

The ¹⁴C determinations

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From the samples submitted by the Kilise Tepe project to the Oxford Radiocarbon Accelerator Unit at different times, the Unit was able to produce a total of 55 successful determinations, of which 14 were from the Byzantine levels and will be discussed in Jackson, forthcoming. The remaining 41 dates are all from Late Bronze Age and Iron Age contexts, that is Levels II and III in the NW corner and Levels 2 and 3 in the Central Strip.¹ The experimental analyses in Oxford were overseen by Thomas Higham, who provided initial comment on the determinations as they emerged; Michael Dee has reviewed the complete assemblage of dates and conducted some Bayesian analyses; and Nicholas Postgate has contributed the accompanying stratigraphic and contextual commentary. A provisional report on the results was included in the article in *Anatolian Studies* (Bouthillier et al. 2014, 134-7). The following account necessarily replicates much of what was written there, but in particular it also includes figures summarizing the Bayesian models prepared by Michael Dee in the program OxCal (Bronk Ramsey 1995).

Before dealing with each area in turn, some general remarks are in order. The occupation levels at Kilise Tepe proved to be consistently bereft of satisfactory carbonized samples from primary contexts. Almost the only instance of such an ideal sample is a deposit of charred barley from the base of a pit in the IIc Stele Building (No. 22; cf. No. 32). This context was indisputably stratified in relation to the architectural phase, and the seeds can be assumed to be contemporary with the context, give or take a year or two. Given the scarcity of such ideal samples, other sources of ¹⁴C had to be tapped. From the taphonomic point of view the most satisfactory alternative was probably animal bone in a well-defined context, such as in a sealed pit or associated with a fire installation: the bone itself could often be seen to be a primary deposit and therefore close in time to the deposition, and the pit or fire installation could be tied into the architecture (examples: Nos. 3, 10). Less helpful are the many charcoal samples (mostly from *Pinus*), which tended to have maximum dimensions of 1 to 5 cm. These were rarely on an occupation surface or other primary context, rather they were incorporated in reprocessed soil, either as the fill of pits or as structural packing within a building, so that they could well be displaced from an original earlier stratigraphic location. Moreover, the wood from which they derived, although often no more than slender branches, could well have been present in the settlement for decades before it was burnt (in contrast to carbonized seeds, for example). All the same, such samples were particularly common in the early phases of the Stele Building and with one exception they do in fact offer some rather consistent dates which also correspond with the stratigraphic sequence, suggesting that

¹ Where two determinations were taken by ORAU from material submitted as a single sample, as part of their in-house reproducibility programme, both determinations are listed with the second one denoted by “bis” (e.g. No. 36bis).

these displaced charcoal lumps are in fact rather more reliable than one might expect. By contrast, the charcoal samples from two of the deep pits in the Central Strip (Nos. 26-31) give a wide range of dates which surely reflects the disparate origin of the filling material.²

Fig. 1

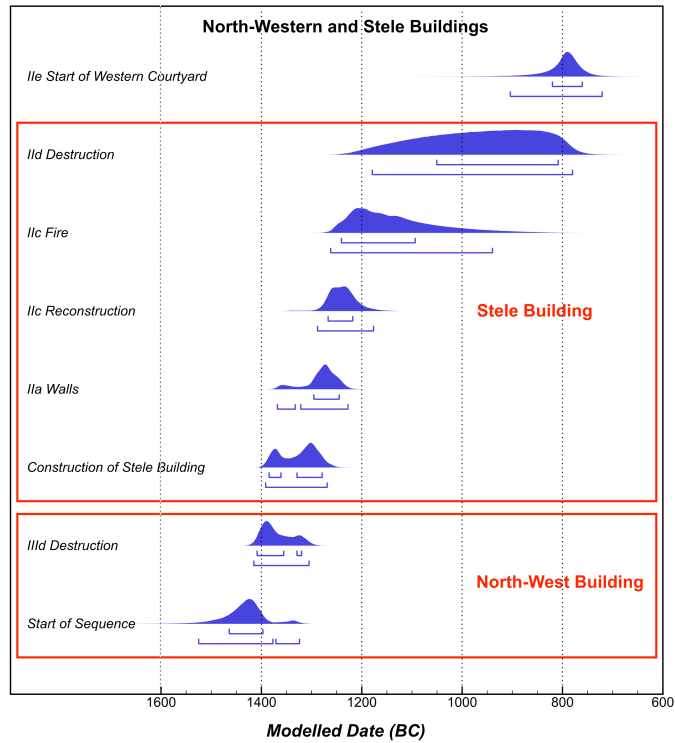
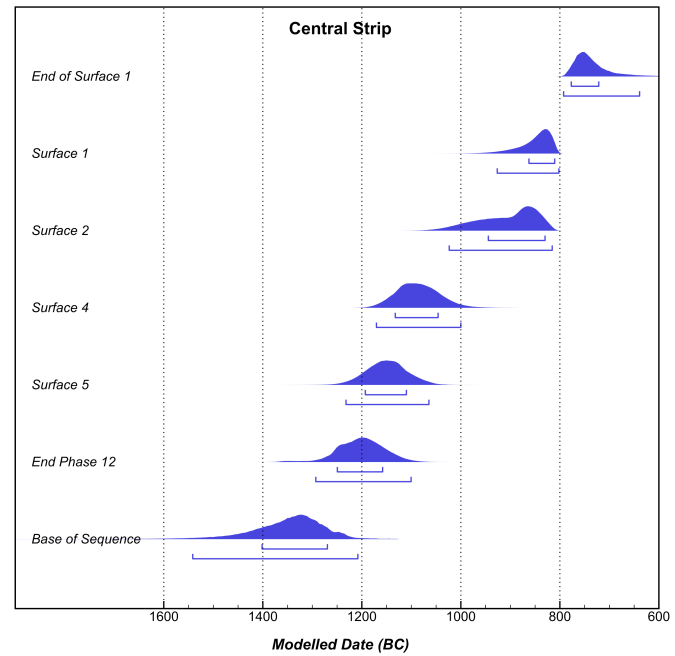


Fig. 2



² For the sometimes complex stratigraphic terminology see Tables 1.1 and 1.2 in §1.

Purpose of new samples

Some ¹⁴C samples were taken in 1994-98. These were listed in EKT (pp. 621-3 with Table 43). Of the five samples processed at the Anglia University Research Laboratory in Cambridge only two belong in the time period treated here: one, from unit 4245 gives a calibrated range of 1880-1680 BC (at 68.2% probability) for Phase IIIb of the North-West Building. This is unexpectedly early, and without further samples is hard to assess. The other, from unit 1372, belongs to the spread of burned material on the floor of the IIIe Eastern Courtyard, and gives 1410-1290 BC @ 68.2%, a range which can easily be reconciled with Samples 4 and 5 as listed below (both figs from the same stratigraphic context).

As part of the dendrochronological analyses undertaken by Kuniholm & Newton at Cornell samples from architectural timbers were sent to Heidelberg. Two samples from Level III d each gave determinations of 1448-1399 BC (68.2%). A further five determinations from a Phase IIc timber from square J18 all gave a range of 1354-1336 BC (68.2%), or in Kuniholm & Newton's words "1346 BC plus or minus not very much at all" (EKT, p. 621). In both cases (Level II d and Level IIc) these dates seemed at the time rather earlier than we would have predicted, but it was noted that "the likeliest reasons for this would be the reuse of timbers or mistaken assumptions about the position of our Levels in the historical and cultural sequences" (Postgate, EKT p. 622). In the light of this, there was a clear case for taking further samples for ¹⁴C dating, and in the event the results from the 2007-2011 excavations suggest dates earlier than we anticipated, reinforcing the evidence of the earlier samples.

No samples were taken from the Stele Building in the 1990s (except from one timber), and this was a conscious decision because of the particular difficulty posed by the ¹⁴C calibration curve around 1200 BC (cf. Manning 2006-7). However, because we were directing our attention very specifically to the end of Level III and beginning of Level II it seemed worthwhile collecting a number of samples in the hope that this might improve the chances of extracting a useful result.

Table 2.1. The North-West Building, Level III contexts

	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴ C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
1	I19/661	94034	IIIc	<i>Olea europaea</i>	Below Rm 32 floor	3151	26	1452-1406	1495-1389	24159	54
2	I19/612	84071	III d	<i>Pinus</i> sp.	within W5806 10cm below surviving top.	3182	30	1494-1429	1508-1409	21286	1

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3	I19/627	94015	IIIId	<i>Bos vertebra</i>	Centre of P09/16	3069	29	1394-1311	1412-1267	24505	55
	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
4	J19/713	96513	IIIe	<i>Ficus carica</i>	Pre-Stele Building packing to S of W6002	3060	27	1389-1306	1407-1265	24160	56
5	J19/713	96513	IIIe	<i>Ficus carica</i>	Pre-Stele Building packing to S of W6002	3092	27	1414-1317	1430-1298	24161	56 bis
6	J19/678	81622	IIIe/IIa	<i>Pinus</i> sp.	Pre-Stele Building deposit under Rm 10 (E)	3081	28	1407-1316	1421-1270	21287	4
7	J19/676	81606	IIIe/IIa	<i>Pinus</i> sp.	Pre-Stele Building packing beneath FI08/14	3107	30	1426-1321	1441-1303	21360	5
8	K19/552	81023	IIIe/IIa	<i>Pinus</i> sp.	Pre-Stele Building packing beneath FI08/14	3140	29	1446-1395	1492-1314	21288	6

We were aware that for statistical reasons it is desirable to take a number of samples from each context, or from closely related contexts. This was not always possible, as for example in the successive phases of Level III in the North-West Building, because the buildings seem to have been demolished and replaced in an orderly fashion which removed *in situ* burnt material, even in association with the fire installations. Of the individual contexts, Sample 1 comes from an occupation surface preceding the IIIId phase. This atypically did have a fair sprinkling of carbonized plant material resting on it, making it a primary context yielding an ephemeral sample well suited to accurate dating. Sample 3 was animal bone retrieved from the fill of the completely sealed pit at the centre of Room 37, and here again the relatively large size of the bone and its archaeological context both imply that this should be a satisfactorily short-lived sample, belonging early in the IIIId phase. Sample 2 is charcoal retrieved from clayey material underlying the stone foundations of Room 37 in its latest IIIId phase. The stratigraphic context is solid, but the charcoal itself is only secondary here, and must derive from activities preceding the wall into which it was incorporated.

The calibrated results for these samples offer a wide range of dates for the later phases of Level III beginning in the 15th and extending into the 14th century BC. After the destruction of the IIIId building, a successor, assigned to phase IIIe, was constructed. Five dates came from contexts beneath the Stele Building which are thought to be contemporary with this phase (Samples 4-8). Three of these are charcoal from pine, the fourth is a carbonized fig, frequent specimens of which were found lying on the IIIe courtyard floor in the 1990s, and are unlikely to have had a chequered taphonomic career. The modelled dates for these samples are unsurprisingly close to the earliest dates for the Stele Building (see below), and suggest that the final years of the North-West Building fell in the late 14th century.

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Table 2.2. Stele Building IIa-c contexts

	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴ C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
9	J20/322	81814	IIa construction	<i>Pinus</i> sp.	Rm 2 foundation layer	3095	27	1415-1318	1431-1301	21289	8
10	K20/291	81425	IIa occupation	<i>Ovis</i> femur	Rm 2 in pit P08/23 below floor	2985	29	1290-1132	1371-1122	24506	57
11	25251	J19/677	IIa occupation	<i>Pinus</i> sp.	Rm 10 first floor surface	3126	31	1436-1326	1492-1314	21361	7
12	K19/545	81026	IIa occupation	<i>Pinus</i> sp.	Rm 5 below W5700	3368	27	1691-1622	1743-1561	21290	9
13	K19/551	81009	IIb occupation	<i>Pinus</i> sp.	Rm 4 occupation surface	3034	26	1373-1265	1394-1213	21291	10
14	K20/254	81402	IIb occupation	<i>Pinus</i> sp.	Rm 4 pre-IIc packing	3061	28	1390-1306	1409-1264	21292	11
15	K20/255	81402	IIb occupation	<i>Tamarix</i> sp.	Rm 4 pre-IIc packing	3084	28	1409-1316	1425-1271	21293	12
16	K20/253	81402	IIb occupation	<i>Pinus</i> sp.	Rm 4 pre-IIc packing	3027	28	1374-1260	1393-1135	21294	13
17	J20/321	81802	IIb occupation	<i>Pinus</i> sp.	Rm 2 occupation debris	3019	29	1371-1216	1389-1132	21295	14
18	J20/300	81803	IIb occupation	<i>Pinus</i> sp.	Rm 2 occupation debris	3022	29	1372-1219	1391-1133	21296	15
19	J20/306	81801	IIb occupation	<i>Pinus</i> sp.	Rm 2 pre-IIc packing	3045	29	1379-1270	1407-1216	21297	16
20	J19/675	81604	IIb occupation	<i>Pinus</i> sp.	Rm 3 surface	3059	29	1389-1303	1412-1261	21298	17
21	J19/675	81604	IIb occupation	<i>Pinus</i> sp.	Rm 3 surface	3054	29	1386-1297	1410-1223	21299	17 bis
22	J19/755	96574	IIc occupation	<i>Hordeum vulgare</i>	Basal fill of interior pit P97/73	2988	27	1292-1133	1370-1125	24074	58

Since our dating material here comes from the 2007-2011 seasons, it belongs to the earlier IIa and IIb phases of the building's use. These offered no burnt contexts, unlike phases IIc and IId, excavated in 1994-98, which were both destroyed by fire. Most samples were therefore charcoal from secondary structural fill or packing layers, which are admittedly not ideal. In positioning the different contexts in relation to the building, we have attempted to differentiate materials laid down prior to the erection of the IIa walls (Samples 4-8, already discussed above) from filling and occupation layers contemporary with its first foundation (Samples 9-12), and from deposits post-dating the IIa occupation and

thus attributed to IIb (Samples 13-21). Taken as a group, the individual and modelled dates from these samples yield a picture consistent with our stratigraphic observations. One sample (12) is way too old and must be ignored as recycled material, but the consistency of the remainder, in which the order of the dates determined agrees with the sequence of samples suggested by their stratigraphic contexts, promotes confidence that the secondary nature of the samples and their contexts has not seriously distorted the picture.

As noted above, material for ¹⁴C dating was not collected in the 1990s from the burned IIc phase of the building because we believed (correctly) that it belonged around 1200 BC. The modelled date for reconstruction event strikes a propitious period of the calibration curve and we can deduce the commencement of phase IIc began in the mid 13th century. On the other hand, its destruction by fire occurred in a particularly unhelpful time since the calibration curves at this point offer three possible date-ranges (see Manning 2006-7). However, in 2007/8 one sample of carbonized grain was taken from the base of a IIc storage pit in Room 10, which is almost by definition precisely contemporary with the end of Phase IIc (and immediately preceding Phase IId); this is Sample 22. It does indeed offer a wide range of calibrated dates (see Fig. 2.1), but the range 1292-1133 BC (68.2%) is at least consistent with a phase later than phases IIa and IIb of the Stele Building (according to the newer results for Samples 9-21), and includes the decades which are indicated by the Mycenaean LH IIIc pottery on the phase IIc floors (1225-1175 BC; see E.B. French, EKT 373-5). There is one exception, because the determination for Sample 10 (1290-1132 BC, 68.2%) is very close to Sample 22. We expected Sample 10, which was taken from the burial of a young sheep skeleton beneath the floor of Room 2 (see §5), to belong to the time of the first IIa construction, but its calibrated date appears to fall a couple of centuries later. Because they are so consistent we are not prepared to jettison all the other IIa/b dates in favour of Sample 10, on the grounds that they are merely secondary whereas the sheep deposit should be considered primary, but we are also very reluctant to abandon our interpretation of the stratigraphic context of the sheep. We do not see a way to resolve this dilemma.

The later Western Courtyard

Table 2.3. I18: Level IIe-IIf contexts

	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴ C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
23	I18/230a	85026	IIe/f	<i>Pinus</i> sp.	Burnt material from FI08/6	2599	28	806-779	818-672	21300	20
24	I18/207	85019	IIe/f	<i>Pinus</i> sp.	Burnt material from FI08/5	2602	29	800-782	823-672	21301	21
25	I18/286	85060	IIf	<i>Pinus</i> sp.	From pit P08/63	2573	28	800-767	810-571	21302	22

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The only successful samples from this area came from the later phase of IIe or from phase II f, and are evidently close to each other in time. They must all be later than Phase II d of the Stele Building to the north-east. The Bayesian modelling suggests the phase commenced around 800 BC (Fig. 2.1). Samples 23-24 came from good primary contexts in hearths, and suggest a calibrated range in the early years of the 8th century BC, which is entirely plausible. The sample from II f, which certainly comes from a context post-dating even the latest phase of the Stele Building, gives a very similar result. The date between 800 and 767 BC seems too early for the White Painted IV ceramics associated with Phase II f, but this entire area was heavily disturbed by pits, and as with the approximately contemporary 2f (Surface 1) pits in K14, it would be no surprise to find earlier material included within their backfill.

The Central Strip

Our samples from the Central Strip may be separated into those from Surface 1 (which is the highest occupation surface before the Hellenistic deposits in Level 1, and on the basis of the ceramics is close in time to phase II f in the North-West corner), those from Phases (or “Surfaces”) 2-5 of Level 2, and a pair of samples from Phases 12 or 13 in Level 3. As in the Stele Building, lack of good primary contexts meant that a majority of the samples from this area were charcoal in secondary contexts, either the backfill of pits or structural packing beneath or above the occupation surfaces.

Table 2.4. Central Strip: Level 3, Phases 12/13

	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴ C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
26	K14/806	92039	Phase 12/13	<i>Rosa</i> sp.	Fill of P09/19	3089	28	1413-1316	1429-1293	24075	59
27	K14/880	92049	Phase 12	<i>Triticum monoc.</i>	Fill of P09/29	2959	29	1257-1128	1291-1055	25586	60

The earliest material from the Central Strip is represented by the Level 3 architecture in J14 and I14, which was associated on its east side with a sequence of external deposits in K14 and neighbouring squares, labelled Phases 8 to 14. Only two samples from this sequence were successfully processed, both from primary ashy deposits associated with pit usage in the relatively early Phases 12-13. Sample 26 suggests a

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date in the 14th century (1413-1316 BC, 68.2%), which would coincide approximately with the initial IIa foundation of the Stele Building (cf. Samples 3-7 above). Sample 27 came from a pit in the next phase but is apparently significantly later, giving a date which seems closer to Level IIc in the Stele Building (1257-1128 BC, 68.2%). Indeed, whilst modelling is of limited use when so few dates are available per phase, the end of phase 12 seems to be positioned right on the turn of the 13th century BC (Fig. 2.2), or very similar in age to the fire that destroyed the Stele building (Fig. 2.1).

Taken all together, then, these dates tend to support the conclusion based on ceramics that the Level 3 house in J14 and its associated open space are approximately contemporary with the IIa/b phases of the Stele Building.

Table 2.5. Central Strip: Phases 2-5

	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴ C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
28	K14/575	82031	Phase 4/5	<i>Pinus</i> sp.	K14b NW, W of W7502	2978	29	1265-1131	1370-1115	23174	53
29	K14/567	82029	Phase 4/5	<i>Pinus</i> sp.	K14b NW: packing below Surface 4	2951	30	1257-1124	1268-1051	21422	26
30	K14/567	82029	Phase 4/5	<i>Pinus</i> sp.	K14b NW: packing below Surface 4	2926	29	1193-1056	1257-1021	21423	26 bis
31	K14/522	82016	Phase 4/5	<i>Pinus</i> sp.	K14b SW: packing below Surface 4	2927	30	1194-1056	1258-1021	21304	27
32	K14/659	75072	Phase 4	<i>Pinus</i> sp.	K14b NE: packing above Surface 4	2880	29	1114-1012	1191-940	21303	23
33	K14/406	75070	Phase 4	<i>Pinus</i> sp.	K14b NW: burnt spread on Surface 4	2937	30	1252-1059	1263-1043	21305	28

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	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴ C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
34	K14/397	75068	Phase 3/4	<i>Pinus</i> sp.	K14b SW: packing below Surface 3	2876	29	1114-1008	1191-936	21307	30
35	K14/279	75044	Phase 3	<i>Pinus</i> sp.	K14b N: burnt spread on Surface 3	2659	29	831-800	896-792	21306	29

Above the Level 3 architecture Phase 6 is represented by the posthole building in K/L14, but no samples were recovered from this phase. There followed Phase 5, with a succession of courtyard deposits to the west in J14, associated with housing further west in I14. Samples 28-31 are pine charcoal from deposits overlying the Phase 5 occupation and sealed by Surface 4: it is difficult to be certain whether their contexts are closer in time to the Surface 4 or the Surface 5 occupation. Given that Samples 28 and 29 have given dates close in time to the carbonized wheat of Sample 27, despite the stratigraphic distance between them, it seems possible that these are secondary inclusions of charcoal much older than their context; but note that Sample 30 is a re-run of Sample 29, which gave a significantly later date close to Sample 31. This is easy to imagine for all of Samples 28-31. As for the samples on (as opposed to sealed by) Surface 4, Sample 33 is close in time to 28-31 and seems likely therefore to be from a secondary deposit with a similar origin. Surface 4 belongs to a succession of similar occupations (Surfaces 4, 3, and 2) immediately preceding Surface 1, and taken together with the ceramics we would expect it to be no earlier, and quite possibly significantly later, than 1000 BC. Samples 32 and 34, although from a similar context, point to an 11th century date. This too seems unexpectedly early and since they too are both pine charcoal, it could once more reflect secondary material (from a different, rather later, source). Finally, Sample 35 from Phase 3 points to a late 9th century date, which is compatible with the ceramic evidence as analysed by C. Bouthillier.

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Table 2.6. Central Strip: Surface 1

	Object No.	Unit	Phase	Sample substance	Archaeological contexts	¹⁴ C measurement		Calibrated date range (BC)		Lab Ref. (OxA-)	KT Sample no.
						Date (¹⁴ C years BP)	Uncertainty (1σ)	68.2%	95.4%		
36	K14/499	82009	Surface 1	<i>Olea</i>	P07/09 lower fill	2807	28	997-924	1046-897	21320	31
37	K14/515	82013	Surface 1	<i>Pinus</i> sp.	P07/09 lower fill	2692	28	893-809	900-805	21321	32
38	K14/490	82009	Surface 1	<i>Pinus</i> sp.	P07/09 lower fill	2721	29	896-834	919-811	21322	33
39	K14/480	82008	Surface 1	<i>Quercus/Olea</i>	P07/09 upper fill	2550	29	797-597	801-551	21323	34
40	K14/661	75042	Surface 1	<i>Pinus</i> sp.	P07/15 fill	2652	29	827-799	827-799	21324	36
41	K14/661	75042	Surface 1	<i>Pinus</i> sp.	P07/15 fill	2701	32	895-813	895-813	21455	36 bis
42	K14/1002	92411	Surface 1	<i>Hordeum vulgare</i>	P09/55	2513	29	771-553	789-539	25305	61

The contexts associated with Surface 1, which we assign to Level 2f, were principally pit fills, and it is therefore unsurprising that they offer a range of dates from the 10th to 8th centuries, with the earlier samples doubtless brought up from lower contexts in the process of digging the storage pits. These therefore serve only to establish the presence of some human activity here at the dates they give, and cannot be expected to date the use or disuse of the pits in which they were found. The latest (Sample 39) spanning the 7th and 6th centuries will be a better measure of the date of the 2f occupation. This was broadly confirmed by Sample 42 from burnt seeds half-way down the very large storage pit in K14b (P09/55) which gives a calibrated date between 771 and 553 BC. Modelling also suggests Surface 1 activity concluded in the 7th century BC (Fig. 2.2). This span of time certainly includes our expected date range for the White Painted ceramics which are characteristic of Surface 1, and which on present thinking should fall neatly around this time.