Radiocarbon dating archaeobotanical remains from Yarnton

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Excavations undertaken by the Oxford Archaeological Unit between 1990 and 1996, at a gravel extraction site between Yarnton and Cassington in Oxfordshire, discovered settlement evidence at the village of Yarnton spanning the Early to Late Saxon periods, as well as earlier and later activity (Hey 2004). Substantial assemblages of faunal and botanical remains, apt for elucidating animal and crop husbandry practices, were recovered during excavation. These remains were especially rich for the Middle Saxon phases (spanning the seventh to ninth centuries), from whose contexts most of the animal bones and archaeobotanical samples derive.

Later disturbance due to ploughing hindered the excavators' ability to establish detailed stratigraphic models for the site: 'the only layers which survived were those which had slumped into the tops of ditches. It was not possible, therefore, to link most of the features stratigraphically; the remains were spread across the settlement, and there was little superimposition of deposits' (Hey 2004, 18). The excavated remains also included few datable artefacts, so a large number of radiocarbon dates were obtained – from charred and waterlogged plant macrofossils, charcoal, human bone, animal bone and bone artefacts – to help establish a firmer chronology (Bayliss and Hey 2004). Four broadly-dated Anglo-Saxon phases were thus devised:

- Phase 1 – Early Saxon (two episodes of occupation: late fifth-/early sixth-century, and seventh-century)
- Phase 2 – Middle Saxon I (late seventh to late eighth centuries)
- Phase 3 – Middle Saxon II (late eighth to late ninth centuries)
- Phase 4 – Late Saxon (late ninth to late tenth centuries)

The Feeding Anglo-Saxon England project (FeedSax) identified twelve archaeobotanical samples, from ten contexts, whose particular richness of charred plant remains rendered them especially important as proxies for crop husbandry practices and conditions. These contexts were originally assigned to Phases 3 and 4, apart from a pit 'which contained a sherd of 13th-century pottery' and which is dubbed 'Medieval' in the archaeobotanical data tables (Hey 2004, 209, 359). In view of the complexities surrounding the dating of Yarnton's archaeology, the project sought direct dates for these samples. The original post-excavation programme had already obtained radiocarbon dates for three of these contexts. For the remaining seven, FeedSax submitted charred grains to the Oxford Radiocarbon Accelerator Unit for radiocarbon dating. The cereal grains had originally been analysed and identified by Chris Stevens (Stevens 2004), and were subsampled by the author from material held at the University of Cambridge. The grains dated by the FeedSax project were photographed at the University of Oxford by the author prior to submission for dating, and these photographs are included in the project's photographic archive (McKerracher *et al.* in prep.).

The radiocarbon determinations obtained for these samples, and for those obtained in the original post-excavation programme, have been calibrated using IntCal20 (Reimer *et al.* 2020) and OxCal 4.4.2 (Bronk Ramsey 2009), and the results are shown in the tables below and figures at the end of this report.

Results

Radiocarbon dates obtained by Oxford Archaeology

sample	material	original phasing	laboratory no.	age BP	calibrated dates AD (confidence)
61	cf. spelt grain cf. emmer grain	late C8–late C9	OxA-7371 OxA-7365	1190±35 1225±50	771–900 (81.6%) 668–895 (92.5%)
235	cereal grain	late C8–late C9	OxA-5470	1200±45	760–902 (71.6%), 916–975 (10.2%)
236	cereal grain	late C8–late C9	OxA-5471	1205±50	678–750 (18.0%), 757–901 (67.5%)
248	charcoal 1 x barley grain	late C8–late C9	OxA-3914 OxA-4683	1270±75 1255±65	643–898 (92.2%) 653–895 (93.1%)

Radiocarbon dates obtained by FeedSax

sample	grains	original phasing	laboratory no.	age BP	calibrated dates AD (confidence)
223	3 x barley	late C8–late C9	OxA-37637	1198±24	771–892 (95.1%)
812	3 x wheat	late C8–late C9	OxA-37675	1184±27	772–896 (88.9%)
810	3 x barley	late C8–late C9	OxA-37502	1362±26	639–685 (84.6%)
754	3 x barley	late C8–late C9	OxA-37638	1176±24	772–897 (85.5%)
781	3 x wheat	late C9–late C10	OxA-37639	1134±26	875–993 (89.4%)
779	3 x barley	late C9–late C10	OxA-37676	1106±26	886–995 (95.4%)
276	3 x barley	Medieval	OxA-37640	1213±25	772–887 (89.1%)

Most of the new results support the original phasing by Oxford Archaeology, and indeed reinforce this phasing with higher-precision radiocarbon dates. For samples 223, 812 and 754, the new radiocarbon dates are consistent with the original late eighth- to late ninth-century phasing (Phase 3). Samples 781 and 779 have also returned radiocarbon date ranges entirely consistent with their original late ninth- to late tenth-century phasing (Phase 4).

The remaining two samples, however, returned unexpected results. The new date for sample 276, from 'Medieval' pit 3166, reveals that this sample in fact belongs to Phase 3, i.e. between the late eighth and late ninth centuries. The thirteenth-century potsherd from pit 3166, upon which the sample's original 'Medieval' phasing is based, is therefore likely to be intrusive. Meanwhile, sample 810, originally dated to Phase 3, returned an unusually precise date range of cal. AD 639–685 (with 84.6% confidence), which could correspond to the latter part of Phase 1 or the beginning of Phase 2 in the original chronology. The parent context of this sample (3431) belongs to the complex of intercutting ditches which characterise the Middle Saxon (Phase 2–3) settlement, rather than to the more ephemeral set of features assigned to Phase 1. Hence, the new radiocarbon date means that we cannot exclude the possibility that the ditch system may have been laid out in the earlier part of the seventh century, or at the latest by *c.* AD 690.

Acknowledgements

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References

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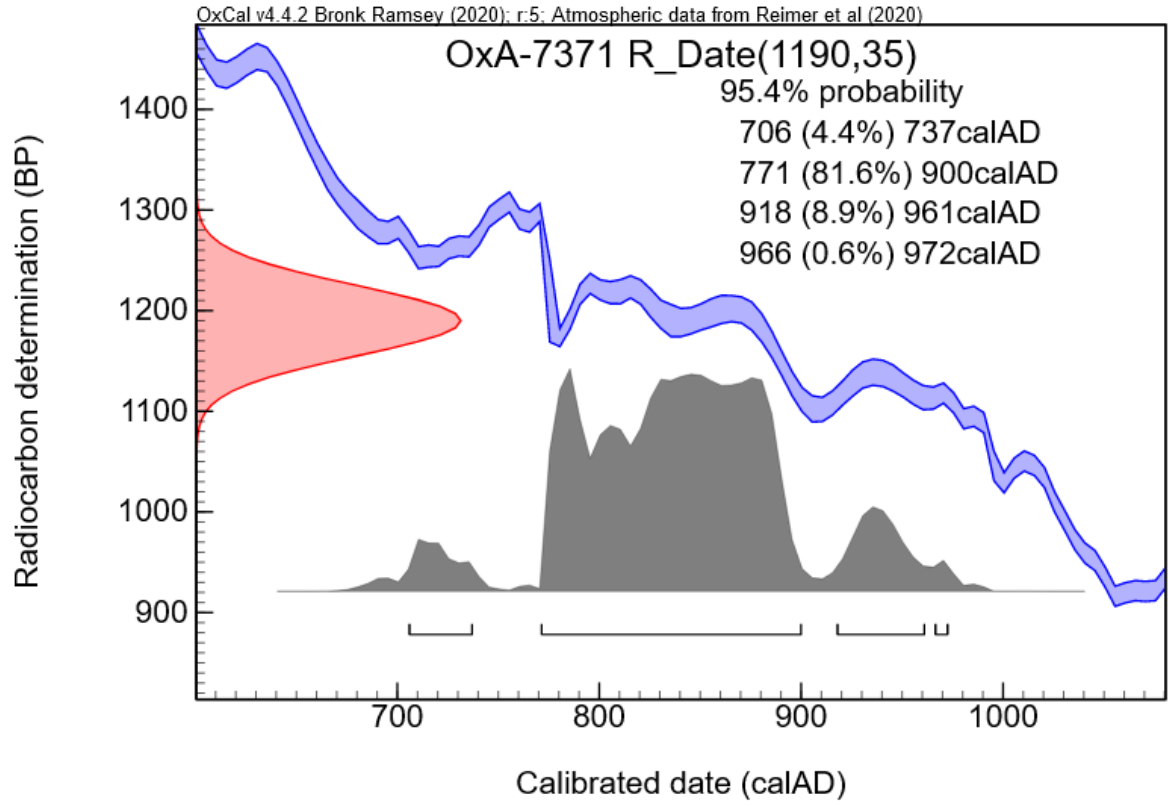
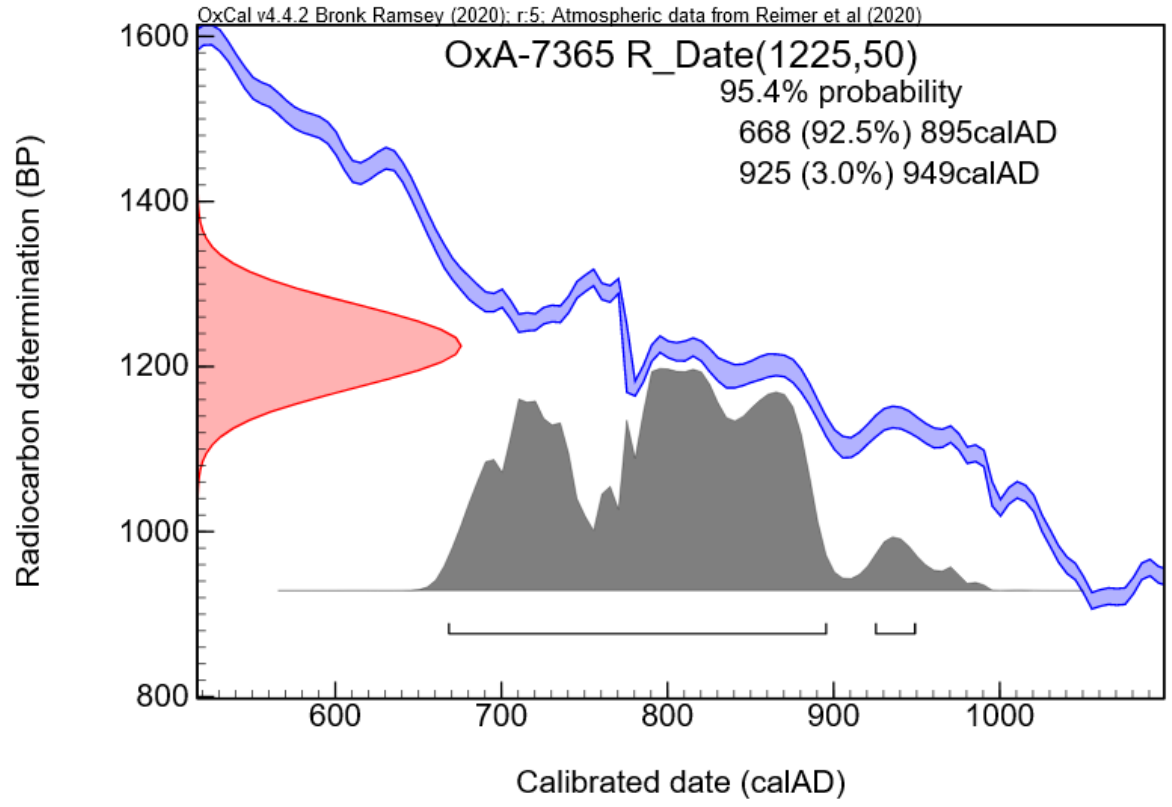
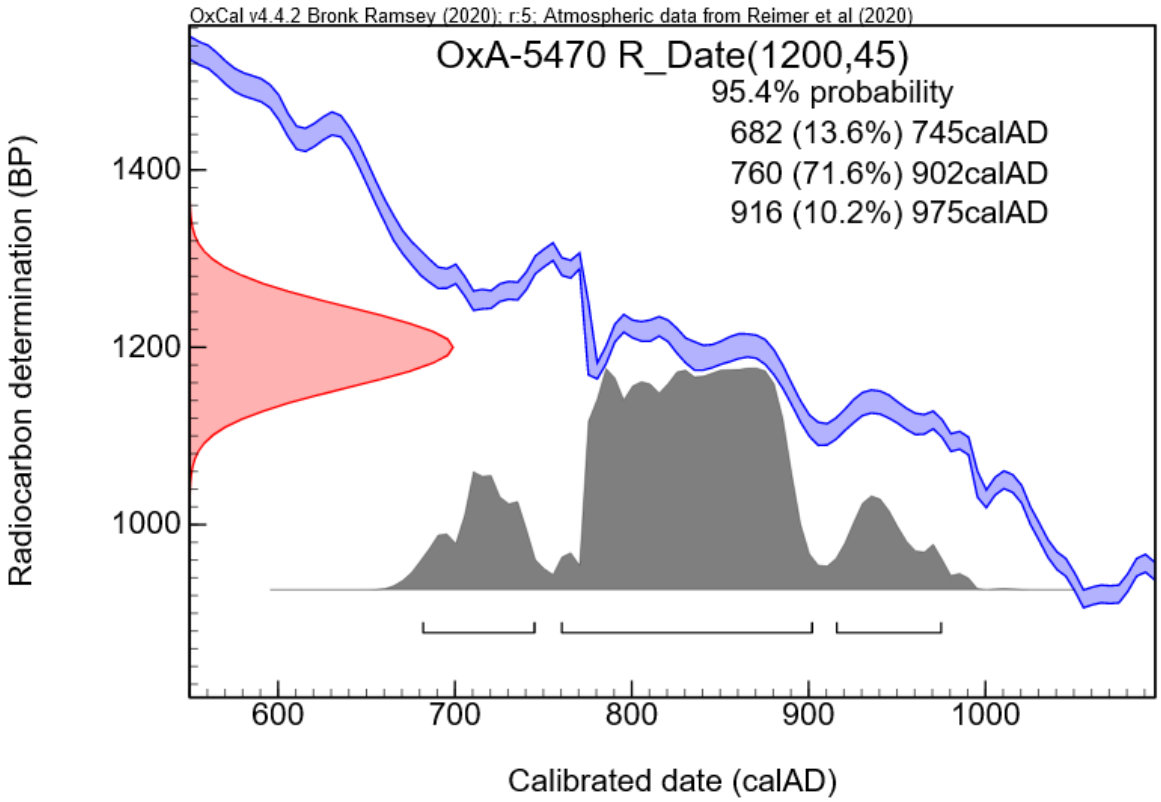
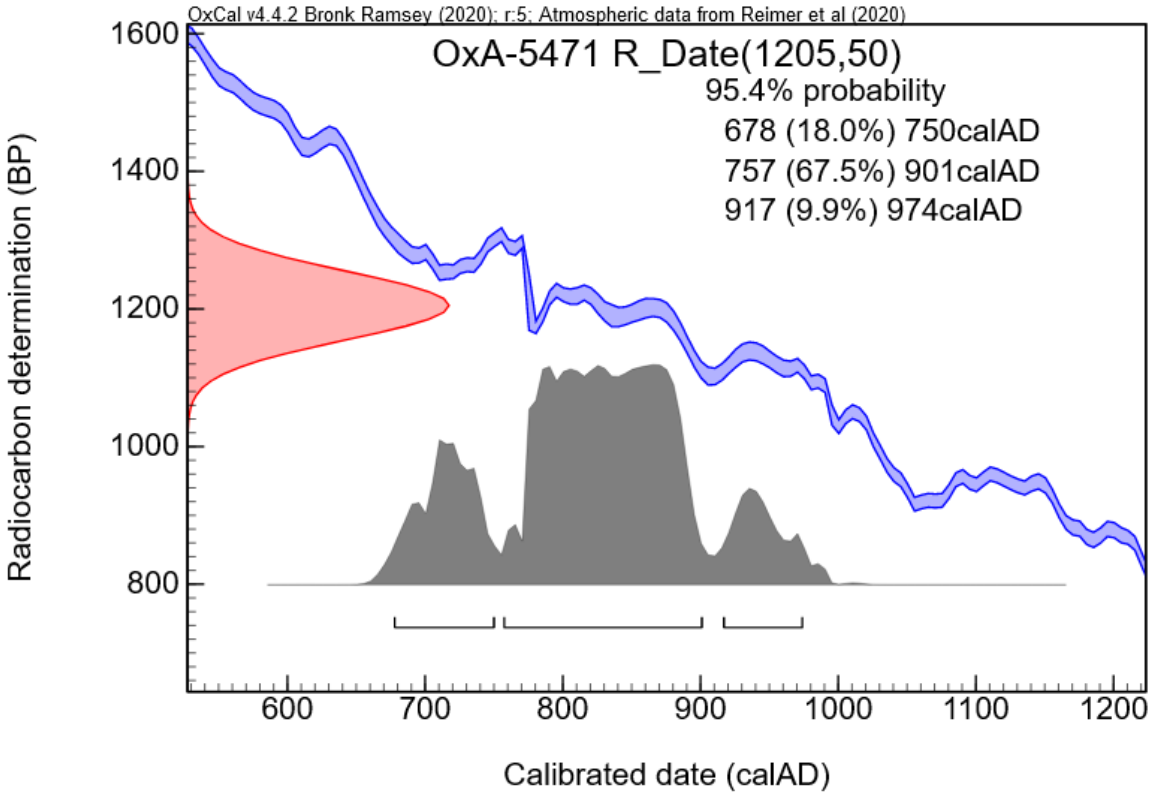
Calibration of radiocarbon determinations






OxCal v4.4.2 Bronk Ramsey (2020); r:5; Atmospheric data from Reimer et al (2020)
OxA-5470 R_Date(1200,45)
95.4% probability
682 (13.6%) 745calAD
760 (71.6%) 902calAD
916 (10.2%) 975calAD
Radiocarbon determination (BP)
1400
1200
1000
600
700
800
900
1000
Calibrated date (calAD)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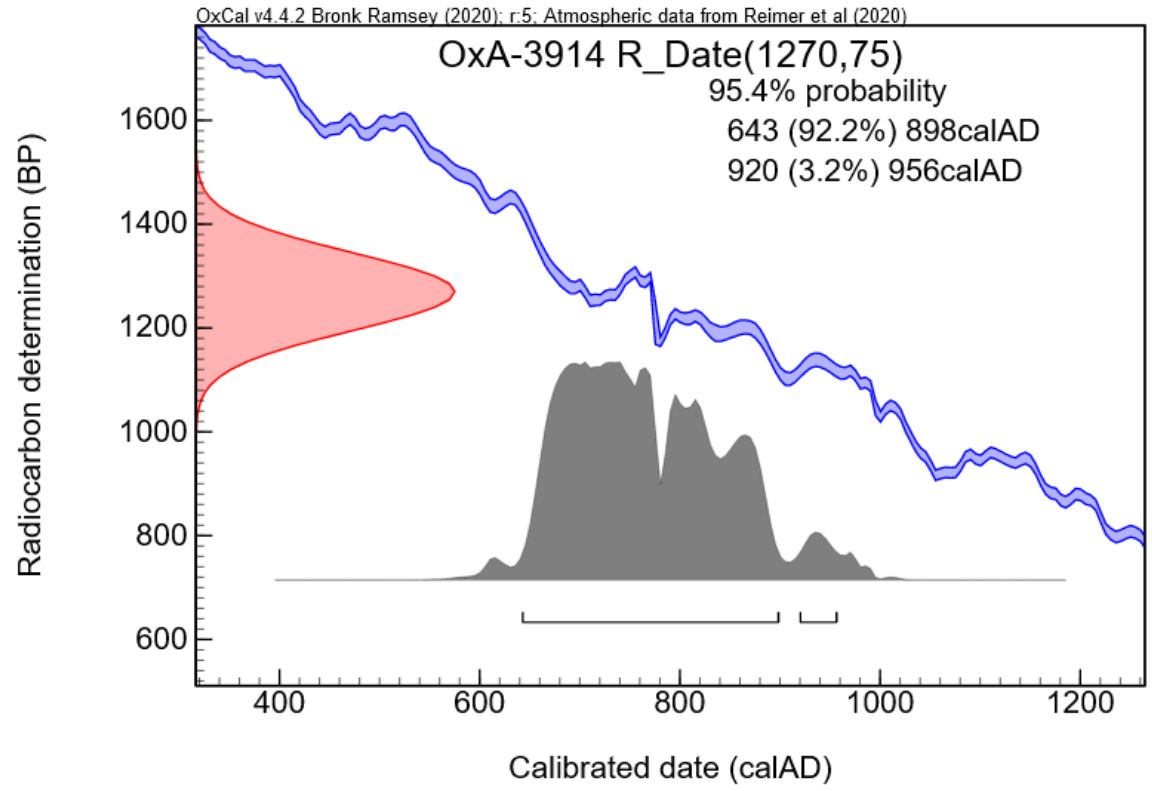
OxA-5471 R_Date(1205,50)
95.4% probability
678 (18.0%) 750calAD
757 (67.5%) 901calAD
917 (9.9%) 974calAD
Radiocarbon determination (BP)
1600
1400
1200
1000
800
600
700
800
900
1000
1100
1200
Calibrated date (calAD)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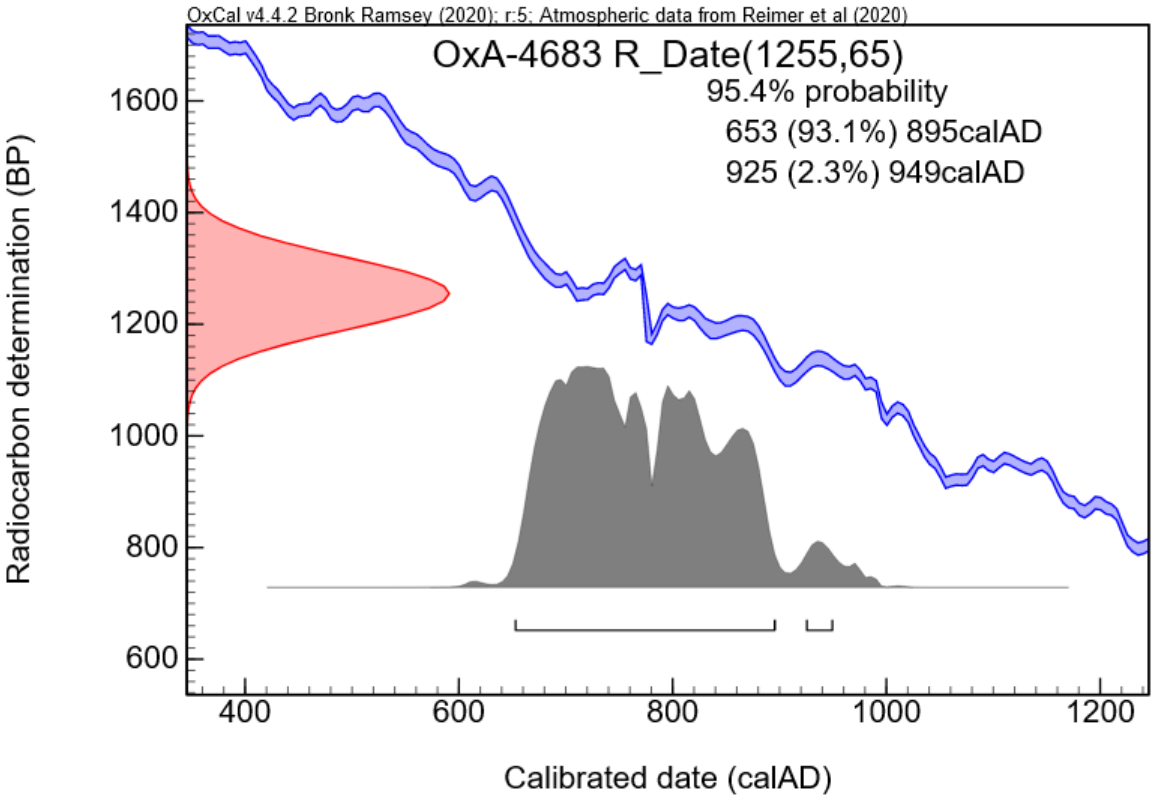
OxA-3914 R_Date(1270,75)
95.4% probability
643 (92.2%) 898calAD
920 (3.2%) 956calAD
Radiocarbon determination (BP)
1600
1400
1200
1000
800
600
400
600
800
1000
1200
Calibrated date (calAD)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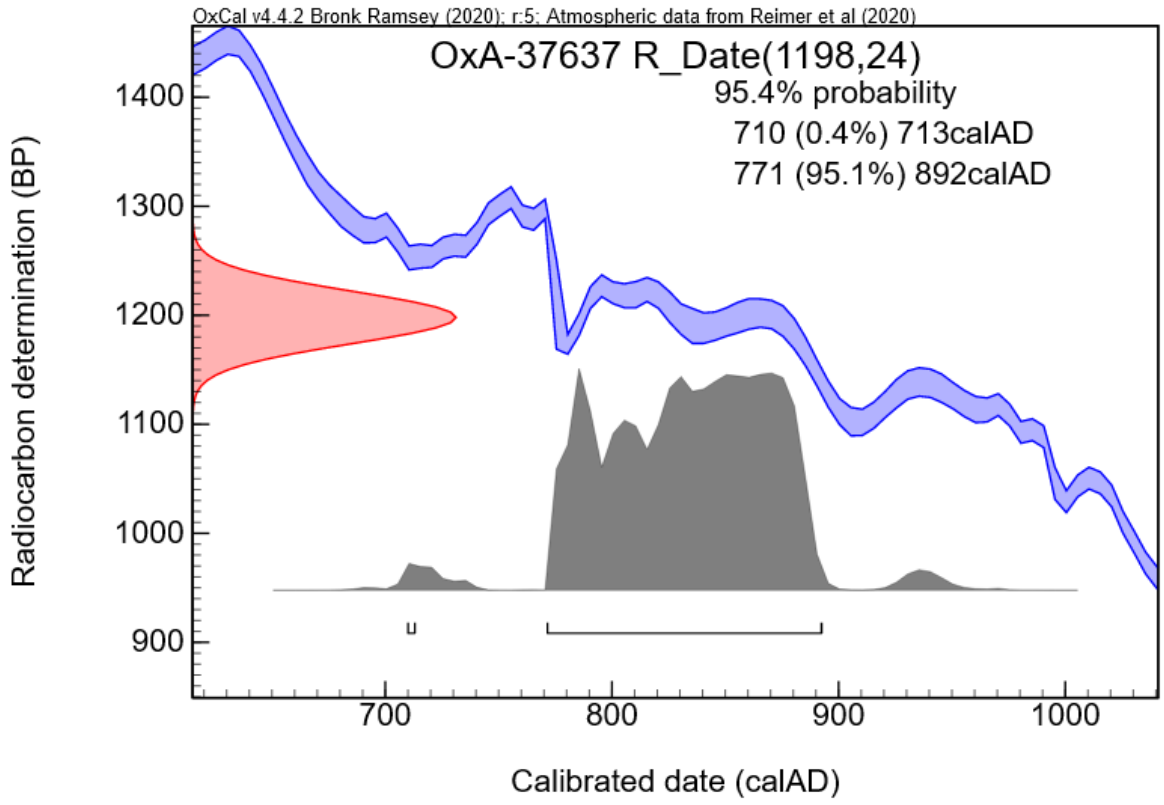
OxA-4683 R_Date(1255,65)
95.4% probability
653 (93.1%) 895calAD
925 (2.3%) 949calAD
Radiocarbon determination (BP)
1600
1400
1200
1000
800
600
400
600
800
1000
1200
Calibrated date (calAD)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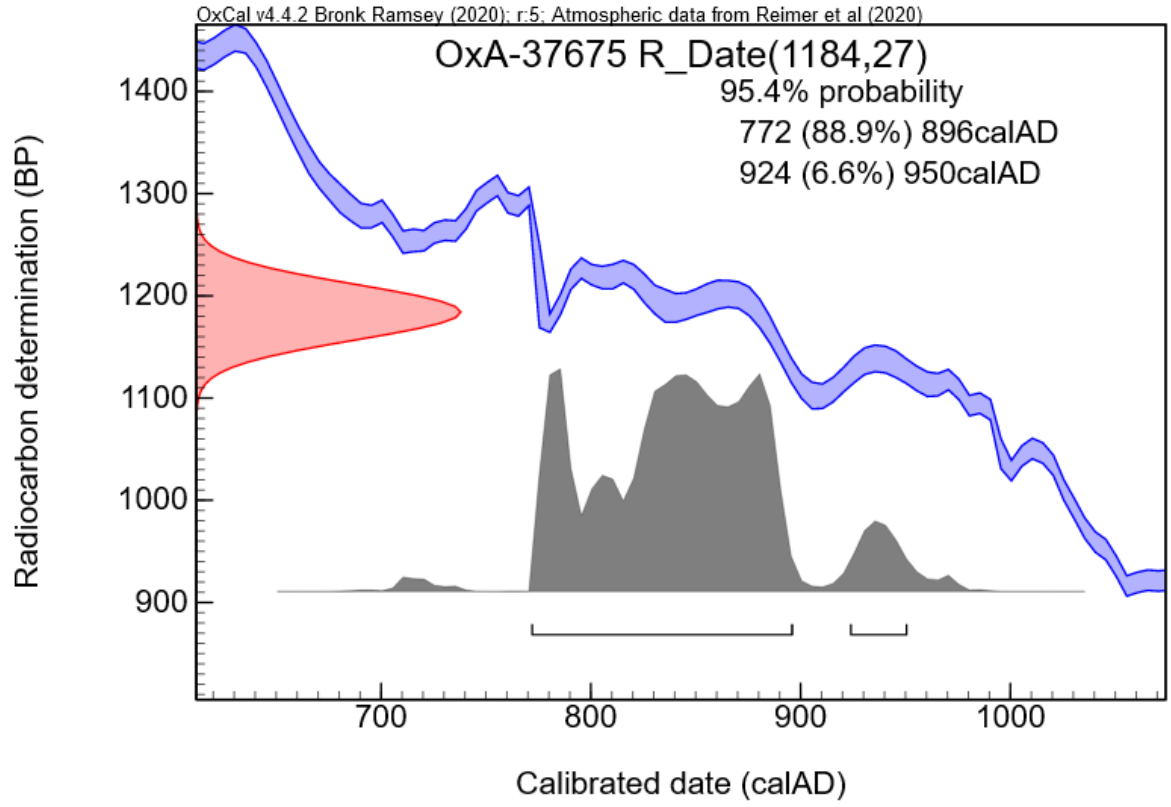
OxA-37637 R_Date(1198,24)
95.4% probability
710 (0.4%) 713calAD
771 (95.1%) 892calAD
Radiocarbon determination (BP)
1400
1300
1200
1100
1000
900
700
800
900
1000
Calibrated date (calAD)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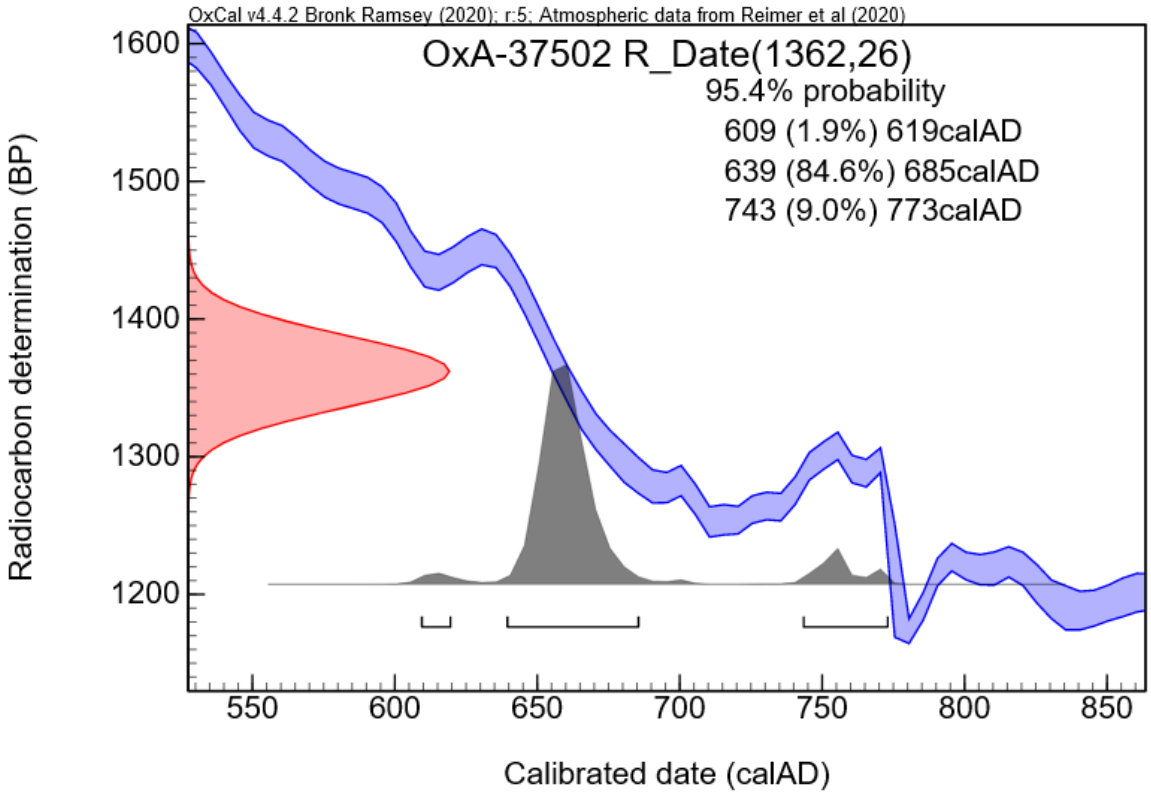
OxA-37675 R_Date(1184,27)
95.4% probability
772 (88.9%) 896calAD
924 (6.6%) 950calAD
Radiocarbon determination (BP)
1400
1300
1200
1100
1000
900
700
800
900
1000
Calibrated date (calAD)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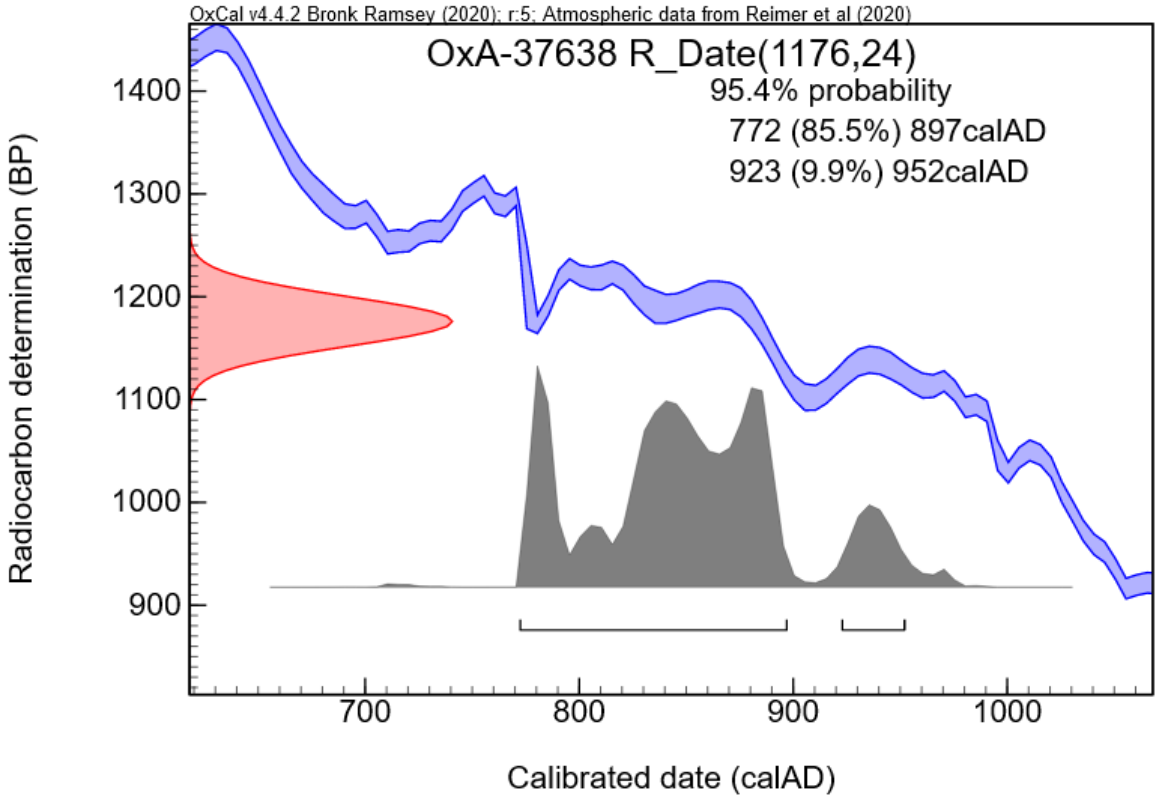
OxA-37502 R_Date(1362,26)
95.4% probability
609 (1.9%) 619calAD
639 (84.6%) 685calAD
743 (9.0%) 773calAD
Radiocarbon determination (BP)
1600
1500
1400
1300
1200
550
600
650
700
750
800
850
Calibrated date (calAD)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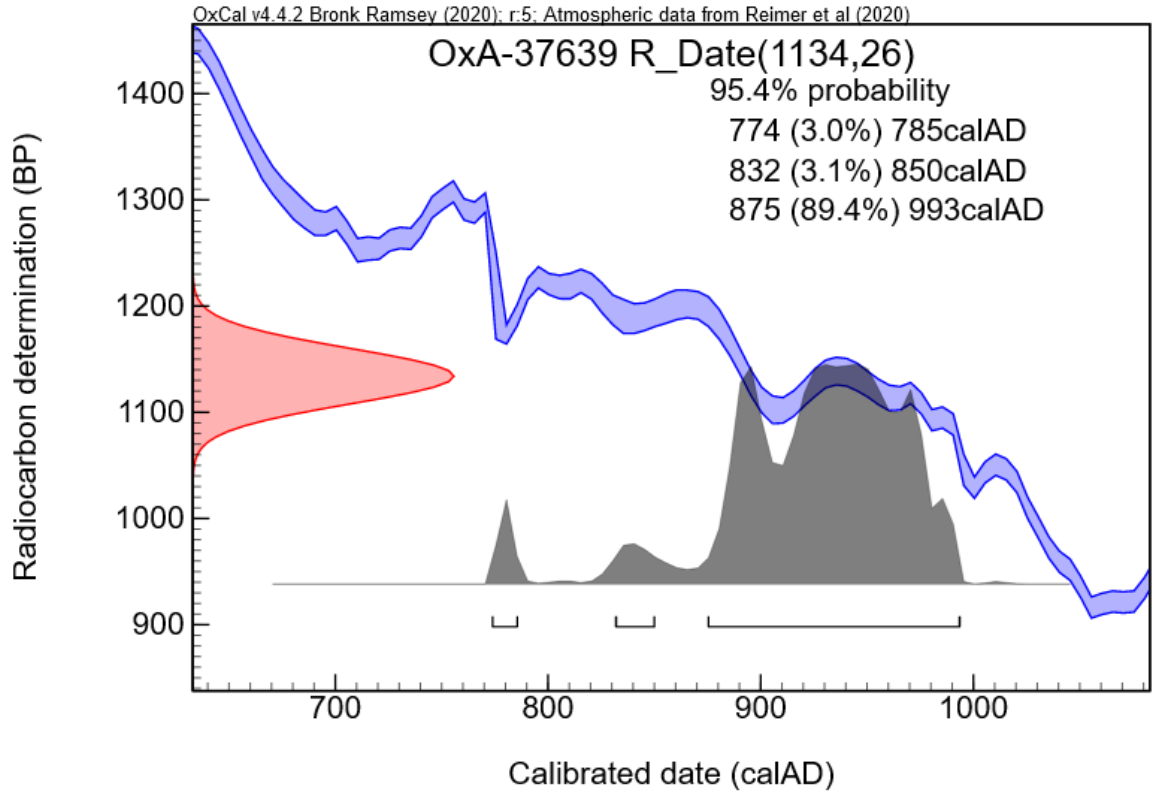
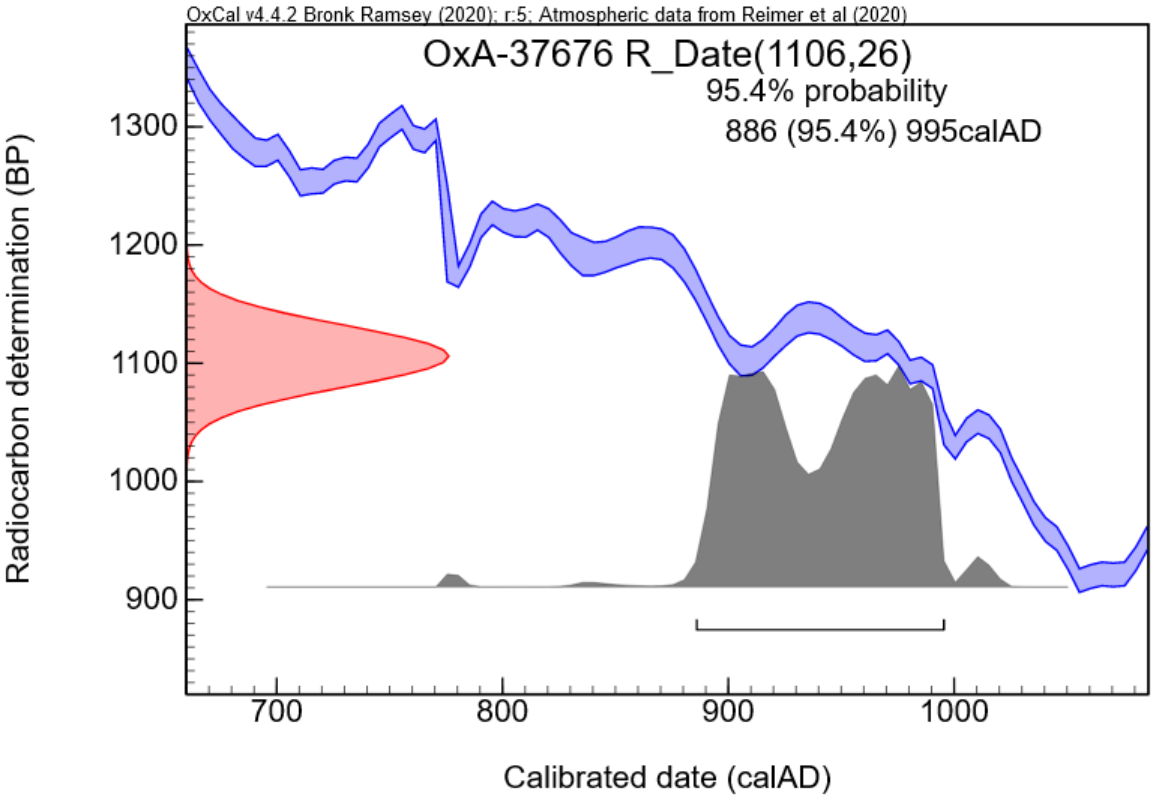
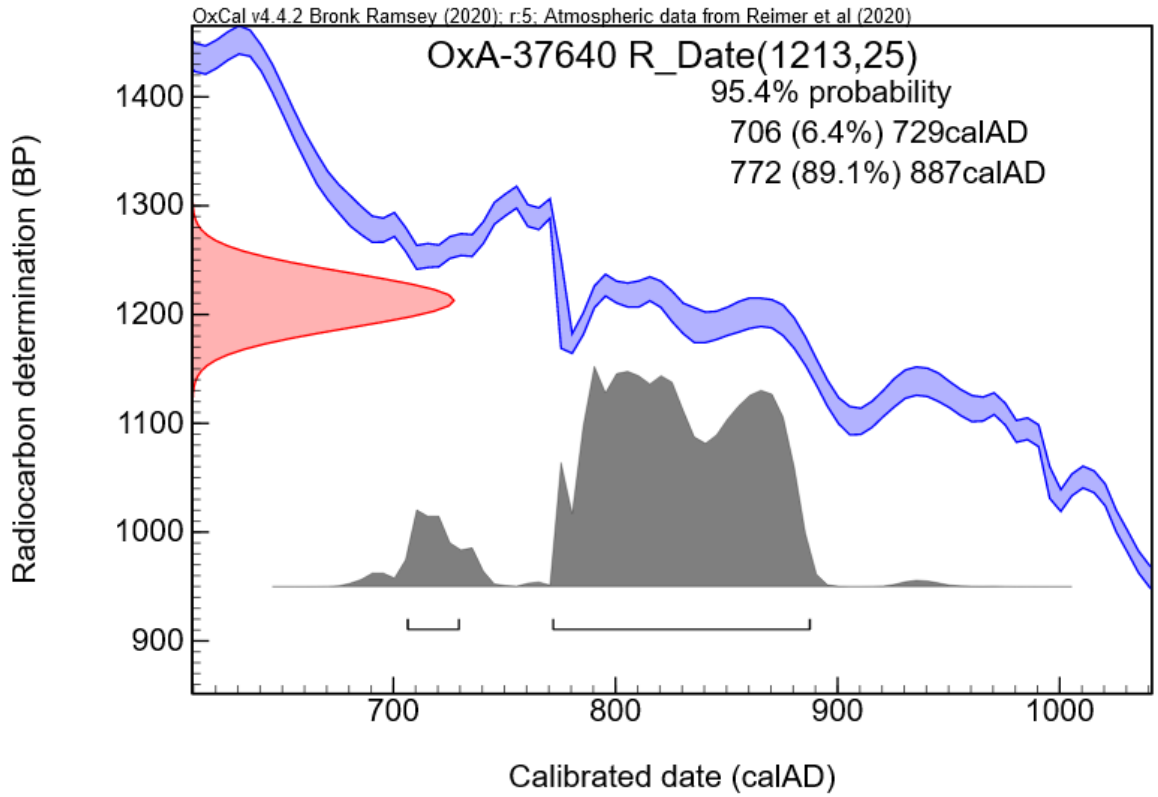
OxA-37638 R_Date(1176,24)
95.4% probability
772 (85.5%) 897calAD
923 (9.9%) 952calAD
Radiocarbon determination (BP)
1400
1300
1200
1100
1000
900
700
800
900
1000
Calibrated date (calAD)


OxCal v4.4.2 Bronk Ramsey (2020); r:5; Atmospheric data from Reimer et al (2020)
OxA-37639 R_Date(1134,26)
95.4% probability
774 (3.0%) 785calAD
832 (3.1%) 850calAD
875 (89.4%) 993calAD
Radiocarbon determination (BP)
1400
1300
1200
1100
1000
900
700
800
900
1000
Calibrated date (calAD)


OxCal v4.4.2 Bronk Ramsey (2020); r:5; Atmospheric data from Reimer et al (2020)
OxA-37676 R_Date(1106,26)
95.4% probability
886 (95.4%) 995calAD
Radiocarbon determination (BP)
1300
1200
1100
1000
900
700
800
900
1000
Calibrated date (calAD)


OxCal v4.4.2 Bronk Ramsey (2020); r:5; Atmospheric data from Reimer et al (2020)
OxA-37640 R_Date(1213,25)
95.4% probability
706 (6.4%) 729calAD
772 (89.1%) 887calAD
Radiocarbon determination (BP)
1400
1300
1200
1100
1000
900
700
800
900
1000
Calibrated date (calAD)