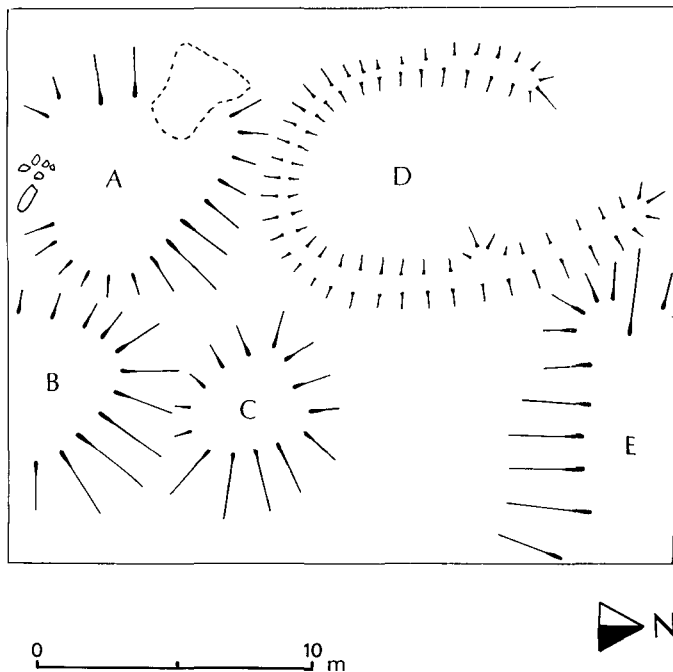


A Resistivity Survey at Tofts Ness, Sanday, Orkney

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Tofts Ness, Sanday, Orkney (NGR HY 7647) has been the subject of a detailed survey by J B Stevenson of the Royal Commission for the Ancient and Historic Monuments of Scotland (Lamb 1980, 33). A prehistoric landscape with some 300 cairns, a complex of banks and other structures has been plotted by conventional means. This form of survey is dependent upon visible remains upon the ground suggested by earthworks, stones or changes in vegetation. It is possible that the conventional survey could be supplemented by resistivity survey techniques to produce a more detailed picture of the past landscape. Tofts Ness should be ideally suited to this form of geophysical survey because its surface geology is of waterlogged sand, which offers a strong contrast to buried 'stone' archaeological features.

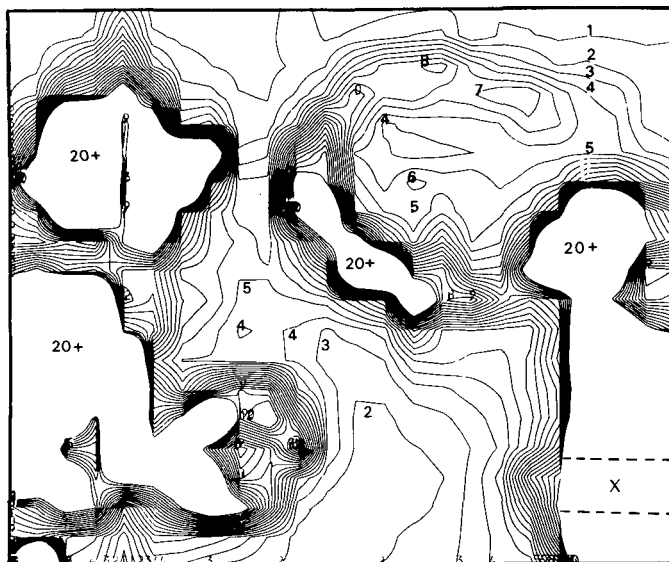


ILLUS 1 Tofts Ness: Conventional earthwork survey of the features contained by the geophysical survey grid

In August 1983 a trial grid 20 m by 24 m was surveyed over a known area of interest to the W of mound 1. The features contained were surveyed both conventionally and by the resistivity method at 1 m intervals allowing for a direct comparison of the results. This would serve to test the suitability of the resistivity technique in the discovery of archaeological remains and as an indication of how any anomalies may appear in terms of contrast and shape.

Four features were identified in the earthwork survey (illus 1), three mounds and a sub-circular enclosure. Of the mounds A and B appear to be related. They survive to a height of

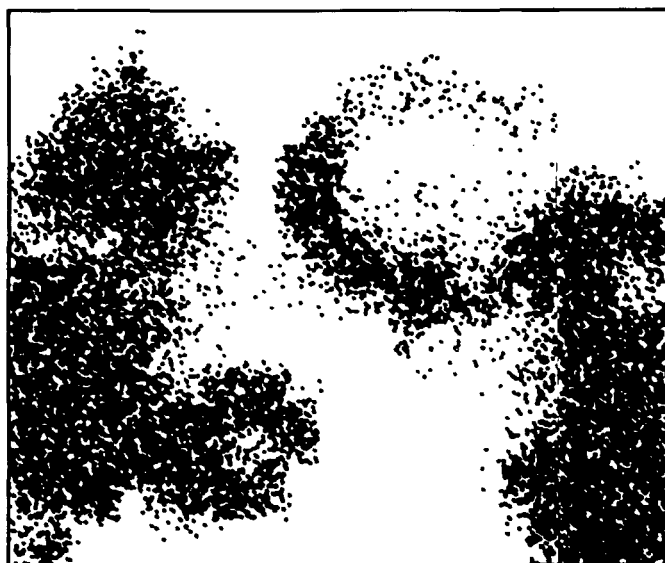
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0 10 m



ILLUS 2 Tofts Ness: Resistivity survey contour plot. Contours in 20 steps (1=30 ohms, 20=172.5 ohms)



0 10 m



ILLUS 3 Tofts Ness: Resistivity survey dot density. Parameters between 40 and 150 ohms

0.75 m with some stone visible and both suffer from erosion caused by rabbits. The circular mound C is a cairn 7 m in diameter with a height of 0.5 m. D is a sub-circular enclosure, possibly a 'hut circle' of diameter approximately 8 m, its bank does not exceed 0.5 m in height and varies in width between 0.75 and 2 m with no stone visible. Only the southern edge of mound E was present in the survey grid. This was 0.75 m high and appeared to be composed of stone and sand.

The resistivity survey was carried out using the 'twin probe configuration' which consists of two 'remote' probes providing a fixed constant resistance and two electrodes mounted on a frame acting as a moving pair of probes which measure the variation in resistance. A Bradphys MKIV constant current resistivity meter was used, the data being logged into an Epson HX-20 microcomputer and processed in the field. The data were then transferred to Bradford University's Cyber 170-720 main frame computer for the contour plot (illus 2) and a Hewlett-Packard HP2100 minicomputer for the random dot density plot (illus 3).

The contour plot is divided into 20 steps ranging between 30 (1) ohms and 172.5 (20) ohms. The dot density plot has parameters of 40 to 150 ohms, below which no dots are produced and above which there is a solid block of dots. The dot density increases from the lower to the higher parameter.

Both plots indicate a clear contrast between the background resistance (between 25 and 40 ohms) and the archaeological features described above. Mounds A, B and C are seen as anomalies over a level of 200 ohms. Mound E has values over 400 ohms and contains a linear feature (X on the contour plot, illus 2) which is not visible upon the ground but which is seen as an anomaly with a strength of over 700 ohms with a N-S orientation. The sub-circular enclosure is clearly defined against the background varying from 70 ohms to the W and 200 ohms to the E. Inside the enclosure an increase of resistance compared to the areas outside in the order of 20 to 30 ohms may indicate underlying archaeology (possibly a floor). The clarity of contrast observed in this survey is well above a typical contrast seen between anomaly and background (often as low as 10%).

The complex surveyed by shape and form appears to be of an early Iron Age date. Further structures not visible on the ground are suggested by aerial photographs to the W. As a technique, resistivity seems ideally suited to locate and identify these and other features to supplement the conventional survey with details of structures and features.

REFERENCE

Lamb, R G 1980 *The Sites and Monuments of Sanday and North Ronaldsay*. RCAMS. Edinburgh.