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Ancient Monuments Laboratory
Report 38/95

REPORT ON GEOPHYSICAL SURVEY, APRIL 1995, DOWN GROUND, KNIGHTON DOWN, ISLE OF WIGHT

A Payne

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Summary

The presence of an important focus of previously unrecorded archaelogical activity was suspected at Down Ground, following the discovery by metal detecting of a concentration of Celtic and Roman coinage. Magnetometer and resistivity surveys were carried out in an attempt to define the nature and extent of the activity in advance of a coroner's enquiry into the legal status of the finds and also as an aid to possible future scheduling. In the western half of the survey, the subsoil changes from chalk to drift deposits, and this has had a strong effect on both sets of results. The resistivity data clearly indicates the boundary between the less conductive chalk and the more water retentive drift deposits. In the western (drift covered) area, background magnetic activity is high and a complex pattern of superimposed magnetic anomalies and a honeycomb pattern of high resistance anomalies were detected. The irregular anomalies in this area are probably natural in origin, but the magnetic results also indicate the presence of a range of buried archaeological features, although no definite building remains were located. In the remainder of the survey, where the ploughsoil is directly developed over chalk bedrock, a possible primitive kiln-type feature was located, but in general the level of archaeological activity appears to decrease. Overall there is not a strong correlation between the geophysical results and the distribution of metal detecting finds, although a cluster of finds does appear to coincide with the location of the aforementioned possible industrial structure.

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ANCIENT MONUMENTS LABORATORY REPORTS SERIES

Down Ground, Knighton Down, Isle of Wight

Report on Geophysical Survey, April 1995

Andrew Payne

Introduction

Following the recovery by metal detecting of a notable quantity of Celtic and Roman coins at Down Ground (NGR SZ 56/87), a geophysical survey was carried out by the Ancient Monuments Laboratory at the request of the Isle of Wight County Council and the English Heritage Conservation Group regional inspector. Interpretation of the finds suggested that they possibly derived from an archaeological site with a religious or funerary affiliation (Tomalin *pers comm*). The survey was commissioned in anticipation of a coroner's inquiry into the legal status of the finds and also to provide evidence in advance of possible scheduling.

Site setting

The site is situated on a saddle that slopes gently from east to west between two higher summits on the edge of the southern escarpment of "the Downs". The saddle is bounded on the west by a deeply incised steeply sloping valley or "shute" cutting down through the escarpment to the south. Geology and soil maps (Institute of Geological Sciences 1976) indicate that the site is located on shallow calcareous silty soils developed on chalk, but the survey results (see below) combined with anecdotal geological evidence suggest that superficial deposits of clay-with-flints (Osborne Wight 1990 and M Canti *pers comm*) are present on the lower slopes of the saddle. Limited augering confirmed the presence of a chalk subsoil in the east of the area surveyed, but unfortunately insufficient time was available to investigate the character of the geological variation to the west. The geophysical effects of this variation were not in fact entirely appreciated until the data was fully processed in the laboratory.

Method

Given the poorly understood nature of the site and the possibility of building remains being present (perhaps a temple or shrine), both magnetic and resistivity techniques were used. An extensive fluxgate magnetometer survey was carried out initially in an attempt to define the general bounds of archaeological activity and a resistivity survey was then used more selectively in areas of interest identified by the magnetometer survey. Instrument readings were based on a grid of 30m squares aligned on and located to points on the National Grid (Figure 1) by the County Archaeological Service with the aid of a global positioning system (GPS).

Magnetometry

Each 30m square was surveyed using Geoscan FM36 fluxgate gradiometers with traverses 1m apart. The local gradient of the Earth's magnetic field was measured at 0.1 nT (nanotesla) sensitivity at 0.25m intervals in a north-south direction along each traverse. The data was recorded in the internal memory of each magnetometer and was periodically transfered in the field to diskette on a portable microcomputer for storage and verification. The resulting dataset was subsequently recombined and processed in the laboratory using a suite of programmes developed by the Archaeometry Branch, installed on a Sun Sparc - Unix workstation. The raw processed data (after preliminary reduction of the effect of instrument drift and responses to iron) is presented in the form of greyscale and trace plots in Figures 3 and 4. A greyscale plot of data enhanced by the application of a 1m radius Gaussian low-pass filter to reduce superficial instrument and soil noise (Scollar *et al* 1986) is also presented in Figures 2 and 5.

Resistivity

The resistance of the ground to a depth approaching 1m was measured using a Geoscan RM15 resistance meter operated in the twin electrode configuration with a mobile probe spacing of 0.5m. The survey was carried out on the same grid used for the magnetometry, with a reading interval of 1m along successive traverses spaced 1m apart. The data was manipulated and processed using the systems described above and the results are presented as a series of greyscale plots in Figure 6. In order to improve the recognition of archaeologically significant anomalies, the initial data (Figure 6a) was enhanced using a 5m radius Gaussian high-pass filter (Scollar 1990) to remove broad (geological background) trends and highlight features less than 5m in width (Figure 6b). Directional filters were also applied (Figure 6c) to emphasise features of a given orientation.

Results

Numerals in bold type refer to anomalies marked on Figure 5)

Magnetometer Survey (Figures 2, 3, 4 and 5)

The variable drift geology (see above) has apparently had a strong influence on the magnetometer data. In the western half of the survey, the chalk geology is probably overlain by a capping of ?clay-with-flints and the magnetic activity is considerably more accentuated here than further east where the ploughsoil is directly developed over chalk (confirmed by augering). The confused pattern of superimposed linear and more irregular anomalies in the western part of the survey is probably the product of a combination of geological and anthropological influences. There is an increased response to the effect of modern ploughing over the drift deposits, visible as a series of narrow striations (**1**) parallel with the field boundaries. Such an increase in magnetic response to superficial features is presumably a result of burning, related to archaeological activity interacting with a greater concentration in the clay of naturally occuring iron oxides available for magnetic enhancement (Le Borgne 1955, 1960, Tite 1972). The more irregular anomalous activity visible in the western area may be the response to an undulating interface between the superficial deposits and chalk which can be caused by periglacial features. Such features have previously been observed by the County Archaeological Unit in Tertiary deposits at Staplers Hill on the east side of Newport, 5 km to the north-west of Knighton Down (D Tomalin *pers comm*).

Disturbance of the subsoil as a result of former quarrying might also explain the irregular anomalies. Extraction of clay on the site, to provide raw material for pottery manufacture, is a possibility, owing to the presence of a distinctive anomaly at (**2**) typical of a thermally magnetised industrial feature such as a kiln or oven. During the survey, burnt pottery was retrieved from the surface in the vicinity of this feature, which also contains deposits (sampled by augering) with a very high magnetic susceptibility (MS) relative to the adjacent topsoil and chalky subsoil (see Figure 7). The highest MS reading (480×10^{-8} m^3/Kg) was obtained from the base of the feature (1m below the modern land surface), suggesting that it may represent a primitive "bonfire" type of kiln similar to one excavated at Brading Roman villa producing Vectis ware. Another discrete feature of similar magnitude has been detected at (**3**) and occasional weaker possible pit-type features at (**4-8**).

Also present are a series of more geometrically arranged and therefore more certainly artificial linear anomalies characteristic of buried ditches (**9-15**). These features become narrow and faint in places and only form a broken pattern, but may represent a series of enclosures and a trackway. The fill of the wide linear feature at (**16**) shows evidence of becoming more strongly magnetised as it progresses westwards. Such localised increases in magnetisation are often an indication that a feature is partly infilled with material of enhanced magnetic susceptibility such as hearth refuse linked to adjacent occupation or industrial activity. Other examples of this process occur at sites of Roman and Iron Age date at Croughton, NHants and Yarnton, Oxon (see David and Payne 1993, and Linford 1995). A group of strong localised anomalies (**16a**, **b** and **c**) adjacent to feature **16** may well represent the actual industrial features responsible for the localised enhancement of the ditch deposits. The geological variation may also have influenced the differential response to feature **16**, as the anomaly gradually fades out towards the transition from drift deposits to chalk. There is no obvious evidence for building remains among the archaeological features detected by magnetometry south of the modern road, but archaeological features probably extend into the area unsurveyed to the north of the road.

The area east of the geological boundary, is magnetically more subdued and apparently contains far fewer anomalies of archaeological significance. The ditches of a possible trackway (perhaps a continuation of feature **9**) have been faintly detected at **17** extending south-eastwards beyond the limits of the survey. The area surveyed to the north-east is largely devoid of features with the exception of a large ferrous pipeline (**18**) on a north-south alignment detected as a strip of intense magnetic disturbance up to 10m wide. East of the pipe the survey has located another group of features including several probable ditches (**19-20**) and part of a large ?infilled hollow or ?quarry (**21**). It is uncertain if these features are connected with the archaeological complex further to the west and the survey coverage is not extensive enough here to interpret any meaningful pattern.

Resistivity (Figure 6)

Geological influences are again very apparent in the resistivity data. The coarse textured chalk subsoil in the eastern part of the area surveyed produced readings in a much higher range relative to the readings obtained from the finer grained, more moisture retaining drift soils, resulting in a bi-modal histogram of the data (see Figure 6a).

The resistivity survey only adds a limited amount of information to that provided by the magnetometry, as it appears to have responded selectively to the irregular features tentatively interpreted as geological in the magnetometer data, while failing to record clear resistance anomalies over the more obviously archaeological features (eg. linear ditches) detected by the latter. A few of the possible ditches detected by the magnetometer survey (for example features 9 and 16) may have been detected as vague increases in resistance. Such a response would be expected from coarse textured or stoney fills which do not trap moisture and it is therefore probable that the majority of the high resistance anomalies derive from cut or negative features rather than positive features such as walls and banks which are more commonly associated with increased resistance. A close comparison of the two surveys appears to confirm this interpretation (for example feature (**23**) on Figures 6a and d which appears as a positive magnetic anomaly and a high resistance anomaly).

The question again arises as to whether some of the smaller-scale variation in the resistivity data is archaeological or geological in origin. Particularly problematic in this respect is the group of irregular cellular structures detected as a series of high resistance anomalies (**22** in Figure 6b), which is also partly represented in the magnetometer data (see above). The form of these anomalies is most compatible with natural formations, but their orientation is rectilinear to the possible ditched trackway detected at (**9**) by the magnetometer, and therefore more speculatively they might also represent the robbed out remains of a structure. Trial excavation is probably required to resolve this question.

Conclusions

The geophysical surveys have confirmed the presence of buried archaeological features at the site including ditches defining a series of trackways and enclosures, although it is unclear at this stage what function they were intended for. The surveys have also produced evidence for some form of semi-industrial activity (perhaps quarrying and pottery production or crop drying/roasting), but as yet there are no definite signs of buried building remains or the religious or funerary activity suspected on the basis of the coin finds. The full extent of the archaeology has yet to be completely defined and a more comprehensive understanding of the site may require further survey to the north, perhaps accompanied by more detailed study of the soil variation. Once the layout of features to the north becomes known, the interpretation of the archaeological remains revealed by the present survey may become clearer. The survey provides a notable example of the problems of separating responses to natural features from anthropogenic intervention. Although many of the more irregular anomalies are assumed to be responses to geological effects, seldom have superficial geological variations or geomorphological effects been registered so clearly in a magnetometer survey. The superimposition of anomalies suggests a combination of natural and artificial sub-surface features; however it is not possible to completely dismiss some of the anomalies as natural on the grounds of shape alone, and the archaeological activity on the site could well be a result of human adaptation of the local geological resources.

There is not a close correspondence between the distribution of metal detecting finds and the geophysical results (see Figures 1 and 2), although there are some exceptions to this. A concentration of finds does occur in the vicinity of the suspected industrial feature (**2**) in grid square 19 and also adjacent to possible ditches (**19** and **20**) detected in squares 21, 34 and 37. Elsewhere the correlation between finds and anomalous activity is negative - few finds were made in the southern part of the survey area (which contains the greatest concentration of magnetic anomalies), but finds were plentiful in the area south of the modern pipe, where the geophysical results were unremarkable.

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Dates: 25-28 April 1995

Reported by: A Payne

20th June 1995

ARCHAEOMETRY BRANCH, Ancient Monuments Laboratory

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LIST OF FIGURES

Figure 1. Location of survey grid

Figure 2. Greyscale plot of magnetometer data in locational setting (1:2500)

Figure 3. Greyscale plot of initial (unfiltered) magnetometer data (1:1000)

Figure 4. Traceplot of initial (unfiltered) magnetometer data (1:1000)

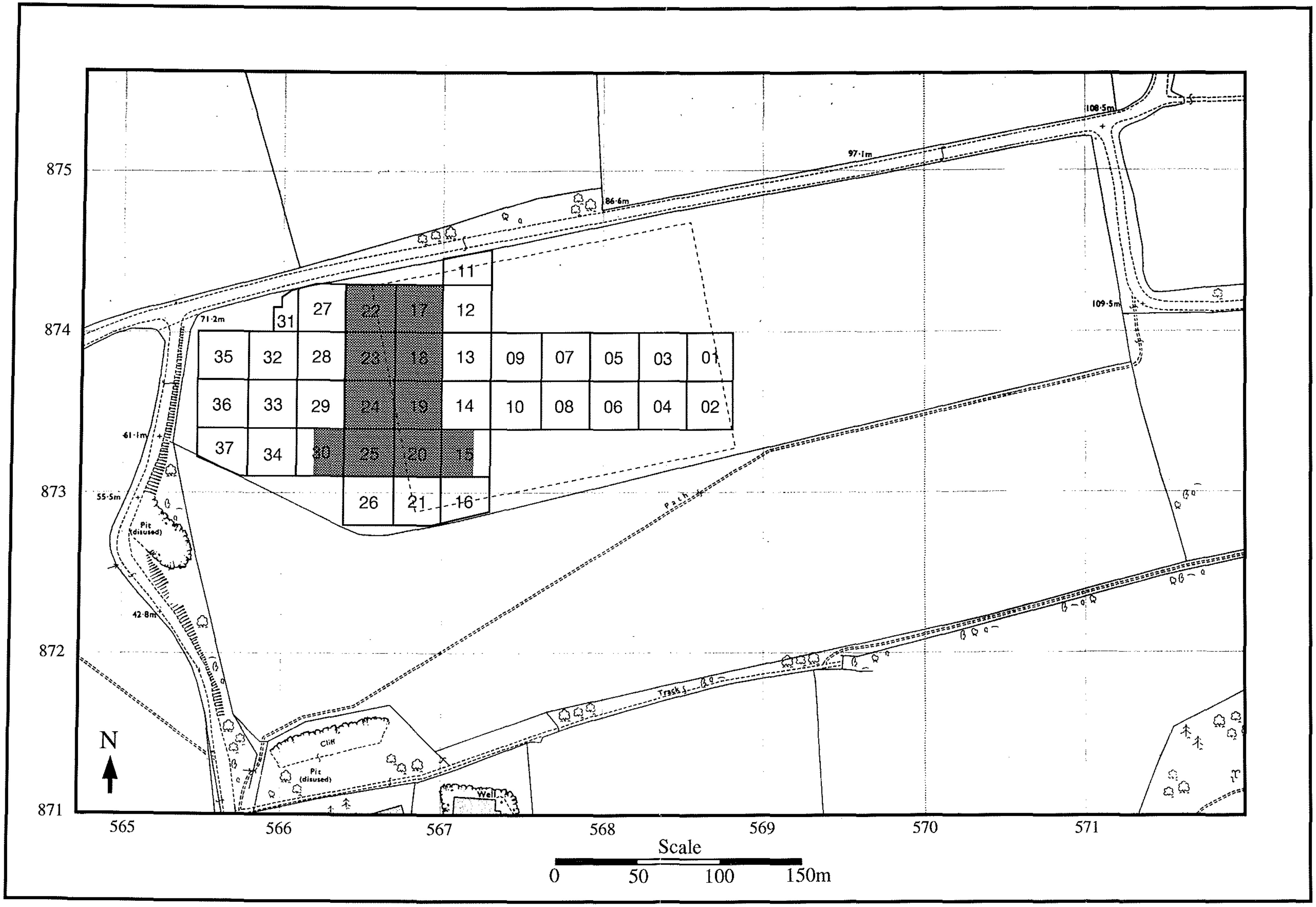
Figure 5. Greyscale plot of enhanced magnetometer data annotated with references to anomalies described in the text (1:1000)

Figure 6. Greyscale plots of resistivity data (a-c) and location of resistivity coverage in relation to the magnetometer survey (d). 6a = raw resistivity data, 6b and c = filtered resistivity data. (1:1000 scale).

Figure 7. Magnetic susceptibility of augered samples from feature 2.

DOWN GROUND, KNIGHTON DOWN, ISLE OF WIGHT

Location of Geophysical Surveys, April 1995



30m grid squares

Approximate area of metal detecting finds — *Magnetometer and resistivity survey* — *Magnetometer survey only*

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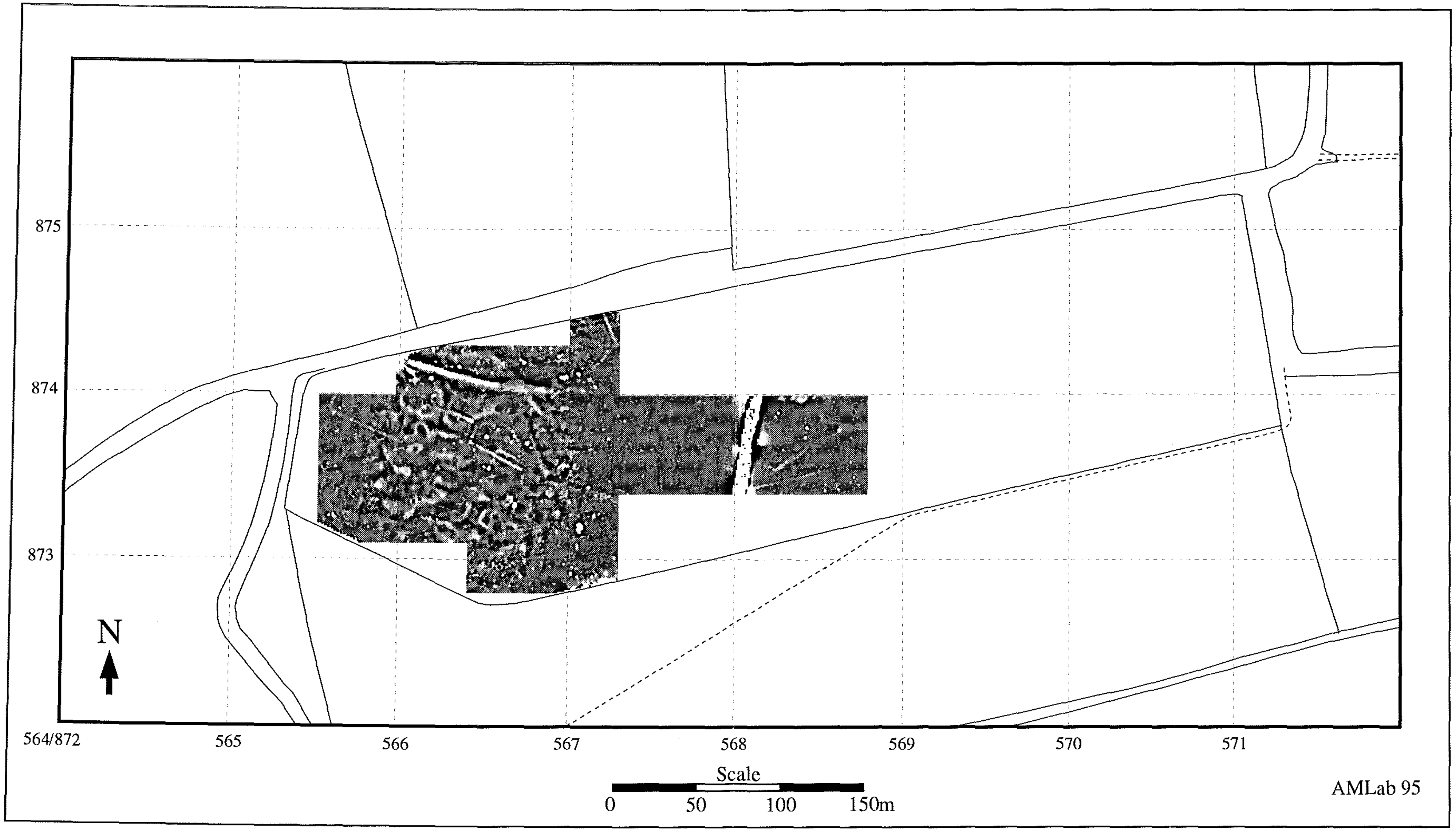
DOWN GROUND, ISLE OF WIGHT



Location of Magnetometer Survey

Figure 3

DOWN GROUND, ISLE OF WIGHT Magnetometer Survey 1995

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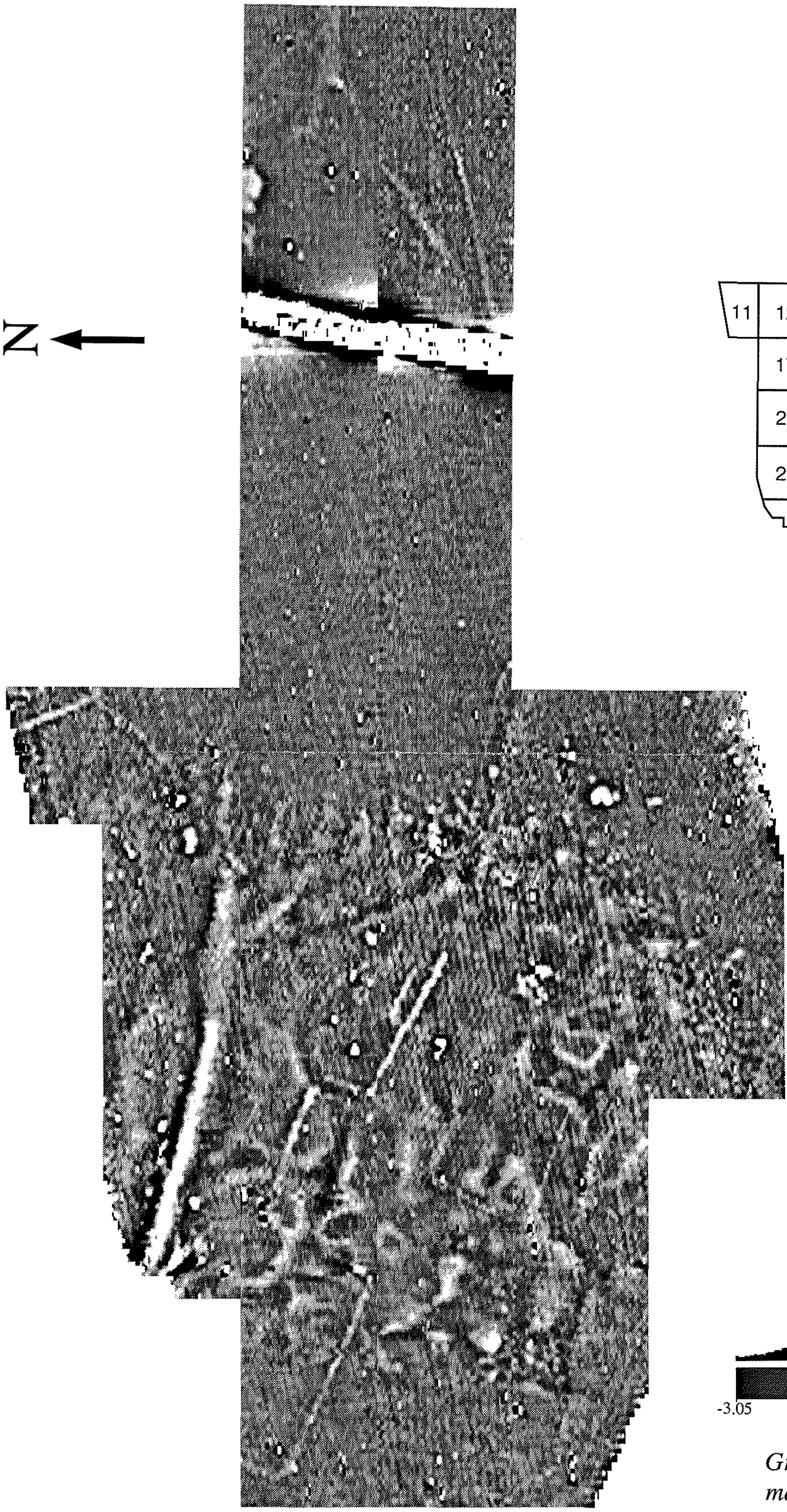

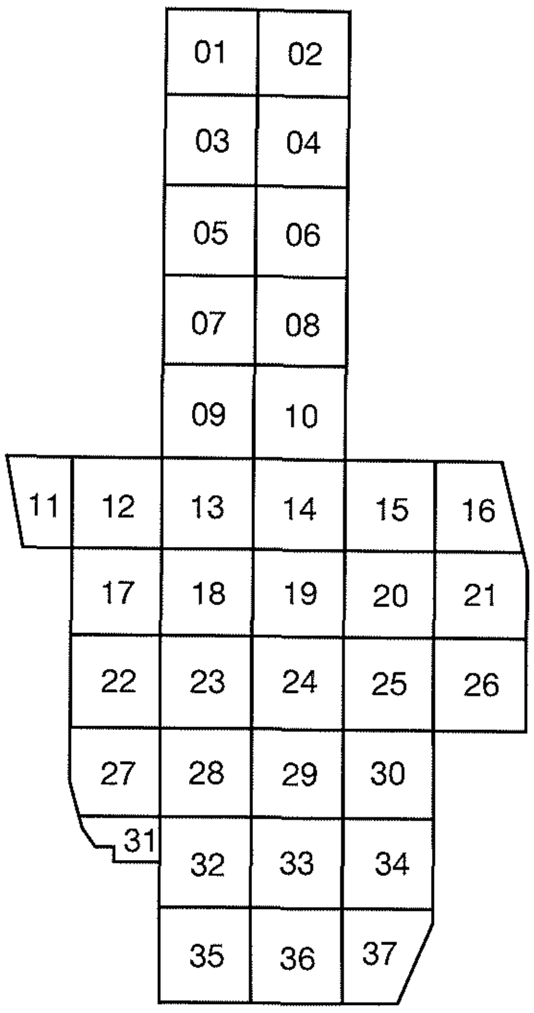

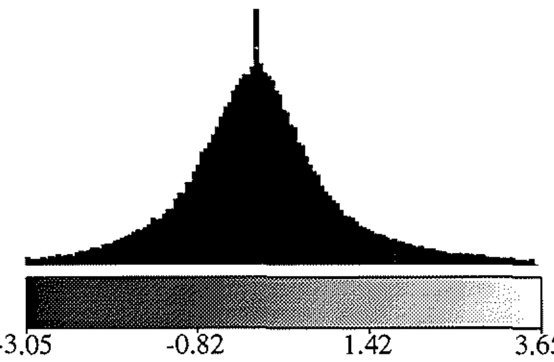

Greyscale plot of raw magnetometer data

Scale

0 50 100 150m

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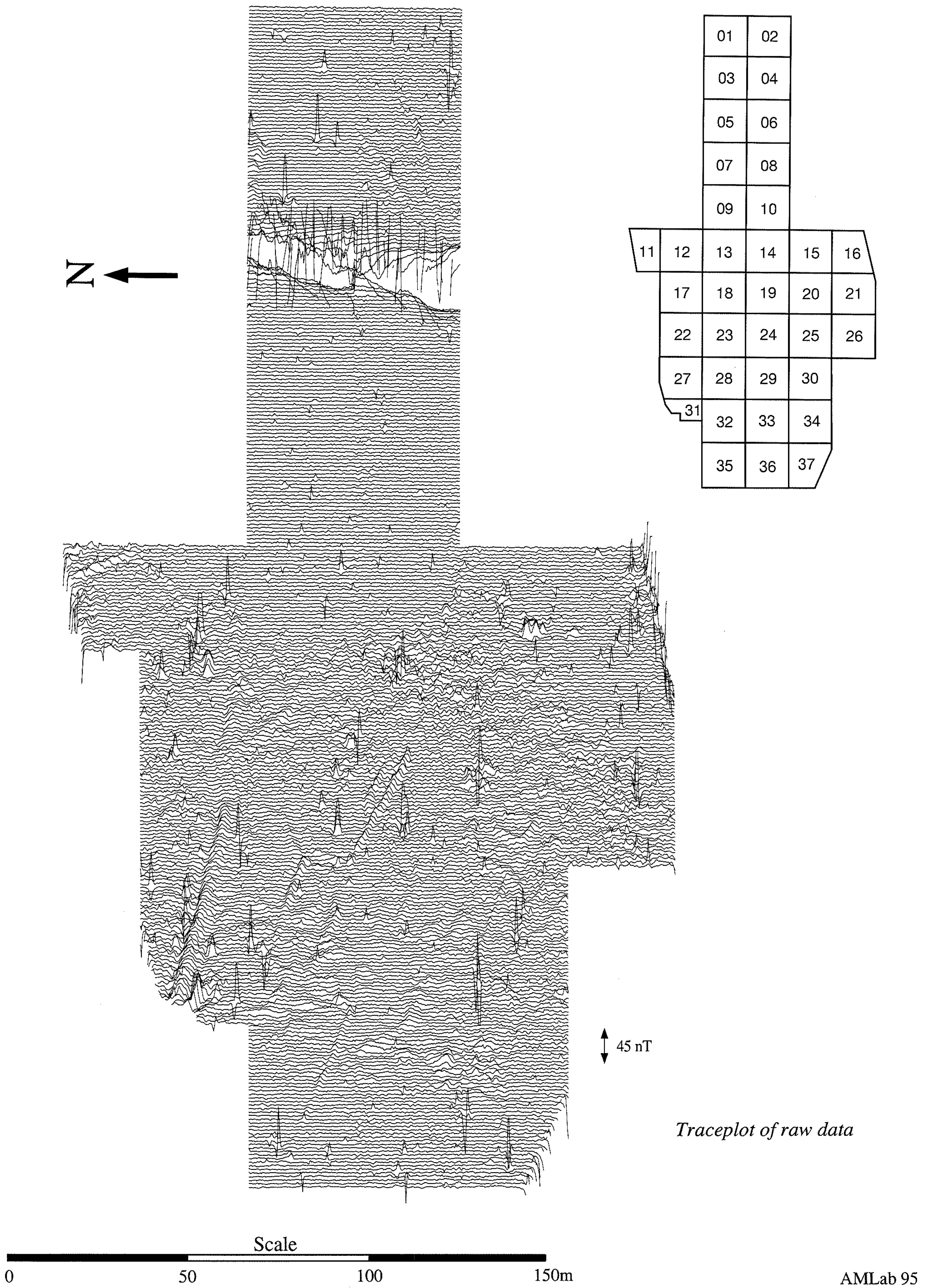
Figure 4

DOWN GROUND, ISLE OF WIGHT Magnetometer Survey 1995



Traceplot of raw data

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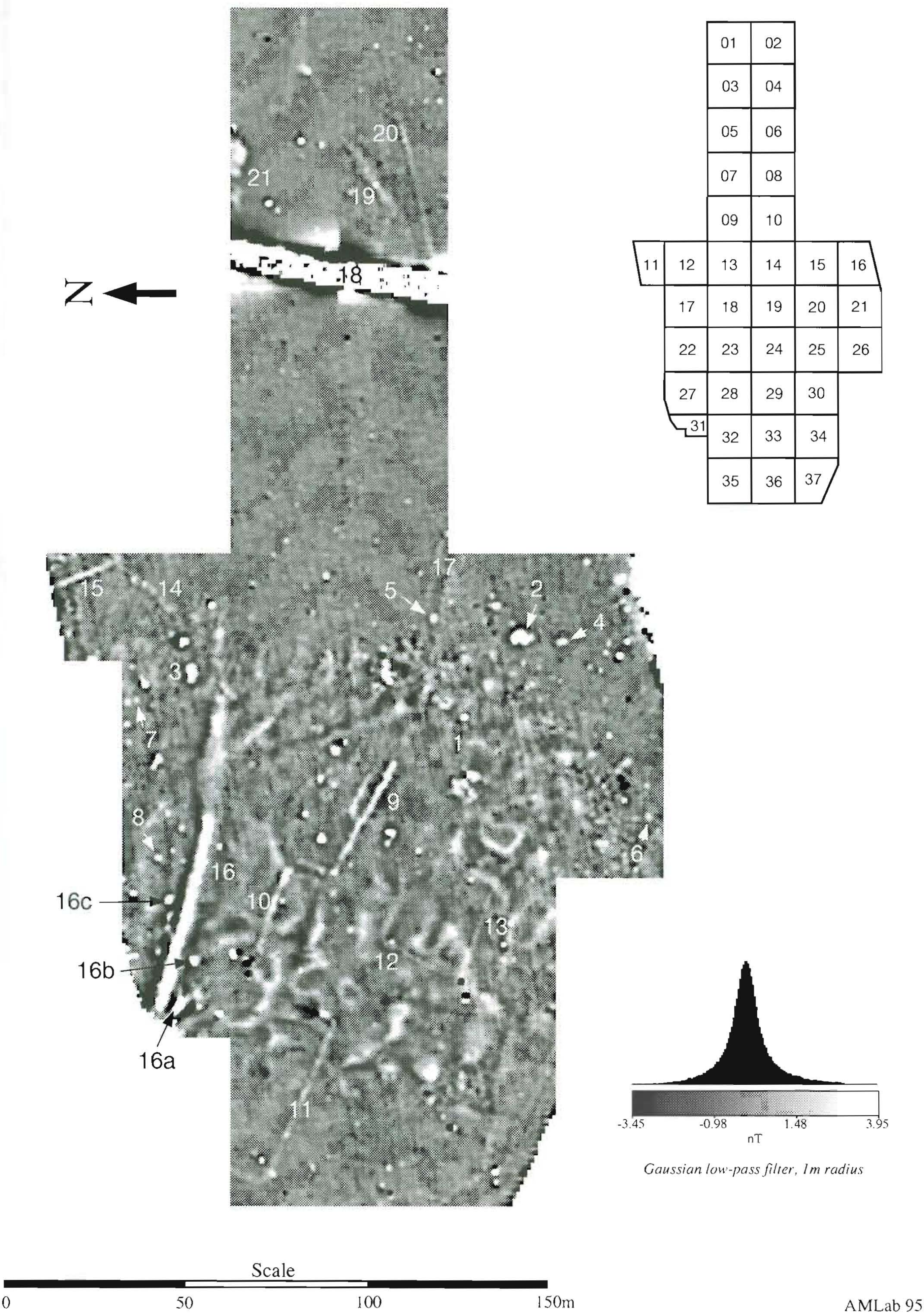
Figure 5

DOWN GROUND, ISLE OF WIGHT Magnetometer Survey 1995



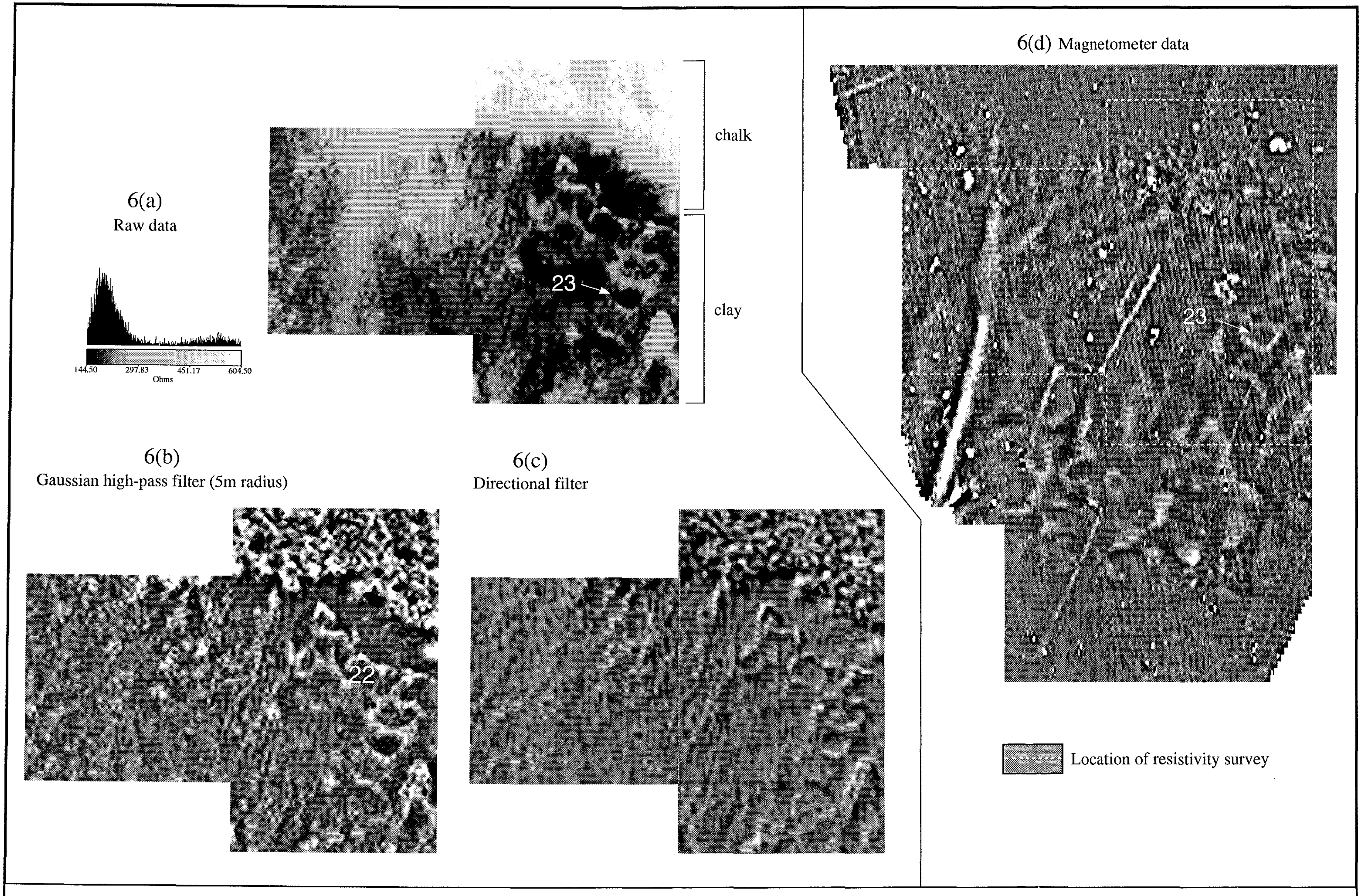
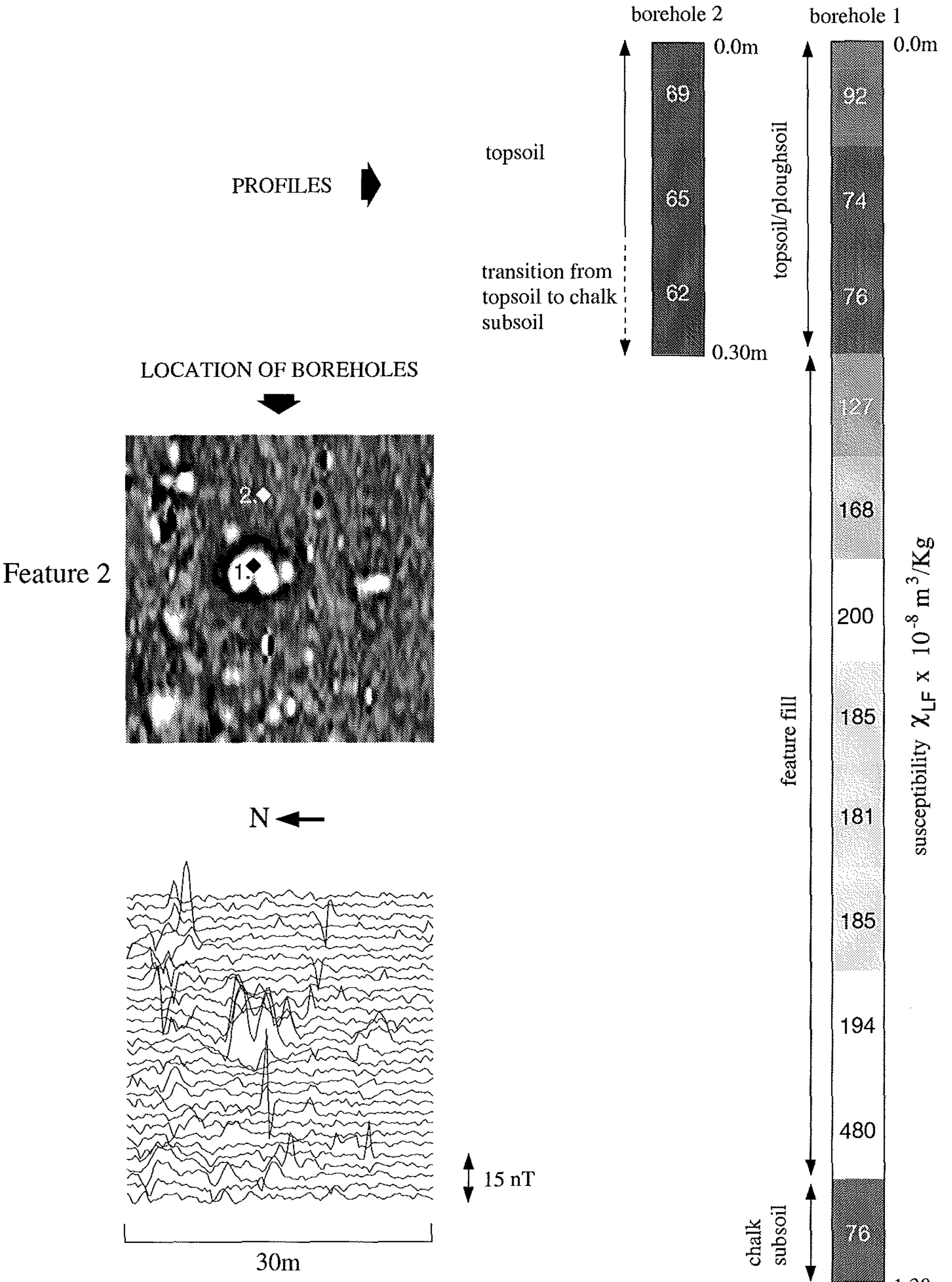


Figure 6 DOWN GROUND, ISLE OF WIGHT, Geophysical Surveys 1995

DOWN GROUND, KNIGHTON DOWN, IOW

Figure 7 : Magnetic susceptibility profiles through Feature 2 and adjacent deposits



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