GEOPHYSICAL SURVEY

by Alister Bartlett

Chapel Garth, Bolton, was surveyed before excavation by the Geophysics Section of the Ancient Monuments Laboratory. Traverses were made across the site at intervals of 1 metre using a fluxgate gradiometer. This instrument gives a continuous signal which can be plotted automatically and later converted into a computer drawn dot-density plot. This plot is shown in Fig with the addition of the areas later excavated.

Some of the major archaeological features of the site were successfully located, as the excavation confirmed. Comparison of the findings provides a useful demonstration of the processes by which magnetic detection operates.

Particularly strong magnetic anomalies mark the position of the house, Building 6, in Site III. The slightly squared-off shape of the corresponding dense clusters of dots is partly spurious and due to saturation of the plot caused by the high readings, but their positions indicate the heaps of burnt thatch and daub around the house. Conversely, there is a gap in the pattern of anomalies over the north end bay of the house which was demolished before the final burning. The barn, Building 2, in Site I also contained burnt deposits causing similar strong anomalies. These do not follow the outline of the building in the same way as those of Site III, but correspond well with the spread of burnt material found on excavation.

The line of the hollow way across the field is marked by the magnetic response of slight banks of upcast material to either side. The effect is greater close to the buildings where there is likely to be more occupation material, which characteristically gives a stronger response than natural soil, and fades towards the east side of the field. The road ditch which lies across the north side of Site I was also detected.

There is another area of magnetic disturbance adjoining the two parts of Site II. This area represents the yard of the hall (Building 3) excavated at the edge of the survey immediately to the west. Debris from the building and iron smelting material could both have contributed to the magnetic activity. The behaviour of the furnace nearby was highly atypical, it having been so completely demolished that only a weak anomaly was detected.

The more southern of the two areas excavated in Site II is comparatively quiet. The pattern of dots may with hindsight be taken to show a marginal response to the turf deposits of Building 4, but neither they nor the post holes are features likely to be clearly detected in a magnetic survey. The background noise level is about 2 gammas (100,000 gammas = 1 oersted) and post holes usually too small to give a response distinguishable from this.

There was a similarly doubtful response to the remains of the chapel in Site I. The line of the south wall was detected but there was no indication that it was part of a larger structure. In fact the response was to a robber trench rather than to the wall itself. This can occur because any ditch containing an increased depth of topsoil which has a magnetic susceptibility greater than the surrounding subsoil will usually be detectable. In this case the effect may again have been increased by the presence of nearby occupation. Much of the masonry of the north wall of the chapel, by comparison, was still in place. This gave no magnetic contrast with its surroundings and was not detected.

Various other magnetic anomalies appear in the plot. Some may be due to superficial iron, which was plentiful on this site, and others to variation in soil depth over the uneven ground. Anomalies coincide with several of the banks. The plot is generally more disturbed around the settlement than it is to the north of the

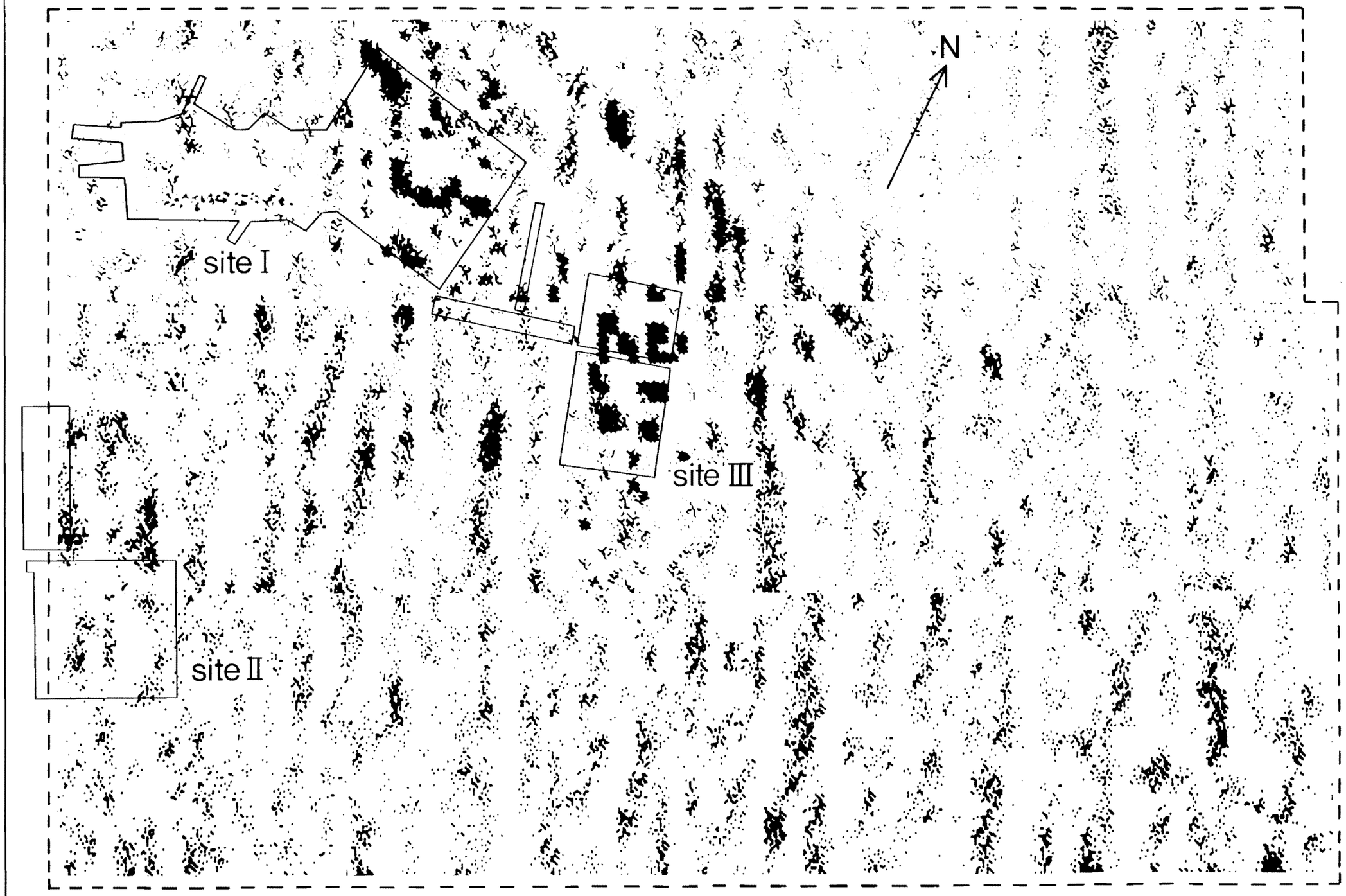
road. The survey alone cannot exclude the possibility of further archaeological remains, but if any are present they are unlikely to be more substantial than those of Buildings 4 and 5 in Site II.

The principal mechanism for the enhancement of magnetic susceptibility on archaeological sites is generally agreed to be the partial conversion of the naturally occuring weakly ferrimagnetic iron oxide haematite to the strongly ferrimagnetic maghaematite on heating, as was confirmed by the experiments of Tite and Mullins (1971). The cumulative effects of domestic fires are likely to cause detectable magnetic changes wherever there has been occupation, but on this site the significance of the process is emphasised by the concentration of magnetic activity around the burnt remains of the buildings.

Reference

Tite, M S and Mullins, C., 1971, Archaeometry 13, 209-219.

BOLTON MAGNETOMETER SURVEY



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