	-	1	1
	chunk	-	-	-	1	-	2	1	-	-	2	-	-	-	-	
	chip	-	-	-	1	-	-	-	-	-	1	1	-	-	-	
	notched piece	1	-	-	-	-	-	-	-	-	0	-	-	-	-	
Total lithic		**483**	**63**	**98**	**133**	**14**	**90**	**84**	**69**	**148**	**130**	**350**	**27**	**78**	**175**	**678**
Ochre	n	-	-	-	1	-	1	-	-	-	1	-	-	-	-	4
	g	-	-	-	1	-	1.3	-	-	-	0.5	-	-	-	-	15.6
Black pigment	n	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9

*CCS=crypto-crystalline silicates and FGBR=fine-grained black rock (e.g., hornfels).
**made on clear quartz

MIDDLE STONE AGE PIGMENTS

The data and R code used to generate the results and plots for the pigment analysis are freely available online at https://github.com/benmarwick/Steele_et_al_VR003_MSA_Pigments. This repository also describes the computational environment in which the analyses were conducted.

REFERENCES

Kruschke, J.K. 2013. Bayesian estimation supersedes the t-test. *Journal of Experimental Psychology: General* 142, 573–603.

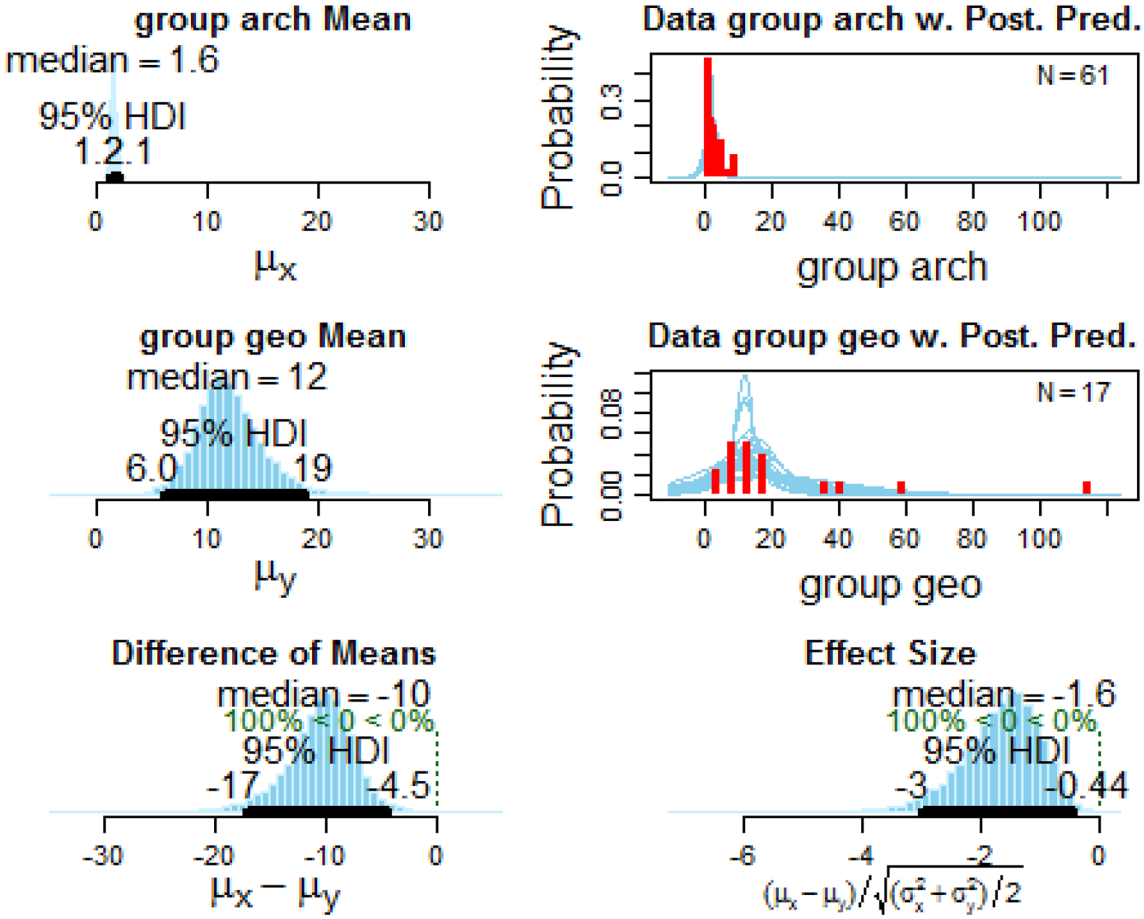


Figure S2. We used a Bayesian method to compare the mass of ochre specimens from different contexts. We chose this method because we found it to be more intuitive than traditional methods of null hypothesis significance testing and because it provides complete information about the credible parameter values. The figure below shows diagnostic plots from the Bayesian estimation of the posterior probability of the difference in means between the archaeological pigment specimens and the geological specimens. The HDI, or highest density interval, in the 'difference of means' plot spans -17 to -4.5. Since this interval excludes zero then the means are credibly different, see Kruschke (2013) for details.

TABLE S5. SUMMARY OF DATA COLLECTED FROM PIGMENT SPECIMENS.

	Sample Code	Location	Square	Layer and Aggregate	Mass (g)	Length (mm)	Width (mm)	Thickness (mm)	Low Frequency Mass Specific Susceptibility (10^-6 m^3 kg^-1)	Frequency Dependency (%)	Fe (oxide % mass)	Ti (oxide % mass)	Co (oxide % mass)
1	AUG	Augsberg Geological	-	-	36.2	NA	NA	NA	90.88	-19.91	8.456	1.180	0.003
2	DAM	Dam 8 Geosamples	-	-	10.6	NA	NA	NA	124.53	0.32	19.868	1.038	0.001
3	DEH	De Hangen	-	-	16.6	NA	NA	NA	78.92	-1.91	10.589	1.086	0.002
4	KFR.01	Location 4 (KFR)	2	94b	0.6	16.7	6.9	3.1	16275.00	-2.92	21.004	1.011	0.001
5	KFR.02	Location 4 (KFR)	6	117c	0.3	13.5	6.9	3.9	1766.67	0.94	30.234	1.101	0.001
6	KFR.03	Location 4 (KFR)	6	117c	0.3	18.9	11.2	0.9	-300.00	16.67	36.520	1.535	0.001
7	KFR.04	Location 4 (KFR)	1	62b	0.6	13.3	9.7	6.1	-50.00	16.67	36.368	1.211	0.001
8	KFR.05	Location 4 (KFR)	6	78c	0.5	18.7	15.3	1.9	-220.00	31.82	33.242	1.076	0.001
9	KFR.06	Location 4 (KFR)	6	126d	0.8	14.6	12.2	4.8	1400.00	0.89	35.499	1.116	0.001
10	KFR.07	Location 4 (KFR)	6	126d	6.9	45.9	24.6	1.7	217.39	-18.67	26.036	2.333	0.001
11	KFR.08	Location 4 (KFR)	6	88d	1.0	13.8	9.9	7.1	116140.00	0.64	38.334	1.878	0.001
12	KFR.09	Location 4 (KFR)	6	86c	1.0	16.3	14.0	4.5	100.00	-10.00	9.606	1.908	0.002
13	KFR.10	Location 4 (KFR)	1	102d	8.7	36.1	18.2	16.3	2279.89	9.55	18.904	3.535	0.001
14	KFR.11	Location 4 (KFR)	6	86b	1.8	22.2	9.8	7.3	6650.00	1.38	23.751	0.805	0.001
15	KFR.12	Location 4 (KFR)	6	-	1.6	20.2	11.3	4.6	118.75	-26.32	45.093	1.227	0.000
16	KKH.01	Location 1 (KKH)	I2D	Dvi2	0.8	17.8	14.9	2.1	-6.25	-700.00	29.858	1.769	0.001
17	KKH.02	Location 1 (KKH)	I2D	Dvi2	4.3	34.2	29.6	4.4	3560.47	0.29	30.545	1.381	0.001
18	KKH.03	Location 1 (KKH)	I2D	Dvi2	3.3	18.9	11.6	7.4	3450.00	2.99	16.140	0.804	0.001
19	KKH.04	Location 1 (KKH)	I2D	Dvi5	1.0	14.7	11.6	4.7	26120.00	-0.13	53.874	2.657	0.000
20	KKH.05	Location 1 (KKH)	I2D	Dvi5	0.6	14.5	8.6	3.2	1066.67	1.56	43.956	1.496	0.001
21	KKH.06	Location 1 (KKH)	I2D	Dvi7	1.4	13.2	7.8	7.1	225.00	-3.17	53.459	1.712	0.000

TABLE S5. SUMMARY OF DATA COLLECTED FROM PIGMENT SPECIMENS (continued).

	Sample Code	Location	Square	Layer and Aggregate	Mass (g)	Length (mm)	Width (mm)	Thickness (mm)	Low Frequency Mass Specific Susceptibility (10^-6 m^3 kg^-1)	Frequency Dependency (%)	Fe (oxide % mass)	Ti (oxide % mass)	Co (oxide % mass)
22	KKH.07	Location 1 (KKH)	I2D	Dvi7	1.7	13.1	6.3	2.9	6541.18	-4.09	45.114	2.014	0.001
23	KKH.08	Location 1 (KKH)	I2D	Dvi9	2.0	20.1	12.1	6.1	267.50	8.41	32.261	3.208	0.001
24	KKH.09	Location 1 (KKH)	I2D	Dvi9	3.7	19.6	10.7	4.1	162.16	5.83	37.482	2.173	0.001
25	KKH.10	Location 1 (KKH)	I2D	Dvi9	4.4	19.7	15.1	7.3	19214.77	0.82	40.758	1.818	0.001
26	KKH.11	Location 1 (KKH)	I2D	Dvi9	1.9	18.4	10.7	4.4	3707.89	-0.28	33.431	2.179	0.001
27	KKH.12	Location 1 (KKH)	I2D	Dvi11	0.5	9.6	7.0	3.2	3310.00	1.51	34.398	1.124	0.001
28	KKH.13	Location 1 (KKH)	I2D	Dvi11	2.2	27.9	12.9	5.9	13129.55	3.84	31.599	2.180	0.001
29	KKH.14	Location 1 (KKH)	I2D	Dvi11	0.6	12.3	5.4	4.2	34808.33	1.96	26.840	1.835	0.001
30	KKH.15	Location 1 (KKH)	I2D	Dvi13	2.0	30.3	14.5	5.0	11397.50	-4.96	25.919	1.681	0.001
31	KKH.16	Location 1 (KKH)	I2D	Dvi13	2.0	24.6	18.6	5.8	2382.50	6.72	0.796	1.406	0.096
32	KKH.17	Location 1 (KKH)	I2D	Dvi13	0.4	14.2	11.1	2.4	137.50	-18.18	2.259	0.123	0.014
33	KLK	Klein Kliphuis	-	-	11.1	NA	NA	NA	166.22	2.71	31.738	1.710	0.001
34	KRA001	Kransvlei	-	-	112.6	NA	NA	NA	57.64	-5.55	5.828	0.472	0.004
35	KRA002	Kransvlei	-	-	13.4	NA	NA	NA	206.72	2.71	14.377	1.164	0.002
36	KRA003	Kransvlei	-	-	15.4	NA	NA	NA	285.39	0.80	13.134	0.737	0.002
37	KRA004	Kransvlei	-	-	39.9	NA	NA	NA	214.54	1.29	4.205	0.533	0.006
38	KRA005	Kransvlei	-	-	9.3	NA	NA	NA	42.47	3.80	24.569	1.082	0.001
39	KRA006	Kransvlei	-	-	0.7	NA	NA	NA	0.00	NA	36.338	1.474	0.001
40	KRA007	Kransvlei	-	-	3.1	NA	NA	NA	0.00	NA	30.894	0.788	0.001
41	KRA008	Kransvlei	-	-	8.9	NA	NA	NA	0.00	NA	4.941	0.642	0.005
42	KRA009	Kransvlei	-	-	16.9	NA	NA	NA	0.00	NA	3.893	0.405	0.007
43	KRA010	Kransvlei	-	-	10.3	NA	NA	NA	0.00	NA	15.288	1.174	0.001
44	KRA011	Kransvlei	-	-	58.5	NA	NA	NA	0.00	NA	40.477	1.424	0.001
45	KRA012	Kransvlei	-	-	6.6	NA	NA	NA	0.00	NA	17.271	1.905	0.001

TABLE S5. SUMMARY OF DATA COLLECTED FROM PIGMENT SPECIMENS (continued).

	Sample Code	Location	Square	Layer and Aggregate	Mass (g)	Length (mm)	Width (mm)	Thickness (mm)	Low Frequency Mass Specific Susceptibility (10^-6 m^3 kg^-1)	Frequency Dependency (%)	Fe (oxide % mass)	Ti (oxide % mass)	Co (oxide % mass)
46	KRA013	Kransvlei	-	-	6.4	NA	NA	NA	NA	NA	17.735	1.330	0.001
47	PL8.01	Location 3 (PL8)	2	42b	1.8	22.9	13.5	4.6	55.56	35.00	0.420	0.126	0.157
48	PL8.02	Location 3 (PL8)	1	41b	2.7	17.4	10.6	10.6	388.89	5.24	20.638	1.426	0.001
49	PL8.03	Location 3 (PL8)	2	42d	4.3	18.7	15.8	9.0	258.14	2.70	26.166	1.203	0.001
50	PL8.04	Location 3 (PL8)	2	40d	1.3	12.9	11.9	6.7	130.77	-38.24	18.649	1.218	0.001
51	PL8.05	Location 3 (PL8)	2	46b	0.4	14.5	9.6	3.6	237.50	0.00	27.417	2.041	0.001
52	PL8.06	Location 3 (PL8)	2	48a	2.4	22.5	8.5	7.0	152.08	-4.11	13.641	1.298	0.002
53	PL8.07	Location 3 (PL8)	2	24a	4.3	28.3	16.6	10.3	25239.53	0.76	38.311	1.574	0.001
54	PL8.08	Location 3 (PL8)	2	28c	0.8	13.7	12.0	6.1	175.00	17.86	18.439	1.837	0.001
55	PL8.09	Location 3 (PL8)	2	24d	6.0	24.4	15.9	12.1	275.83	-1.21	35.003	2.821	0.001
56	PL8.10	Location 3 (PL8)	2	22a	1.1	14.8	7.9	6.7	145.45	28.12	9.932	1.282	0.002
57	PL8.11	Location 3 (PL8)	1	21b	0.6	11.6	8.2	6.7	-25.00	233.33	34.418	1.162	0.001
58	PL8.12	Location 3 (PL8)	2	20a	0.8	15.9	9.1	4.6	25.00	-125.00	8.747	0.627	0.003
59	PL8.13	Location 3 (PL8)	2	30d	4.1	23.7	11.7	8.6	232.93	-8.38	17.270	2.996	0.001
60	PL8.14	Location 3 (PL8)	2	32a	3.2	17.3	13.9	10.0	259.38	-2.41	39.278	1.572	0.001
61	PL8.15	Location 3 (PL8)	2	32a	0.9	13.9	11.9	4.2	55.56	-20.00	40.697	1.090	0.001
62	PL8.16	Location 3 (PL8)	2	32b	1.8	18.0	12.1	9.1	727.78	9.92	41.354	1.524	0.001
63	PL8.17	Location 3 (PL8)	1	31a	2.7	26.9	25.2	3.6	13375.93	4.47	1.446	0.849	0.024
64	PL8.18	Location 3 (PL8)	1	37b	3.1	18.2	11.4	9.4	282.26	0.00	2.426	0.085	0.010
65	VR3.01	Location 2 (VR3)	III	III-17/905	1.0	13.7	11.5	6.4	80.00	-18.75	38.443	1.526	0.001
66	VR3.02	Location 2 (VR3)	III	III-16/818	2.2	24.1	13.6	4.9	638.64	0.71	7.238	0.797	0.593

TABLE S5. SUMMARY OF DATA COLLECTED FROM PIGMENT SPECIMENS.

	Sample Code	Location	Square	Layer and Aggregate	Mass (g)	Length (mm)	Width (mm)	Thickness (mm)	Low Frequency Mass Specific Susceptibility (10^-6 m^3 kg^-1)	Frequency Dependency (%)	Fe (oxide % mass)	Ti (oxide % mass)	Co (oxide % mass)
67	VR3.03	Location 2 (VR3)	III	III-20/959	4.4	37.4	11.0	5.3	155.68	-1.46	27.966	1.145	0.001
68	VR3.04	Location 2 (VR3)	III	III-20/977	8.3	44.4	26.7	7.5	254.22	4.98	2.992	0.618	0.009
69	VR3.05	Location 2 (VR3)	III	III-20/977	2.4	17.5	12.3	8.1	24677.08	1.33	35.688	2.390	0.001
70	VR3.06	Location 2 (VR3)	III	III-20/977	8.6	34.6	12.0	12.0	2995.35	0.16	28.844	2.066	0.001
71	VR3.07	Location 2 (VR3)	III	III-20/977	0.9	13.0	10.3	7.5	183.33	-15.15	27.285	1.666	0.001
72	VR3.08	Location 2 (VR3)	III	III-20/977	1.0	21.1	19.8	2.4	410.00	-7.32	2.971	0.139	0.009
73	VR3.09	Location 2 (VR3)	III	III-20/938	1.6	16.5	12.6	9.8	87.50	-35.71	9.636	1.073	0.002
74	VR3.10	Location 2 (VR3)	III	III-20/938	4.0	22.2	12.9	10.3	82042.50	0.07	3.147	0.113	0.008
75	VR3.11	Location 2 (VR3)	III	III-20/939	4.0	20.9	15.6	8.2	151.25	-11.57	42.864	1.807	0.001
76	VR3.12	Location 2 (VR3)	III	III-20/931	1.2	17.3	14.7	4.6	70.83	-17.65	28.602	2.528	0.001
77	VR3.13	Location 2 (VR3)	III	III-20/931	1.0	16.6	9.9	7.1	-65.00	-38.46	0.420	0.126	0.157