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Ancient Monuments Laboratory  
Report 145/87

ROLLRIGHT, OXON. GEOPHYSICAL SURVEY  
1982-1986.

Andrew David

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### Summary

This report describes the results of extensive magnetometer coverage of the landscape surrounding the Rollright stone circle. Both archaeological and natural features were found and shown to correlate well with the aerial evidence of cropmark patterns. Confirmation of the nature and location of several of these features was achieved by excavation as part of a complementary archaeological survey by the Oxford Archaeological Unit. Amongst the most clearly detected features were those belonging to an Iron Age settlement site to the north-east of the stone circle, a trackway leading from this towards the Whispering Knights, and two ring ditches some distance to the south of the circle. The magnetometer findings are believed to be a genuine representation of the main extant archaeological remains present in the areas surveyed, and it appears that no major new sites have been detected.

The text of an earlier report on the geophysical survey of the interior of the stone circle is also included.

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## ROLLRIGHT STONES, OXFORDSHIRE

Report on geophysical surveys carried out by the Ancient Monuments Laboratory during 1982-6. Geophysics Report No 8/86

### Plans enclosed:

- 1 - Location plan
- 2 - Distribution of magnetic anomalies
- 3-6 - Magnetometer traces
- 7 - Magnetic and resistivity plots from a survey of the stone circle (The King's Men).

### Introduction:

The survey work to be described was originally requested by the Inspectorate of Ancient Monuments (DoE) as a complement to the archaeological survey and excavation programme of the Rollright prehistoric complex and its immediate surroundings then being undertaken by the Oxford Archaeological Unit. It was hoped that geophysical techniques, and particularly magnetometer survey, might locate archaeological features previously removed from the landscape but whose presence might be suspected from documentary sources (eg Stukeley, 1710, 1743), aerial photography and fieldwalking. In addition to the evident Neolithic and Bronze Age significance of the hilltop, Iron Age, Roman, Anglo-Saxon and medieval features were to be expected (see Lambrick, 1983).

Over the course of several visits to the area magnetometer coverage was extended field by field around the visible monuments (see Plan 1). In each field a 30m grid was laid out and the ground then covered systematically by 30m fluxgate gradiometer traverses spaced at 1.0m intervals. Simultaneous recording of the magnetometer signal as a series of graphical traces has allowed the construction of charts of local magnetic field strength variations for each survey block and these are reproduced here at a reduced scale on Plans 3 - 6.

The stone circle itself was surveyed in rather more detail and this has been reported upon separately (Report G 11/85). Briefly, magnetometer coverage was intensified to a 0.5m traverse spacing, and this was complemented by a resistivity survey using a probe spacing and reading interval of 0.5m as well. Plan 7 illustrates the results of these surveys, with a possible interpretation alongside evidence from the OAU's contour survey.

The results from all the magnetometer surveys are indicated on Plan 2, at 1:2000, where apparently significant magnetic anomalies are shown in black. The results from each field can now be summarized in turn:

Field 0060/0061 (Plan 3):

This substantial survey grid covers the area to the south and east of the King's Men, extending from the road to well south of the Whispering knights. The greater part of this appears to be largely free of significant anomalies with the exception of several linear features between the circle, the road and the Whispering Knights. Excavation has now shown that those linear features running roughly parallel to the road are natural in origin, a possible explanation of which may be that they are cambering fissures or even minor faults which have been subsequently exploited by periglacial activity. Although the excavations have only tested these features in three places (in grid squares 24, 33 and 41), it seems probable that similarly aligned magnetic anomalies both in this field and in field 0003 can also be explained geomorphologically.

Other linear features in this area are, however, of archaeological origin, and include the ditch seen running N - S between squares 22 and 50, and the two parallel ditches that run between squares 15 and 75. Test trenching has shown that all three ditches are of Iron Age date and that the latter two constitute a road or trackway leading towards the settlement enclosure in field 7400 to the north.

Other anomalies in this survey block are scarce and of uncertain significance. Small anomalies here and there (eg in squares 80, 86 and 18) may relate to features such as pits or other signs of occupation, but it is unlikely that these are substantial or indicative of any major concentration of activity. Occupational features such as pits and hearths would be expected to produce strong and clearly recognizable anomalies such as those encountered at the Iron Age site to the north of the road. An anomaly suggesting a partially circular feature in square 52 was found to be a solution hollow on excavation. Parts of two rather broad anomalies near the edge of the road in squares 6 and 15 are of uncertain origin but a possibility is that they result from the presence of small quarry pits of unknown date. Similar anomalies have been detected close to the road in other fields and may also be evidence of small-scale and indiscriminate quarrying.

There is no evidence for anomalies close to the Whispering Knights that could be relatable to their proposed earlier status as part of a burial cairn. Quarry pits or ditches should be detectable in these conditions, if only as rather faint anomalies, but confirmation of their absence would be more satisfactory with the addition of detailed resistivity traversing. Trial excavations, however, did suggest that the absence of any major features of this type is genuine.

There are no clear indications of burials or any other anomalies that might relate to the reputed Anglo-Saxon cemetery in this field.

The linear anomaly running parallel to the grid between squares 5 and 84 is presumably the former boundary between fields 0060 and 0061.

The many narrow linear negative magnetic anomalies running north-south across the survey area are the response of the magnetometer to the regularly spaced tractor ruts or 'tramlines' used during crop spraying. It is a reflection of the strong magnetic susceptibility of the soil that such a depletion in the magnetic field strength should be detectable over such slight features as tractor ruts.

#### Field 0003 (Plan 4):

Parts of a linear feature have been detected to the north of this field between squares 2 and 11, running parallel to the road, and therefore having a similar orientation to the apparently natural alignments seen in the previous field. Without testing this feature though, it must remain a possibility that it has a genuine archaeological origin, such as part of another early trackway.

There are two groups of other anomalies in this field, in squares 20 and 15 respectively. They are composed of two or more broad but weakly defined anomalies which suggest shallow pits or hollows. The linear anomaly in squares 36 and 41 may be a feature of recent cultivation.

#### Field 7400 (Plan 5):

This field contains the Iron Age settlement enclosure partly visible at the time of Stukeley's account, and known more recently from aerial photographs. The magnetometer has reacted strongly to the main ditch and also to numerous features both inside and outside the enclosure. The main ditched enclosure is very approximately rectangular in shape, and although much of the interior is clear of magnetic activity, there are clusters of anomalies indicating groups of pits on either side of its perimeter. An outer ditch may exist on the west side but the traces are less regular than those for the inner ditch and, alternatively, could reflect a linear scatter of pits. An entrance-way may exist through the eastern side of the enclosure but there is a particularly dense group of pit anomalies here, in square 13, and these obscure its position. Magnetic disturbance from occupation features such as pits and hearths is in fact so dense in places, (eg squares 11, 12 and 16) that large parts of the pattern of the site are confused. Disturbance from occupation features extends widely westward and northward, and many individual features are discernible. The ditch of a second enclosure is visible in square 3 and 4, and a weak anomaly running through squares 21 and 22 may represent the extension of the trackway seen to the south in field 0061. The large anomaly between this and the enclosure ditch in square 22 may be a small quarry pit.

#### Field 5700 (Plan 5):

Compared to the previous field, this one contains markedly fewer important anomalies. Activity related to the Iron Age enclosure

can be seen extending into squares 15, 20 and 25, but elsewhere in the field detectable features seem to be scarce and of no clear significance. There appear to be small isolated pits and segments of ditches, but these do not belong to any identifiable structures and do not seem to be related to either of the excavated barrows noted by the OAU near the King Stone. In particular there is no obvious trace of a quarry for the round cairn, at least on its north-west side.

Field 4100 (Plan 6):

Like the other fields to the north of the road, this one has been damaged by quarrying at its southern end and archaeological features may have been lost. The magnetometer traces show very few anomalies of likely importance, and quarrying or cultivation may even be responsible for some of these. This probably applies to the linear feature in squares 6 and 11, although it may be noted that it is on the same alignment as the faint and incomplete trace of the prehistoric ditch in field 0061.

Field 4371 (Plan 6):

This area, to the west of the stone circle, is apparently blank of significant anomalies except along its northern margin, near the road, where the magnetic disturbance may again have been caused by quarrying rather than settlement or occupation features.

Field 7038 (Plan 6):

These six 30 m squares were placed with the intention of securely locating the two ring ditches visible as cropmarks. The rings are only faintly defined on the magnetometer traces, but are nevertheless distinct against a very quiet magnetic background. There are no central anomalies visible, and it may be assumed that the structures have been heavily damaged by cultivation. There is, however, an anomaly in the south-west corner of square 3, measuring about 4 x 4 m, which is not unlike several other anomalies, thought to be small quarrying hollows, seen nearer the road, but in this location it might be of different significance. There is no magnetic evidence for settlement near the ring ditches, which may in part account for the poor magnetic contrast of their fills.

The King's Men (Plan 7):

The results from the survey here have been discussed at length in a previous report. Both magnetic and resistance anomalies were located within the circle. Although the latter showed no striking patterning in terms of detailed features, the general east-west trend in the pattern of variation conforms with the site's basic physiographic situation which is also reflected in the natural fissuring detected by the magnetic survey in field 0061 to the east. The most distinctive magnetic anomalies appeared to correspond, or to be offset from, slight mounds which may or may not be of ancient origin. Neither survey

technique has revealed conclusive evidence for distinctive archaeological features within the circle such as the presence of particular buried stones, or of an external ditch, and there is certainly no evidence to support the peculiarities in magnetic fields reported by Brooker (1983). Some of the other small pit-like anomalies on the magnetic chart may or may not be of archaeological origin.

#### Magnetic susceptibility readings:

Samples of topsoil from various locations around the survey area were measured for magnetic susceptibility. The locations of the sampling points and the susceptibility values are listed below.

Field:	Grid. ref.:	Magnetic (mass) susceptibility [x10 exp(-8) SI/kg]
0061	SP 2966 3075	123
	SP 2987 3081	132
	SP 2967 3093	168
	SP 2976 3095	155
0003	SP 2988 3094	88
	SP 3001 3101	73
0007	SP 2998 3109	83
	SP 2986 3107	88
7400	SP 2972 3104	238
	SP 2974 3098	123
5700	SP 2962 3101	138
4100	SP 2945 3096	92
	SP 2940 3091	92
0006	SP 2933 3086	82
4371	SP 2938 3079	153
	SP 2950 3083	172
	SP 2952 3073	148
The King's Men:	SP 2957 3086	216 82

These high magnetic susceptibility values, ranging from 82 - 238 x10 exp(-8) SI/kg, reflect the iron-rich nature of the Jurassic limestone parent rock which has in places been allied with magnetic enhancement associated with the archaeological processes of burning and decomposition. Such enhancement is responsible for the extremely high readings over the Iron Age enclosure (238 x10 exp(-8) SI/kg), and recent burning is responsible for the high value recorded for the centre of the stone circle (216 x10 exp (-8) SI/kg). The remaining readings across the site are too few to give more than a very general impression of the background magnetic condition of the soil: more systematic and detailed sampling would be needed in order to indicate areas of increased magnetic enhancement over occupation sites where subsoil features are rare or absent.

#### Conclusions:

The very ample coverage that this survey has given to the surroundings of the Rollright stone circle, one of the largest such surveys to be attempted, has produced valuable confirmation of the cropmark evidence and has in places added clarity and

detail. Small features such as minor pits, post-holes and graves may have been missed, but larger features and aggregations of features such as the ring ditches (f 7038) and the Iron Age enclosures (f 7400) have been clearly detected. As soil magnetic susceptibility conditions are very favourable for the detection of archaeological features the apparent absence of the latter over much of the survey area must be accepted as genuine.

Surveyed by: A. David  
A. Bartlett  
D. Bolton  
A. Payne  
L. Somers

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- Stukely, W. (1743), Abury



## The Rollright Stone Circle

Geophysical survey, 1985, No G 11/85. AML Report No. 4808.

The interior and immediate surroundings of the stone circle were surveyed in May 1985 as part of the more widespread geophysical exploration of the adjacent landscape at Rollright. Both magnetometer and resistivity surveys were made, the resulting plots are shown on the enclosed plan (7) where an attempt has also been made to compare the location of both surface features and geophysical anomalies.

### Magnetometer survey:

Magnetometer traverses were made at 0.5m intervals across the site, and the resulting traces show considerable magnetic disturbance both inside and outside the circle, interspersed amongst areas of relative inactivity.

Within the circle, the most conspicuous anomalies occur near the centre, and four of these overlap respectively with four very slight surface mounds identified by the OAU surface contour survey. In each case the magnetic anomaly is some 2m to the SE of its nearest mound. It is possible that infilled pits are responsible for the anomalies, and the slight and subdued mounds are all that remain of their upcasts. The central area of the circle has been the scene of many small bonfires and, no doubt, exploratory diggings also. The anomalies tend to be elongated in the direction of the mounds, which could therefore represent material scooped from pits which have subsequently become backfilled with the relatively magnetic topsoil. A burnt patch near the centre of the circle showed considerable magnetic susceptibility enhancement compared with soil away from the middle ( $216 \times 10^{-8}$  SI/kg in contrast to  $82 \times 10^{-8}$  SI/kg): although a shallow surface layer of such magnetically enhanced soil does not generate a substantial anomaly, its infilling of even a small pit would produce anomalies such as those seen here.

Away from the centre of the circle, other anomalies have been indicated on the plan, and may be of significance although none are particularly clearly defined or constitute part of any obvious pattern. An area of magnetic enhancement and noise SE of the centre and running up to the circle perimeter, in particular, may represent human activity. Unfortunately there is disturbance from extraneous iron objects here, and elsewhere, and the fence close to the southern edge of the circle has caused considerable interference. Background disturbance is present outside the circle also, and although some anomalies in the NE corner of the survey area may be of archaeological origin, these results are ambiguous.

### Resistivity survey:

Resistivity readings were taken at 0.5m intervals across the site using a 0.5m Twin Electrode configuration with a Geoscan RM4

meter. The data has been computer processed, and both a trace plot and a contour plot are shown on the plan. The plots show resistivity values undulating broadly over the site to no apparent pattern, and with occasional peaks of high resistance occurring both inside and outside the circle. These areas of high resistance have been shown on the interpretative plan D where they appear unrelated to magnetic anomalies or surface features. They may perhaps be explained by the presence of buried stone, large or small, or more likely to the relative preservation of bedrock close to the surface. Readings close to the stones themselves are disturbed, and higher values are a response to the base of the monoliths or their packing material. The perimeter of the circle is set within a ring of discernibly undisturbed readings which may be a reflection of soil compaction by visitors walking around the circle.

#### Conclusions:

The most distinct evidence for archaeological features produced by these surveys is the group of four magnetic anomalies around the middle of the circle. These may represent pits related in some way to local ground surface undulations and the presence of localized burning. There is no evidence from the survey for when these features were made or when the associated activity took place.

Other magnetic anomalies within and without the circle may also be of artificial origin but there may be some confusion with both natural features and superficial iron debris. No encircling ditch has been detected. The soils at Rollright have been shown to be particularly sensitive to magnetic enhancement, and anomalies from Iron Age features to the north are of a much greater scale than those seen here, suggesting that the latter are relatively shallow and slight.

The resistivity survey reveals a picture which, although it may contain evidence for buried stones or rubble, cannot be shown not to be natural in origin. A more widespread survey, to act as a control, would be required to substantiate this.

Surveyed by A. David and A. Payne

ROLLRIGHT OXON.

Geophysical survey, 1982-86

Location of survey grids



1 : 2500

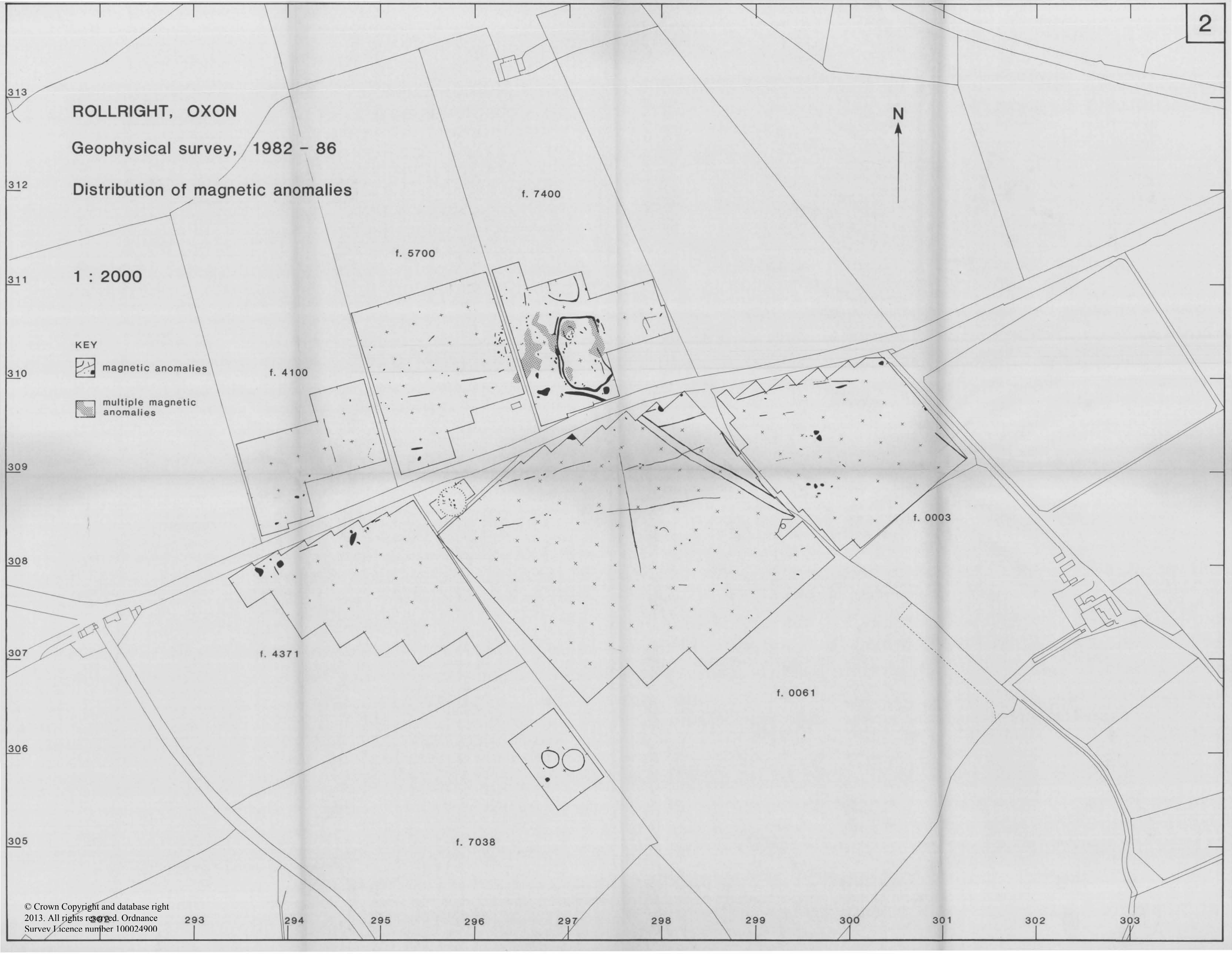


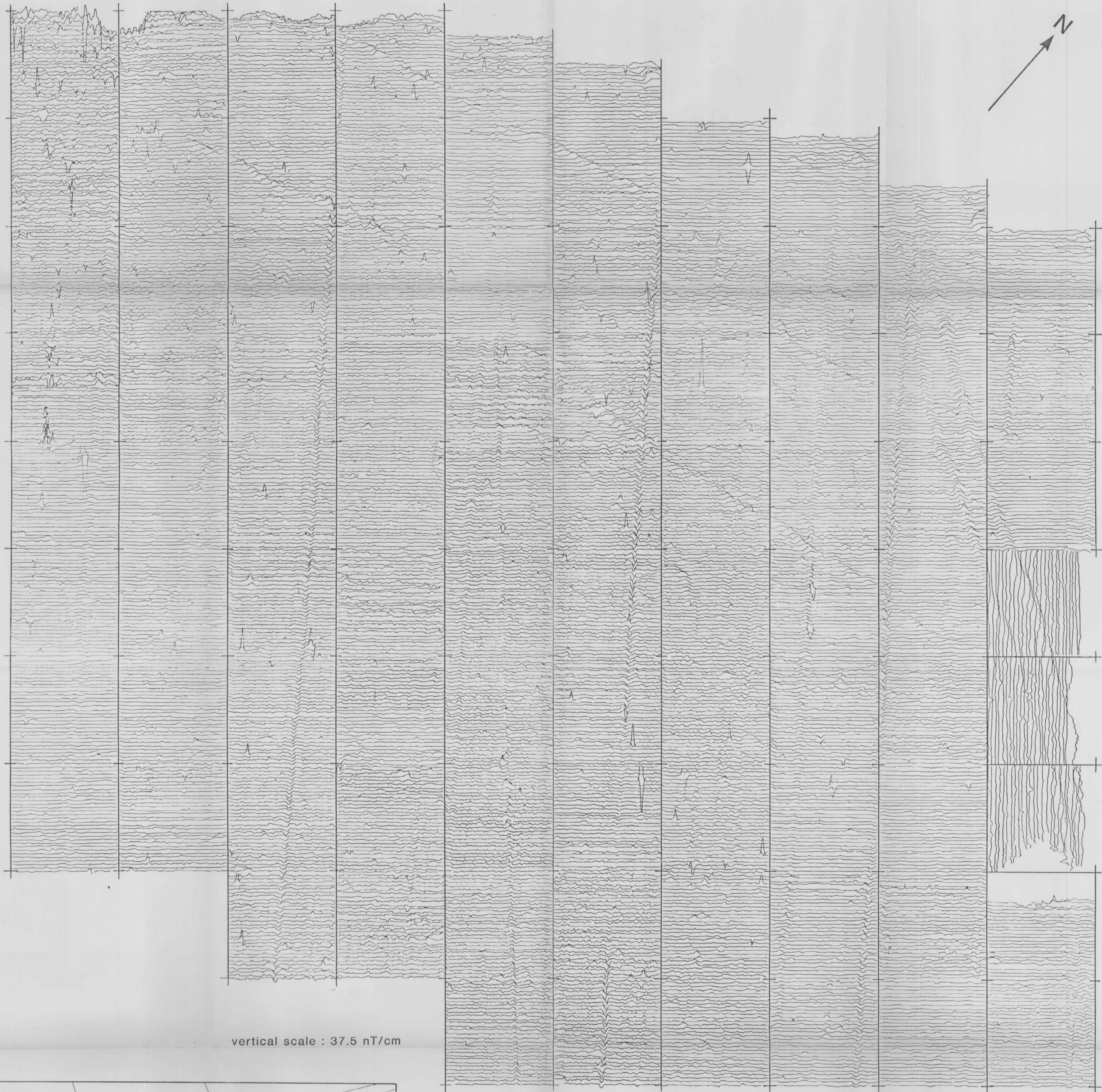
ROLLRIGHT, OXON  
Geophysical survey, 1982 - 86  
Distribution of magnetic anomalies



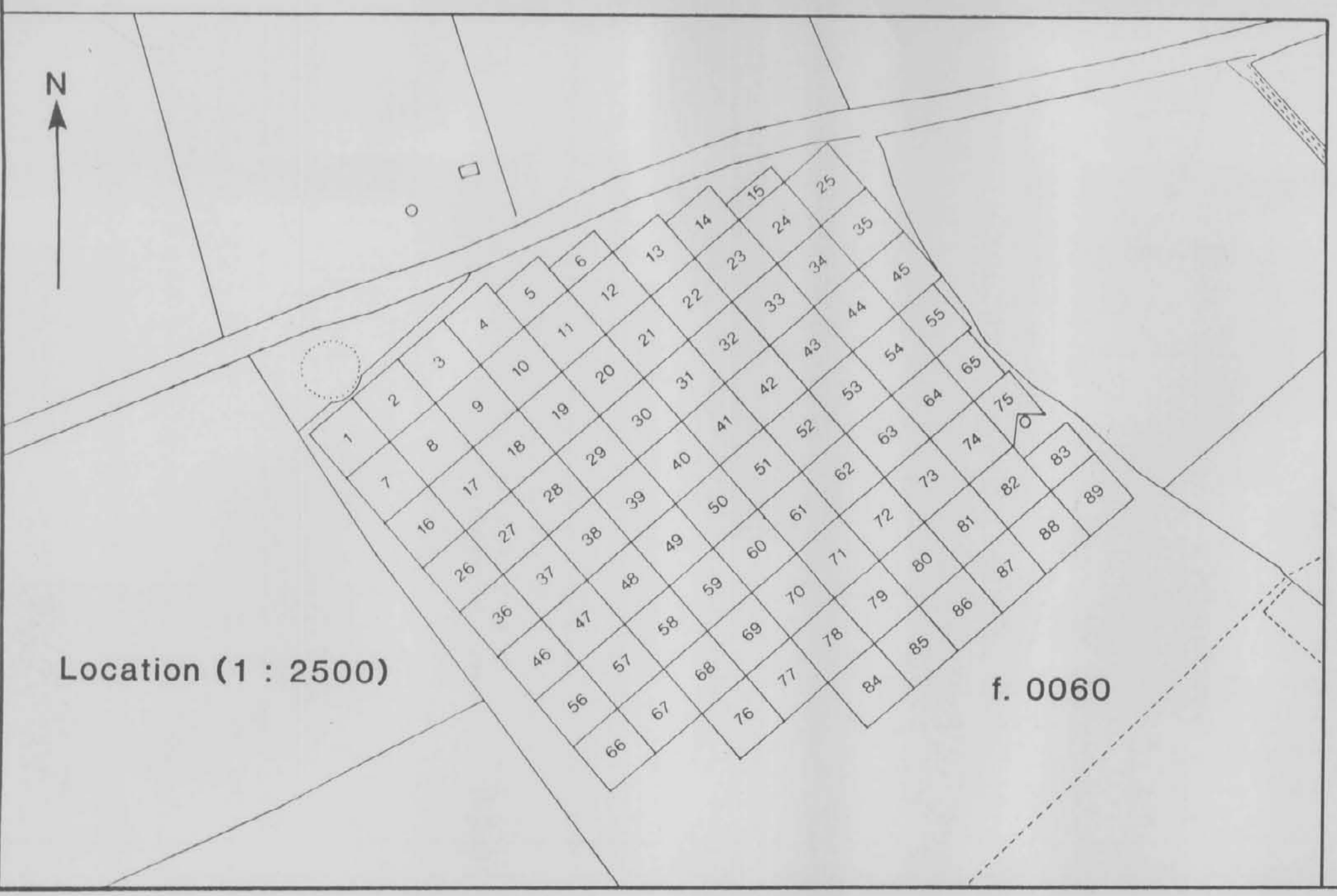
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- KEY
-  magnetic anomalies
  -  multiple magnetic anomalies





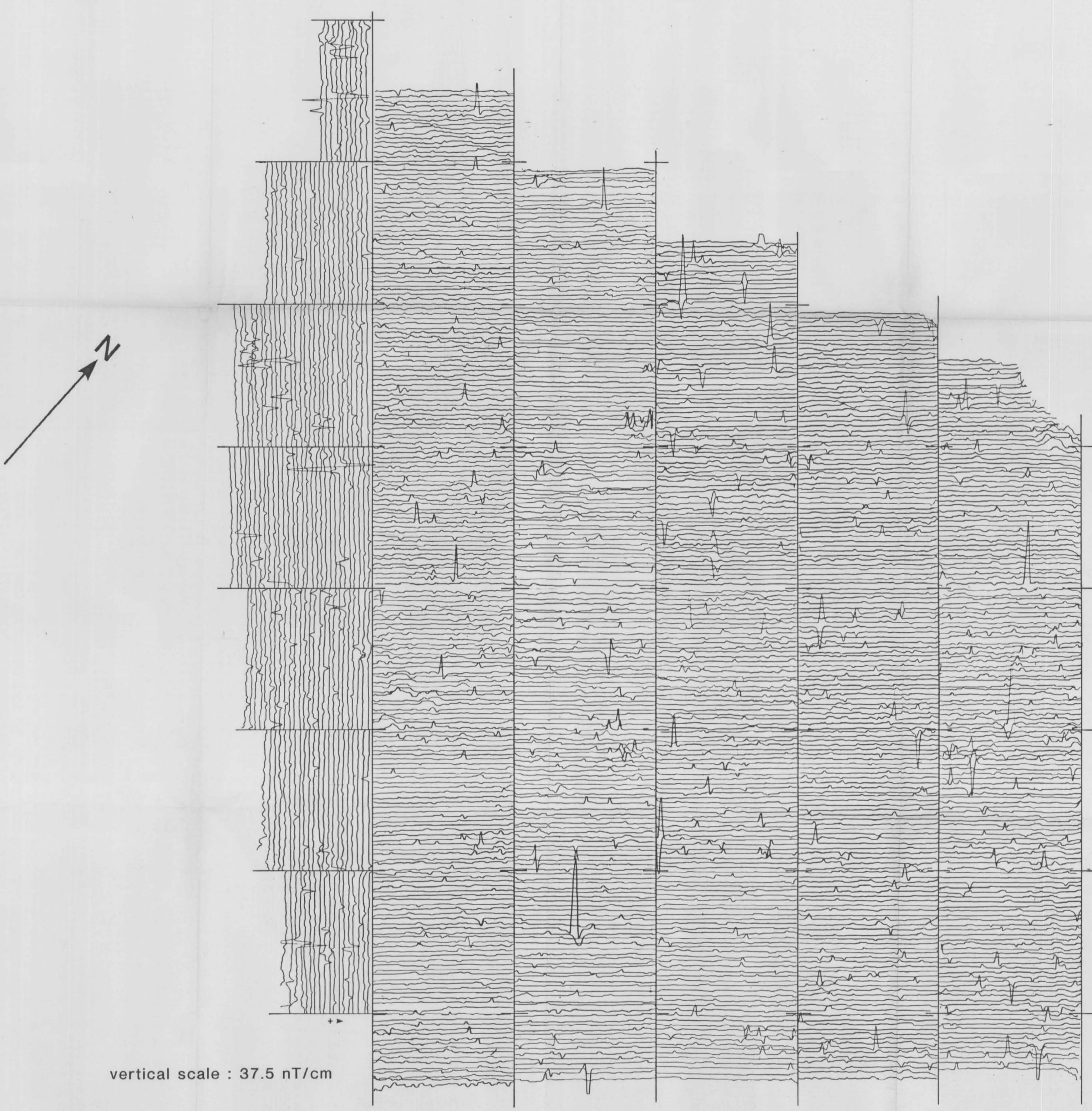
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**ROLLRIGHT, OXON**  
 Magnetometer survey, Z1982 - 86

1 : 500

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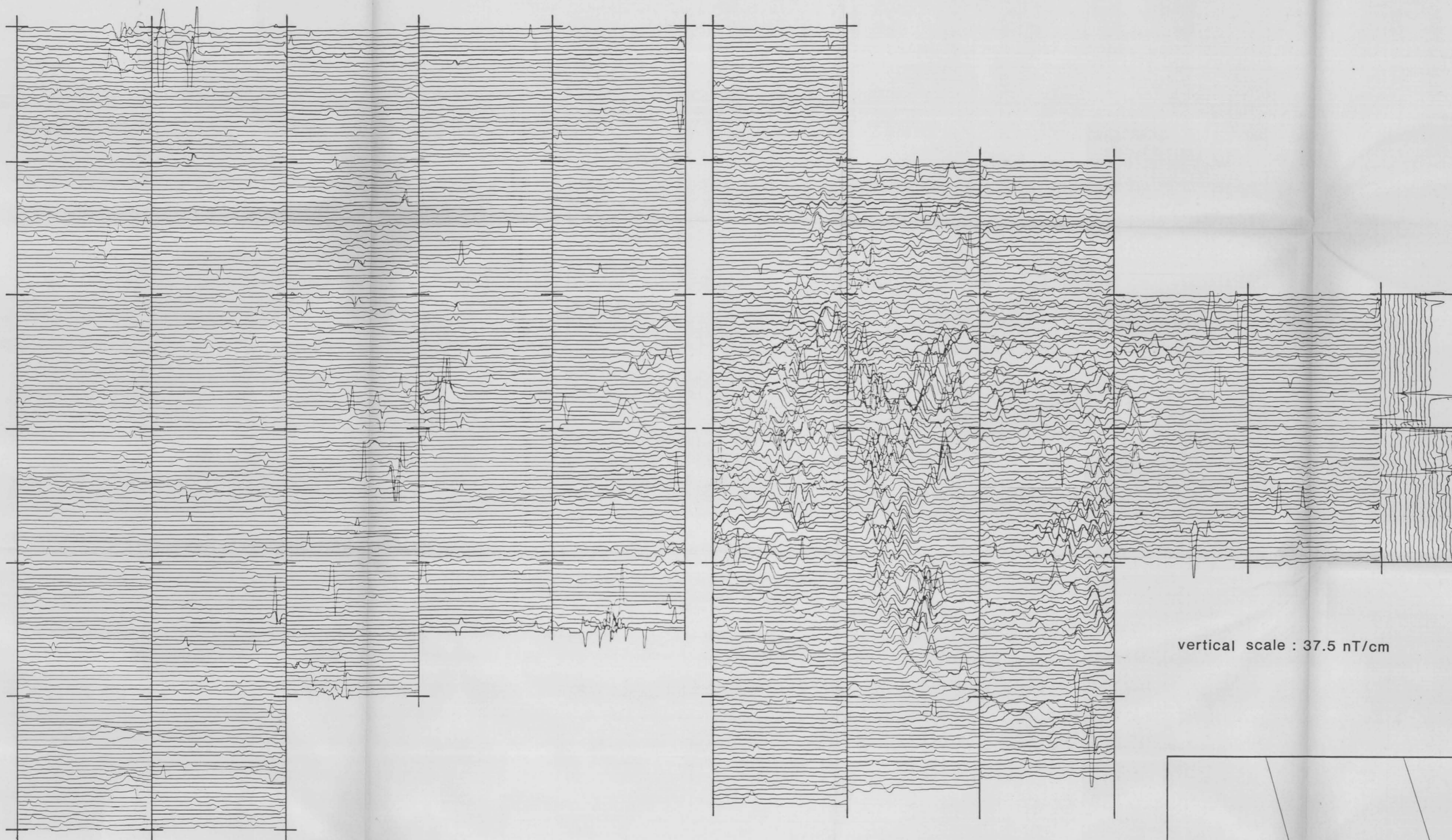
# ROLLRIGHT, OXON

Magnetometer survey, 1982 - 86

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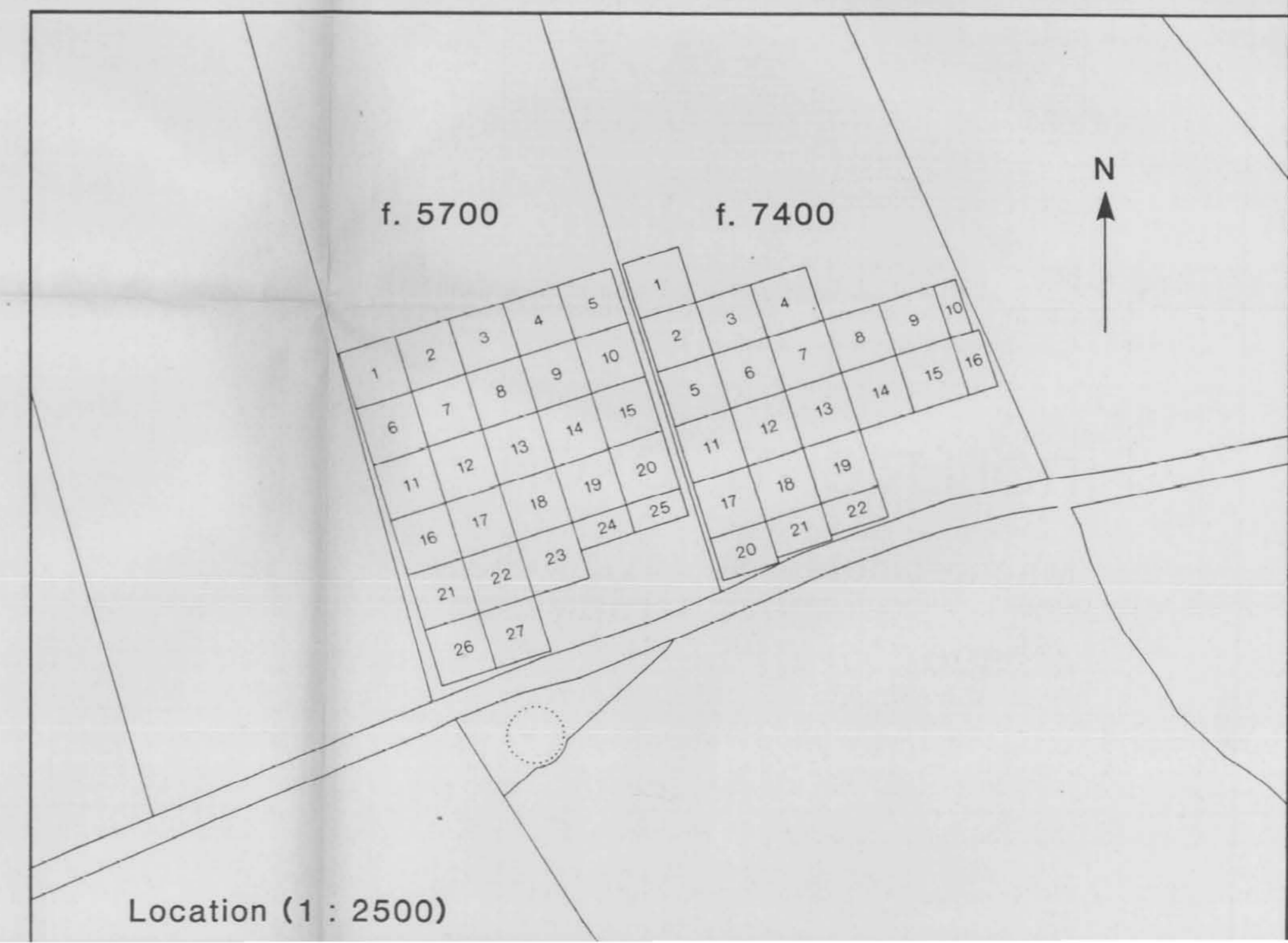


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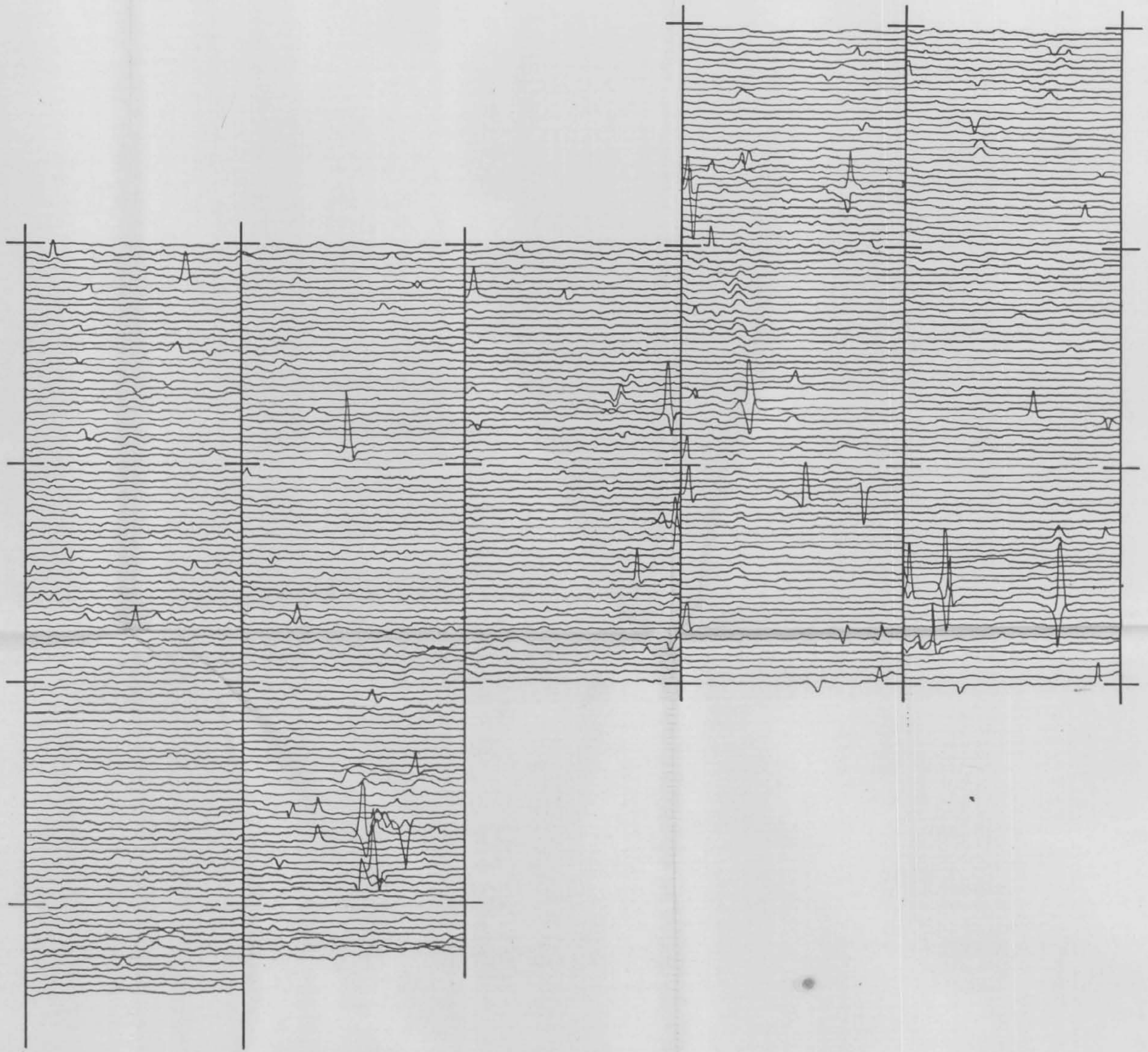
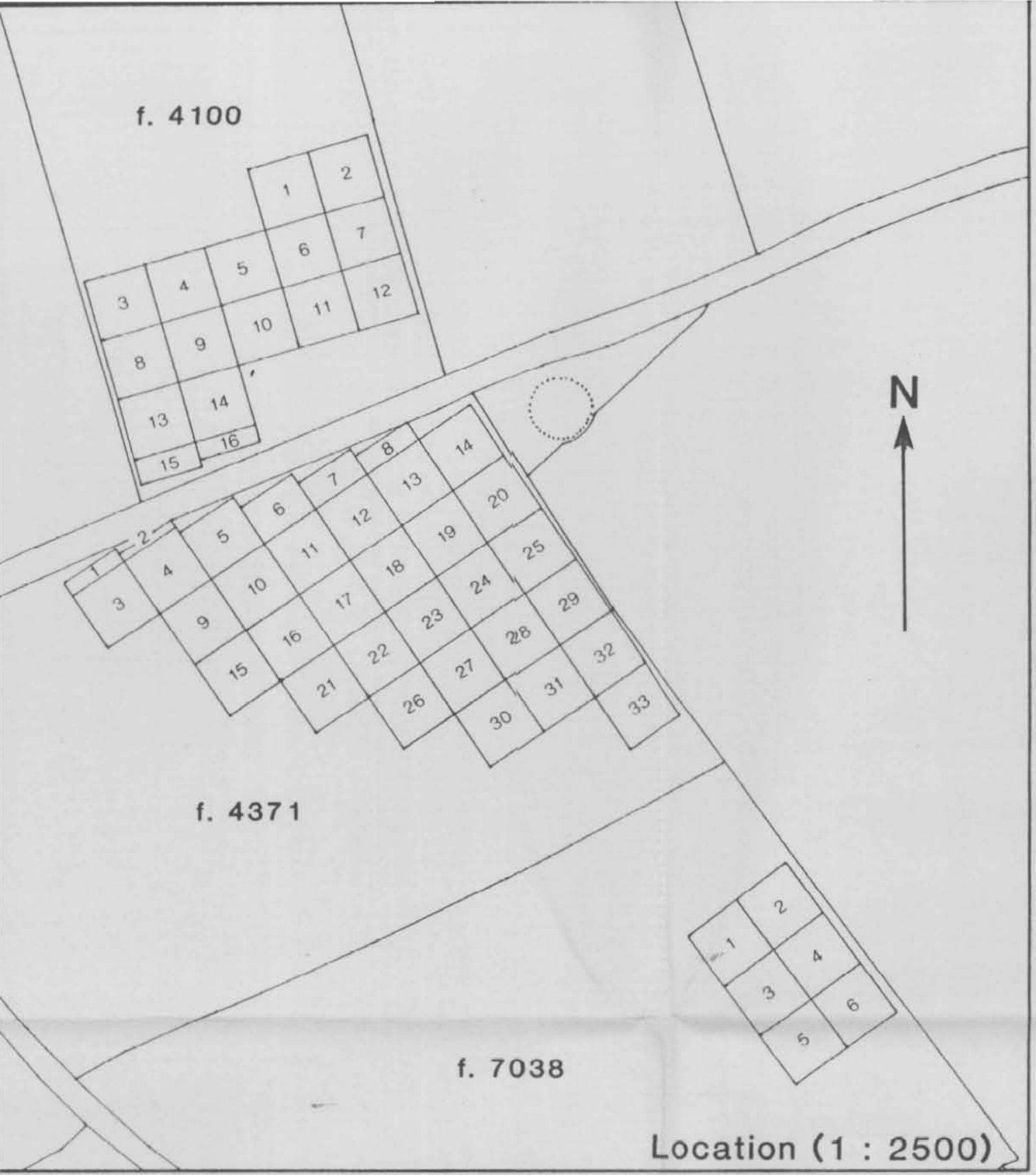
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**ROLLRIGHT, OXON**  
 Magnetometer survey, 1982 - 86  
 1 : 500



Location (1 : 2500)

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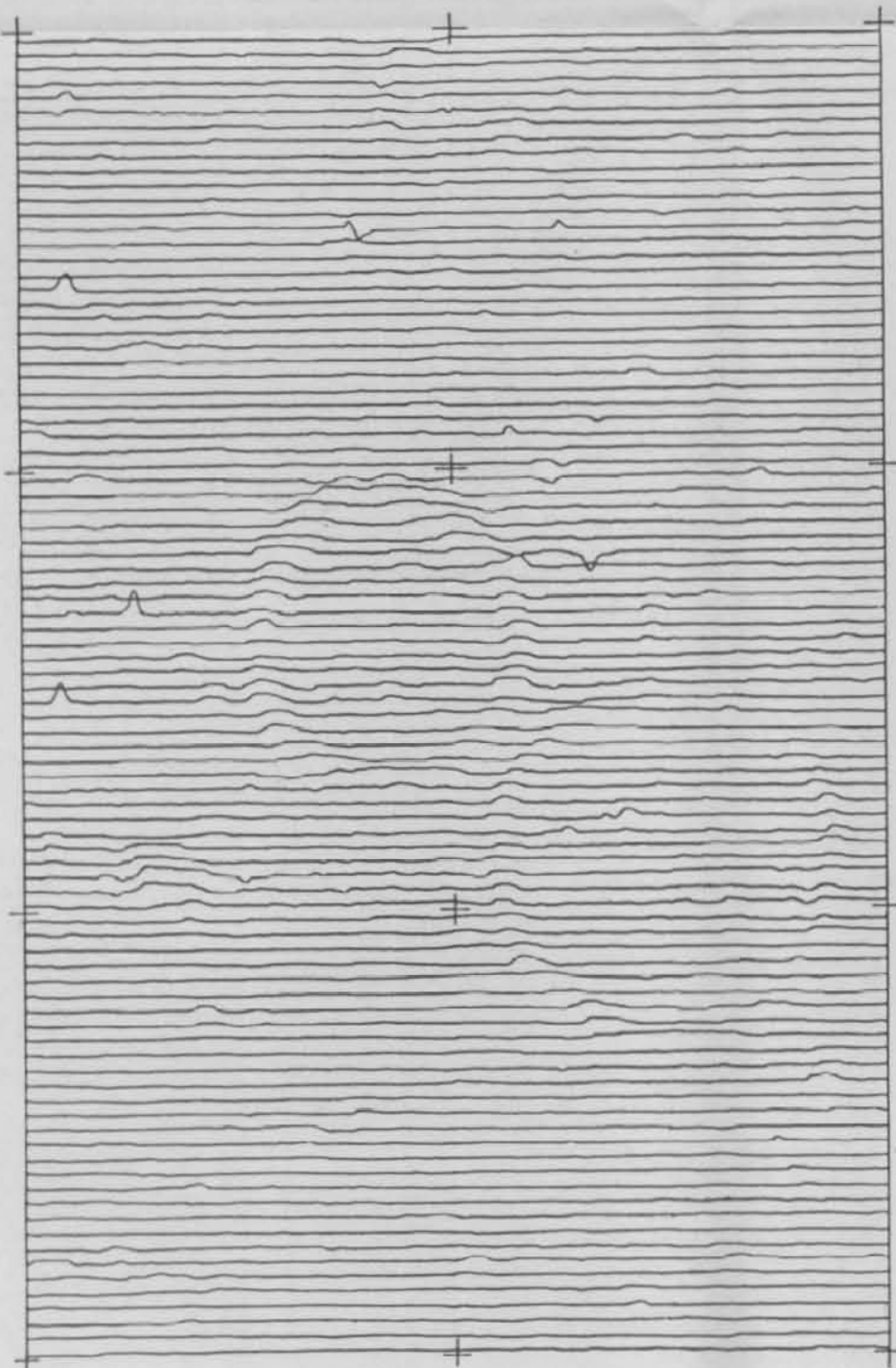


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Magnetometer survey, 1982 - 86

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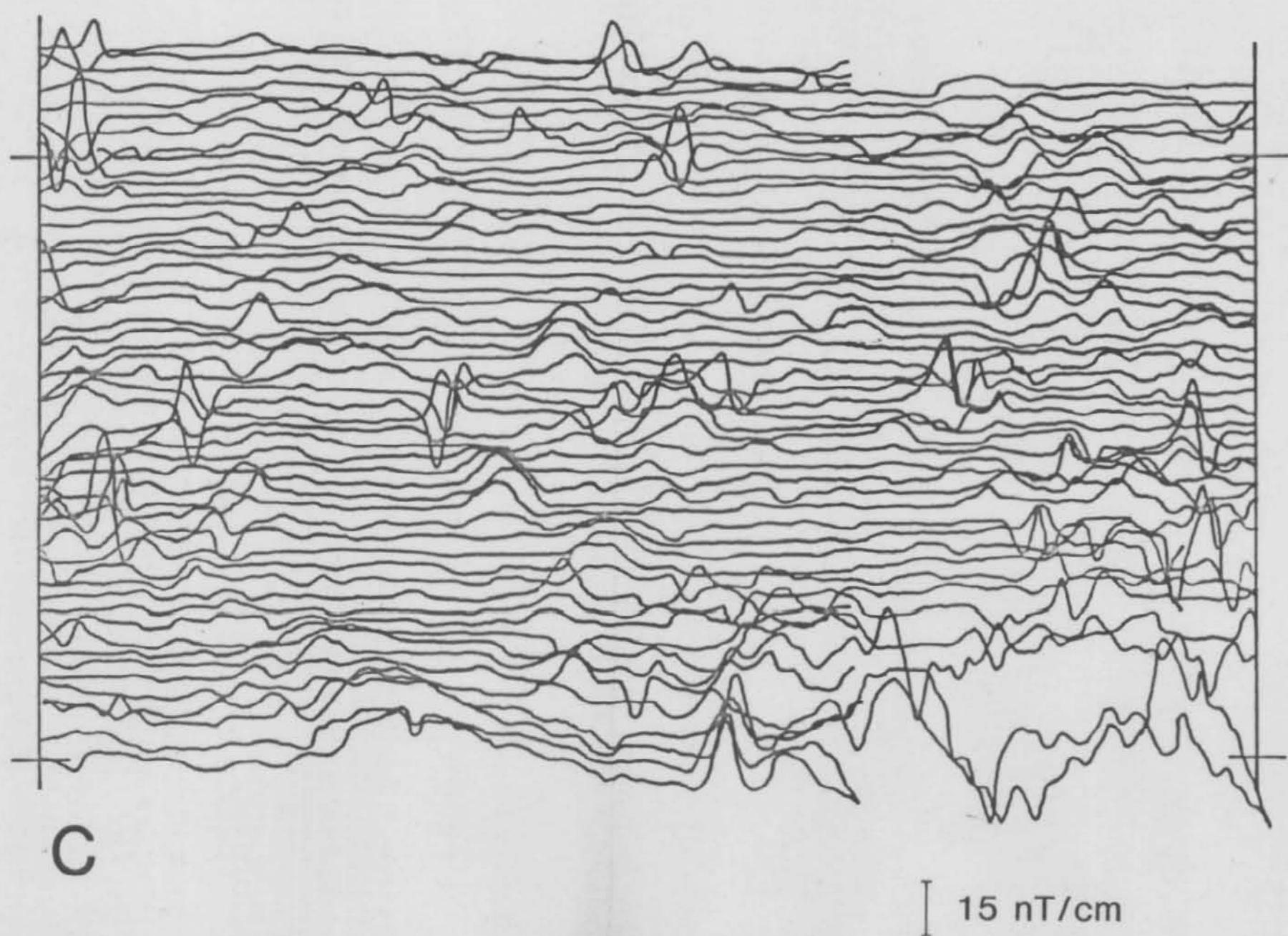
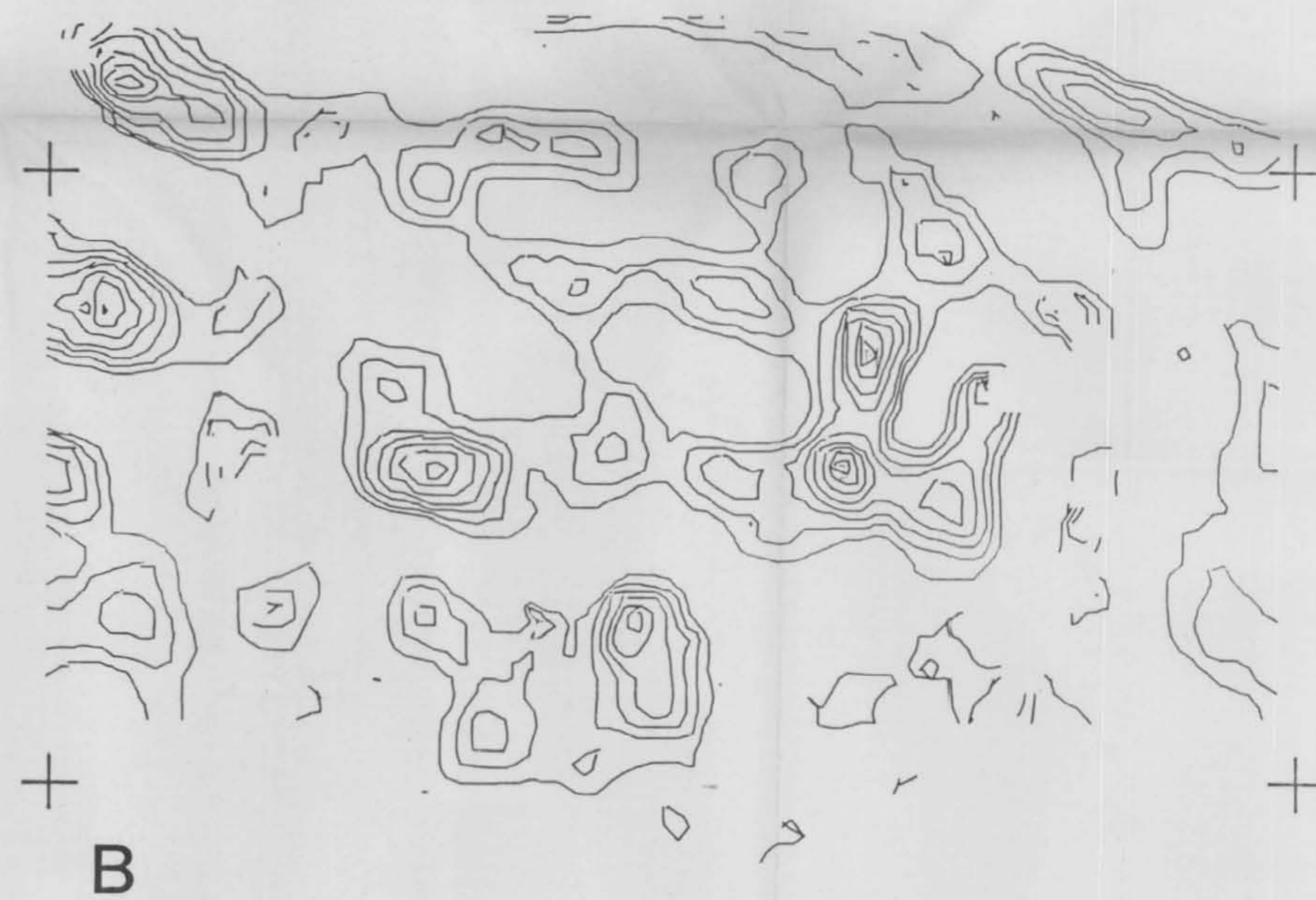
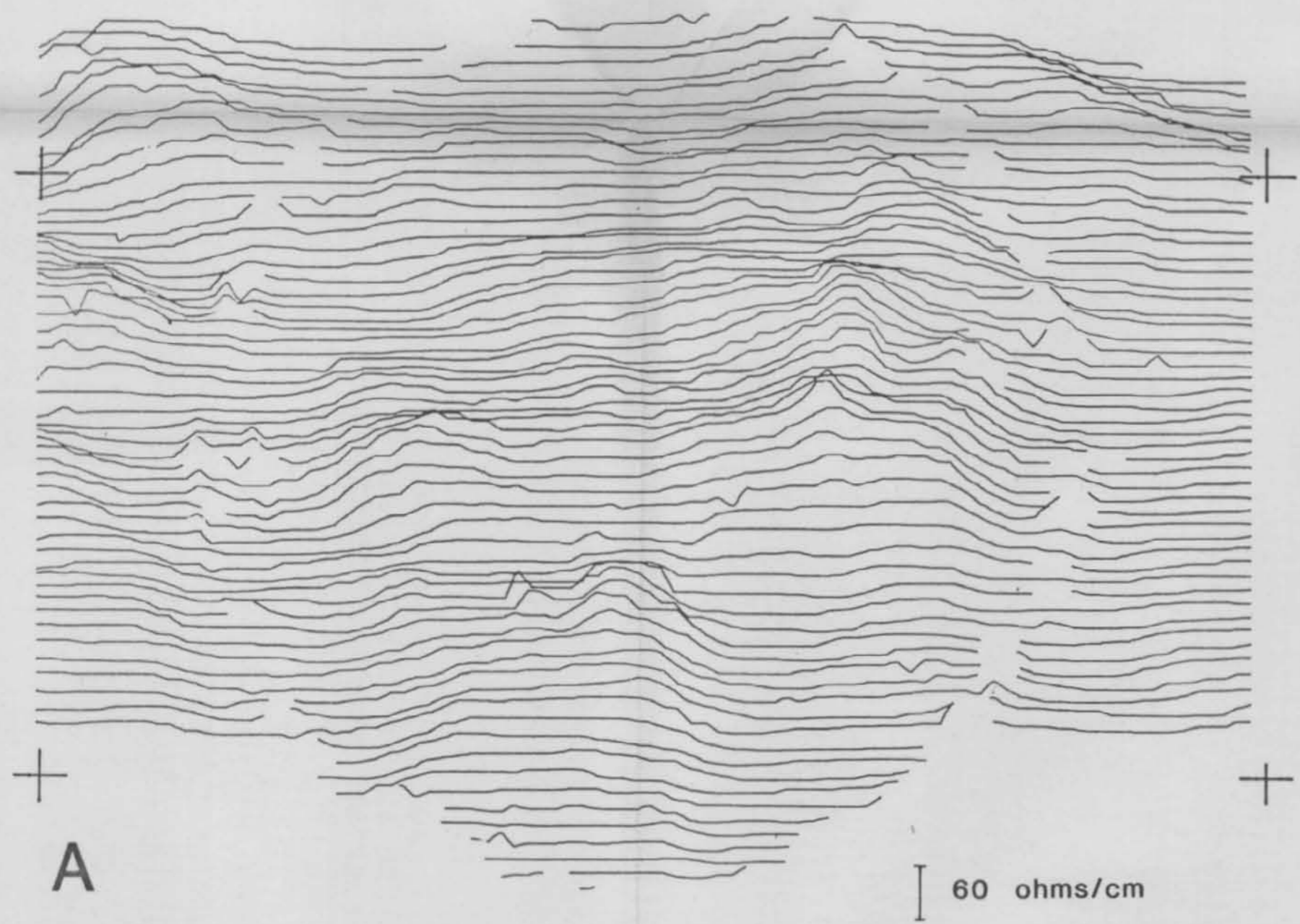
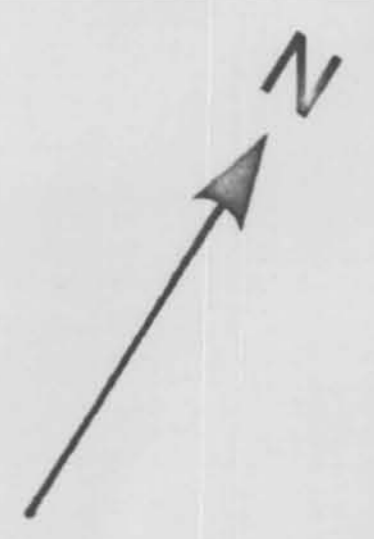
vertical scale : 37.5 nT/cm





# ROLLRIGHT STONE CIRCLE, OXON.

GEOPHYSICAL SURVEY, 1985



A resistivity survey : trace plot  
smoothed and filtered data

B resistivity survey : contour plot  
smoothed and filtered data, positive anomalies,  
mean to maximum, contour interval : 10 ohms

C magnetometer survey

D interpretation

magnetic anomalies

resistivity anomalies > 30 ohms

surface features



1 : 200