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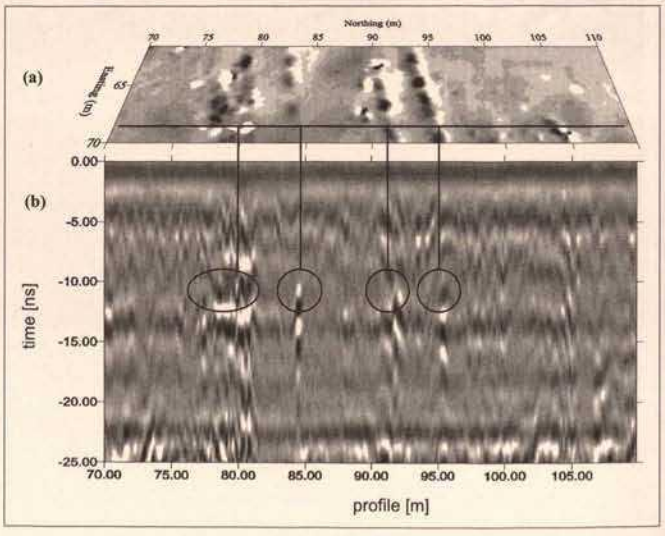
Interpretation Enhancement of Archaeometric Investigations due to Joint Interpretation of Geophysical Fields

Because of different limitations, e. g. time, instrumental or economic limitations, only single-method geophysical investigations are carried out in many cases. However, a single method is often limited by the capability of the utilized physical principles to display certain archaeological patterns. Therefore, an integrated geophysical investigation technique should be applied to overcome this problem. At Kalø peninsula (Jutland, DK) an integrated geophysical prospecting was carried out to detect different subsurface targets related to the old medieval castle and its surroundings. To locate houses and the position of different defense structures, four different areas were investigated using geomagnetic prospecting, ground penetrating radar (GPR), geoelectrical profiling and surveying. By means of combined geomagnetic and GPR measurements the situation at the first entrance to the peninsula was investigated. To correct the GPR data for topographic effects, the topographic map was refined by dense surveying. Because geoeletrical profiling has generally a lower resolution than the other two methods, it was applied as a first prospecting method to find the continuation of the ancient road outside the forecourt. Afterwards, anomaly regions found by this method were studied in detail using GPR and geomagnetic prospecting. The data revealed the distribution of old farm houses in the forecourt and the position of the ancient road leading from the entrance of the forecourt up to the castle. A 3D-image of the urban plan of the area under study is finally presented.

Fig. 1. Joint interpretation of total magnetic field data (a) and GPR data (b) on a profile crossing the remains of an ancient building. From the GPR time section a depth to the top of the remaining foundation of about 50 cm was estimated. Depth estimates of 45–50 cm, obtained by means of inverse modelling and from logarithmic power spectra of geomagnetic data, were in good coincidence with the former results



N. Kozhevnikov

Barun-Kahl : History of Purely Geophysical Discovery of the Oldest Iron Age Site at the Western Shore of Lake Baikal

Some years ago, very slowly decaying transient signals were measured during TEM survey over metamorphic crystalline rocks in the mouth of the Barun-Khal valley which is situated in the vicinity of village Chernorud, at the western shore of Lake Baikal. Being converted to apparent resistivity, these transients resulted in values of about 2–5 Ohm meter. Since both in-field and laboratory DC resistivity measurements didn't indicate any conductive rocks evidence within the TEM anomaly area, the TEM results seemed to be confusing.

To elucidate the cause of the slowly decaying transients, parent rock and soil samples were studied in the laboratory using: 1) microscopic examination; 2) small coil TEM measurements; 3) hysteresis and thermomagnetic analyses. It turned out that anomalous in-field measured transients were caused by the relaxation of magnetization of extremely fine ferri -and/or ferromagnetic particles concentrated in the near-surface layer. The origin of these particles for a long time remained a mystery.

In 1996, the third-year students of the Irkutsk Technical University that had in the vicinity of Chernorud their training in field geophysics, found a gopher's burrow. Among the soil thrown out of the burrow, many slags and charcoal fragments were found, which suggested an ancient metallurgical activity. The slags were electrically nonconductive. Examination of slags with chemical, X-ray diffraction and SEM analyses has revealed