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# Magnetometer Survey at the Early Latène Barrow at Glauberg, Germany and Izs Environs

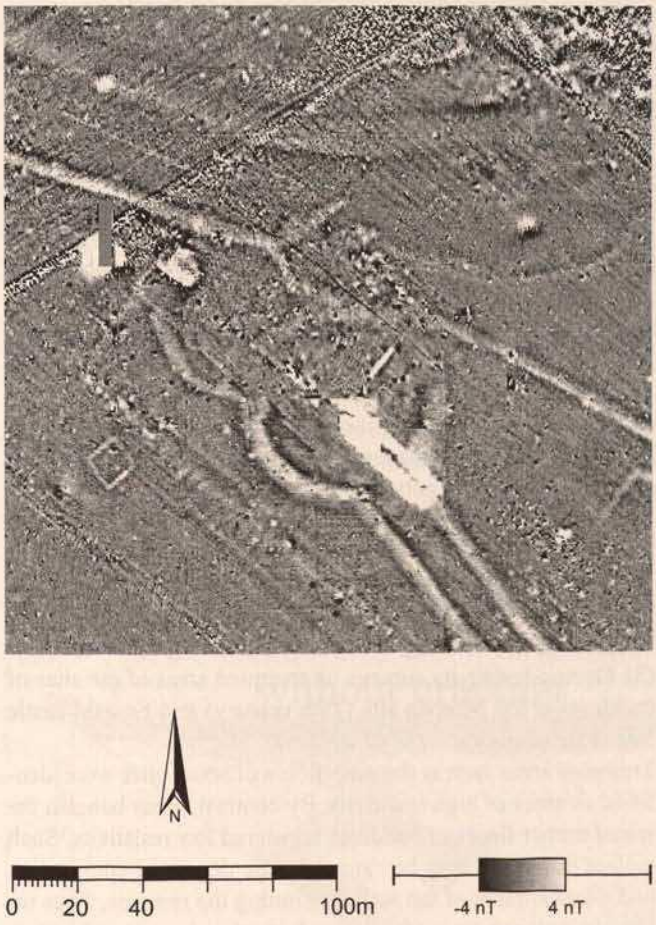


Fig. Glauburg-Glauberg, Wetterau district, Hessen; Monumental early La Tène barrow with ditch system; 256-gray-scale plot of the fluxgate-magnetometer survey (detail); order from the Department of the Preservation of Monuments in Hessen, Wiesbaden

In 1994 the Hesse Department for the Preservation of Monuments excavated a rich grave of the Early Latène period at the southern slope of the prehistoric hillfort of Glauberg in Hesse, Germany.

The grave goods (gold torque, bronze wine-flagon etc.) lead to the assumption that it was the grave of an important personality. In the course of further excavations, an almost completly preserved statue of an idealized celtic ruler or hero and fragments of three more statues were brought to light. These findings and excavations at the hillfort of the Glauberg proved that this site was an important place on the northern rim of the Celtic world, similar to the princely residences of southwestern Germany, northern Switzerland and eastern France.

In the first place aerial photography found hints for a barrow measuring about 50 m in diameter being surrounded by a ditch. The excavation in 1994 confirmed this idea. Further weak traces of features were visible in the near environs of the barrow.

A first magnetometer and resistance survey following the excavation and covering an area of 1.5 hectares with the barrow in its centre showed very soon that it was included into a large system of ditches that enclosed the area in the Iron Age period.

Until now an area of about 110 hectares was covered by an even 0,5 m grid system using a fluxgate-gradiometer. The ditch-system localized up to now has an extension of more than 1,2 km from east to west. Also visible are further ditch-sytems of different age. Scattered over the whole area of investigation are several settlements of neolithic to Iron age context inside and outside the large Iron age ditch-system.

The magnetometer survey at the Glauberg makes the special operation of geophysical methods among archaeological field methods clear (excavation, aerial photography, field walking etc.). Its potentiality and increasing importance in archaeology once again becomes visible.

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# A Comparative Study of Electromagnetic Survey and Excavation Results at Archaeological Sites Containing Kilns and Buildings

Electromagnetic probing was conducted before excavation on baked areas and trampled areas at a number of archaeological sites. The studies undertaken were as follows:

(1) Magnetic surveys at a Suzu-ware kiln Site (14th century);
(2) Magnetic investigation at the Paleolithic Ohara B site;
(3) Electric resistivity surveys on trampled areas of the sites of buildings at the Murodo site (18th century) and Emashi castle site (15th century).

**Results**

(1) Magnetic surveys of a kiln site (13–14th century).
Both a proton precession magnetometer and a fluxgate gradiometer were used and clear magnetic anomalies appeared in four areas. Excavation revealed that the appearance of these anomalies is related to the direction of the major axis of the kilns. Kilns with their major axis aligned north-south show quite a good cor-

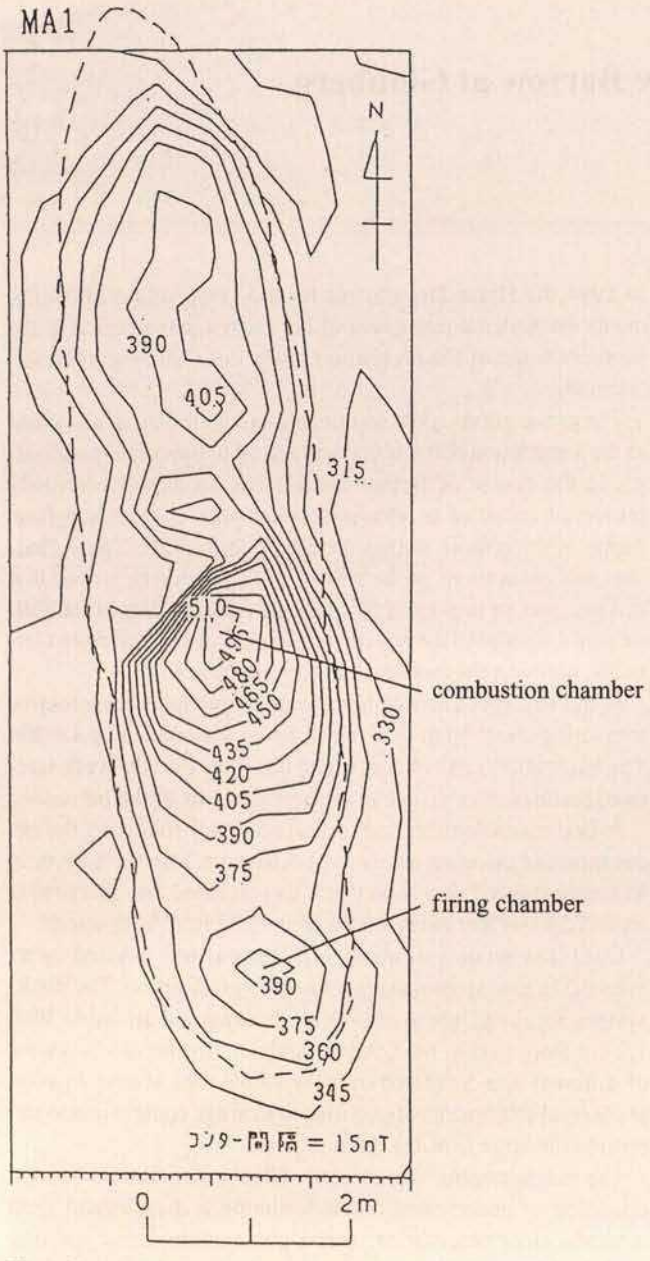


Fig. 1. Case 2: Distribution of the total magnetic force at a kiln surveyed by proton magnetometer at Kurobatake site. Excavation confirmed that intense high anomaly areas were the combustion chamber and the firing chamber of the kiln

relation with magnetic anomalies, whereas kilns with an east-west alignment show a southward deflection of their anomaly patterns.

When a proton magnetometer survey was done with low sensor height ( less than 5cm from the ground surface) quite clear anomalies were detectable on the kiln sites. Excavation showed that these anomalies correspond to the combustion chamber and the firing chamber of the kiln. As a result of being heated to a high firing temperature, these regions had acquired intense magnetization (thermo-remanence) not only on the surface but at a deeper level as the magnetic properties of the baked soil confirm.

(2) Magnetic investigation at the Paleolithic Ohara B site.

Finding a hearth is important evidence for the existence of a dwelling from the Paleolithic period onwards. We attempted a magnetic survey in combination with a rock-magnetic study for this purpose. At an artificially baked area by an open-air fire, both a magnetic survey and a test of the remanent magnetization of the soil proved effective as methods of locating the slightly baked area. The Paleolithic Ohara B site was studied using these magnetic methods, and a magnetically anormalous area was found suggesting the site of a fireplace. Another magnetized area was found by analysing the distribution of magnetization in the buried soil. The remanent magnetization in the soil showed a circular directional pattern, which could have been caused by a strong electric current flowing from the air into the ground. Such a pattern would be consistent with the spot having been struck by lightning. Thus, the soil retains evidence of lightning striking it in the Paleolithic period. This suggests that the effects of lightning can be recognised using archaeological techniques.

(3) Electric resistivity surveys on trampled areas of the sites of buildings at the Murodo site (18th century) and Emashi-castle Site (15th century).

Trampled areas such as the earth floors of house sites were identified as areas of high resistivity. By contrast, areas beneath the raised timber floors of buildings registered low resistivity. Such a clear difference may be caused by the degree of compaction and water content of the soil constituting the remains. Thus resistivity surveys are useful for studying the character of former buildings.

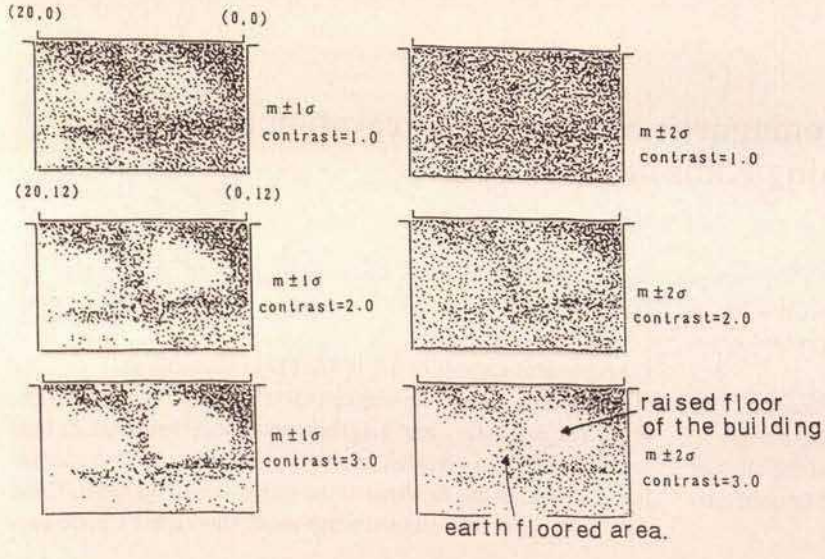


Fig. 2. Case 1: Distribution of resistivity surveyed using an RM-15 meter at the Murodo site. The low resistivity zone corresponds to the area under the raised floor of the building and the high resistivity zone to the earth floored area