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REPORT ON GEOPHYSICAL SURVEY AT MEAD FARM, YARNTON CASSINGTON PROJECT, OXFORDSHIRE, 1993

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Summary

Despite the presence of Victorian gravel workings a substantial palimpsest of archaeological anomalies has been revealed by this magnetometer survey. These results underline the importance of an understanding of local geomorphology to the success of geophysical techniques within th Yarnton Cassington Project area, particularly when interpreting topsoil magnetic susceptibility results. Detailed magnetic measurements on subsurface soil samples recovered from the site aided the identification of archaeological magnetic enhancement.

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MEAD FARM

Report on geophysical survey, November 1993

Introduction

The aim of this survey was to investigate the extent of archaeological activity surrounding the Anglo-Saxon burial ground south of Mead Farm, Yarnton, Oxon. The recovery of surface artefacts during recent field walking extended the scope of the survey to the neighbouring parcel of land to the south-east. It was believed that considerable disturbance had occurred due to the extraction of gravel during the last century.

The site (SP 478 114) lies over the second (Summertown-Radley) gravel terrace and is close to the boundary with the Oxford Clay and Kellaway Beds.

Method

A magnetometer survey was deemed to be the most suitable survey technique due to the large area of land to be covered and was conducted in conjunction with a topsoil magnetic susceptibility survey.

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 as a greyscale image (**Plan A**), a traceplot (**Plan B**) and a greyscale image superimposed upon the OS map (**Figure 2**).

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 4**.

Subsurface soil samples were recovered by augering significant magnetic anomalies. These samples were measured in the laboratory for their values of χ, χ_{FD}, SIRM and IRM_{-100mT}/SIRM (Thompson and Oldfield 1986). The data from these samples is presented in **Figures 3(a)-3(d)**.

Results

Magnetometer survey

A pattern of positive linear ditch anomalies extends through squares 1-20 and appears to

terminate in squares 45, 49 and 53-54. Unfortunately the response from these features is quite weak and is further confused by the striation (especially within Plan A plot 2) caused by modern ploughing running in the same direction. However, it is obvious that these anomalies form a system of enclosures, some of which extend outside the survey area (square 15), most probably a Saxo-Norman field system. The data from square 19 (see Plan C) is particularly intriguing as the ditch system appears to curve around a tentative double ditched circular anomaly.

Perhaps the most striking feature of this data is the wide linear anomaly (squares 5, 11, 12, 19 and 26) which does not appear to emerge in the eastern parcel of land. Its size (15m wide) and the results of augering (see below) suggest that this may be a natural rather than an artificial feature - perhaps an infilled channel, although this proposal is belied by topography. At least one of the medieval ditches (above) appears to overlie it. Magnetometer survey at Worton Rectory Farm, Cassington (Linford 1994) supports a natural origin, perhaps associated with the edge of the gravel terrace. Other anomalies, also possibly natural, appear in squares 16, 33 and 34, and 52 although the former (16, 33 and 34) may well indicate the location of backfilled Victorian gravel workings.

Squares 21-40 contain no evidence of the field system and are dominated by the ploughing pattern and a number of anomalies related to modern interference. These disturbances can be attributed to the pathway running through squares 32 and 38 and the metal fastenings around the saplings planted along the southern edges of squares 31 and 37-40. The curious negative linear anomaly running through squares 36-37 is difficult to interpret although it seems more likely to be of modern than of archaeological origin.

Archaeological activity in the eastern land parcel (squares 41-58) is concentrated upon the western edge of this field and in square 42 immediately south of the pond where a high density of surface artefacts was recorded. An isolated linear anomaly is also visible in square 52, but is possibly caused by a modern agricultural "tramline". Although at the time of the survey both fields were planted with identical cereal crops the effects of ploughing are far less noticeable in these squares. This, together with the topsoil susceptibility values (see below) and observations of soil texture made in the field suggests that parts of this field lie beyond the gravel terrace.

Topsoil Magnetic Susceptibility survey

Figure 3 appears to shows little clear correlation between topsoil magnetic susceptibility readings and the archaeological activity indicated by the magnetometer plot. This may be explained in part by the muting effect over grass in the Anglo-Saxon burial ground and the land adjoining Mead farm and the Manor house where much lower readings have been recorded. Also the highest readings within the plot do not correlate with any anomalies in the magnetic data. A degree of caution must therefore be applied to the interpretation of this data, possibly due to the survey area crossing a boundary between second gravel terrace and Oxford Clay to the east.

Subsurface soil samples

Figures 4(a), 4(b) and 4(c) show the results from augering the tentative ring ditch, the ?geomorphological anomaly and a control point 15m east of the ring ditch respectively. The

results from augering the double linear anomaly in squares 57-58 are shown in Figure 4(d). Figure 4(c) shows how the magnetic susceptibility, SIRM and IRM_{-100mT}/SIRM all decrease with depth in a manner consistent with an undisturbed soil profile (Oldfield and Thompson 1986). This is in stark contrast to the results from the ring ditch (Figure 4(a)) which produces five distinct 'magnetic horizons' beneath the topsoil layer. Of particular interest is layer 4 which appears to contain a high proportion of magnetite resulting in the anomalously high SIRM value.

Results from the ?geomorphological anomaly (Figure 4(b)) are similar to the natural soil profile although both SIRM and IRM_{-100mT}/SIRM remain relatively consistent throughout the three samples.

The double linear anomaly (Figure 4 (d)) has produced the highest values of magnetic susceptibility, SIRM and IRM_{-100mT}/SIRM. The magnitude of these results suggests considerable magnetic enhancement of the soil at depths greater than 35cm. Whilst this may well indicate archaeological activity it should be noted that the trackway immediately west of this anomaly was formed of burnt material with a similarly high susceptibility. Thus there is a possibility that this anomaly is related to a more recent event, perhaps the construction of the railway line.

Conclusion

The influence of background geology upon the quality of magnetic results in Yarnton Cassington area is demonstrated by the exceptional clarity of this data. Whilst geomorphological and modern interference have effected parts of the site the revelation of the Saxo-Norman field system and the tentative ring ditch anomalies proves the favourable geophysical response obtained over second terrace river gravels. The topsoil magnetic susceptibility results should be interpreted with a degree of caution as the influence of geological variation and modern interference on the readings is not fully understood over this site.

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

Reported by: N Linford

Date of report: 27/1/94

References

Linford, N 1994 Report on geophysical survey at Worton rectory Farm, Oxon. *Ancient Monuments Laboratory Report Series* **113/94**

Scollar, I, *et al*	1990	Archaeological Prospecting and Remote Sensing, 507-508, Cambridge.
Thompson & Oldfield	1986	Environmental Magnetism. Allen & Unwin.

Location of survey

SP 4711

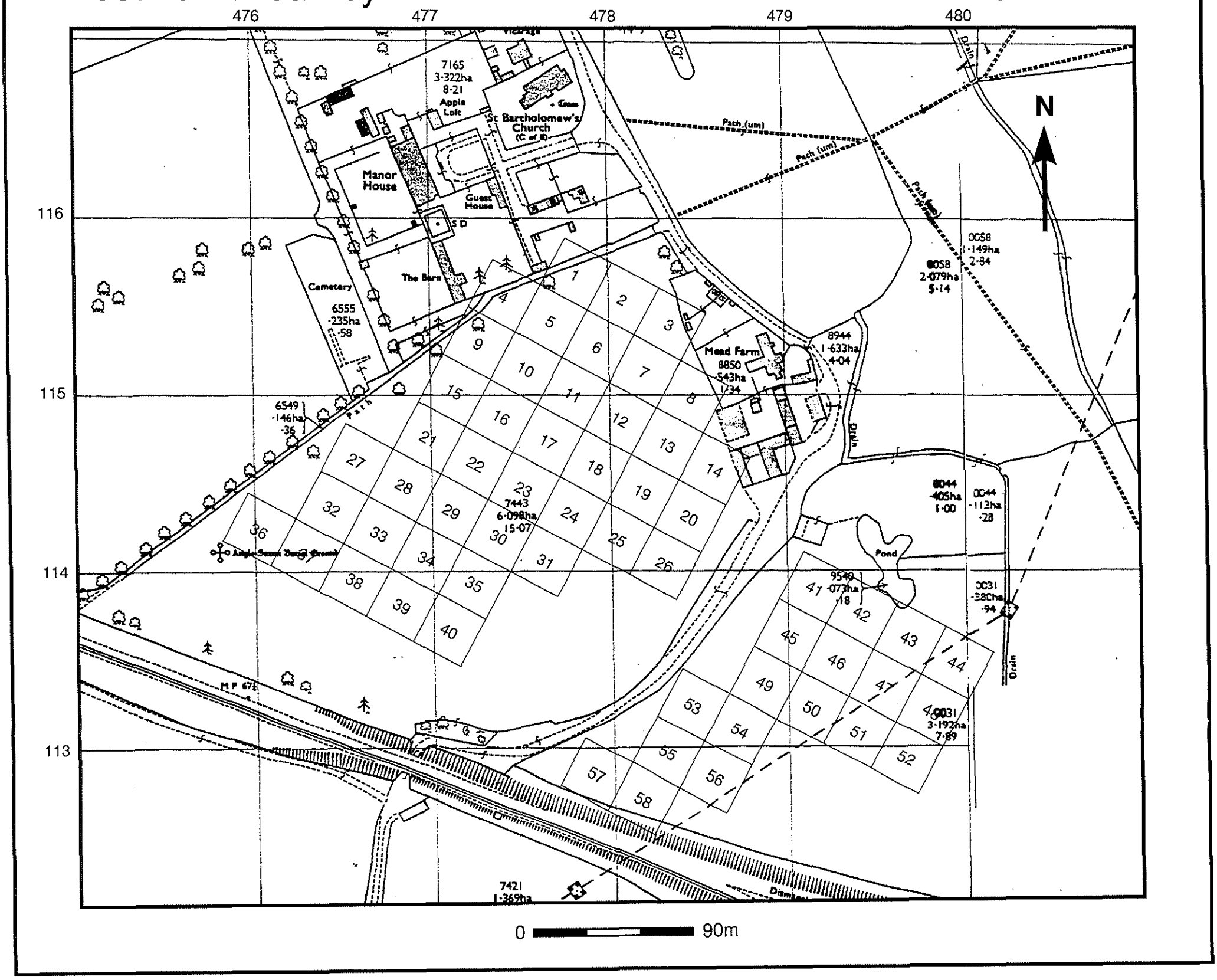


Figure 1 - Mead Farm, Yarnton; location of geophysical survey November 1994.

Magnetic data

SP 4711

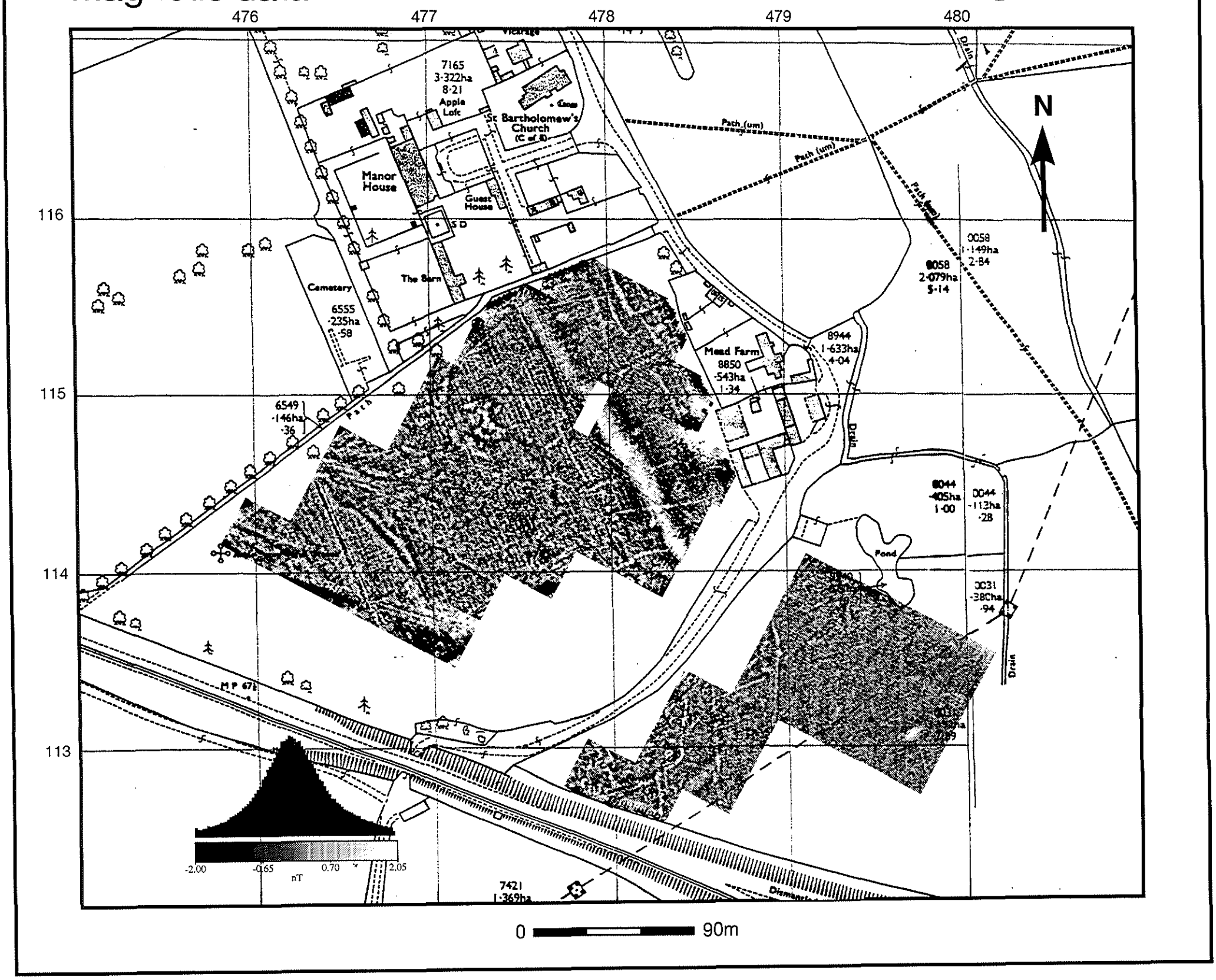


Figure 2 - Mead Farm, Yarnton; Magnetometer data at 1:2500 scale.

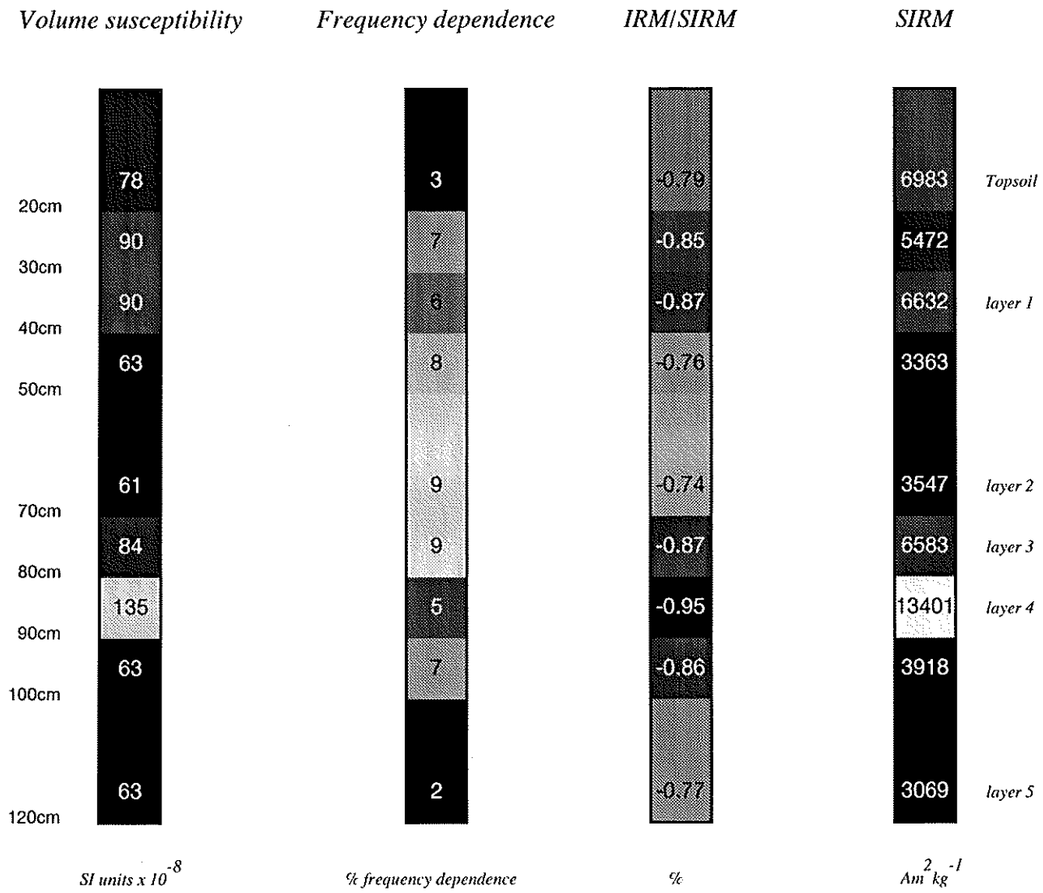


Figure 3(a); Magnetic susceptibility results from augered ring ditch.

Topsoil Magnetic Susceptibility data

SP 4711

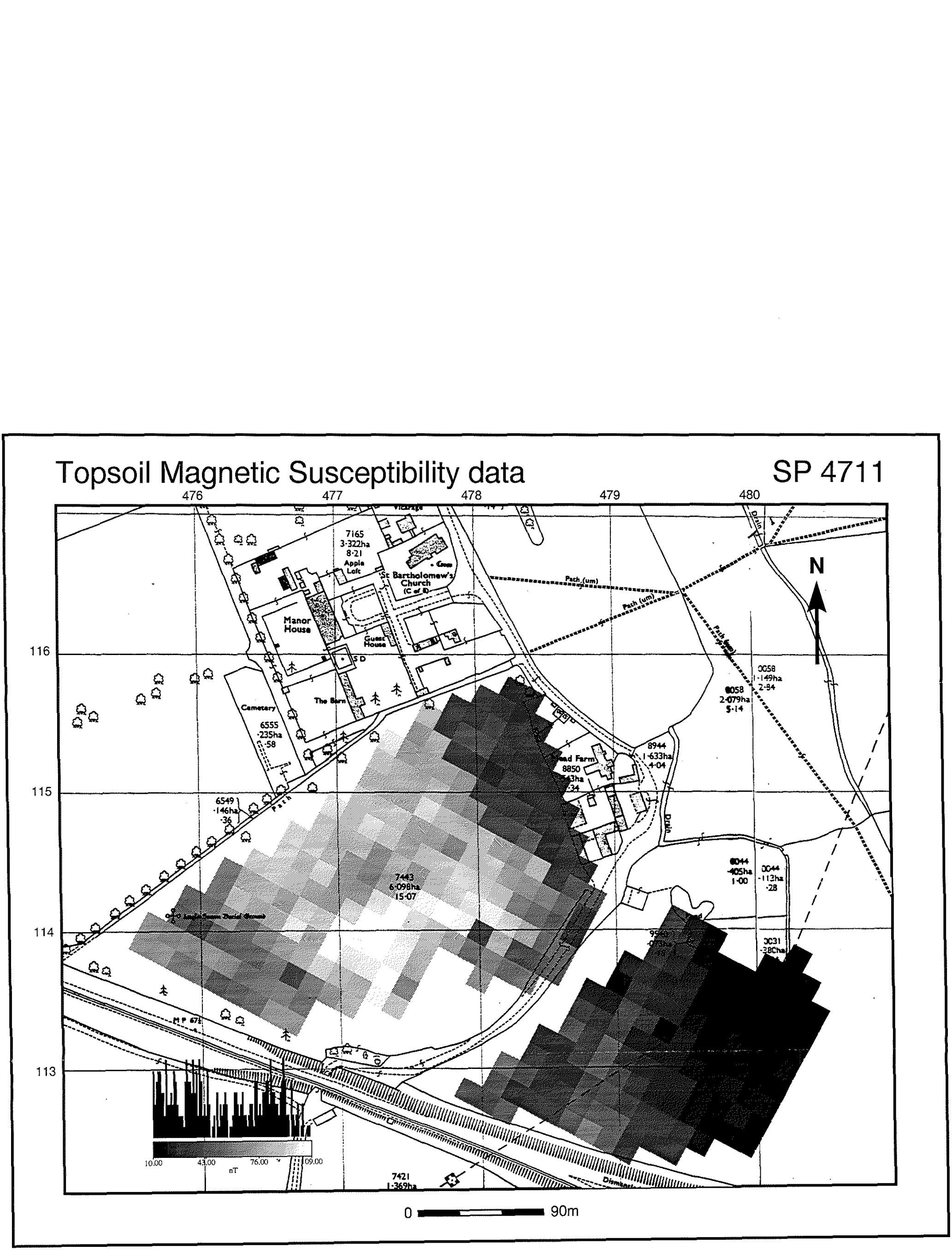
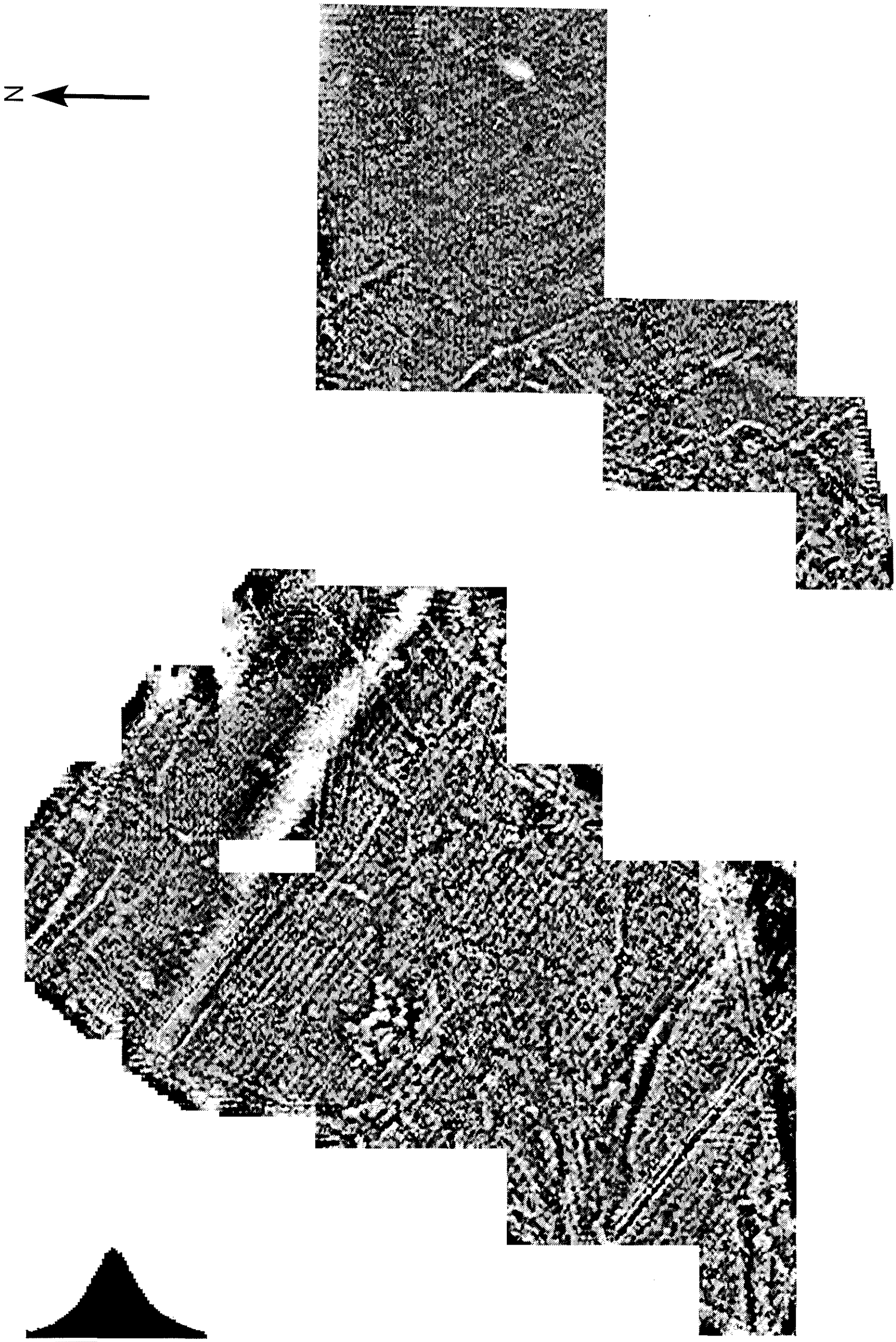


Figure 4 - Mead Farm, Yarnton; Topsoil Magnetic Susceptibility data at 1:2500 scale.

MEAD FARM, YARNTON, OXON. PLAN A



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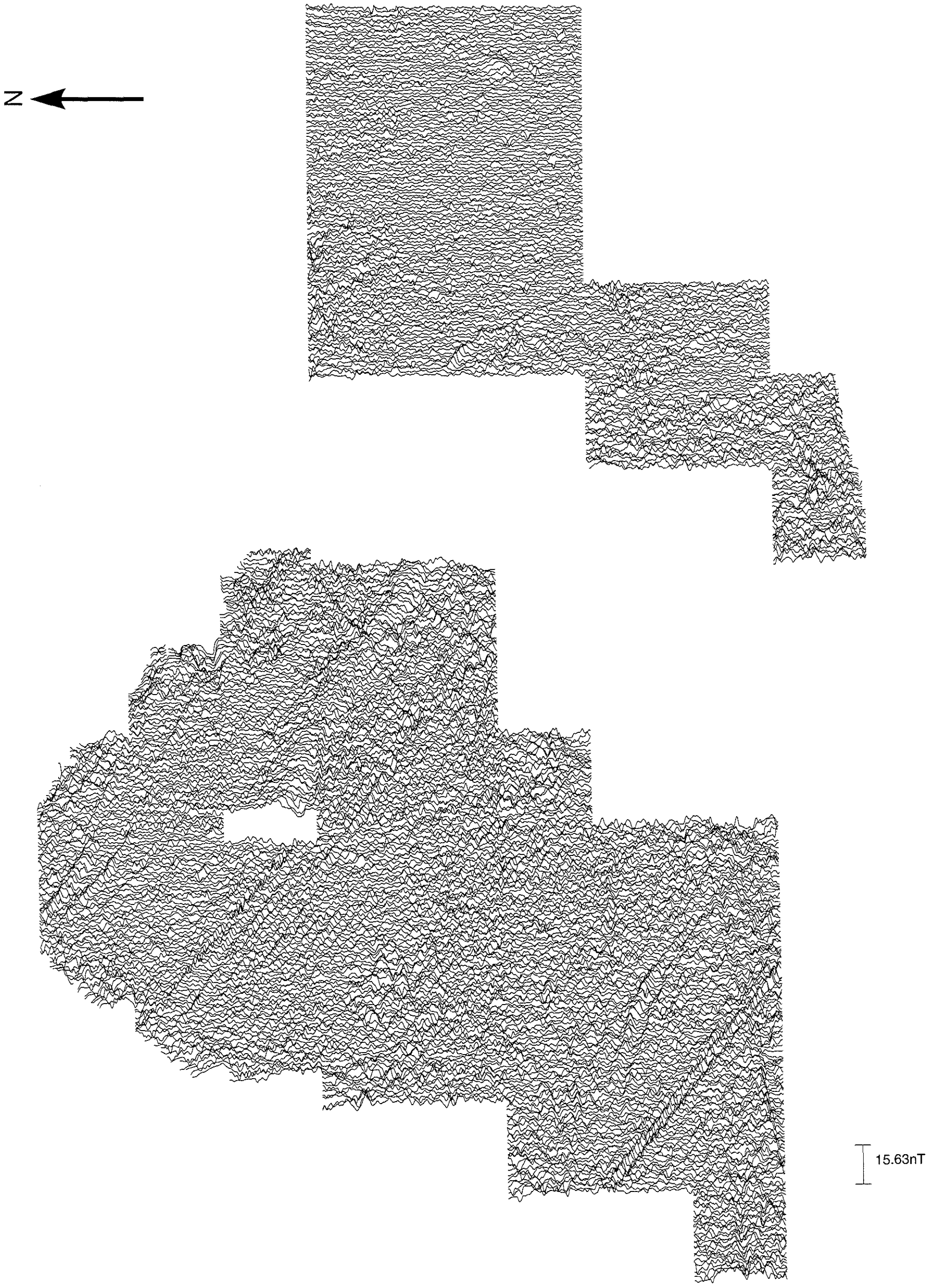
PLAN A; plot 1 - Greytone smoothed magnetometer data.

MEAD FARM, YARNTON, OXON. PLAN B



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PLAN B; plot 2 - Traceplot smoothed magnetometer data.

YARNTON, OXON.

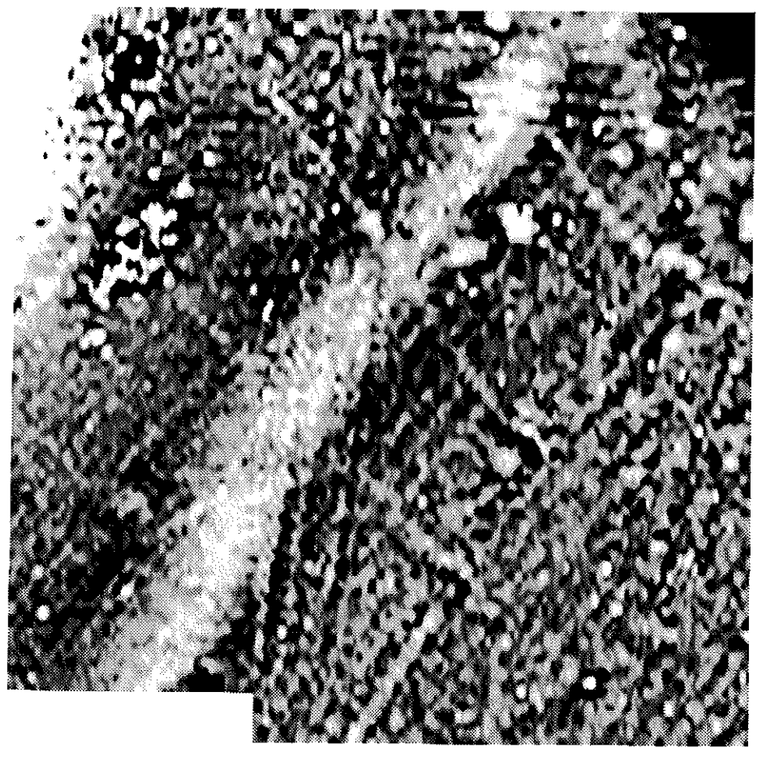
Plan C

Magnetometer survey November 1993

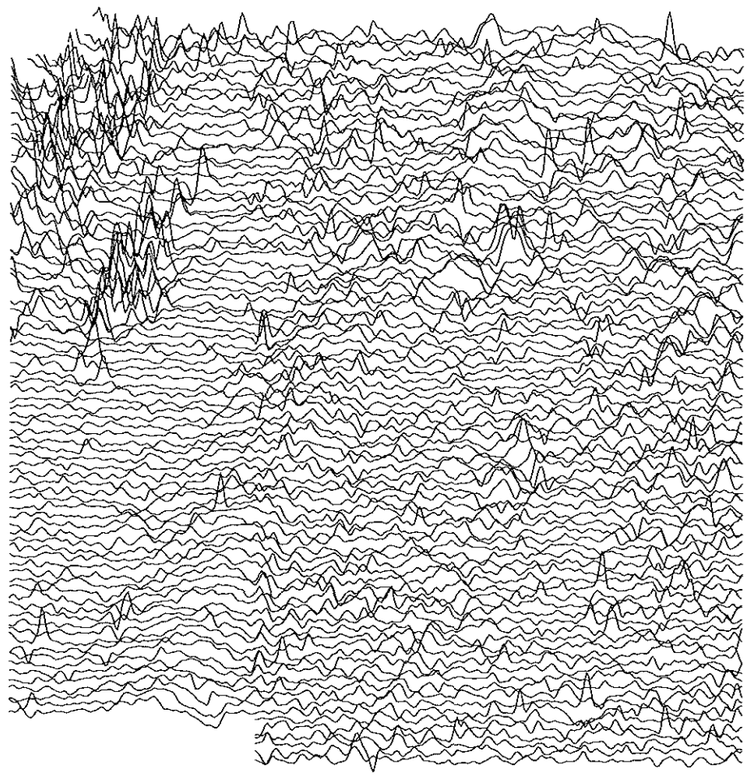
Mead Farm - detail of ring ditch

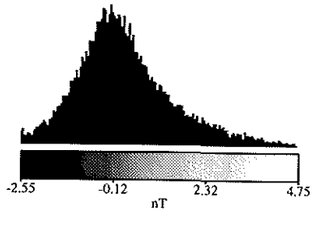
N

3. Greytone smoothed data



4. Traceplot smoothed data





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