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Two Long Barrows, Nr Avebury, Wiltshire. Report on Geophysical Survey, December 2000.

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Summary

Magnetometer surveys were conducted over the South Street and Horslip long barrows, near Avebury, Wiltshire in order to locate them accurately on the ground in advance of their removal from cultivation. Although a response was recorded to the ditches at both sites, the magnetisation of these features was quite weak and few other significant anomalies were recorded.

Keywords

Geophysics

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TWO LONG BARROWS, Nr AVEBURY, Wiltshire.

Report on geophysical survey, December 2000.

Introduction

Magnetometer surveys were conducted over two long barrows near Avebury, Wiltshire. The first, known as South Street long barrow (National Monument Number: 21735), is situated near the Longstones at Beckhampton. The second, the Horslip long barrow (National Monument Number: 21716), is located on the flank of Windmill Hill. The surveys were requested by the Avebury World Heritage Site Management Officer with the objective of correctly locating the monuments prior to their removal from cultivation. The surveys might also be expected to provide information on the character and physical survival of the monuments, and their immediate surroundings.

The South Street long barrow (SU 0902 6928) was mostly excavated during 1964-5 and 1966-67 (Ashbee *et al* 1979) and the Horslip long barrow (SU 0860 7052) in 1959 (*ibid*). Both lie on well drained calcareous clayey and silty soils of the Blewbury and Andover 1 associations (Soil Survey of England and Wales 1983). South Street is underlain by Middle Chalk (*ibid*; 250) whilst Horslip is over Lower Chalk (Institute of Geological Sciences 1974). Their respective scheduled areas had been left in 'set aside' to allow for the survey. Due to the orientation of the survey grids and indications from initial results it was necessary at certain points to extend the survey onto the adjacent winter wheat crop.

Method

Magnetometer survey

Magnetometer survey has been shown to be effective in the Avebury region in the detection of buried ditches and features associated with long barrows (e.g. Bray 1998), and was therefore the method of first choice on this occasion. The survey was conducted over all the numbered grid squares (Figure 1) using the standard method outlined in note 2 of Annex 1, but with a traverse interval of 0.5m. Plots of the South Street data-set are presented as both an X-Y traceplot and a linear greyscale, at a scale of 1:650 on Plan A. Plots of the Horslip data-set are presented as both an X-Y traceplot and a linear greyscale, at a scale of 1:750 on Plan B. The only corrections made to the measured values displayed in the plots were to zero-mean each instrument traverse to remove heading errors and to 'despike' the data through the application of a 2m by 2m thresholding median filter (Scollar *et al* 1990; 492) to reduce the detrimental effects produced by surface iron objects. In addition the lower and upper values of the South Street data have been trimmed for presentation as a traceplot on Plan A.

Results

South Street long barrow

A graphical summary of the anomalies discussed in the following text is provided on Plan C1.

The magnetic response has been severely affected by modern disturbance [1] along the boundary with Nash Road (formerly South Street). Other ferrous interference can be seen at [2], and at [3-4], the latter probably responses to debris in the excavation backfill of the long barrow ditch (see below). The linear positive magnetic anomaly [5] is almost certainly an artefact of the excavation, perhaps the infilling of a section (across ditch cuttings II and VII, section l-n'; Ashbee *et al* 1979; figs 23-4) deepened at the time to expose periglacial involutions. The direction of recent ploughing [6] has been recorded in the southern field.

The two barrow ditches have been located at [7] and [8]. The anomaly [7] arising from the northern ditch (~ 2.5nT) is interrupted which may either indicate the presence of a causeway (but see Ashbee *et al* 1979; 257), or be an effect of the continuation of the excavated section [5]. The magnetic response to both barrow ditches is not significantly higher than the background level (see traceplot – Plan A1).

Anomalies [9-11] have been located between the ditches, and within the excavated area but no corresponding features are apparent (*ibid* fig 23). Just to the north of [7], and outside the area excavated in 1966-67, is a positive magnetic anomaly [12], perhaps a pit. Other anomalies nearby have a more ferrous character and may therefore be more recent.

Also in this field are two separate negative linear anomalies [13] and [14] although it is unclear what relationship, if any, they have with the long barrow. The remaining anomalies recorded in the southern field are isolated linear responses similarly difficult to interpret.

Horslip long barrow

A graphical summary of the anomalies discussed in the following text is provided on Plan C2.

The background response here is more subdued (< ± 1nT) than at South Street, and, as the survey area did not coincide with field boundaries, there is significantly less magnetic disturbance. The notable exceptions are at [15] and [16], which may well relate to huts used in the 1959 excavations (Ashbee *et al* 1979; plate 28a); and at [17] and [18] which probably represent detritus in backfilling (in particular, in the ditch cuts across C and D; *ibid*; fig 2).

The broad bands of slightly raised magnetic readings at [19] and [20] relate to the long barrow ditches. To the north are about four discrete positive anomalies [21], arranged in an approximate semi-circle across the ends of the two ditches, outside the previously excavated area.

A well-defined linear positive magnetic anomaly [22], probably a ditch, running approximately NE-SW to the east of [19], was only partially captured by the survey.

Conclusion

Both surveys are characterised by a very weak and partial response to known features, notably the flanking ditches. The debris from the previous excavations is very evident in places.

At South Street the position of the western end of the outer ditches has been identified. However, the response from the eastern end of [8] has not been completely recorded as Nash Road has bisected the survey area. At the time of the excavations in the 1960's, South Street was recorded as being approximately 2.8m wide (Ashbee *et al* 1979; fig 23). At the time of this survey Nash Road and its verges span an area of approximately 9m. Additionally, the disturbance from the ferrous fences affects a strip up to 8m wide, thus impeding the location of the south-eastern ditch terminal.

Unsurprisingly there has been no response to the greatly reduced barrow mound at South Street, and no obviously significant features have been detected outside the barrow ditches (apart, possibly, from at [12]).

The barrow ditches have also been located at Horslip, with an equal if not more subdued response. The ditches are mainly defined by the disturbed magnetic readings at their terminals, presumably resulting from the intrusive excavations here. One explanation for the lack of significant response to the substantial ditches (between 2.4m and 3.6m below the 1959 ground surface; *ibid*; 214) is that their magnetically enhanced soils are too deeply buried for the magnetometer to record a stronger response. Around the northern ends of the two ditches, and outside the excavated area, are a number of positive magnetic anomalies that may be speculated to represent features contemporary with the barrow.

Overall, the survey has successfully provided confirmation of the exact location of the barrows, although additional information on character and preservation is very limited. Further survey using resistivity might provide some corroborative information, for instance where magnetic interference has been a problem.

Surveyed by: P Linford
N Linford
L Martin

Date of survey: 11-14/12/2000

Reported by: L Martin

Date of report: 14/03/2001

Archaeometry Branch,
English Heritage,
Centre for Archaeology.

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Soil Survey of England and Wales, 1983, Soils of England and Wales, Sheet 5, South West England.

List of enclosed figures.

Figure 1 Location plan of survey grid squares for South Street long barrow over base OS map (1:2500).

Figure 2 Linear greyscale of magnetometer data for South Street long barrow superimposed over base OS map (1:2500).

Figure 3 Location plan of survey grid squares for Horslip long barrow over base OS map (1:2500).

Figure 4 Linear greyscale of magnetometer data for Horslip long barrow superimposed over base OS map (1:2500).

Plan A Traceplot and linear greyscale of magnetometer data for South Street long barrow (1:650).

Plan B Traceplot and linear greyscale of magnetometer data for Horslip long barrow (1:750).

Plan C Graphical summary of significant geophysical anomalies.

Annex 1: Notes on standard procedures

1) **Resistivity Survey:** Each 30 metre grid square is surveyed by making repeated parallel traverses across it, all aligned parallel to one pair of the grid square's edges, and each separated by a distance of 1 metre from the last; the first and last traverses being 0.5 metres from the nearest parallel grid square edge. Readings are taken along each traverse at 1 metre intervals, the first and last readings being 0.5 metres from the nearest grid square edge.

Unless otherwise stated the measurements are made with a Geoscan RM15 earth resistance meter incorporating a built-in data logger, using the twin electrode configuration with a 0.5 metre mobile electrode separation. As it is usually only relative changes in resistivity that are of interest in archaeological prospecting, no attempt is made to correct these measurements for the geometry of the twin electrode array to produce an estimate of the true apparent resistivity. Thus, the readings presented in plots will be the actual values of earth resistance recorded by the meter, measured in Ohms (Ω). Where correction to apparent resistivity has been made, for comparison with other electrical prospecting techniques, the results are quoted in the units of apparent resistivity, Ohm-m (Ωm).

Measurements are recorded digitally by the RM15 meter and subsequently transferred to a portable laptop computer for permanent storage and preliminary processing. Additional processing is performed on return to the Centre for Archaeology using desktop workstations.

2) **Magnetometer Survey:** Each 30 metre grid square is surveyed by making repeated parallel traverses across it, all parallel to that pair of grid square edges most closely aligned with the direction of magnetic North. Each traverse is separated by a distance of 1 metre from the last; the first and last traverses being 0.5 metre from the nearest parallel grid square edge. Readings are taken along each traverse at 0.25 metre intervals, the first and last readings being 0.125 metre from the nearest grid square edge.

These traverses are walked in so called 'zig-zag' fashion, in which the direction of travel alternates between adjacent traverses to maximise survey speed. However, the magnetometer is always kept facing in the same direction, regardless of the direction of travel, to minimise heading error.

Unless otherwise stated the measurements are made with a Geoscan FM36 fluxgate gradiometer which incorporates two vertically aligned fluxgates, one situated 0.5 metres above the other; the bottom fluxgate is carried at a height of approximately 0.2 metres above the ground surface. The FM36 incorporates a built-in data logger that records measurements digitally; these are subsequently transferred to a portable laptop computer for permanent storage and preliminary processing. Additional processing is performed on return to the Centre for Archaeology using desktop workstations.

It is the opinion of the manufacturer of the Geoscan instrument that two sensors placed

0.5 metres apart cannot produce a true estimate of vertical magnetic gradient unless the bottom sensor is far removed from the ground surface. Hence, when results are presented, the difference between the field intensity measured by the top and bottom sensors is quoted in units of nano-Tesla (nT) rather than in the units of magnetic gradient, nano-Tesla per metre (nT/m).

3) **Resistivity Profiling:** This technique measures the electrical resistivity of the subsurface in a similar manner to the standard resistivity mapping method outlined in note 1. However, instead of mapping changes in the near surface resistivity over an area, it produces a vertical section, illustrating how resistivity varies with increasing depth. This is possible because the resistivity meter becomes sensitive to more deeply buried anomalies as the separation between the measurement electrodes is increased. Hence, instead of using a single, fixed electrode separation as in resistivity mapping, readings are repeated over the same point with increasing separations to investigate the resistivity at greater depths. It should be noted that the relationship between electrode separation and depth sensitivity is complex so the vertical scale quoted for the section is only approximate. Furthermore, as depth of investigation increases the size of the smallest anomaly that can be resolved also increases.

Typically a line of 25 electrodes is laid out separated by 1 or 0.5 metre intervals. The resistivity of a vertical section is measured by selecting successive four electrode subsets at increasing separations and making a resistivity measurement with each. Several different schemes may be employed to determine which electrode subsets to use, of which the Wenner and Dipole-Dipole are typical examples. A Campus Geopulse earth resistance meter, with built in multiplexer, is used to make the measurements and the Campus Imager software is used to automate reading collection and construct a resistivity section from the results.

SOUTH STREET LONG BARROW, Nr AVEBURY, WILTS.
Location of geophysical survey, December 2000.

SU0969

Figure 1; South Street long barrow, Nr Avebury, Wilts, *Location of magnetometer survey, December, 2000.*

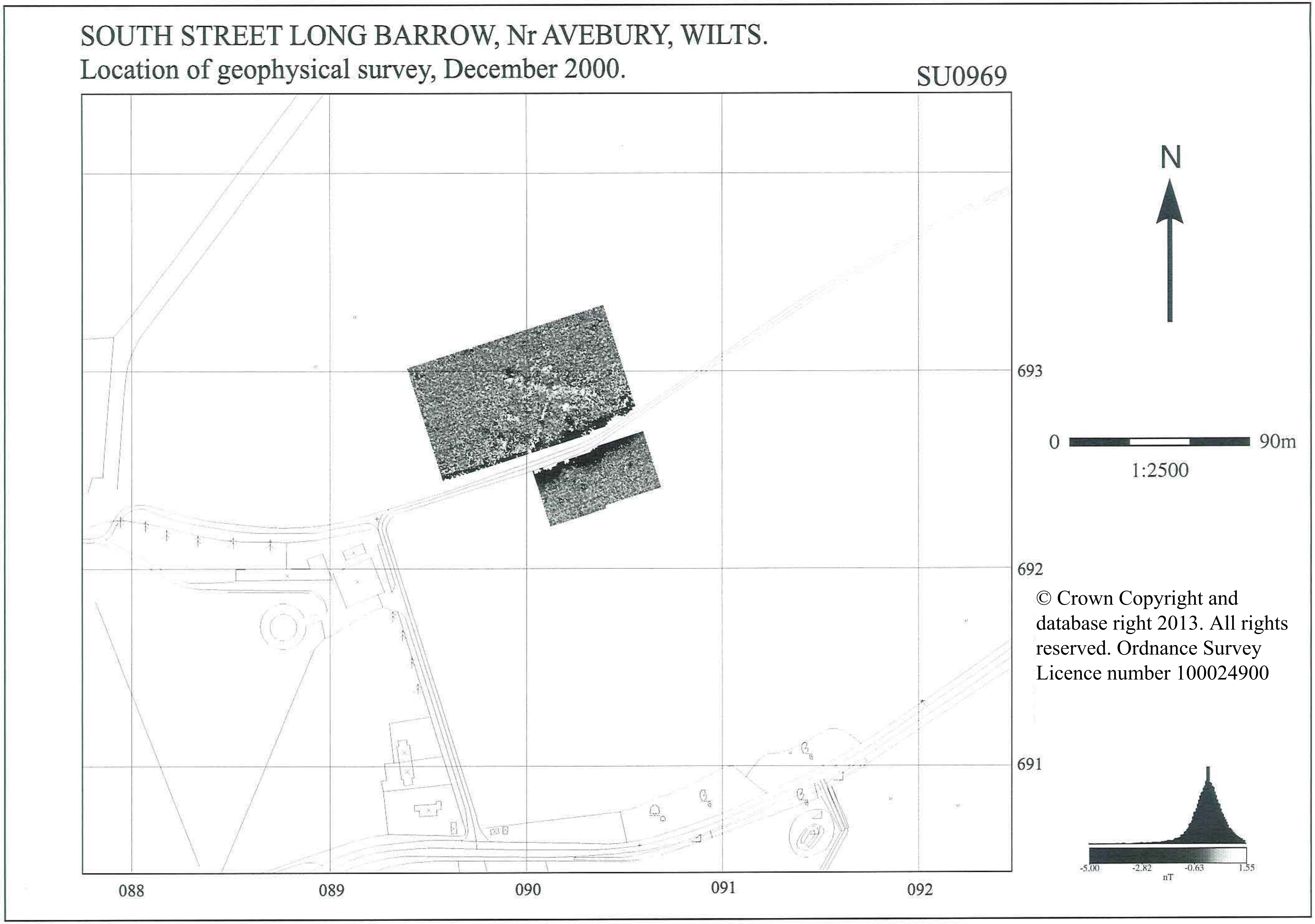


Figure 2; South Street long barrow, Nr Avebury, Wilts, Linear greyscale of magnetometer data, December, 2000.

HORSLIP LONG BARROW, Nr AVEBURY, WILTS.
Location of geophysical survey, December 2000.

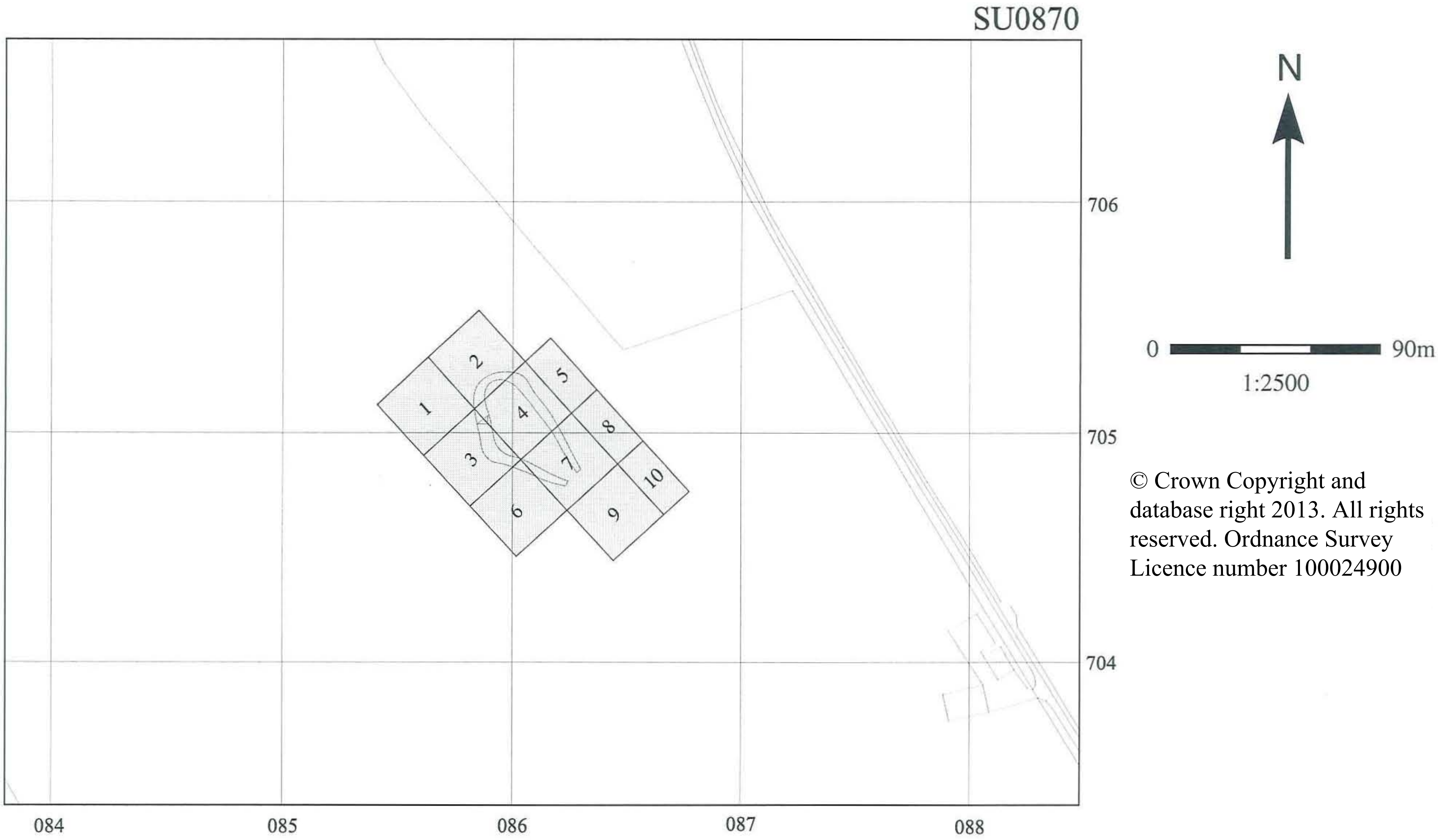


Figure 3; Horslip long barrow, Nr Avebury, Wilts, *Location of magnetometer survey, December, 2000.*

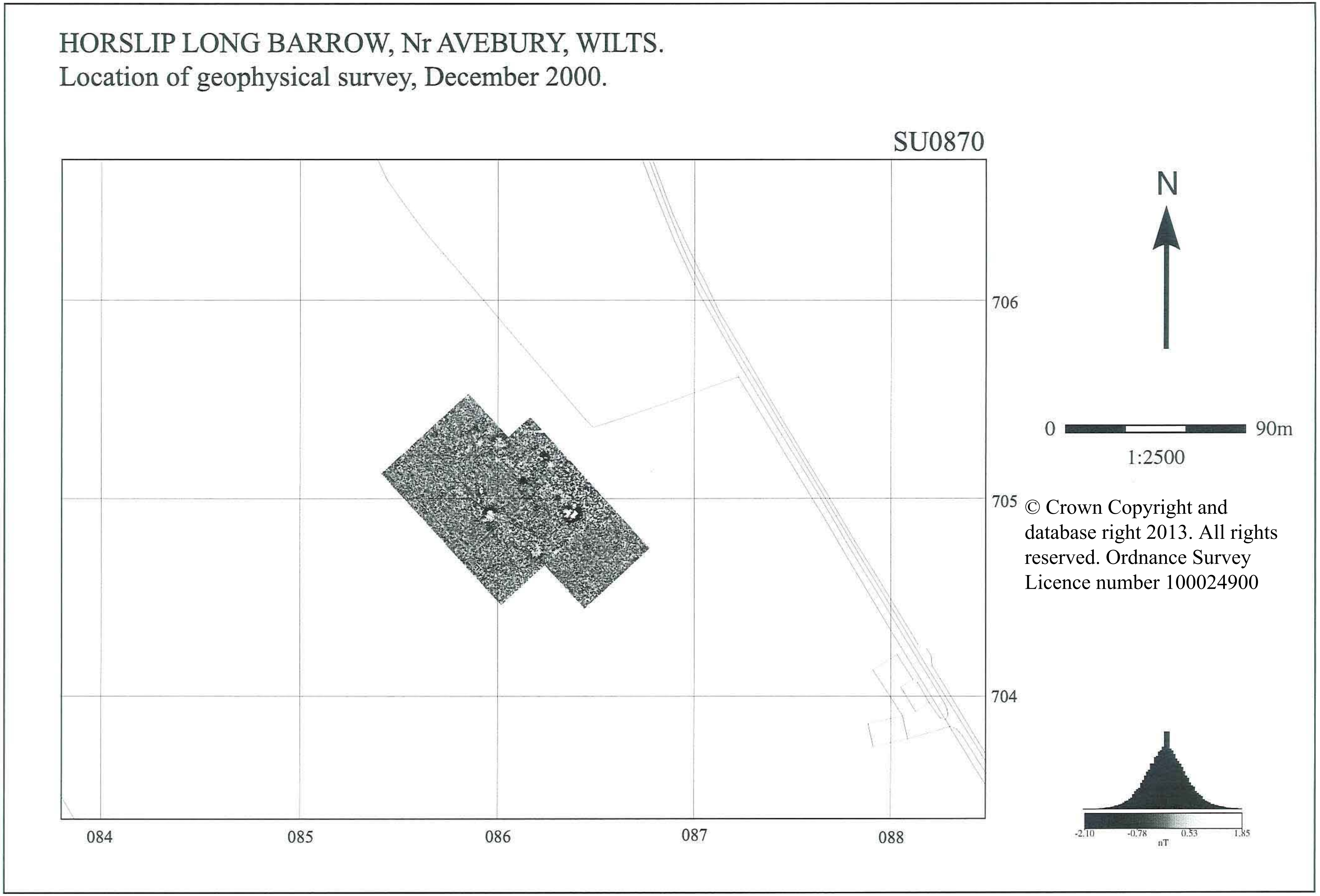
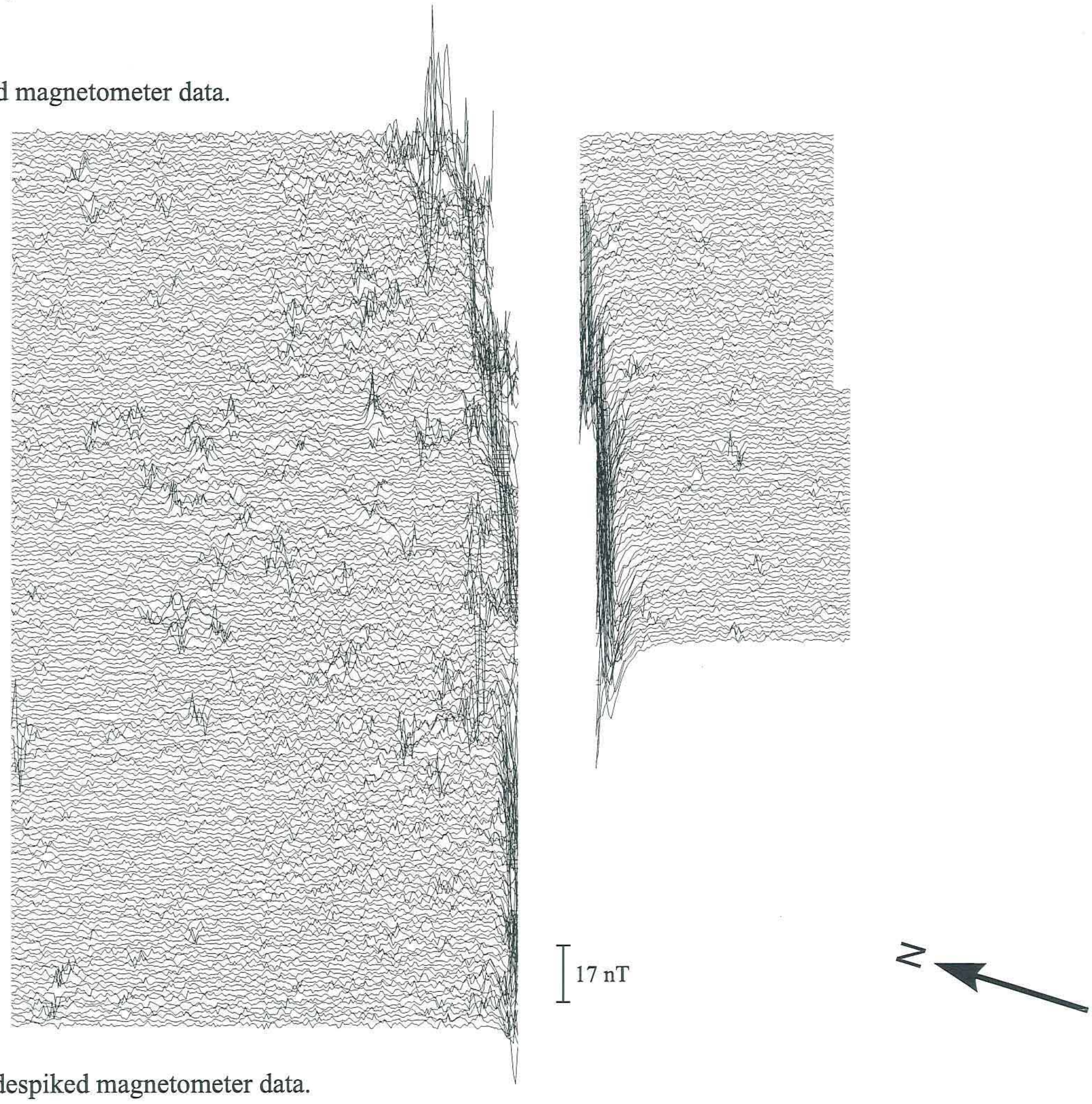


Figure 4; Horslip long barrow, Nr Avebury, Wilts, *Linear greyscale of magnetometer data, December, 2000.*

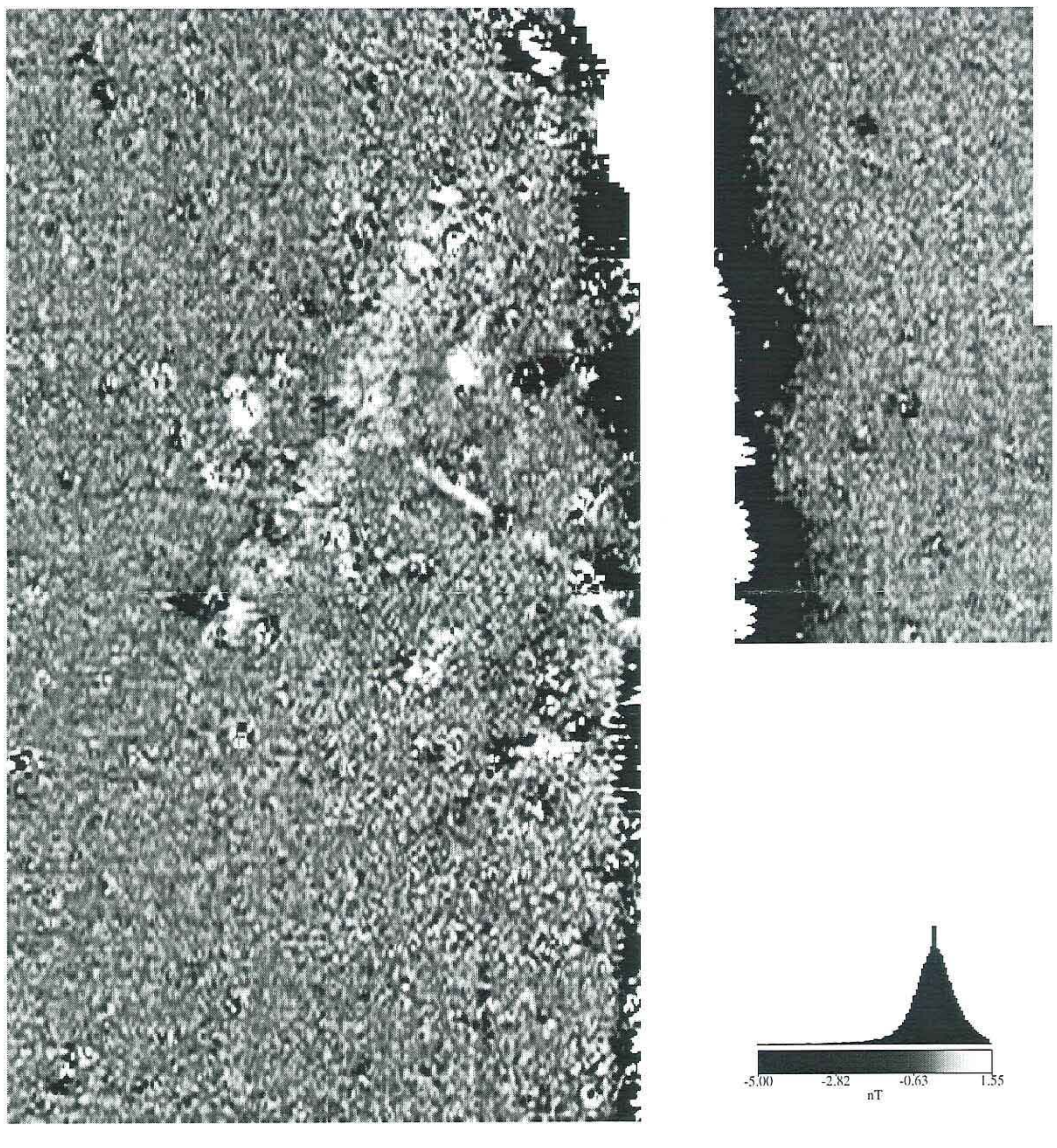
SOUTH STREET LONG BARRROW, Nr AVEBURY, WILTS.
Magnetometer survey, December 2000.

PLAN A.

1) Traceplot of despiked magnetometer data.



2) Linear greyscale of despiked magnetometer data.



0 60m

1:650

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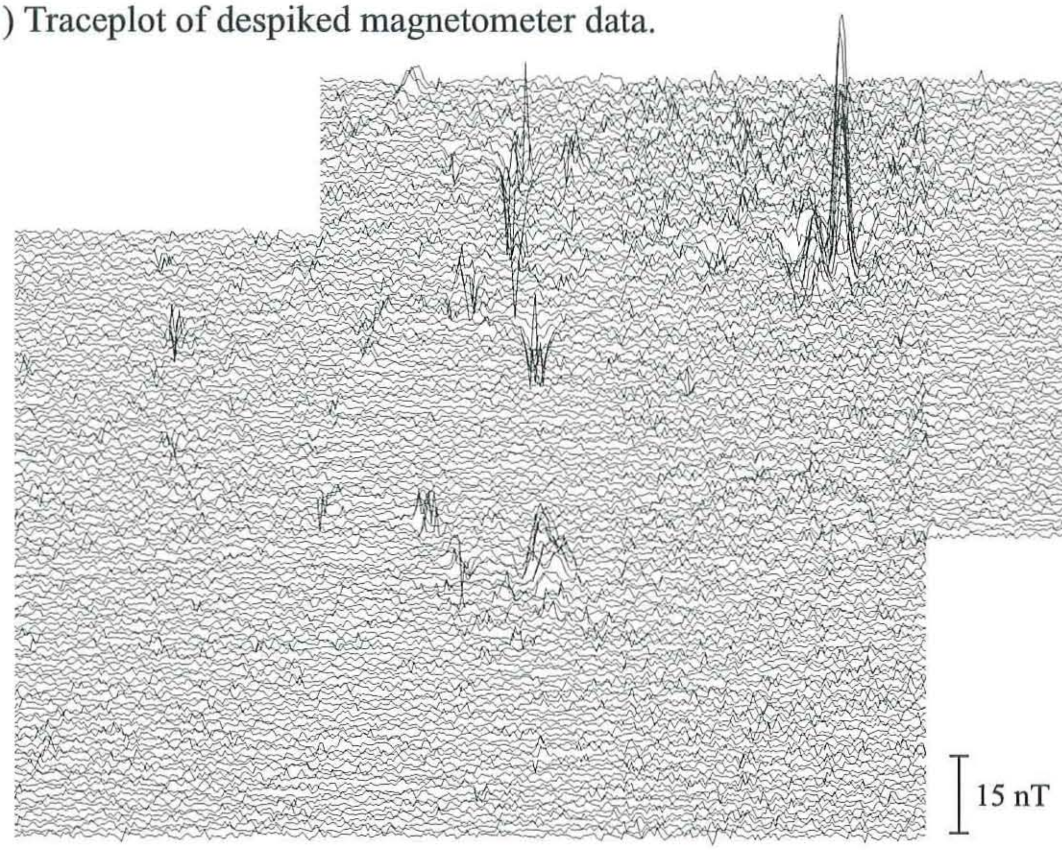
HORSLIP LONG BARROW, Nr AVEBURY, WILTS.

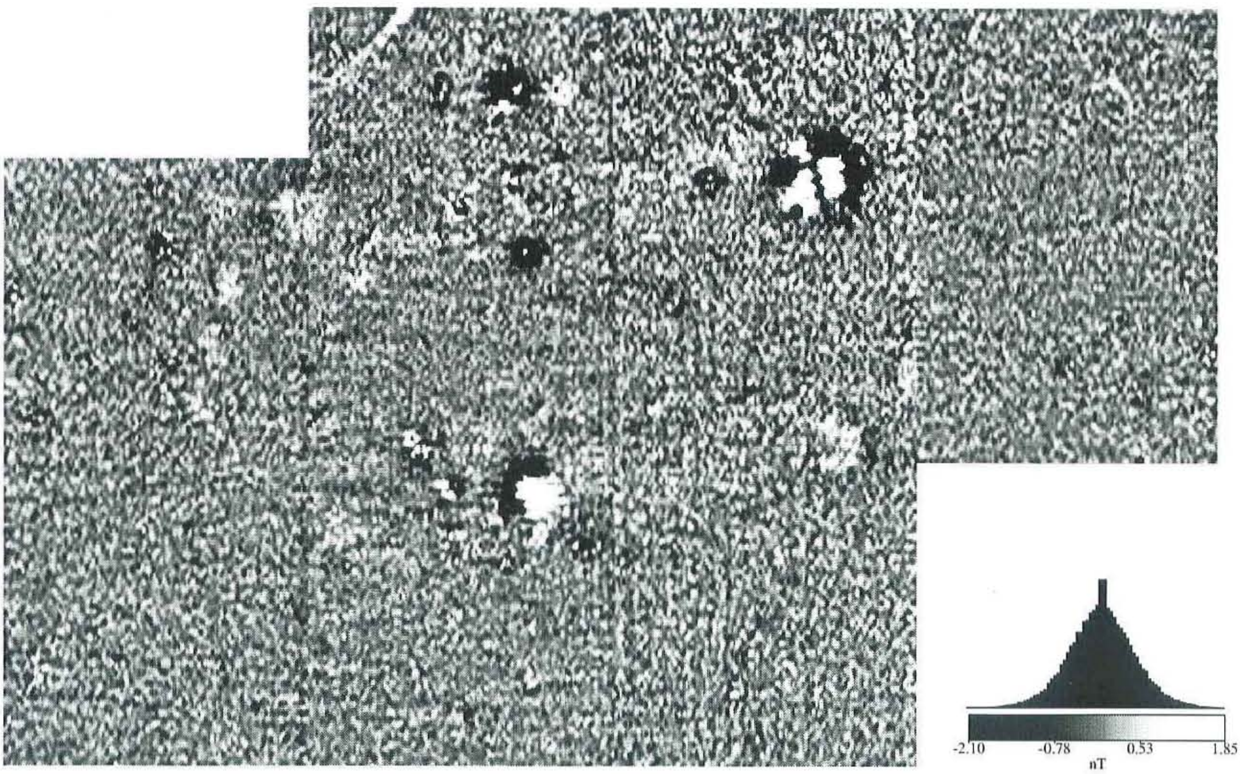
PLAN B

Magnetometer survey, December 2000.

1) Traceplot of despiked magnetometer data.



2) Linear greyscale of despiked magnetometer data.



0 60m

1:750

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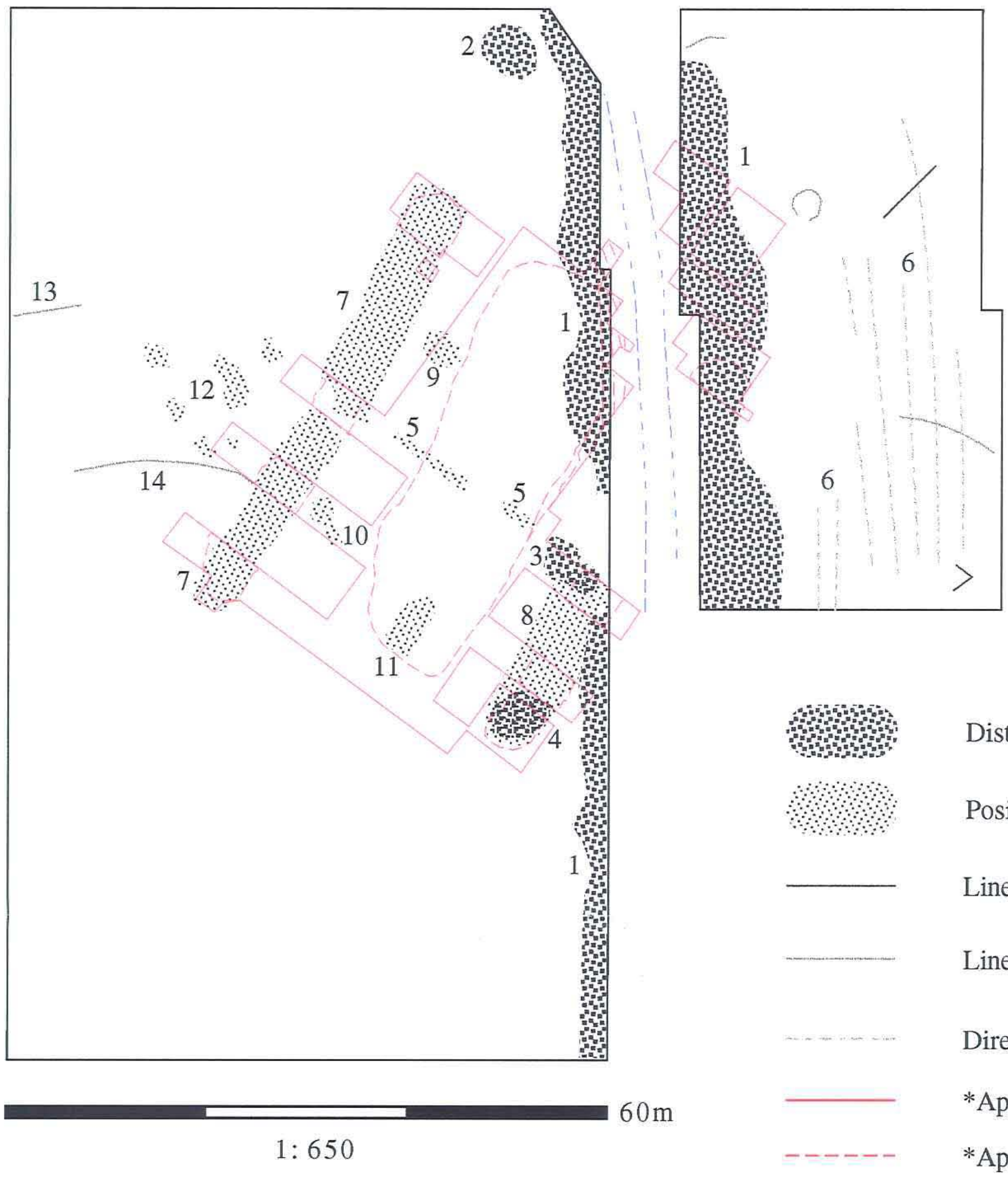
PLAN C

Graphical summary of significant geophysical anomalies, December 2000.

1) South Street long barrow.



Disturbed magnetic anomaly

Positive magnetic anomaly

Linear positive magnetic anomaly

Linear negative magnetic anomaly

Direction of ploughing

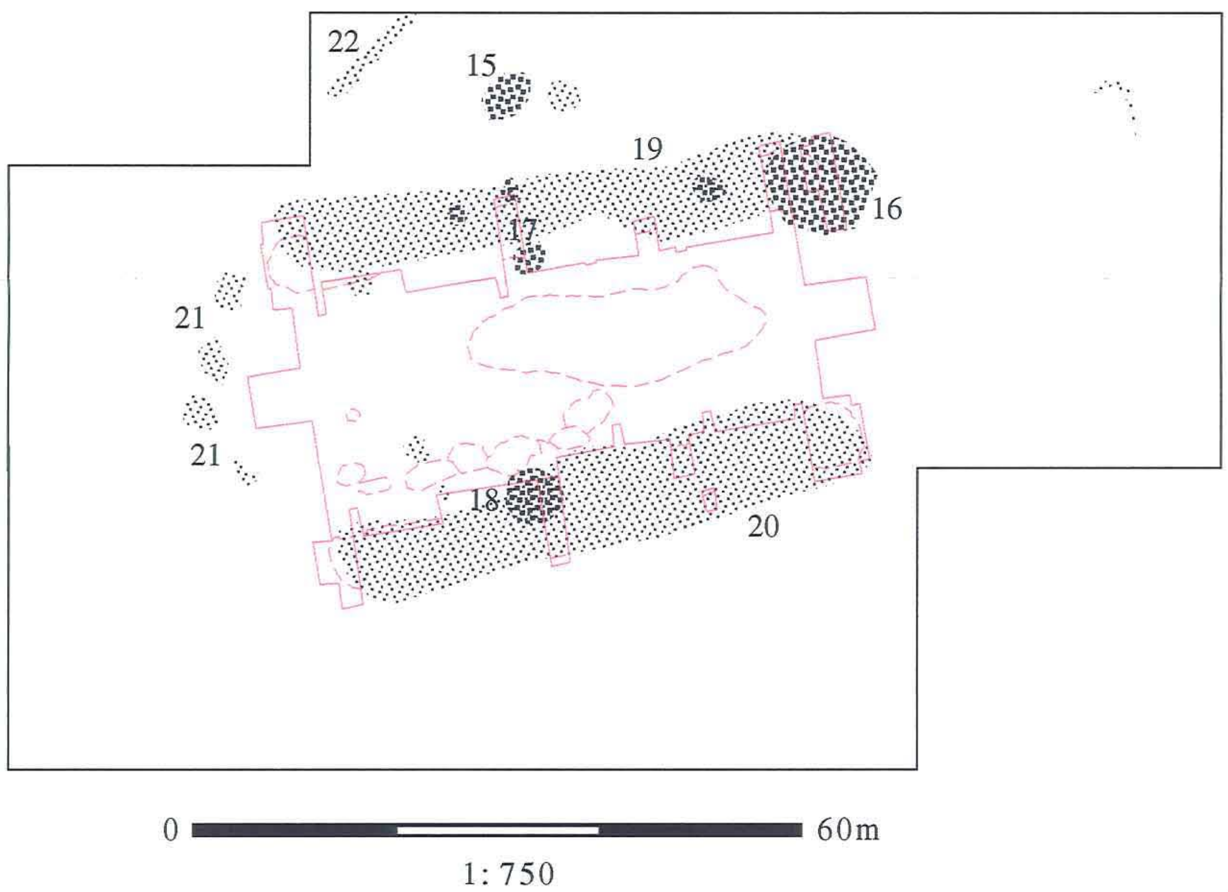
*Approximate location of excavation trench

*Approximate location of excavated feature

*Approximate location of South Street

* After Ashbee *et al* 1979; figs 2 & 23.

2) Horslip long barrow.



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