

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.

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## 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 15<sup>th</sup> 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.