

THE ARCHAEOMAGNETIC DATING OF TWO 14TH-15TH CENTURY HEARTHES

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(The cross-references denoted 'CQ' in this paper relate to *Charter Quay, The Spirit of Change*, Wessex Archaeology 2003)

Introduction

The two hearths were originally thought to be a single feature, although there was a suspicion on site that the context to be sampled for archaeomagnetic dating might be two features. To cover this possibility a larger number of samples than usual were taken. This view was confirmed both in the laboratory, where the samples fell into distinct groupings, and subsequently on site when a further excavation revealed the two hearths (see CQ p. 28; Fig. 49).

The samples from the central area of the feature suggested that there had been some subsidence or damage to this area in antiquity. These samples were not therefore used in the determination of the final dates.

1. Measurement ref. **CL-23/1**
Feature: Hearth, Context 2724
Lat: 51.41° N; Long: 0.31° W
Orientation: Gyro theodolite
Sampling method: Discs
No. of samples used/taken: 8/8
Removal of viscous magnetism:
Samples 11/11/98. Final report 9/12/98

In the laboratory, the samples were found to be highly magnetised. Preliminary processing was carried out before a pilot sample was subjected to the staged de-magnetisation process to remove any viscous magnetism present. De-magnetisation did not result in an improvement of the overall results. Therefore the date range presented below is that obtained prior to de-magnetisation.

The mean direction of magnetic remanence after the last firing was:

Dec = 0.13° W; Inc = 59.33°; alpha-95 = 2.31°

This gives a date range of **1375-1400 AD** at the 68% confidence level.

2. Measurement ref. CL-23/2
Feature: Hearth, Context 2280
Lat: 51.4° N; Long: 0.31° W
Orientation: Gyro theodolite
Sampling method: Discs
No. of samples used/taken: 5/5
Removal of viscous magnetism:
Samples 11/11/98. Final report 9/12/98

In the laboratory, the samples were found to be magnetised. Preliminary processing was carried out before a pilot sample was subjected to the staged de-magnetisation process to remove any viscous magnetism present. De-magnetisation did not result in an improvement of the overall results. Therefore the date range presented below is that obtained prior to de-magnetisation.

The mean direction of magnetic remanence after the last firing was:

Dec = 3.03° W; Inc = 59.76°; alpha-95 = 3.22°

This gives a date range of **1390-1410 AD** at the 68% confidence level.

Principles behind archaeomagnetic dating

The Earth's magnetic field is constantly changing both in direction and intensity. It is generally agreed that the magnetic field is caused by dynamo process within the Earth's liquid outer core. Around 80% of the field can be explained by imaging a bar magnet at the centre of the Earth and inclined at an angle of 11 degrees to the axis of rotation. The remaining 20% is caused by localised turbulence in the outer core. This is called the geomagnetic secular variation which makes archaeomagnetic dating possible. For archaeological dating it is the variation in the local fields which is most applicable.

In order to exploit these changes and use them for dating purposes we first need to establish a calibration curve which describes the changes in the local field over the historical period. Because of the random nature of the secular variation such a curve will follow no particular law and its shape will vary drastically from one part of the Earth to the other. The curve for Britain can be extrapolated to Ireland and Northern France.

References

- Clark, A.J., Tarling, D.H. and Noel, M., 1988. Developments in archaeomagnetic dating in Britain. *Journal of Archaeological Science* **15**, 645-667.
- Turner, G.M. and Thompson, R., 1982. Detransformation of the British geomagnetic secular variation record for Holocene times. *Geophysical Journal of the Royal Astronomical Society* **70**, 789-792.