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Ancient Monuments Laboratory
Report 113/93

YARNTON CASSINGTON PROJECT, OXFORDSHIRE. WORTON RECTORY FARM REPORT ON GEOPHYSICAL SURVEY, NOVEMBER 1993

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Summary

Magnetometer survey at Worton Rectory farm has failed to demonstrate the presence of archaeological anomalies in association with the earthworks visible to the south of this site. However, the detection of anomalies of geomorphological origin, possibly indicating the edge of the gravel terrace and the success of trial electromagnetic survey compensated for this disappointment.

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WORTON RECTORY FARM

Report on geophysical survey, November 1993

Introduction

The aim of this survey was to investigate the extent of archaeological activity to the south of the shrunken medieval village at Worton Rectory Farm, Cassington, Oxon. This work forms part of the Yarnton Cassington project (Hey 1993) to record the archaeology of 140ha of surrounding farmland threatened by eventual gravel extraction. A particular aim of the survey was to investigate the archaeological significance of the earthworks visible to the south of the site.

The site (SP 463 112) lies on the boundary between the second (Summertown-Radley) gravel terrace and, Oxford Clay and Kellaways Beds.

Method

A magnetometer survey was deemed to be the most suitable survey technique due to the success of this method over a pilot test site to the west of Worton Rectory Farm. A topsoil susceptibility survey was conducted in conjunction with the magnetometer survey although this was restricted in scope by instrument failure. The land parcel containing the earthworks was further investigated by electromagnetic survey to map spatial variation in ground conductivity.

A survey grid divided into 30m squares was established over the site (**Figure 1** - location plan) with partial squares extending to the field boundaries. The area was then surveyed with a Geoscan FM36 fluxgate gradiometer along successive N-S traverses separated by 1.0m intervals. Readings were logged every 0.25m and the data was downloaded to a microcomputer in the field. Final presentation of the data has been enhanced by the application of a local median filter to remove the intense response of buried/surface iron and a low pass Gaussian filter to suppress image noise (Scollar *et al* 1990); the data is presented in both greyscale and traceplot form on **plans A, B** and **C**.

Topsoil magnetic susceptibility measurements were taken at a 15m sample interval using a Bartington MS2 meter and field search loop. The data is displayed as a greyscale image superimposed over the OS map in **Figure 2**.

Conductivity measurements were made at a 1m sample interval using a Geonics EM38 conductivity meter. An external data logger was used to record the quadrature phase response of this instrument in arbitrary machine units (AU), as it proved impossible to

accurately calibrate the needle display of the instrument to the voltage on the analogue output. The conductivity data is presented in both greyscale and traceplot forms on **plan D**.

Each plan is accompanied by a figure summarising the anomalies alluded to in the following text.

Results

Magnetometer survey

Due to current land use the area south of the farm buildings is now divided into a series of paddock enclosures not shown on the OS map. This resulted in the survey being conducted in four land parcels separated by a screen of trees and an open land drain.

PLAN A *squares 1 - 5*

A considerable degree of modern interference dominates this area - presumably caused by the builders' debris from the current renovation of the stone barn west of square 4. The only anomaly of potential archaeological significance is visible in square 2 and appears as a positive anomaly on three parallel lines of plot 2. The most striking anomaly within the data is the wide negative/positive band running east-west across squares 4 and 5. This may represent the boundary between the second gravel terrace to the north and the underlying Oxford Clay to the south although the anomaly is not seen to continue into any of the other areas surveyed.

PLAN B *squares 6 - 9*

Again, modern interference has hampered the quality of the data from square 6 and the northern edges of squares 8 and 9. This appears to be caused by a buried pipe or tank in square 6 and metal fastenings in the paddock fencing that encroaches upon squares 8 and 9. The identification of archaeologically significant anomalies is thus restricted by the modern interference and the keyhole nature of this part of the survey. Close examination of traceplot 4 reveals a number of weak (< 2nT) linear anomalies although their origin is impossible to determine.

PLAN C *squares 10 - 30*

The squares west of the land drain (see Figure 1 - location plan) contain considerable modern interference particularly visible in the NW corner of square 10. The linear anomalies running across the north and south edges of squares 17-19 are filter artifacts caused by the removal of operator-induced corrugation throughout these squares. These effects were minimised by the use of a directional cosine filter (Scollar 1990) before the data from these three squares was combined with the rest of the grid. The linear anomaly running north-south through the centre of squares 11, 18 and 25 was caused by the metal fastenings used in the paddock fence dividing this parcel of land. The earthworks visible on the ground in this area have failed to produce a magnetic anomaly.

The data to the east of the land drain is less disturbed and modern interference is only associated with the location of the horse jumps in this field. Again a number of weak, positive anomalies are visible although the most convincing example appears to be a former field boundary or ditch running diagonally from the south-west corner of square 28 through square 21 to the north-east of square 14. Of particular interest are the sizeable amorphous anomalies in squares 13 and 20, and in squares 16, 23 and 30. The exact nature of these curious anomalies is impossible to suggest although the most likely explanation would appear to be the presence of a geomorphological feature, possibly a gravel or clay pocket.

Electromagnetic survey

PLAN D *squares 10 - 12 and 17 - 19*

The conductivity data from these squares (Figure 1 - shaded squares) shows an area of interference in the north-east corner of square 10 correlating with a similar disturbance in the magnetometer data. Of greater interest are the positive (high conductivity) anomalies running north-south across the survey area. Whilst the central anomaly (squares 11 and 18) is caused by the paddock fencing, the two parallel anomalies represent the extension of the earthwork ditches visible on the ground. There is no indication of similar anomalies running in the east-west direction.

Topsoil Magnetic susceptibility survey

Figure 2 *squares 10 - 12, 17 - 19 and 24 - 26*

Due to instrument failure topsoil susceptibility survey was limited to the above squares only. The readings from the surveyed area are all relatively low and the only indication of enhancement is visible in the north of the paddock and along the edge of the drain. Comparison of this data to the results obtained over the grassed areas at Mead Farm, Yarnton (Linford 1994, *Figure 3*) demonstrates the much lower enhancement that has occurred at Worton. As the magnetometer results and geological evidence suggest that these squares lie just beyond the edge of the second gravel terrace the influence of background geology may well have masked any form of archaeological enhancement on this site.

Conclusion

Modern land use at this site has to some extent hampered the acquisition of geophysical survey data. In particular the key-hole nature of the survey and the interference from modern ferrous metal has severely restricted the quality of the magnetic data. The most successful data (from squares 13-16, 20-23 and 27-30) shows the weak response of ditch-type anomalies over this geology and the intrusion of large, amorphous areas of disturbance. The wide band of disturbance encountered in squares 4 and 5 possibly indicates the edge of the gravel drift geology and thus magnetometer survey offers the potential to accurately define other outcrops throughout the Yarnton Cassington Project area.

The topsoil magnetic susceptibility results from this site are inconclusive and appear to reflect the influence of current land use and background geology as opposed to any relevant anthropogenic enhancement.

The use of conductivity measurements, although still in an experimental stage, has clearly demonstrated the potential of this technique for identifying archaeological targets. However in this case the significance of the anomalies is difficult to ascertain.

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P Cottrell
N Linford
A Payne
T Williams (Bradford University)

Date of survey: 15-19/11/93
22-25/11/93

Reported by: N Linford

Date of report: 4/2/94

References

Hey, G 1993 Project design specification: Evaluation of Study Area *Oxford Archaeological Unit report.*

Linford, N 1994 Report on Geophysical survey at Worton Rectory Farm, Cassington, Oxon. *Ancient Monuments Laboratory report series* **112/94.**

Scollar, I, *et al* 1990 Archaeological Prospecting and Remote Sensing, 507-508, Cambridge.

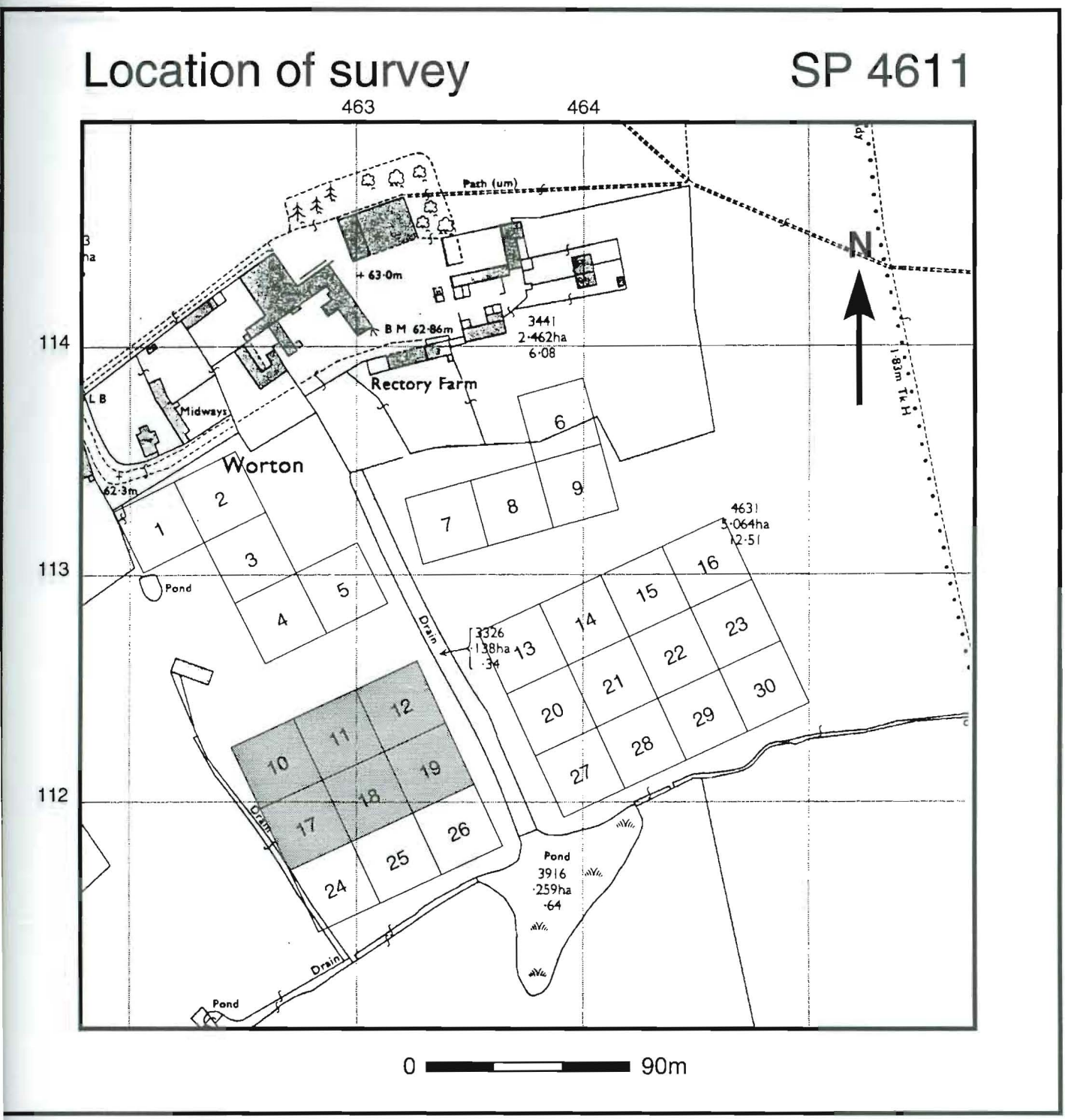


Figure 1 - Worton Rectory Farm, Yarnton; location of geophysical survey November 1994. Shaded squares show EM38 survey.

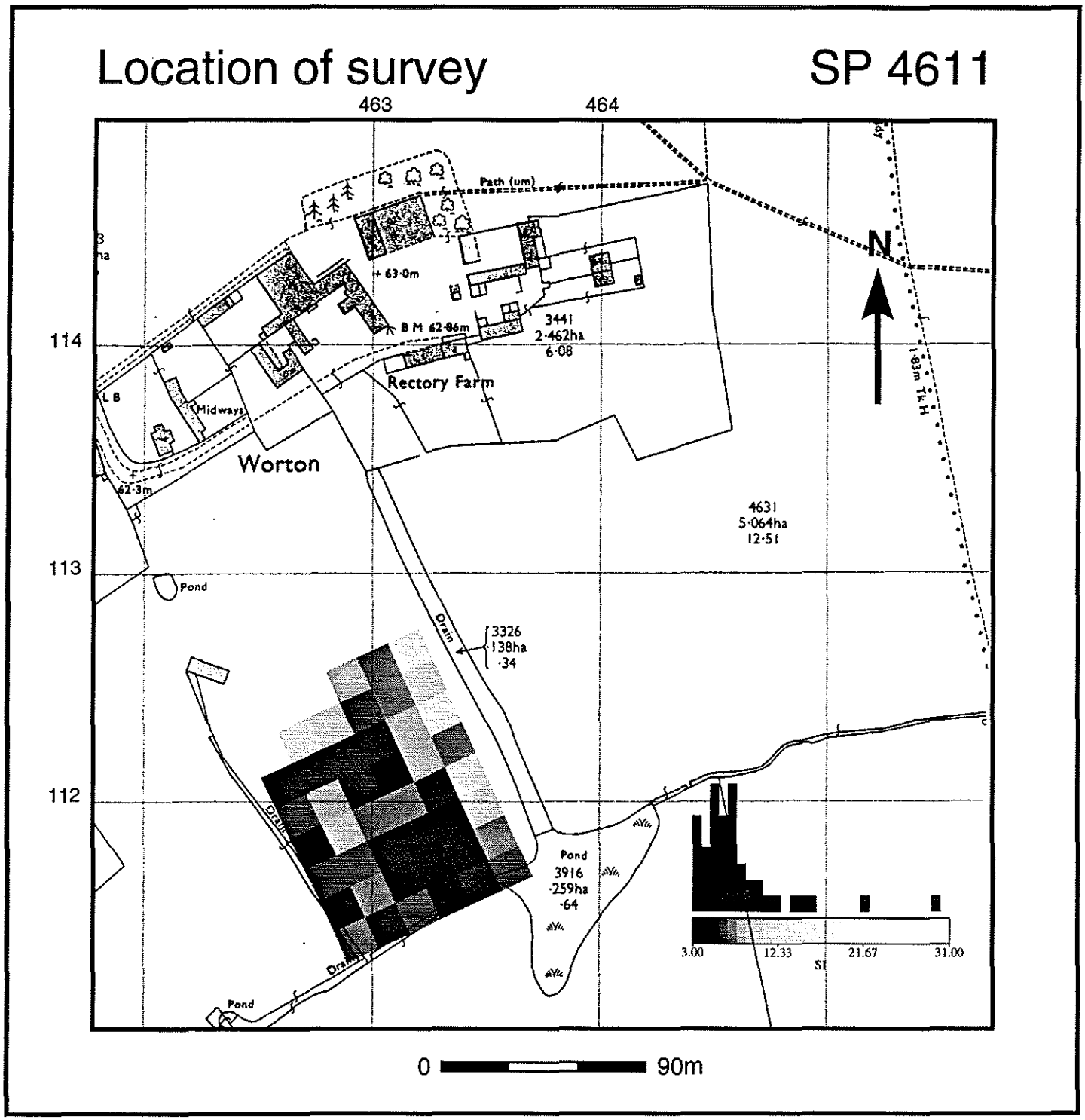
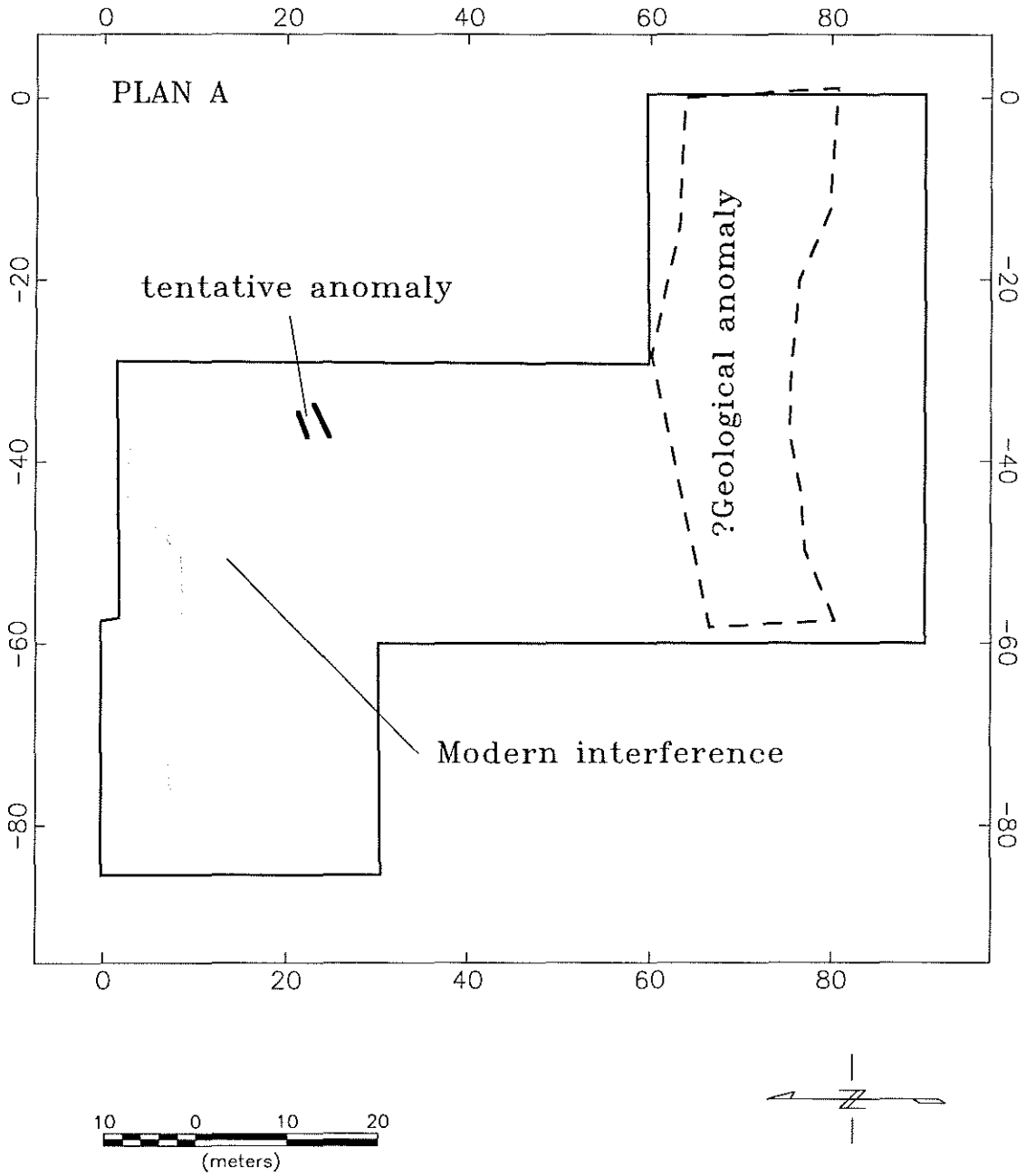


Figure 2 - Worton Rectory Farm, Yarnton; Topsoil magnetic susceptibility survey November 1994.



Worton Rectory Farm

YARNTON, OXON.

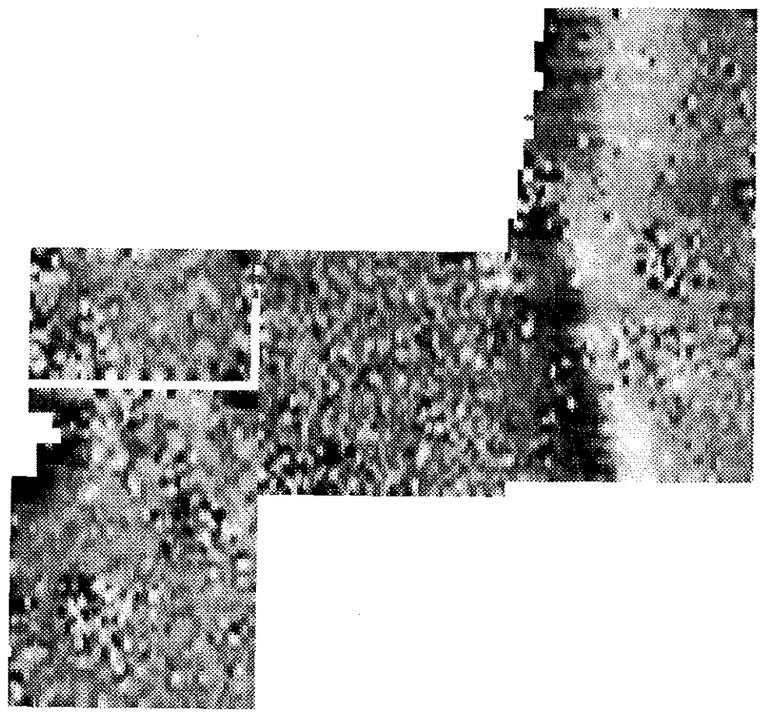
Plan A

Magnetometer survey November 1993

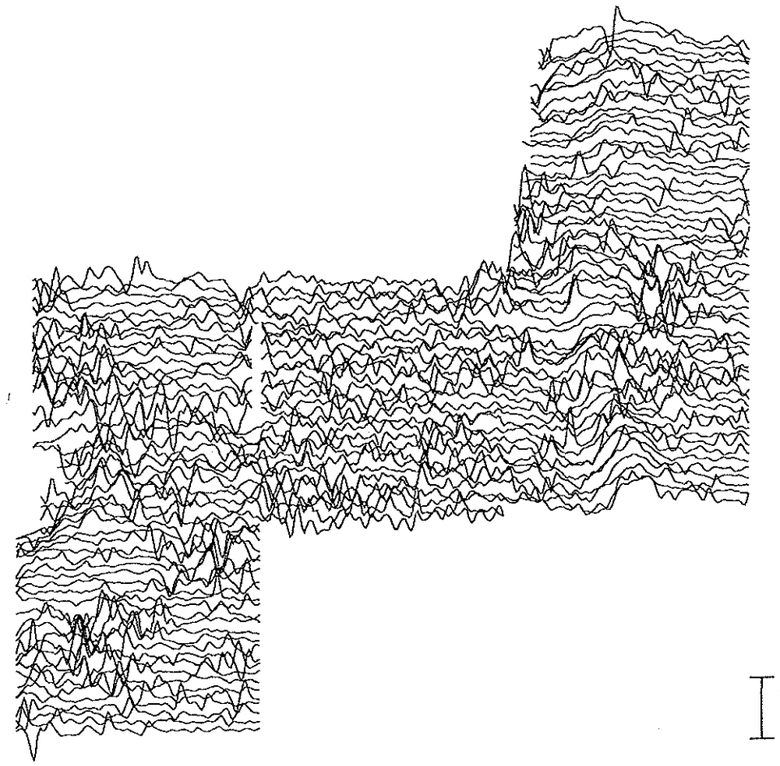
Worton Rectory Farm

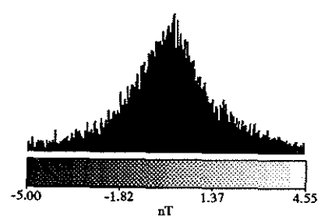
z ←

1. Greytone smoothed data



2. Traceplot smoothed data





0 60m

1:750

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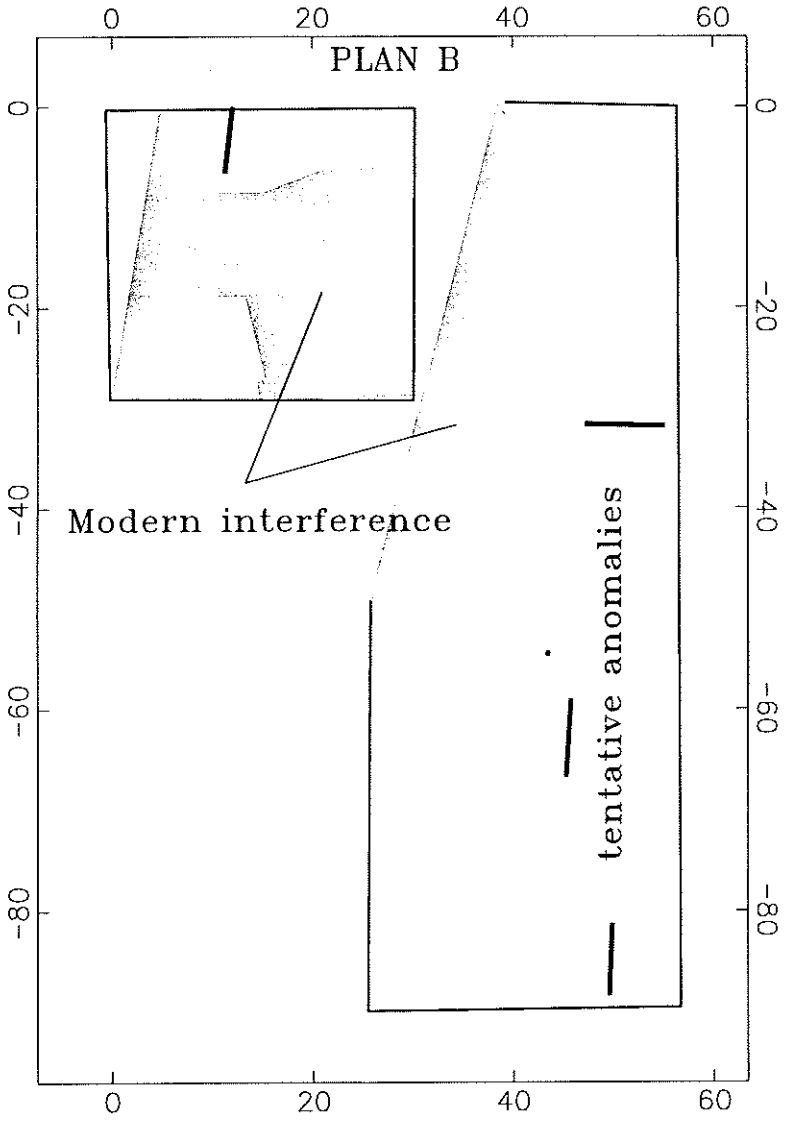


Worton Rectory Farm

YARNTON, OXON.

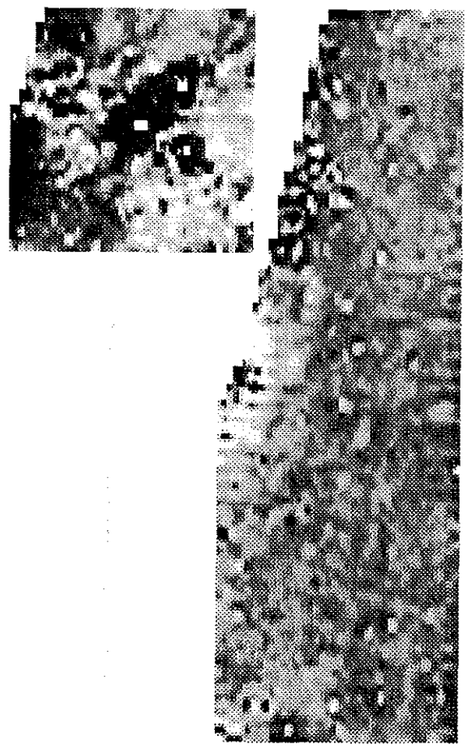
Plan B

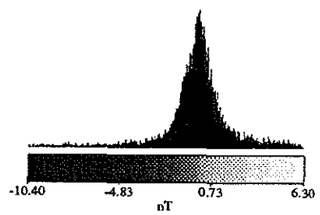
Magnetometer survey November 1993

Worton Rectory Farm

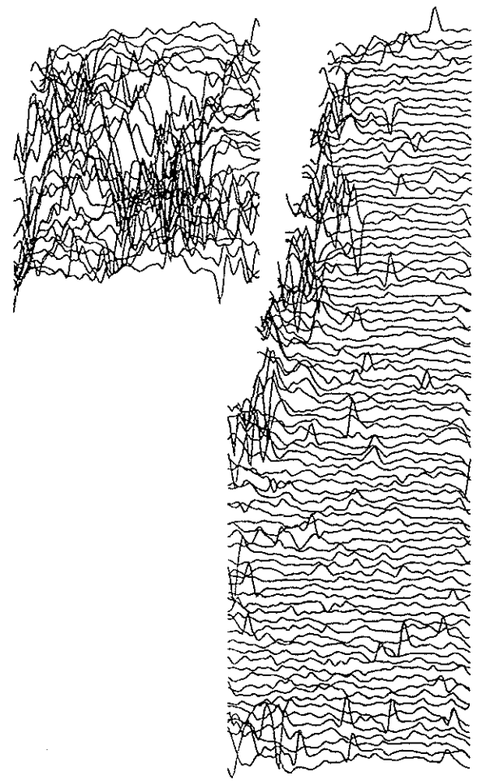
z ←

3. Greytone smoothed data





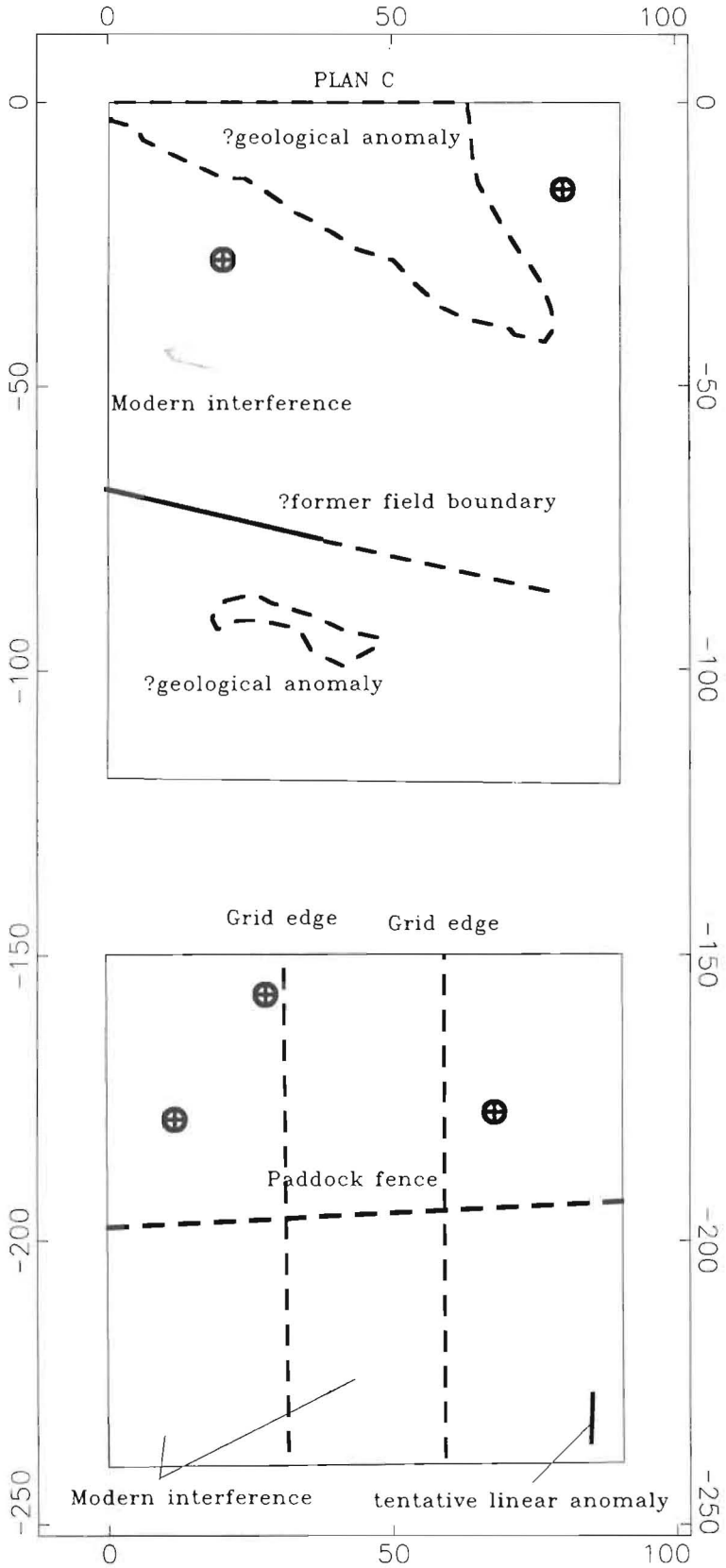
4. Traceplot smoothed data



18.75nT

0 60m

1:750



⊕ = possible pit/buried iron

25 0 25
(meters)

Worton rectory Farm; summary of anomalies

YARNTON, OXON.

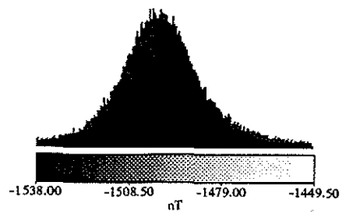
Plan C

Magnetometer survey November 1993

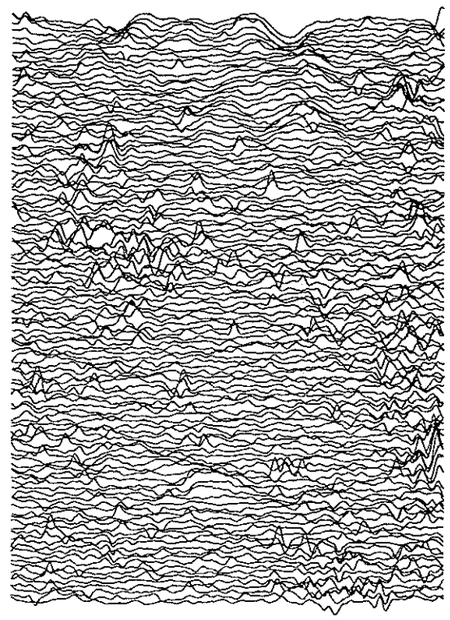
Worton Rectory Farm

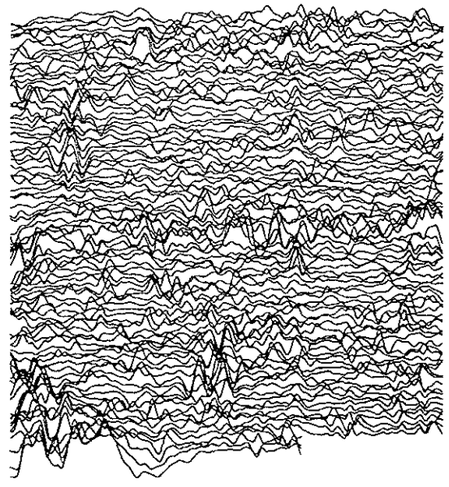
z ←

5. Greytone smoothed data



6. Traceplot smoothed data





31.25nT

0 90m

1:1250

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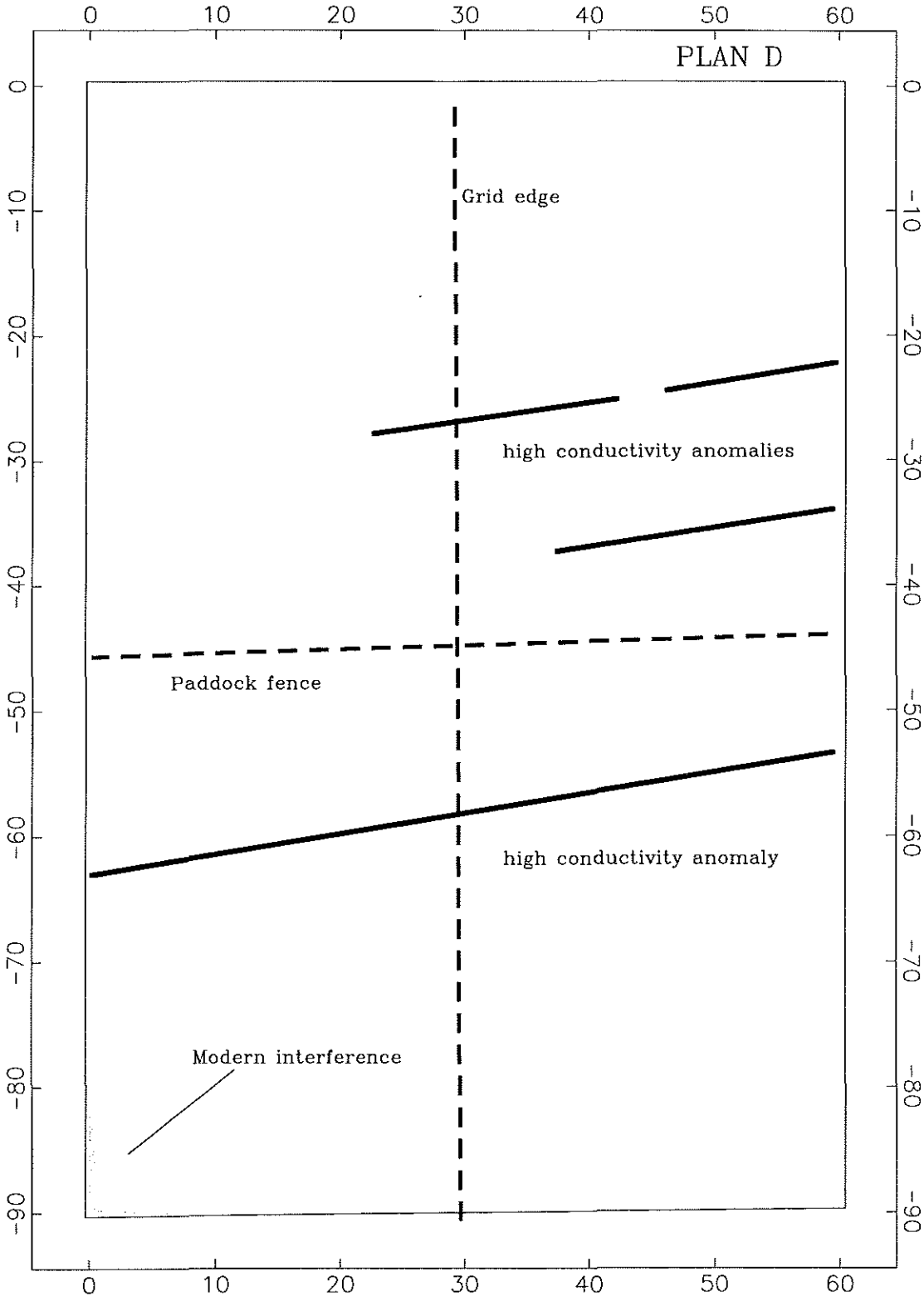
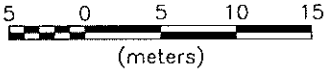
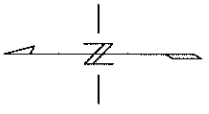






Worton Rectory Farm

YARNTON, OXON.

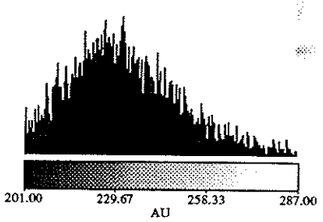
Plan D

Electromagnetic survey November 1993

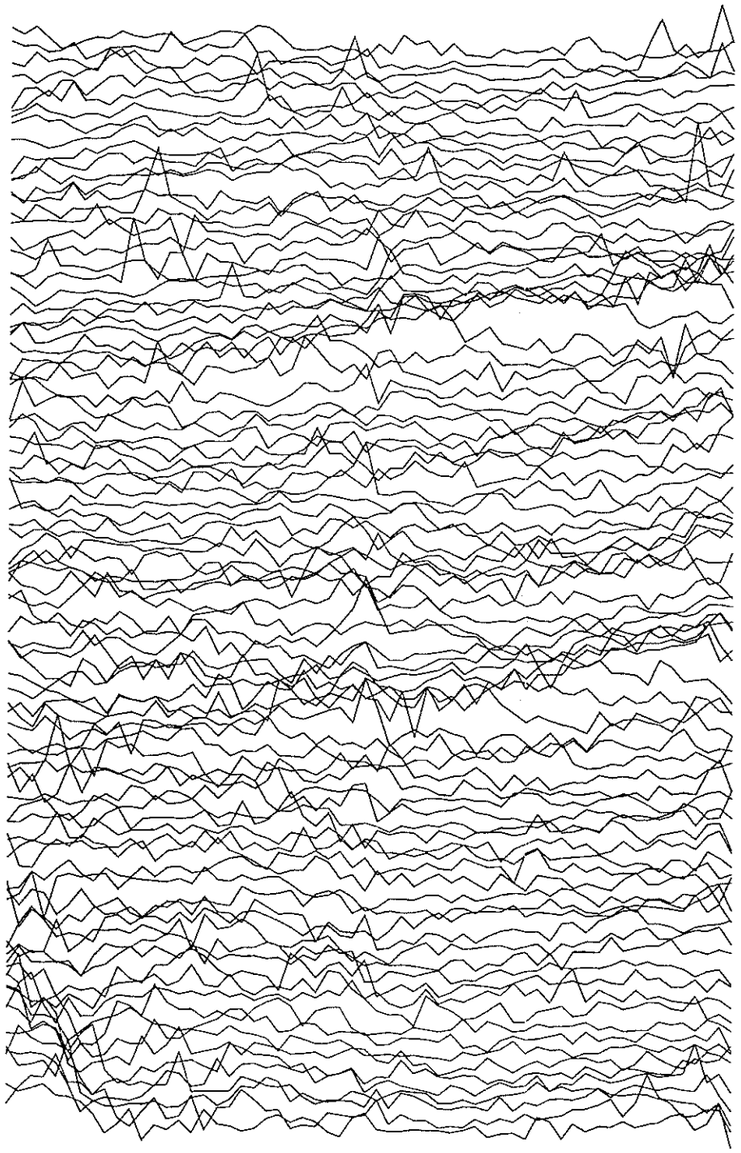
Worton Rectory Farm

N

7. Greytone despiked data



8. Traceplot despiked data



100 AU

0 30m

1:500

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