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Durrington Walls Henge, Wiltshire. Report on Geophysical Surveys, January 1996 and April 2003

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Summary

This report describes the results of magnetometer surveys carried out at the major henge monument of Durrington Walls in 1996 and 2003. The western part of the monument was surveyed in 1996 and in 2003 the coverage was extended to the east, including the henge bank and ditch and the area between the south-east entrance and the River Avon. The combined surveys have provided a considerable amount of new information on the internal character of the henge, features outside the entrance facing the river and the form and layout of the enclosing bank and ditch.

Keywords

Geophysical Survey

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DURRINGTON WALLS HENGE, WILTSHIRE

Report on Geophysical Surveys, January 1996 & April 2003

Introduction

Much degraded by the passage of time, Durrington Walls (SAM No. 10365) are the remains of a massive Later Neolithic henge monument (of a similar scale to Avebury) located at NGR SU 150437 3km north-east of Stonehenge. The henge is of amphitheatre-like form enclosing and axially positioned along a dry hanging valley running down to the river Avon from the higher ground of Larkhill to the west. The 17 hectare enclosure appears incongruously positioned on the steep slopes of the Avon valley, but it was no doubt carefully and deliberately sited, with its entrances emphasising a downhill line of access from the high ground to the river-side.

Previous fluxgate magnetometer survey of the western part of Durrington Walls undertaken by English Heritage in 1996 (David and Payne 1997; Souden 1997, 57; WAM 1998) was extended to cover the remaining eastern side of the henge monument in April 2003. The new survey encompassed the degraded bank and ditch defining the eastern and southern arc of the henge earthwork; the area between the south-east entrance and the River Avon and the remainder of the interior of the henge cut by the re-routed line of the A345 road (Figs. 1 and 2). The latter crosses through the henge from north to south on a raised embankment and archaeological investigations carried out by Prof G Wainwright along the route prior to construction in 1967 resulted in the discovery of two circles of concentric timber post settings within the henge (the northern and southern circles; Wainwright and Longworth 1971).

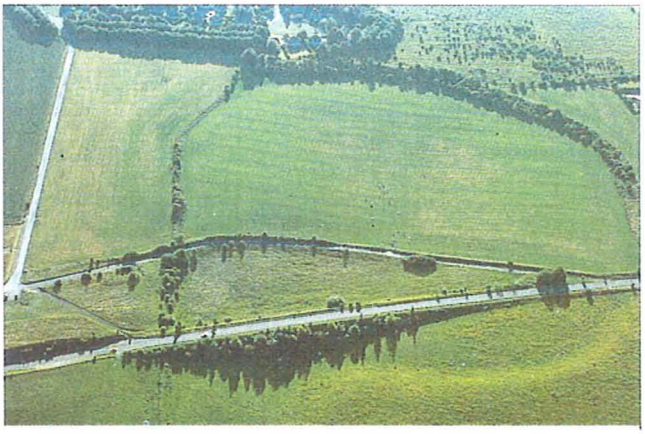

Figure 1.
Durrington Walls viewed from the east (River Avon side) with the best preserved section of the henge earthwork visible in the right foreground (NMRC © Crown copyright)

The new survey was carried out at the request of Dr M Parker Pearson in support of The Stonehenge Riverside Millennium to Millennium Project (Parker Pearson and Richards 2002). This project is concerned with exploring the possible linkage of Durrington Walls with Stonehenge via the adjacent River Avon and the Stonehenge Avenue which terminates further upstream on the Avon; the whole complex perhaps forming a single funerary and processional route in the Later Neolithic. The primary purpose of the magnetometer survey was to help establish if any archaeological features lie between the south-east entrance to Durrington Walls and the riverside –

for example a processional route down to the water's edge represented by parallel ditches, palisades or a hollow-way (Parker Pearson and Richards 2002).

The local soils are of the Andover 1 and Coombe 1 associations, consisting of shallow well-drained calcareous silty soils developed over chalky drift (colluvium) and Cretaceous upper chalk (Soil Survey of England and Wales 1983; Geological Survey of England and Wales, 1967).

Methods

The new data-set was acquired using Bartington Grad 601-2 dual fluxgate gradiometer systems. Readings were collected on a 30m grid (Figure 2) at 0.25m intervals along parallel traverses spaced 1.0m apart using the 200 nano tesla (nT) range setting of the instrument. This data was combined with the earlier data-set previously acquired in 1996 using Geoscan FM36 fluxgate gradiometers. Sample intervals and instrument settings were equivalent in both surveys although the newer Bartington magnetometers have a 1.0m vertical separation between the two fluxgate sensors compared to a 0.5m separation in the case of the Geoscan magnetometers. The recorded magnitude of response from each instrument type has been divided by the respective vertical sensor separation prior to combining the two data sets (Figures 3 and 10) to ensure that they are presented in comparable units.

Plots of the magnetometer data are presented in Figures 3-10. Figures 3 and 10 present a grey-scale image of the combined magnetometer surveys overlain on the Ordnance Survey 1:2500 plan of the site with the outlines of the main archaeological anomalies identified added to Figure 10. A more detailed archaeological interpretation is provided on Figure 11. The methodology used to process the data presented as larger scale plots in Figures 3, 8 and 9 involved:

i) initial elimination of the effects of instrument drift by equalising the mean of each line of readings to zero
ii) reduction of extreme values in the data caused by near surface iron objects using a process known as 'de-spiking' (a form of median filtering where every value outside a specified threshold is replaced by the local median calculated from the neighbouring values within a specified radius of the reading)
iii) application of a 1m radius Gaussian low-pass filter to smooth the data slightly to eliminate high frequency noise and emphasize responses to archaeological features greater than 1.0m in width.

The greyscale and traceplots presented in Figures 4-7 present the data in a more raw form after step (i) above (to remove any effects of instrument drift) but with no smoothing or 'de-spiking'. To remove the worst effects of the widespread ferrous disturbance encountered over the site the data range plotted in Figures 3-6 has been truncated to cut-off values above and below the limits of +/- 75 nT. Comparison of the two sets of plots (Figures 4-7 and 8-9) illustrates the considerable processing of the data that was required to effectively visualise the archaeological information in the data against a naturally quiet magnetic background and the widespread effects of modern ferrous material.

Results

Alphabetical references in bold type in the following section of text refer to specific anomalies indicated on Figure 11.

The massive henge ditch has been clearly detected in the new magnetic data as a weak but well-defined broad positive curvilinear magnetic anomaly up to 15m in width (Figures 6 and 8). The ditch anomaly shows some interesting irregularities in form indicating uneven width and alignment. These variations are particularly evident at points **A** and **B** on the southern and eastern sections of the ditch circuit (Figure 11). The magnitude of the anomaly from the ditch also shows distinct variation around the circuit, suggesting increased concentrations of occupation or burnt material in particular sections of the ditch-fill. The varying width of the ditch or "scalloping effect" may be evidence of gang digging in sections about 40m long. The southern terminal of the ditch at the south-west entrance is visible in the plot (**C**; Figure 11) just before the point where the survey coverage is interrupted by the fence along the eastern side of the road embankment.

The irregular magnetic response from the section of ditch south-west of the entrance (**B**) may be a sign of possible re-cutting of the ditch-circuit here on a different alignment. This would support Wainwright's suggestion that the irregular kink in the ditch in this area might be the result of bad planning by Neolithic diggers (Wainwright and Longworth 1971; 19).

The eastern bank of the henge, although not directly visible in the magnetic data, appears to correspond with an area of slightly increased magnetic disturbance (the area of the bank and the associated anomalies are indicated on Figure 11). The origin of this disturbance is unclear but it is probably in some way related to the artificial make-up of the bank construction material. A short curvilinear anomaly seen arcing through this area (at **D**) may represent a structural feature within the bank or part of an earlier enclosure predating the bank. Further study - involving examination of aerial photographs - suggests that the curvi-linear anomaly represents a terminal for the bank, indicating either a much wider original entrance or the starting point for the construction of the henge bank (Dr M Parker-Pearson *pers comm).* It is worth noting that there is also a clear deviation in the line of the henge ditch adjacent to the curvilinear feature and the magnetic response to the ditch is also heightened in this region of the site.

Within the new part of the henge interior surveyed west of the road embankment, a series of linear positive magnetic anomalies are visible (**E**, **F** and **G**) aligned along the axis of the henge towards the south-east entrance. They are unlikely to be features of Neolithic date directly associated with the henge because the survey has failed to respond to the large post-pits of the remnant of the southern timber circle also present in this area (which is known to lie beneath up to 1.5m of colluvium; Parker Pearson and Richards *in press*). The linear anomalies are therefore likely to be less deeply buried and of more recent date than the timber circle (perhaps representing later prehistoric or more recent boundary features). Elsewhere within the eastern part of the henge interior no other anomalies of obvious archaeological significance have been detected with the exception of an isolated pair of possible pits (**H**) east of the road embankment.

Beyond the henge in the area between the south-east entrance and the bank of the Avon, two discrete clusters of localised positive magnetic anomalies have been detected (**I** and **J**). Their location immediately outside the henge entrance and symmetrical arrangement each side of the terminals of the bank may be significant. These anomalies were initially interpreted as possible groups of Iron Age or later pits (high up in the colluvium) or deeper (and thus possibly Neolithic) areas of burning, however, subsequent augering suggests the anomalies derive from burnt deposits that post-date the bank (Parker-Pearson *et al* 2003). Although the bore-hole evidence suggests an origin for the anomalies either side of the entrance, the precise nature of the burning here has yet to be determined.

Directly to the east of the northern cluster of anomalies is a linear positive anomaly (**K**) approaching the henge from the river and aligned on the northern side of the south-east entrance. This is interpreted as an earth-filled feature such as a ditch, palisade slot or hollow-way and could potentially represent part of an avenue or approach feature leading up to the henge entrance from the bank of the Avon. Further investigation will be required to confirm this, but a Neolithic origin is perhaps unlikely given the expected deep colluvial deposition in this area.

The new anomalies described above augment the information obtained from the earlier magnetometer survey of the western (or uphill) part of the henge furthest away from the river. This survey (David and Payne 1997, Fig. 11; WAM 1998) produced evidence for a series of small oval ditched enclosures (**L**, **M**, **N** and **O**) with entrances in a variety of orientations arranged to the north and south of a large circular ditched feature (**P**) occupying the head of the shallow dry valley enclosed by the henge. The 1996 survey also revealed the presence of a probable Iron Age settlement (**Q**) characterized by pit alignments, narrow circular gullies and ditched boundaries in the central northern zone of the henge interior.

The geophysical survey was followed by a series of bore-holes to test the archaeological significance of the main anomalies of interest (Parker Pearson *et al* in press). The preliminary findings where relevant are discussed above. Contour mapping of the ground surface between the south-east entrance of the henge and the river, currently in progress, will also add further information of value to the interpretation of the geophysical data.

Conclusions

Despite a high concentration of ferrous debris littering the site, combined with a weak magnetic response to buried archaeological features resulting from colluvial deposition, the surveys have provided a considerable amount of new information on the structure and layout of the henge. Numerous probable archaeological features have also been detected within the henge enclosure and adjacent to the entrances. The relationship of many of these features to the henge itself has yet to be determined. Some of the features detected were already suspected on the basis of previous, less intensive, survey (see the original magnetic scanning survey carried out in 1967 by A. J. Clark published in RCHME 1979), others are completely new and previously unknown. Particularly note-worthy discoveries resulting from the new 2003 survey are the variations in the form of the henge ditch around the southern and

eastern circumference of the henge that possibly provide interesting new evidence on the construction techniques used by the Neolithic henge builders. The combined surveys provide the most complete plan to date of what was once a huge and impressive monument in the landscape. Compared to better known monuments such as Stonehenge and Avebury the monument is difficult to perceive on the ground due to the effects of prolonged cultivation, sloping ground and major road building. However with the aid of the geophysical data it is now possible to appreciate the monument as a whole to a much clearer degree than has previously been possible.

Surveyed by:	N Linford L Martin A Payne	Dates of surveys:	28/04/–02/05/2003
	M Cole A David N Linford P Linford A Payne		8-12/01/1996 & 23-25/01/1996
Reported by:	A Payne	Date of report:	20/11/2003

Archaeometry Branch,
English Heritage,
Centre for Archaeology.

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Acknowledgements

This report incorporates comments on the interpretation of the geophysical results provided by Mike Parker-Pearson. Andrew David also contributed to discussion of the results. The coring outside the south eastern entrance was carried out by Mike Allen of Wessex Archaeology.

Figure listing

Summary

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FIGURE 2

DURRINGTON WALLS, WILTSHIRE Location of Fluxgate Magnetometer Surveys, 1996 & 2003

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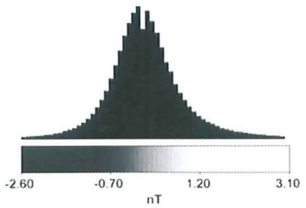
FIGURE 3

DURRINGTON WALLS, WILTSHIRE Location of Fluxgate Magnetometer Survey, April 2003



SMOOTHED AND DESPIKED DATA WITH EARTHWORKS ON THE EASTERN SIDE OF THE HENGE INDICATED AS MAPPED BY THE ORDNANCE SURVEY

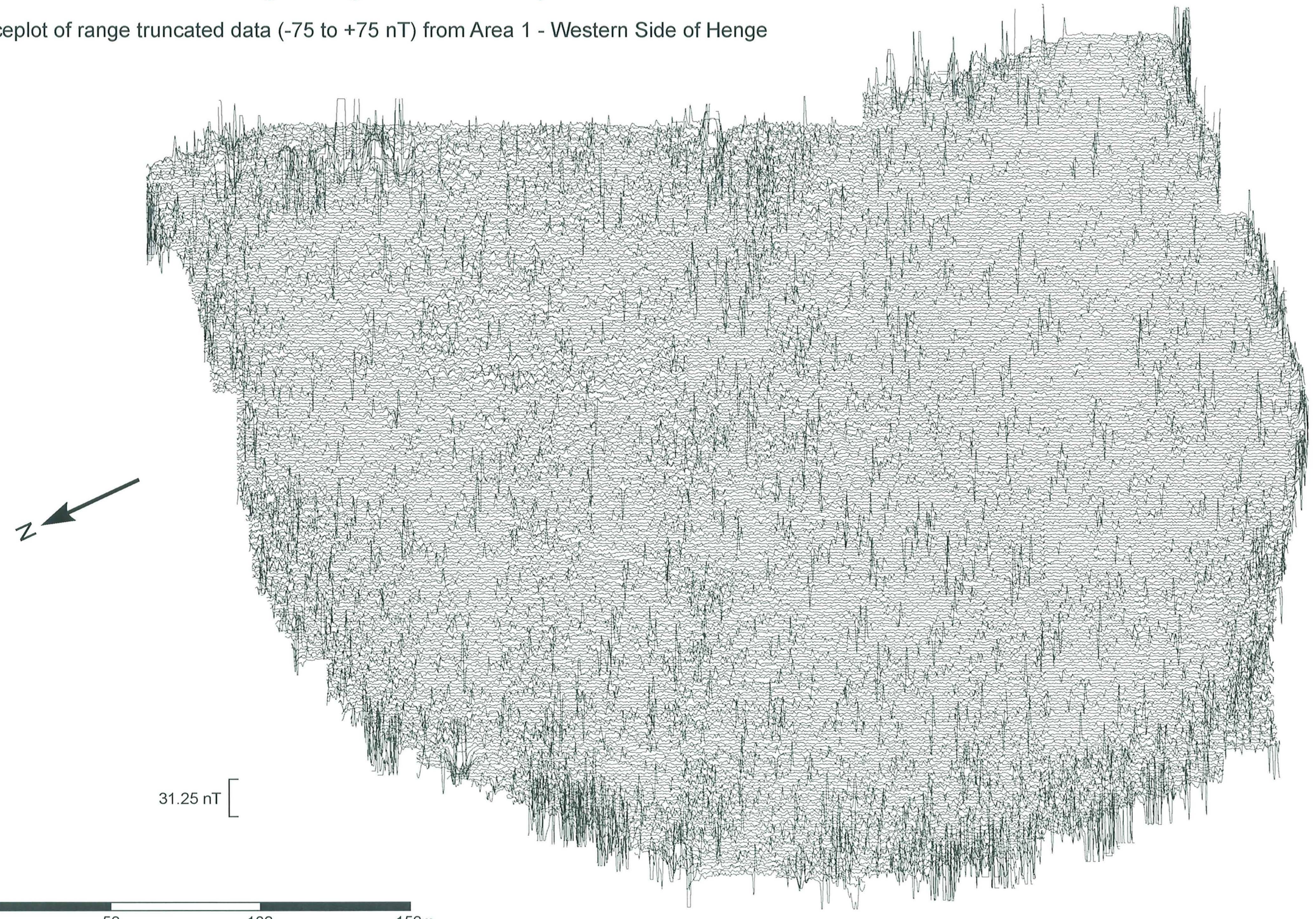
1 : 2500

ENGLISH HERITAGE, CENTRE FOR ARCHAEOLOGY, 2003

FIGURE 4

DURRINGTON WALLS Fluxgate Magnetometer Survey 1996

Traceplot of range truncated data (-75 to +75 nT) from Area 1 - Western Side of Henge



0 50 100 150m

1 :1250

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FIGURE 5

DURRINGTON WALLS Fluxgate Magnetometer Survey, April 2003

Traceplot of range truncated data (-150 to +150 nT/m) from Area 2 - Eastern Side of Henge

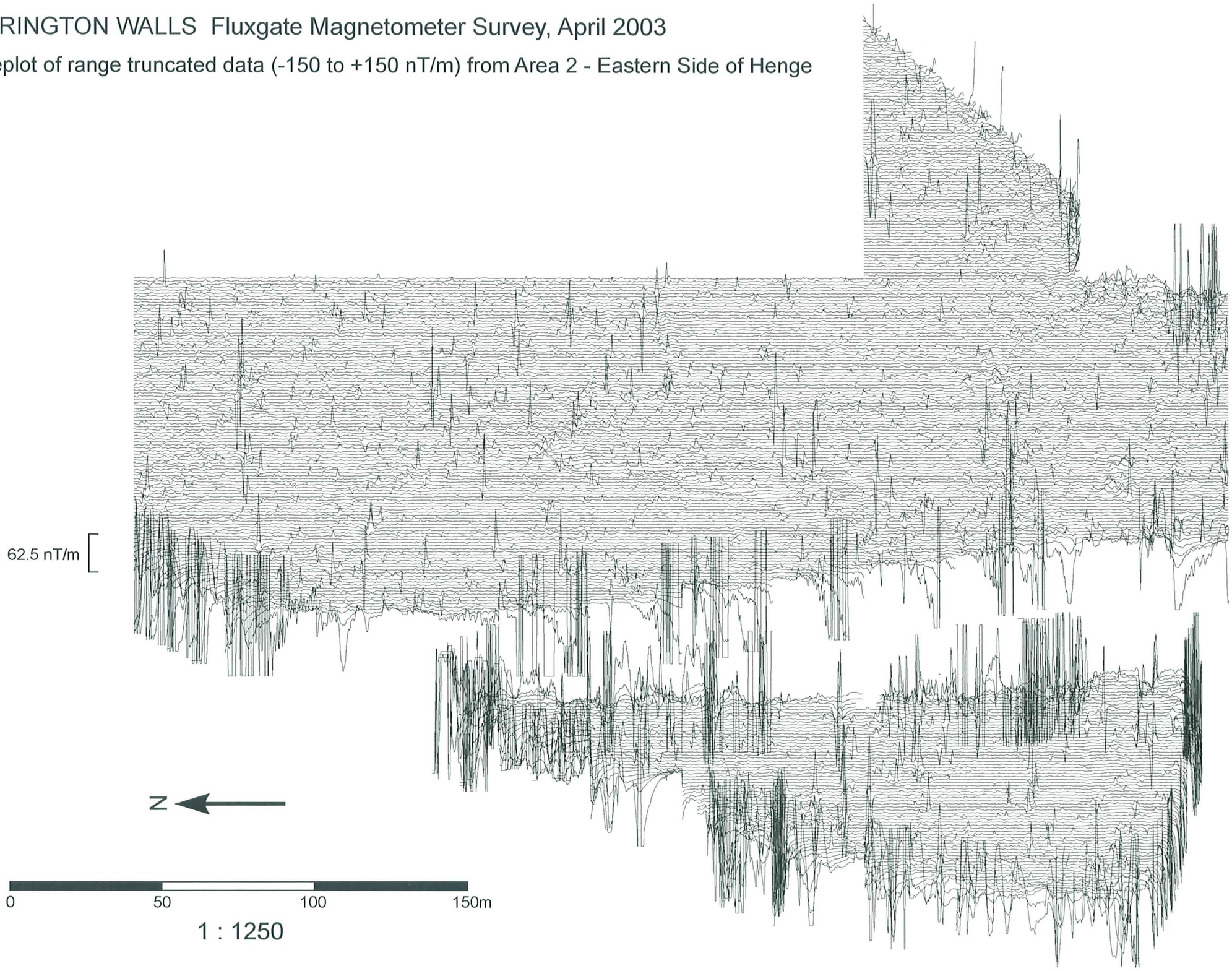

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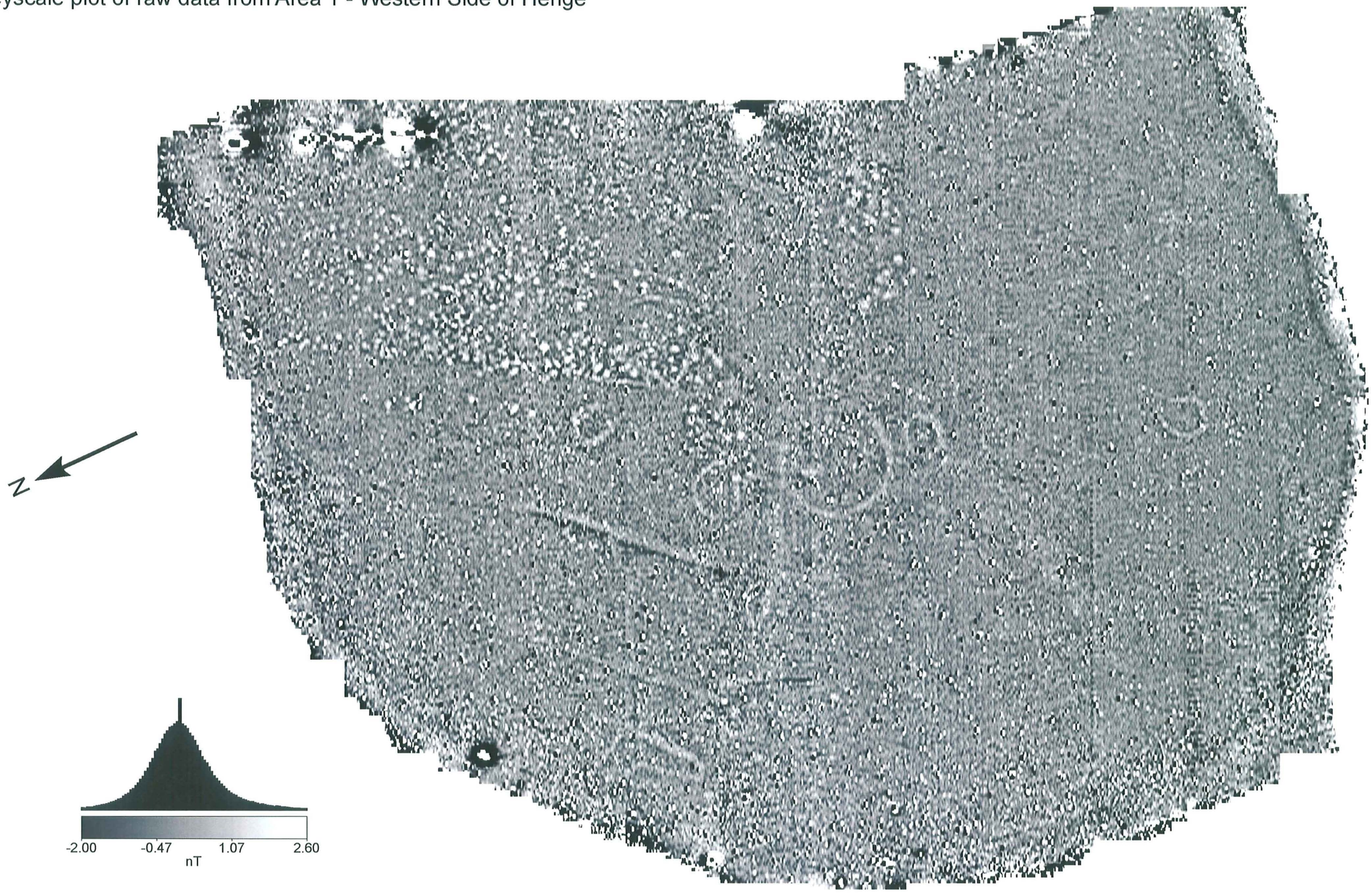
FIGURE 6

DURRINGTON WALLS Fluxgate Magnetometer Survey 1996

Greyscale plot of raw data from Area 1 - Western Side of Henge



1 : 1250

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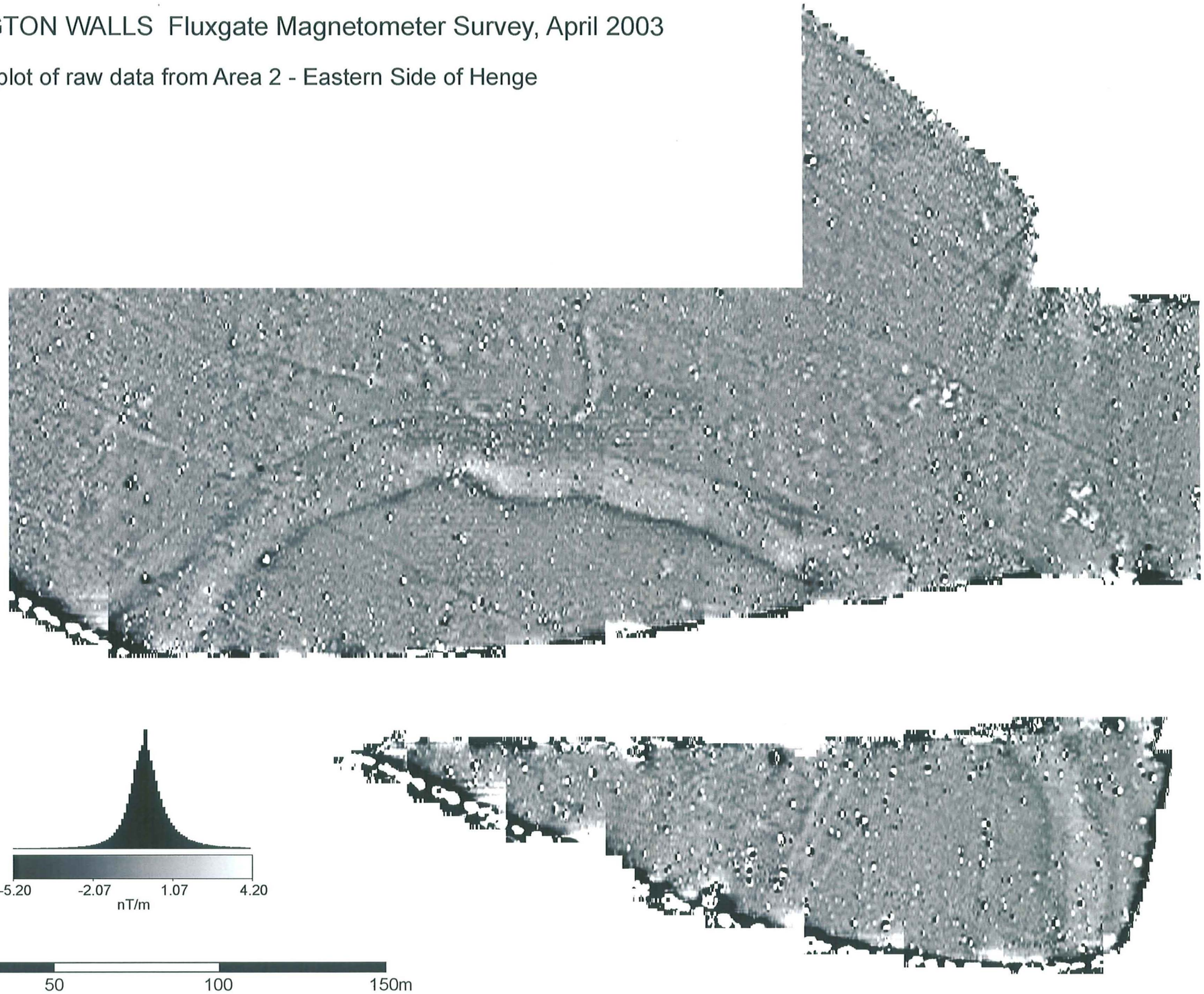
FIGURE 7

DURRINGTON WALLS Fluxgate Magnetometer Survey, April 2003

Greyscale plot of raw data from Area 2 - Eastern Side of Henge



1 : 1250

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FIGURE 8

DURRINGTON WALLS Fluxgate Magnetometer Survey 1996

Greyscale plot of despiked and smoothed data from Area 1 - Western Side of Henge

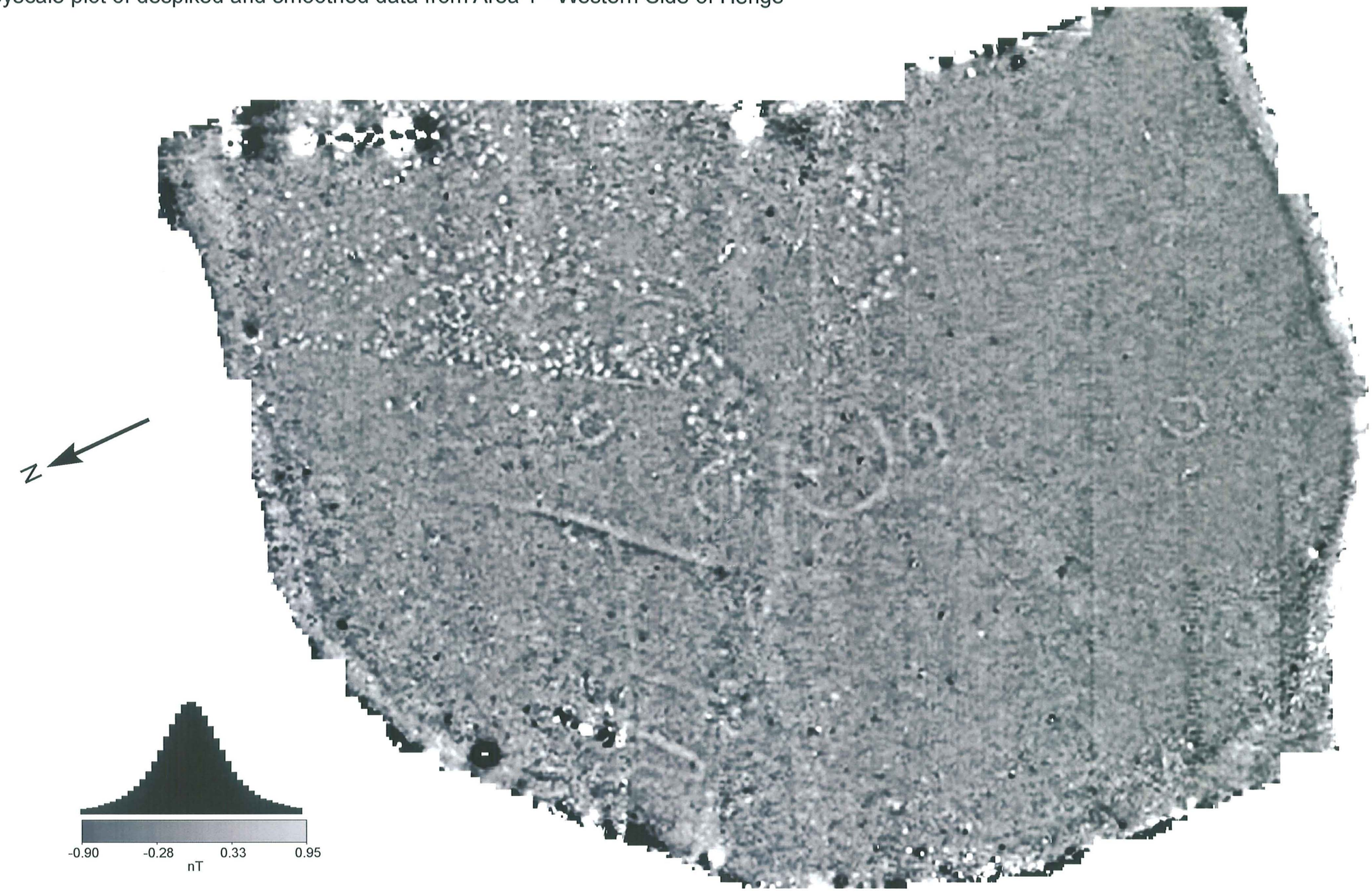

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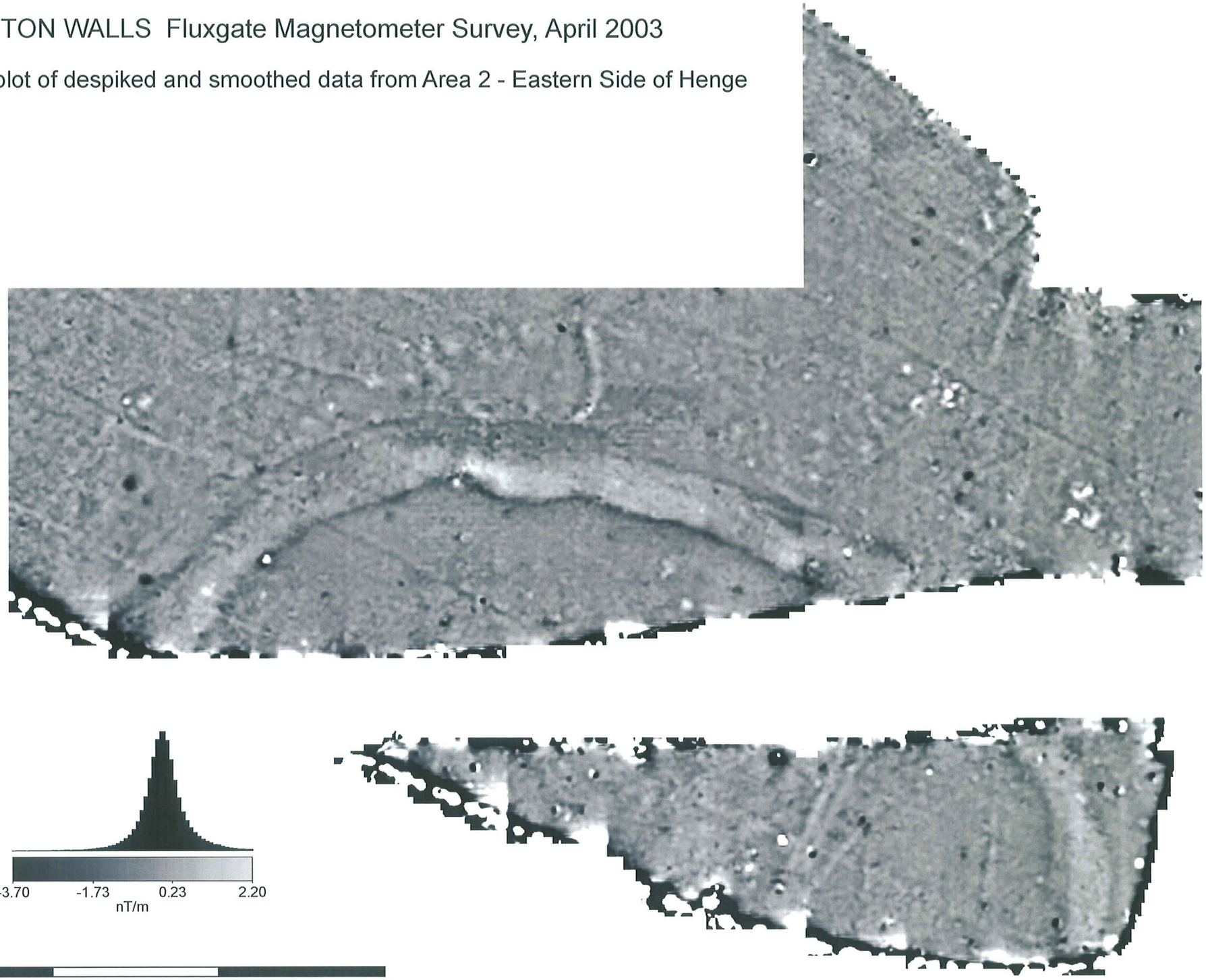
FIGURE 9

DURRINGTON WALLS Fluxgate Magnetometer Survey, April 2003

Greyscale plot of despiked and smoothed data from Area 2 - Eastern Side of Henge



1 : 1250

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FIGURE 10

DURRINGTON WALLS, WILTSHIRE Fluxgate Magnetometer Survey, 1996 & 2003

Simplified schematic plan of main archaeological features detected, superimposed on greyscale plot of magnetometer data

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FIGURE 11

DURRINGTON WALLS, WILTSHIRE Detailed Interpretation of Fluxgate Magnetometer Survey, 1996 & 2003

N

A - Q anomalies described in the text

silted up/in-filled features:-
pits, ditches, gullies, depressions

distinctly disturbed response in region of eastern henge bank

outline of the bank on the eastern side of the henge derived from OS

course of the main henge ditch

areas of slightly raised magnetic response - possible accumulations of magnetically-enhanced sediment

areas of noisier magnetic response - possible archaeological activity or a product of more recent ground disturbance

areas of intense magnetic disturbance resulting from ferrous material in the topsoil

line of edge of henge ditch

? earlier alignment of henge ditch replaced by possible re-cut

other weak positive linear anomalies

other weak negative linear anomalies

former cultivation pattern - positive furrow

former cultivation pattern - negative furrow

limit of survey coverage

0 50 100 150m

1 : 2500

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