[Supplementary material]

Lithic analysis and the transition to the Neolithic in the upper Tigris Valley: recent excavations at Hasankeyf Höyük

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1. The site and excavations

Hasankeyf Höyük is located about 2km east of the modern village of Hasankeyf, in Batman province, southeastern Turkey (Figure S1). The geographical coordinates of the site are N37.71870555, E41.42932777. The site is going to be submerged in the Ilısu Dam, which is under construction on the downstream of the Tigris, and rescue excavations were carried out from 2011 to 2014 under the directıon of Prof Yutaka Miyake from the University of Tsukuba, Japan, within the framework of the Hasankeyf Rescue and Conservation Project led by Prof Dr Abdüsselam Uluçam from Batman University.

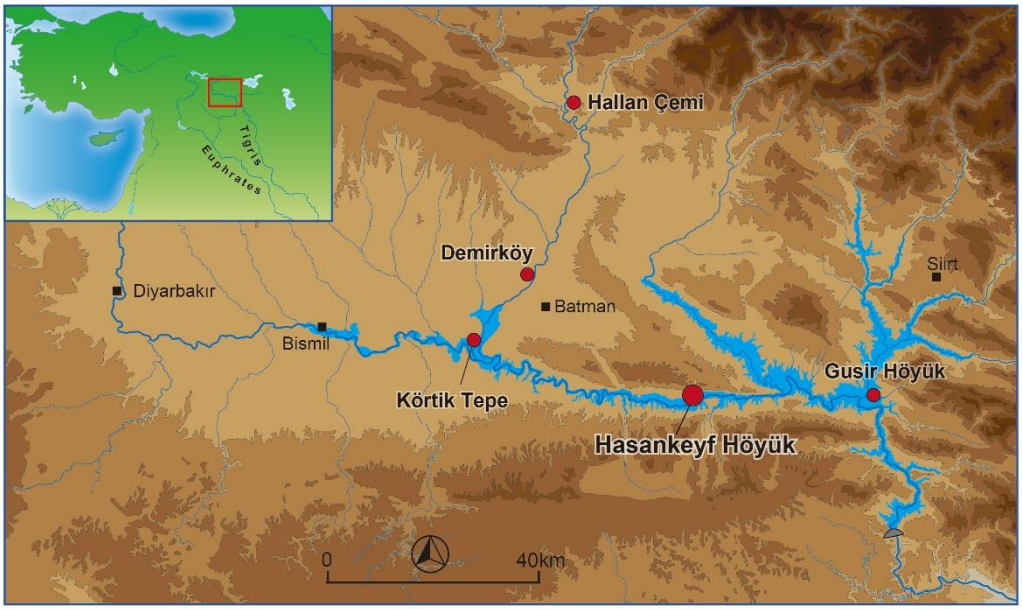

Figure S1. Map of the upper Tigris valley.

Except for the several Iron Age and Hellenistic pits dug from the surface, the entire cultural deposit belongs to the later 10th to the beginning of the 9th millennia cal BC, from the top layer to the natural sediment at the bottom of the deep sounding in Grid G15 at the eastern edge of the mound. Throughout the sequence, round subterranean buildings were built and rebuilt across the entire excavated area. The upper parts of most of the buildings were removed during the construction of subsequent buildings making it very difficult to identify the original surfaces of each building or their chronological order. It is apparent, however, that the rectangular building, Structure 3, was built on the top of the mound, and it cut into some of the round buildings. This allows us to divide the occupation into at least two consecutıve chronological phases. The later phase is represented only by the rectangular buildings, Structure 3 and Structure 140. All the other buildings belong to the earlier phase, although they are not necessarily contemporary. This chronological boundary is reflected

through a notable difference in the structure of the lithic assemblages, but in a slightly different way, between the lower levels of Structure 3 and those of the middle and upper levels. The artefacts from the lowest floor level of structure 3 were recovered from the fill of the building, backfilled after its use. The intrusion of earlier artefacts from the round buildings beneath it is unlikely. This means that the lithic assemblage of Hasankeyf Höyük can be chronologically divided into those from all the round buildings and the lower floor level of Structure 3 (earlier phase), and those from the upper and middle floor level of Structure 3 (later phase).

2. Radiocarbon dating

Seventy two AMS radiocarbon dates from charcoal samples collected throughout the whole occupational sequence are available. The dates were obtained by the Laboratory of Radiocarbon Dating at the University of Tokyo and the Paleo Labo Company, Japan. All the samples are wood charcoals and were prepared by the AAA method. $\delta^{13}C$ values were measured by AMS. The earliest date is 10118±37 BP and the latest is 9527±71 BP, calibrated to 9972–9671 cal BC and 9121–8757 cal BC at 68.2% probability, but with most dated to the second half of the 10th millennium BC. Dates were modelled in OxCal v.4.2.4, using the IntCal13 calibration curve (Bronk Ramsey 2009; Reimer *et al*. 2013). The dates from five structures, which yielded the lithic assemblage studied in this paper, are given in Table S1 and Figure S2. Most dates are in agreement with the general stratigraphic sequence of these buildings.

References

BRONK RAMSEY, C. 2009. Bayesian analysis of radiocarbon dates. *Radiocarbon* 51: e337–60.

REIMER, P.J. et al. 2013. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. *Radiocarbon* 55: 1869–87. http://dx.doi.org/10.2458/azu_js_rc.55. 16947

Table S1. Radiocarbon dates for five buildings mentioned in the main text (all samples are wood charcoal).

Sample ID	Context	Laboratory Number	^{14}C Date BP	Calibrated Date BC 1σ	δ^{13}C
HKFK12-31	Str.72	PLD-24784	10016±38	9663–9444	-25.25 ± 0.27 ‰
HKFK12-32	Str.72	PLD-24785	9937±36	9441–9315	-24.36 ± 0.26 ‰
HKFK12-29	Str.72	PLD-24590	10055±32	9759–9459	-27.32 ± 0.38 ‰
HKFK12-30	Str.72	PLD-24591	9998±32	9653–9401	-27.58 ± 0.40 ‰
HKFK12-33	Str.8	PLD-24786	9903±37	9372–9295	-24.21 ± 0.25 ‰
HKFK12-34	Str.8	PLD-24787	9997±39	9653–9392	-27.11 ± 0.24 ‰
HKFK11-11	Str.8	MTC-16076	9778±69	9305–9196	-24.70 ‰
HKFK11-01	Str.8	MTC-16066	9860±82	9442–9249	-23.99 ‰
HKFK11-07	Str.8	MTC-16072	9828±76	9370–9231	-23.79 ‰
HKFK11-14	Str.8	MTC-16079	9784±95	9372–8957	-25.02 ‰
HKFK12-26	Str.30	PLD-24588	10017±32	9659–9448	-27.28 ± 0.40 ‰
HKFK12-24	Str.30	PLD-24781	9964±39	9644–9320	-19.75 ± 0.29 ‰
HKFK12-25	Str.30	PLD-24782	9883±36	9359–9287	-25.66 ± 0.24 ‰
HKFK12-23	Str.30	PLD-24780	9865±35	9329–9273	-24.33 ± 0.23 ‰
HKFK11-02	Str. 1	MTC-16067	9827±69	9357–9238	-24.36 ‰
HKFK11-12	Str. 1	MTC-16077	9916±82	9649–9278	-24.21 ‰
HKFK11-06	Str. 1	MTC-16071	9597±66	9154–8837	-26.59 ‰
HKFK11-15	Str. 1	MTC-16080	9733±68	9289–9146	-23.84 ‰
HKFK11-08	Str. 1	MTC-16073	9674±72	9254–8875	-23.99 ‰
HKFK12-17	Str.3 middle level	PLD-24775	9927±36	9436–9305	-25.35 ± 0.28 ‰
HKFK12-20	Str.3 middle level	PLD-24587	9974±39	9649–9332	-28.36 ± 0.37 ‰
HKFK12-19	Str.3 middle level	PLD-24777	9920±37	9394–9300	-27.16 ± 0.24 ‰
HKFK12-18	Str.3 middle level	PLD-24776	9568±35	9123–8834	-25.04 ± 0.24 ‰
HKFK12-14	Str.3 middle level	PLD-24586	9690±32	9241–9159	-28.07 ± 0.39 ‰
HKFK12-15	Str.3 middle level	PLD-24773	9559±33	9121–8816	-23.58 ± 0.25 ‰

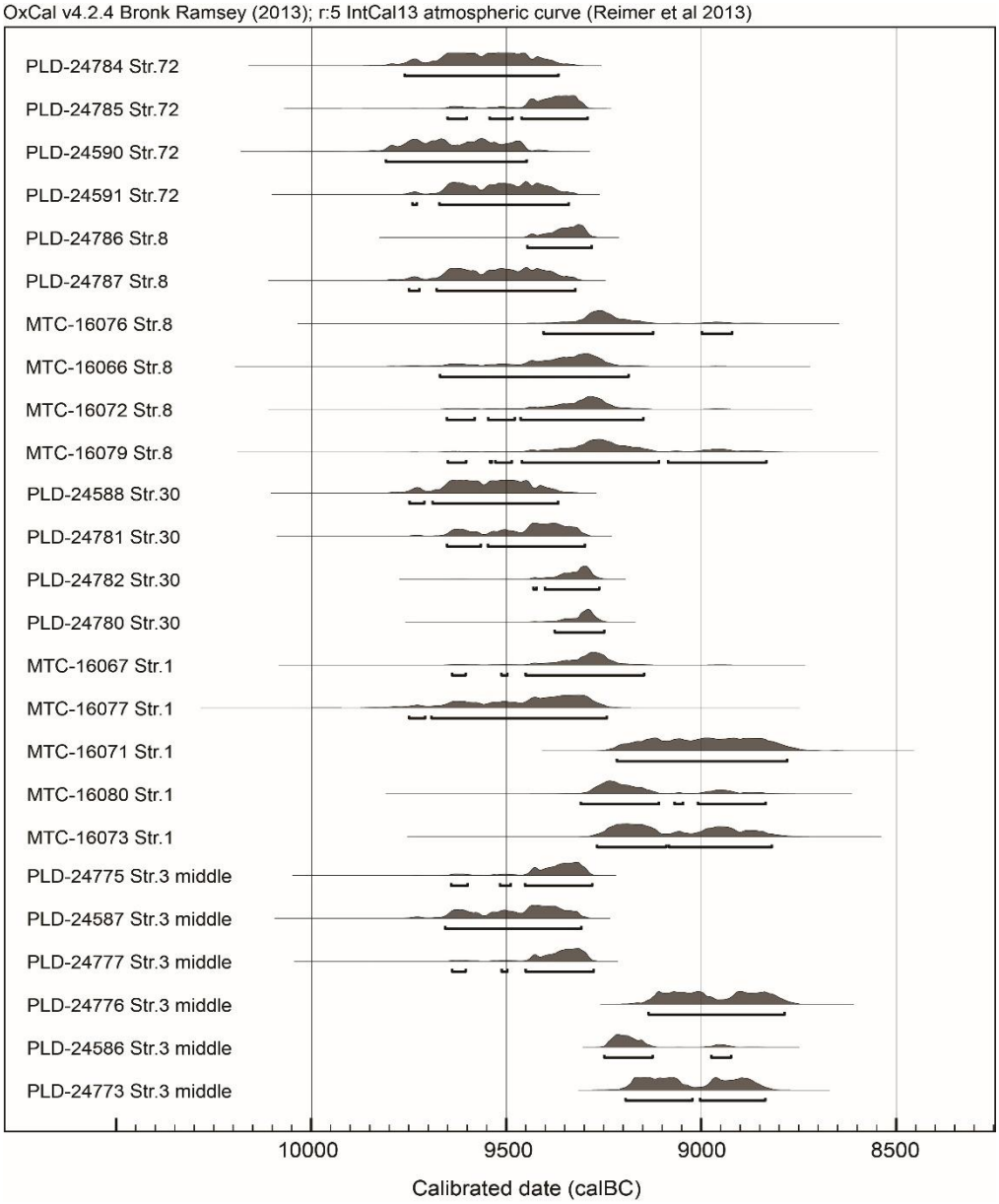

Figure S2. Radiocarbon dates for five buildings mentioned in the main text.

3. Additional description of the lithic artefacts

Blades and bladelets were not separated in this study and were counted together because their size distribution does not show a bimodal pattern. It is probable that both were produced from the same core reduction sequence, with blades knapped at an earlier stage of reduction than the bladelets. The blades/bladelets are on average 39mm in length and 12.5mm in width. Most of them are not as regular as pressure-detached blades, suggesting blade production by direct percussion.

Most of the **conical blade cores** range from between 30 and 50mm in length. The platform angle is close to 90 degree and blades were often detached from around the whole perimeter of the platform, which was often well prepared. Similar conical cores are known from other contemporary sites in the upper Tigris valley, such as Hallan Çemi, Demirköy Höyük and Gusir Höyük.

Scalene triangles were formed by one plain edge and an angled back that was always shaped by direct retouch on either the right or left side of the blade blank. The sharp pointed end is sometimes distorted, and edge damage, including impact fractures at the tip, has not been frequently identified, at least with the naked eye. Their size varies from between 9 and 35mm in length (average: 21.9mm) and between 4 and 20mm in width (average: 8.1mm). **Foliate microliths** range from 16 to 38mm in length (average: 24mm), and 7 to 15mm in width (average: 9.8mm). The retouched lateral edges are usually not very sharp, and some of them have a curved profile. No distinctive use-wear is has been identified. **Nemrik points** are usually larger than microliths, but the smallest examples are within their size range. Their dimensions range from 27

to 49 mm long (average: 38.2mme) and 9 to 16mm wide (average: 12.6mm). Other points are made on blades with naturally pointed distal ends. The distal tip is either not retouched, or only slightly retouched along the edges. The proximal end is retouched to form a round base or a short tanged shape similar to that of Nemrik points.

The size of **oblique truncations** ranges from 14.0 to 55.0mm long, 5.0 to 23.0mm wide and 1.5 to 7.0mm thick. The distal end of the blade blank is truncated by fine retouch in a direction diagonal to its axis, while its proximal end is usually unmodified. Their shape varies according to the axis of truncation, which can be either from the right side of the blade down to the left side, or *vice versa*, forming an asymmetric profile. The truncated end may be slightly concave, convex or straight, and its edge angle suggests that it was probably used as a working edge. The size of **narrow borers** ranges from 32 to 59 mm long (average: 41.8mm), and 8 to 15mm wide (average: 10.6mm) and usually thicker than other tools (3 to 7mm thick). One or both lateral edges are shaped by direct, abrupt retouch from the pointed tip to the proximal base, thus forming a thick narrow rod-like shape. Although termed ‘borers’, no clear use-wear or torsion fractures caused by a rotating motion are visible on their tips or sides, meaning their function remains unknown.

Table S2. Type-list for the flint artefacts with breakdown of sieved and un-sieved contexts.

Type of flint artefacts	Str. 72		Str. 8		Str. 30		Str. 1		Str. 3 upper and middle		Total
	hand picked	sieved	hand picked	sieved	hand picked	sieved	hand picked	sieved	hand picked	sieved	
Conical blade cores	4		2			1	8	4	6		25
Single-platform cores	28	1	12	3	8	7	14	10	57		140
Discoidal cores	8		6	5	3	1	9	2	4		38
Multi-platform cores	14		12	2	1	5	11	4	17		66
Core tablets			2				2	1			5
Core trimming elements			1		1	1			2		5
Crested blades								1	3		4
Overshot blades	4		4	2	1	1	5	1	18		36
Blades (plain)	57	4	44	62	25	74	60	118	474	4	922
Blades (used & retouched)	15		10	15	8	19	9	4	136		216
Blade-like-flakes	640	10	45	46	35	69	58	43	193		563
Flakes	1379		3537		2145		3597		4211		14869
Microlith fragments	1		3	15	4	10		13	6	2	54
Lunates				2							2
Scalene triangles	5		7	28	4	5	3	10			62
Foliate microliths	8		2	7	6	8	18	26	27		102
Foliate microlith–Oblique trun.	2			5	1	2	1	4	5		20
Foliate microlith–Narrow borers					1				2		3
Oblique truncations	5	2	5	6	2	3	1	9	11		44
Narrow borers	1		2	1	3	3	5	5	5		25
Borers					1	2	3	4	14		24
Nemrik points									10		10
Other points									2		2
End-scrapers, long type							1		24		25
End-scrapers, short type				1				1	17		19
End-scraper fragments							1		4		5
Side-scrapers									2		2
Round scrapers									6		6
Flake scrapers	2	2	2				4	1	12		23
Backed blades	1		1	1	2	3		7	4		19
Blades with gloss									1		1
Other retouched and fragments	6	1	5	8	3	4	10	12	13		62
Total flint tools	31	5	27	74	27	40	47	92	165	2	510
	36		101		67		139		167		
Total flint artefacts	1604	20	3702	209	2254	218	3820	280	5286	6	17399
	1624		3911		2472		4100		5292		

Table S3. Type-list for the obsidian artefacts with breakdown of sieved and un-sieved contexts.

Type of obsidian artefacts	Str. 72		Str. 8		Str. 30		Str. 1		Str. 3 upper and middle		Total
	hand picked	sieved	hand picked	sieved	hand picked	sieved	hand picked	sieved	hand picked	sieved	
Conical blade cores						1					1
Single-platform cores			1		1		2				4
Discoidal cores	1										1
Multi-platform cores						1			1		2
Core trimming elements	1										1
Overshot blades			1		1				3		5
Blades (plain)	21	1	14	10	3	5			143		297
Blades (used or retouched)				1			1		3		5
Blade-like-flakes					1						1
Flakes	53	11	128	116	20	69	38	66	180		681
Microlith fragments			1	2				1	2		6
Lunates				1							1
Scalene triangles	2		7	2	1	2			1		15
Foliate microliths	2			1	2	1	1	1	2		10
Foliate microlith–Oblique trun.	1										1
Foliate microlith–Narrow borers	1										1
Oblique truncations		1					1				2
Narrow borers	2										2
Nemrik points									1		1
Other points									2		2
End-scrapers, long type						1			1		2
Round scrapers									2		2
Flake scrapers									2		2
Backed blades	1						1				2
Splintered pieces	15		5	1	6	1			5		33
Other retouched and fragments	1										1
Total obsidian tools	25	1	13	7	9	5	3	2	18	0	83
	26		20		14		5		18		
Total obsidian artefacts	101	13	157	134	35	81	44	68	348	0	981
	114		291		115		112		348		