3.17 Geophyscial Survey at Sand, Applecross | Nyree Finlay & Louise McAllan

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Finlay,_geophysics.pdf'.

Introduction

In Spring 2004, geophysical survey was undertaken at Sand, near Applecross (NG6841 4934) around the site excavated in 2000 by Scotland's First Settlers Project (Hardy & Wickham-Jones 2000; Hardy, Section 3.2). The survey was undertaken as part of a pilot project to explore the geophysical signature of Mesolithic sites (Finlay 2004). Geophysics is currently rarely used in Mesolithic research and in the long run the project aimed to demonstrate whether it works as a research methodology for the discovery and investigation of hunter-gatherer sites (Finlay & Sharpe nd). The aim of this survey was to explore the geophysical response of the shell midden deposit and to identify whether the extent of the unexcavated midden could be discerned using gradiometry and resistivity techniques. Unfortunately due to a technical fault, the resistivity survey was abandoned and only the gradiometry results can be presented.

Methodology

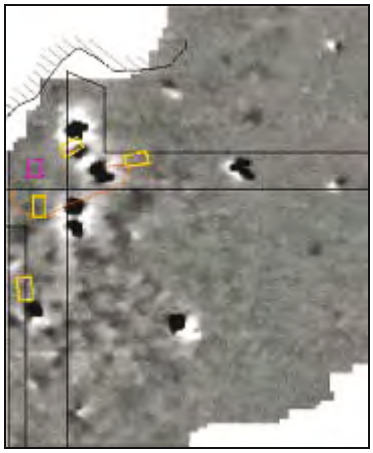
Illus 528: Midden deposits visible in exposed sondage pit with abandoned resistivity survey in progress

The survey was conducted over two days by a four-person team using Geoscan Research Ltd instruments across the grass covered apron in front of the rockshelter at Sand. This east-facing slope incorporates the excavated trenches (see Illustration 523, below left & Illustration 524, right). The magnetic survey was undertaken over one day, it covered a *c*500m² area and employed an FM36 Fluxgate Gradiometer set to a sensitivity of 1.0nT, allowing for the detection of features up to a depth of 1m below ground surface. A traverse and sampling interval of 0.25m was employed to enhance survey resolution and aid the detection of discrete features. Five survey grids (5m east—west × 20m north—south) were located over the excavation area (see Illustrations 523, below left & 525, below middle left) and dummy readings taken over the exposed rock in the interior of the rockshelter and at break of slope. Results were processed using Geoscan Research Geoplot v3.0 (see Illustrations 526, below middle right & 527, below right).

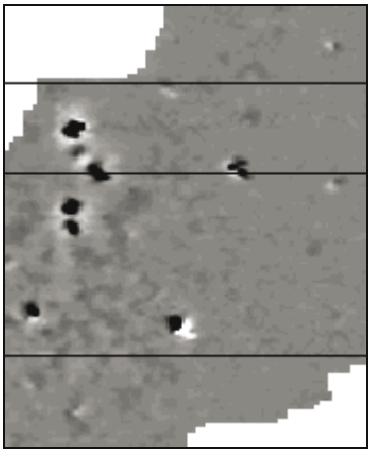
Illus 524: Gradiometry survey in progress at 0.25m intervals along north to south excavation trench

At the time of survey (April 2004), the site was grass covered with some bracken scrub and a carpet of lesser celandine flowers. Weather conditions were fair and ground

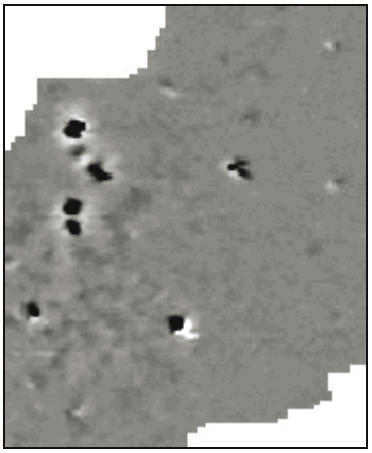
conditions dry. The trenches excavated in 2000 were clearly visible as differential grass growth and shell midden deposit (containing bone, limpet and periwinkle shells) was exposed in mole disturbance in the unexcavated areas. The day after the gradiometer survey a small square of turf was removed for other purposes and this clearly reveals the nature of the remaining midden deposit in the unexcavated areas and its proximity to the surface (see Illustration 528, above left).



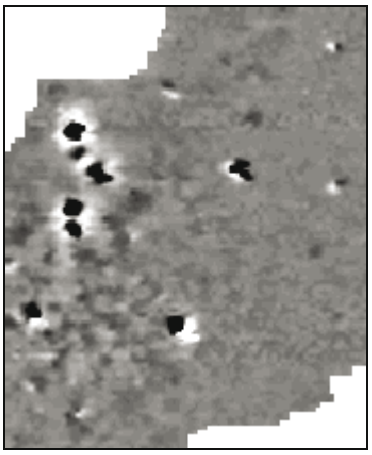
Illus 523: Location of the overall gradiometer survey area and overlay plan of site trench and test-pits



Illus 525: Position of the individual survey grids



Illus 526: Unprocessed gradiometry survey plot

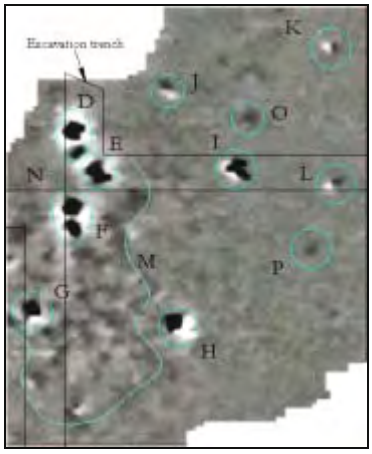


Illus 527: Processed gradiometry results. Data processed by L McAllan

Results

A Linear anomaly. This disturbed response may relate to geological features as it is located at the edge of the rockshelter collapse and top of terrace slope
B, C Linear anomalies reflect edge effects related to the survey grids (see Illustration 525, above middle left)
D, E, F These larger dipolar anomalies correspond with the excavation trenches. Fragments of slag together with the remains of a smithing hearth were recovered from the higher excavation spits in this area (Heald & Hunter, Section 3.9)
G, H, I These dipolar anomalies are isolated responses outwith the main excavated areas. They are similar in character to anomalies D–F. They may indicate further hearths or metal working activity
J, K, L These small dipolar anomalies are likely to reflect individual metal finds
M A large area of magnetic disturbance
N The area directly over the extant midden deposit produced a very subtle negative magnetic response in comparison to the surrounding areas. The edges of this deposit are obscured due to the character of the rockshelter, collapse within the interior and the dipolar anomalies in the excavated area
O, P Discrete small, enhanced magnetic anomalies.

The gradiometer survey results (see Illustration 529, right) appear to be affected by the prior excavation at the site. Of the main features listed above the large dipolar anomalies in the vicinity of the excavated trenches are the most dominant and these are interpreted as probable metal working remains based on the excavation evidence and the nature of the geophysical response. Likewise, the response to the features at G also corresponds to metal finds within one of the earlier test pits. Other similar sized anomalies, H and I, may represent comparable features or further possible hearth remains. There is also a possibility that these anomalies may represent the response from fire cracked stone due to strong thermoremanent magnetisation. The large area of disturbance (M) is likely to be a geophysical response to the quantity of fire cracked stone recovered in this area (Clarke, Section 3.6). This material was not removed from site but was later incorporated into the backfill that also included fire cracked rocks from elsewhere on site, and gravel from the sorted sieve residue, as well as stone from a neighbouring quarry exposure of similar type to the basal geology at the site (Birch *pers comm*).



Illus 529: Processed and annotated gradiometry results in relation to excavated trench

Sand: Interpretation & Discussion

The aim of the survey was to explore the geophysical response of the shell midden deposit at Sand and to see whether the unexcavated limits of the midden could be discerned using geophysical survey. Unfortunately the extent and character of the midden deposit was not easily defined. This is due to a combination of factors, some of which relate to the location and extent of the midden deposit at the site as well as extensive collapse in the rockshelter. There is also the disturbance caused by excavation as that has obscured the subtle negative responses recorded over the unexcavated midden deposit. The interpretation is also clearly influenced by the detection of dipolar responses that are likely to reflect iron objects, slag and potentially fire cracked rock as these all gave an extremely strong response.

Evidence of metal working was recovered from the excavated area and comprised the remains of a smithing hearth together with iron slag at the intersection of the two trenches. Copper alloy fragments, iron nails and other objects were found in this area and elsewhere in the trench (Hardy & Wickham-Jones 2000:67–8; Heald & Hunter, Section 3.9). Metal slag was also recovered from Test Pit 1. Overall the distribution of these metal objects corresponds with the main area of dipolar anomalies identified in the survey. Several other anomalies outwith the excavated area are likely to indicate further metal objects, igneous rocks or possibly further foci of smelting activities. This makes it difficult to ascertain whether some of these responses may relate to the fire cracked rock which, in itself, may relate to Mesolithic activity on site.

Comparable information on the geophysical responses to be anticipated from shell midden deposits is limited by the paucity of focused research. An area of enhanced magnetic readings was apparently recorded over a medieval limpet shell midden overlying Bronze Age structures at Dolphin Town, Tresco, Isles of Scilly (GSB Prospection 1999). At this site metal artefacts and rabbit disturbance also appear to have affected the results and thus potentially masked the character of the midden deposit (Taylor 2004).

In conclusion, while geophysical survey techniques were relatively unproductive at Sand in defining the extent of the midden, there is clear potential to explore further the application of these techniques prior to excavation at other shell midden sites. This research is needed to determine the character of geophysical responses and to assess the suitability of these techniques for discerning the extent of shell midden deposits. In this way, not only is the suite of non-destructive archaeological techniques for Mesolithic research extended, but also possible later events can be highlighted.

Published by The Society of Antiquaries of Scotland, in association with
the Council for British Archaeology and Historic Scotland.
Available free of charge in HTML format (see Terms & Conditions of Use).

Use http://www.sair.org.uk/sair31 to cite this page.
ISSN 1473-3803; ISBN 978 090390361 5

Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

… > Documents > Final Reports > Finlay,_geophysics.pdf