ENGLISH HERITAGE

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Dear Tim

NANTWICH WATERLOGGED DEPOSITS – RADIOCARBON DATING

I have just received the final pair of radiocarbon results, for the samples from the wooden trackway at Welsh Row, and I have added them to the results table. Please note the addition of another methodological reference as well as other minor changes to the discussion.

Laboratory number	Sample reference and depth in core	Material dated	$\delta^{13}C$ (‰)	Radiocarbon age (BP)	Calendar date (95% confidence)
Borehole F					
OxA-18722	Spot sample 3, 0.76–0.82m	*Ulmus* sp. sapwood	-24.6	150 ±23	cal AD 1660–1950
SUERC-18781	076100F06, 0.76–1.00m	hazel nutshell	-25.7	775 ±30	cal AD 1210–1290
OxA-18683	100125F05, 1.00–1.25m	hazel nutshell	-24.5	946 ±20	cal AD 1020–1160
SUERC-18780	125150F04, 1.25–1.50m	sloe stone	-27.1	970 ±30	cal AD 1010–1160
OxA-18721	150186F03, 1.50–1.86m	hazel nutshell	-24.3	966 ±23	cal AD 1010–1160
Borehole N					
OxA-18684	Spot sample 6A, 2.00–2.05m	*Salix* sp. wood	-24.8	1068 ±23	cal AD 890–1020
SUERC-18782	Spot sample 6B, 2.00–2.05m	*Corylus* sp. wood	-27.2	1130 ±30	cal AD 780–990
SUERC-18783	Spot sample 8, 2.23–2.33m	*Alnus* sp. wood	-27.1	1215 ±30	cal AD 690–890
OxA-18723	Spot sample 9, 2.35–2.40m	*Fraxinus* sp. roundwood	-28.5	1071 ±24	cal AD 890–1020
OxA-18724	Spot sample 10A, 2.62–2.70m	*Salix* sp. roundwood	-28.2	1192 ±24	cal AD 730–940
SUERC-18784	Spot sample 10B, 2.62–2.70m	*Salix* sp. roundwood	-27.1	1215 ±30	cal AD 690–890
Borehole P					
SUERC-18786	150163P09, 1.50–1.63m	hazel nutshell	-25.2	865 ±30	cal AD 1040–1260
OxA-18726	163173P08, 1.63–1.73m	hazel nutshell	-20.6	840 ±25	cal AD 1160–1260
SUERC-18785	173191P07, 1.73–1.91m	hazel nutshell	-27.7	910 ±30	cal AD 1030–1210
OxA-18725	191200P06,	hazel	-23.3	841 ±24	cal AD 1160–1260

	1.91–2.00m	nutshell			
Borehole AD (Welsh Row brushwood trackway)					
GrN-31797	Timber 1	*Acer campestre*	-29.6	945 ±15	cal AD 1020–1150
GrN-31798	Timber 2	*Alnus* sp.	-27.8	970 ±15	cal AD 1025–1160

Discussion

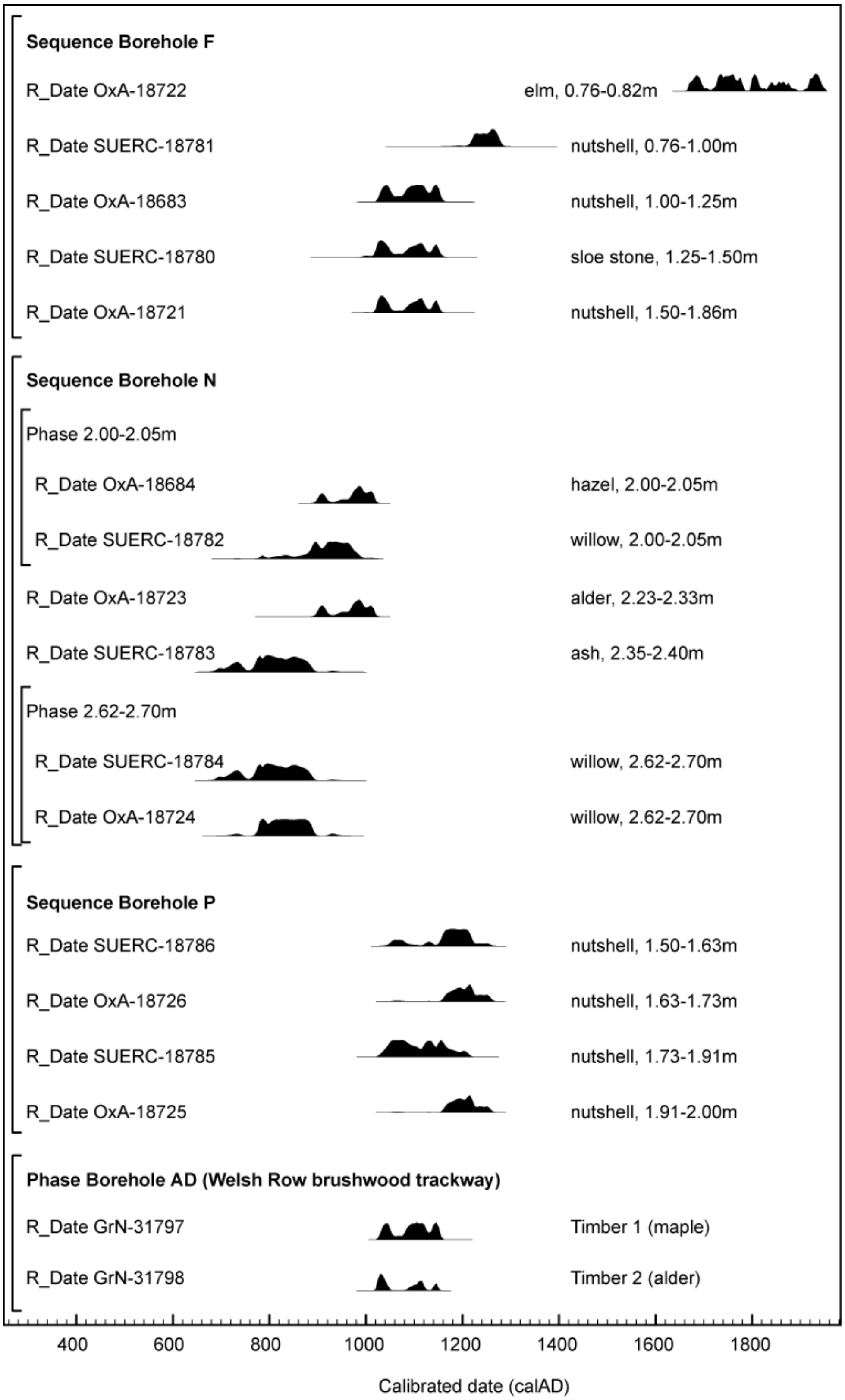
Each sample consisted of a single-entity short-lived plant macrofossil or timber (Ashmore 1999). The samples from Boreholes F, N, and P were dated by Accelerator Mass Spectrometry (AMS) radiocarbon dating at the Scottish Universities Environmental Research Centre in East Kilbride (SUERC; technical procedures are described by Vandenputte *et al* (1996), Slota *et al* (1987), and Xu *et al* (2004)), or at the Oxford Radiocarbon Accelerator Unit (OxA; laboratory methods are given by Bronk Ramsey *et al* (2002; 2004)). The Welsh Row timbers were dated by Gas Proportional Counting at the Centre for Isotope Research, Groningen University, The Netherlands, following Mook and Streurman (1983). Internal quality assurance procedures at all three laboratories and international inter-comparisons (Scott 2003) indicate no laboratory offsets, and validate the measurement precision quoted.

The results reported are conventional radiocarbon ages (Stuiver and Polach 1977). The calibrated date ranges have been calculated by the maximum intercept method (Stuiver and Reimer 1986), using the program OxCal v4.05(Bronk Ramsey 1995; 1998; 2001; 2008) and the IntCal04 data set (Reimer *et al* 2004), and are quoted in the form recommended by Mook (1986), with the ranges rounded outwards by 10 years, or by 5 years where the radiocarbon error is less than ±25. The probability distributions shown in the figure below have been calculated using the probability method (Stuiver and Reimer 1993), and the same data.

The four results from Borehole P are statistically consistent with a single radiocarbon age (T' = 4.1, T'(5%) = 7.8, ν = 3; Ward and Wilson 1978), and could thus be of the same calendar date. This is what we would expect to find if the organic deposit between 1.50 and 2.00m depth in this core had accumulated very rapidly.

The six results from Borehole N are not statistically consistent (T' = 35.4, T'(5%) = 11.1, ν = 5), and these samples therefore cannot all be of the same date. You can see from the figure that although SUERC-18783 (spot sample 8) appears to be slightly earlier than the underlying OxA-18723 (spot sample 9), there is a general trend for samples from stratigraphically-earlier levels to be older than those from later levels, which we would expect to find if the samples were not intrusive or residual, and if a period of time had elapsed between deposition at 2.70m and 2.00m. This suggests that the waterlogged deposit in this section of the borehole dates to the late Saxon period, an impression reinforced by the statistical consistency between results from the two samples at the top of this deposit, 6A and 6B (OxA-18684 and SUERC-18782; T' = 2.7, T'(5%) = 3.8, ν = 1), and those at the base of it, 10A and 10B (OxA-18724 and SUERC-18784; T' = 0.4, T'(5%) = 3.8, ν = 1). It is difficult to say precisely when sedimentation at these levels took place, or what time span is represented by the waterlogged deposit between 2.00 and 2.70m; it could be as little as a few decades in the ninth and/or tenth century AD.

The five results from Borehole F fail the test of consistency by a wide margin (T' = 872.1, T'(5%) = 9.5 ν = 4), but this is due to the post-medieval elm spot sample 3 (OxA-18722) at 0.76–0.82m depth. The four medieval results are still not consistent, however (T' = 31.0, T'(5%) = 7.8, ν = 3), and the nutshell at 0.76–1.00m is appreciably more recent than the three samples from lower in the core. Whether the thirteenth-century date of this sample provides more than just a *terminus post quem* for this deposit is worth thinking about, but at any rate the deposit appears to be significantly later than the waterlogged deposit between 1.86 and 1.00m in the core, which may have accumulated rapidly in the eleventh or twelfth century AD; the three results here are statistically indistinguishable (T' = 0.6, T'(5%) = 6.0, ν = 2).



The two results from Borehole AD are statistically consistent with a single radiocarbon age (T' = 1.4, T'(5%) = 3.8, ν = 1; Ward and Wilson 1978), and could thus be of the same calendar date – as expected, given that neither timber had a significant intrinsic age and that the two timbers formed part of the same structure. If we assume that this trackway was built of freshly-felled timber, it was built between the early-mid eleventh century and the middle of the twelfth century cal AD. This is somewhat later than the post-Roman date permitted by the sherds in the underlying deposit, and a century or two earlier than the dendro-dated corduroy trackway nearby.

If you have any questions, please don't hesitate to contact me.

Regards,

John Meadows

PS If you want to edit the figure above, or simply need it in a different format or with a better resolution, please let me know.

Cc: J Stopford
D Quinn

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