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Ancient Monuments Laboratory
Report 35/89

ARCHAEOMAGNETIC DATING: IRTHLINGBOROUGH, NORTHANTS.

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Summary

The archaeomagnetic dating of a burnt clay deposit in a 'tree-fall hollow' at Irthlingborough has produced an unreliable result owing to its weak and unstable magnetic signature.

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Archaeomagnetic Dating: Irthlingborough, Northants.

Introduction

The burnt clay fill of an excavated 'tree-fall hollow' was sampled in the hope of dating the burning episode with which it was associated. It was a possibility that the fill had remained **in situ** since being burnt and therfore that a remanent geomagnetic direction contemporary with this episode might be measureable.

Method

The burnt clay was sampled using the disc method (see notes), and orientation was by gyro-theodolite. Unfortunately, due to the poor consistency of the sampled material and the wet conditions the size of some of the samples recovered was smaller than is preferred. Furthermore, for the same reasons, some samples disintegrated; in the end it was possible to measure only the remanences of the nine samples discussed below.

Results

The directions of natural remanent magnetisation (NRM) and magnetic intensity of the samples are summarised in the table below. The measurements of declination and inclination have been normalised to values consistent with a national average centred at Meriden.

Sample	Declination (Deg)	Inclination (Deg)	Intensity (gamma)
IR1	20.111	60.768	0.984
IR2	84.178	38.069	6.475
IR3	78.723	83.684	12.163
IR4	52.282	60.736	42.271
IR5	75.686	20.218	72.976
IR6	1.720	73.268	24.103
IR7	32.732	65.948	13.611
IR8	29.762	70.840	28.862
IR9	62.565	57.233	20.223

It is clear from the above table that the thermo-remanent directions are highly scattered. Due to the variation in sample size, the intensity of the magnetic remanence contained within the samples also varies considerably. Nevertheless, low intensity alone does not appear to be the primary reason for the variation of magnetisation between samples, since IR5, with the strongest intensity, has a clearly anomalous inclination. This would seem to suggest that the material sampled was not heated above its blocking temperature, thus only achieving partial magnetic alignment.

An average NRM has been calculated, although three samples (IR2,

IR3 and IR5) had to be excluded from this since their inclinations fall outside the 50 to 80 degree range in which magnetic inclination has varied over the past ten thousand years. The mean direction of the remaining six samples was found to be:

Dec = 36.6 +/- 11.1 Deg East; Inc = 66.1 +/- 4.5 Deg;

alpha-95 = 5.9 Deg

Using the detransformed geomagnetic secular variation curve obtained from lake sediment evidence (Turner and Thompson, 1982), the following date range was obtained for this mean direction (see Fig. 1):

3720 - 3530 cal BP at the 68% confidence level.

The alpha-95 statistic quoted above reflects the degree of scattering inherent in the measured NRM readings. The magnitude of this value suggests that little confidence can be placed in the date obtained. Demagnetisation of the samples, to remove spurious viscous magnetisation, was not attempted because of the already very weak original magnetic intensities.

Conclusions

Three reasons must be considered in attempting to account for the high degree of scattering in the measured magnetic directions:

1) The material sampled had been re-deposited or distorted since firing. In this case the date obtained above is invalid owing to the necessity for the sediment to have remained static since firing.

2) Spurious magnetic directions may also have resulted from the subsequent downward translocation of magnetic minerals which have in turn corrupted alignments within the sediment.

3) The firing temperature was below the blocking temperature of the clay in question, allowing only partial magnetic alignment.

Owing to one or more of these reasons, magnetic directions within the deposit are very variable and it must be concluded that the resulting calculation of a date can only be extremely tentative.

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Reference:

1) Turner G. M. and Thompson R., Detransformation of the British geomagnetic secular variation record for Holocene times, Geophys. J. R. astr. Soc. 70 pp 789-792, 1982.

Figure 1) Projection of mean magnetic direction at the 68% confidence level (solid lines), onto the lake sediment curve (Turner and Thompson, 1982). Dashed lines indicate most probable date range.