



designed to build on the potential of rapid magnetometer survey for investigating hillfort interiors on chalkland geology shown by earlier surveys at sites such as Maiden Castle and in the Danebury Environs.

The project aims were to:

- i) better define and assess the archaeological resource preserved inside hillforts in order to help guide future management and conservation initiatives and
- ii) expand the presently limited extent of our understanding of hillfort interiors across a single region.

The project has revealed a wealth of new evidence for the nature of the internal utilisation of Wessex hillforts. While supporting some of the existing models of hillfort development, the surveys also show that the pattern is considerably more complex and varied than previously realised. A complete set of results from the project will be presented publicly for the first time and their interpretation discussed (discussion of significance of the results among participants will be very welcome as their interpretation is currently only at a preliminary stage)

If time permits, Wessex hillforts will be contrasted with geophysical results just obtained from the concentration of hillforts around the foothills of the Cheviots in the Northumberland National Park. The different geophysical approaches required to optimise the information recovered from these sites (of intrinsically different character to their Wessex counterparts) by non-destructive means will briefly be discussed.

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Investigation of Hearth Fuel Sources on Lewis Using Mineral Magnetism

As part of a wider research programme of experimental archaeology at Callanish Farm, Isle of Lewis, Scotland, a number of experimental hearths were constructed, based on excavated evidence from the Late Iron Age houses at Bosta. Controlled and repeated burning of different fuel sources, for example well-humified peat, fibrous-upper peat, peat turf and wood was carried out over a number of burning episodes of three day durations.

A range of mineral magnetic measurements, including remanences and the variation of susceptibility with high temperature, were taken from the resulting ash samples. The high temperature susceptibility measurements show that the fibrous upper peat and peat turf have a single magnetic component, with loss of susceptibility between 570 and 600 °C. In comparison the well-humified peat and the wood display a loss in susceptibility at significantly lower temperatures, with many samples having two distinct magnetic components. Stepwise discriminant analysis

was performed on the room temperature magnetic data. A biplot of the resulting two main variables distinguishes between the four different sources.

Magnetic measurements were also carried out on hearth samples from two archaeological sites, Galson and Guinnerso, on

Lewis. Comparison was made to the ash samples in order to determine if the fuel sources could be identified. Both the high temperature susceptibility curves and the discriminant analysis suggest that for the two selected sites the predominant fuel source was well-humified peat.

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Mineral Magnetic Study of Enhanced Soils from Old Scatness Broch, Shetland

Measurements of in-situ and laboratory-based magnetic susceptibilities on material from the multi-period Old Scatness Broch site on Shetland, Scotland have indicated greatly enhanced soils. The enhancement in susceptibility is associated with midden deposits and is over one hundred times the susceptibility of surrounding deposits. In order to understand the origin of the enhancement and suggest causes for it, investigations were made to determine the nature and extent of the magnetic grains within the soils. A range of laboratory-induced remanences and susceptibilities, including the variation of susceptibility with high temperature, were measured on samples from three different areas within the site: 1) 67 samples were taken from two horizontal profiles through midden deposits within a circular post-broch structure.

Discrete layers of deposition were visible within the midden. These midden deposits gave exceptionally high in-situ magnet-

ic susceptibility values. 2) Five samples were collected from midden material deposited within a Pictish structure. 3) 88 samples were collected from a continuously sampled (at 2 cm intervals) profile within a pit dug on the outskirts of the main settlement area. The profile extends through layers of midden, soil and sand material.

In addition to determining the magnetic mineralogy and domain state of the magnetic grains, the magnetic data is also being used to compare between the different groups of material to gain an insight into changes in anthropogenic activity through time. For example, differences between the midden material collected from the circular structure and the midden material from within the Pictish structure are being investigated, which could give information on variations of fuel sources, industrial activities or burning processes between different periods.

C. W. Pierce, C. A. Shell

Three Dimensional Geophysics and Visualisation

Ground penetrating radar (GPR) and resistivity profiling provide potential routes to the generation of full three-dimensional geophysical models of buried archaeological sites. This paper reports on the development of field methodology for these two techniques in southern England, with the investigation of appropriate data processing procedures and the visualisation needs for presentation of the results in a form comprehensible to the archaeologist. These three interdependent aspects will be discussed with data examples drawn from a set of sites selected to give a broad range of site and sediment characteristics, includ-

ing buried sarsen (quartzite) stones in the West Kennett Avenue, Avebury, a sarsen-chambered neolithic long barrow with chalk mound, and the brick foundations of a late 15th Century Hall. The importance of appropriate procedures for topographic correction is emphasised, particularly where simple correction algorithms available in commercial software are limited in their applicability. Animation has a potentially significant role in the visualisation of multi-dimensional data, especially where data are available from complementary resistivity and GPR surveys.