

## Large Scale Geophysical Investigations in Ulucak Höyük Archaeological Site

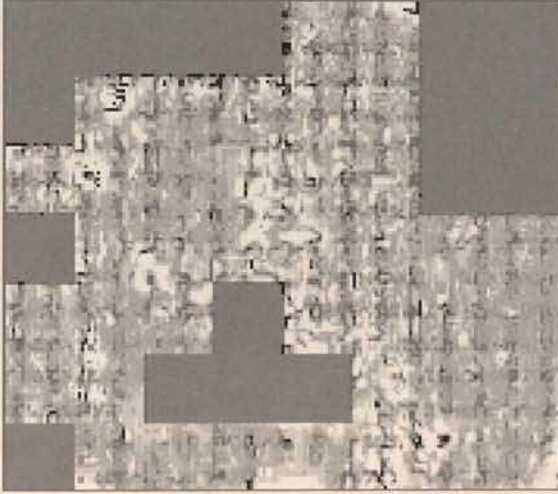


Fig. 1. The magnetic map of the Ulucak Höyük

Ulucak Höyük archaeological site is located 10 km away from Izmir. The artificial hill includes different settlements from Early Bronze Age to Late Roman Period. In this area, the archaeological excavation has been carried out since 1995. This excavation showed that the Ulucak archaeological site is very important for the history of Izmir city and environs in Early Bronze Age and later on. The geophysical surveys have continued to map all artificial hills by different geophysical exploration techniques such as magnetic, resistivity, self potential and EM-VLF since 1998. The magnetic gradiometer studies were carried out by Geoscan FM-36 fluxgate gradiometer in 3,900 square meter area, approximately. In this study, the measurement intervals were chosen as 0.5 m on the profiles approximately 1 m apart. Furthermore, the data were collected in 39 area by 10 m x 10 m. In the processing, the data were firstly united in an appropriate

co-ordinate system for all survey areas. Then, the arranged data were processed with different signal processing techniques and the enhancement map of the magnetic survey was obtained, (Fig. 1). Gradiometer measurements show that magnetic anomalies are generally condensed in the southern and eastern part of the artificial hill. Moreover, the magnetic anomalies are directed in two different directions. First anomaly group is N-S and E-W, and seem to similar the Late Roman foundations found by the archaeological excavations in the southern part of Höyük. The second anomaly group was near the Early Bronze age settlements in the eastern part of Höyük.

Resistivity studies have been carried out by twin array with 0.5 x 1 m grid interval in the Höyük. The aim of this study is to measure all this area by the resistivity method by the end of 1999. The preliminary results are quite interesting and the buried archaeological settlements were clearly defined in resistivity maps which are similar to each other. Especially, the resistivity and magnetic are in accordance in the southern part of the Höyük. In addition, the self-potential method was applied in the some anomalous area which high magnetic and resistivity values were obtained. The data were collected by two different measurement arrays, gradient and total area systems. As can be seen from the gradient map, the self-potential anomalies are low in amplitude. However, it is directed to N-S and E-W direction as magnetic and resistivity maps are (Fig. 2). This result is important to support the usefulness of self-potential methods in archaeological prospection. Furthermore, a new correction technique was tested to develop the self-potential method. The data showed that the new correction technique is very useful in archaeological prospection, and data quality was rather increased compares to the classical correction techniques in self-potential method.

In addition to these geophysical surveys, the EM-VLF method was used along some test profiles and areas. The results were interesting and previously identified anomalies observed clearly in magnetic, resistivity and self-potential maps, were again obtained.

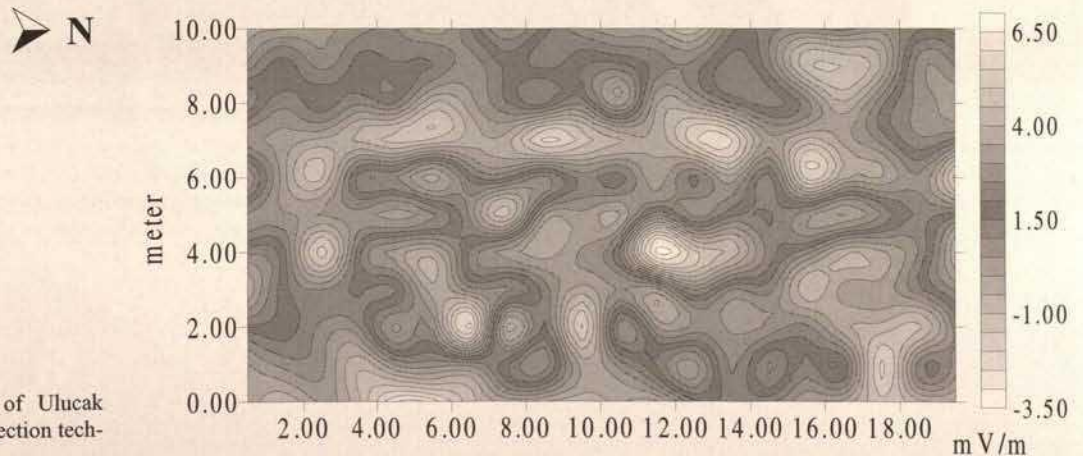


Fig. 2. The gradient map of Ulucak Höyük by using the new correction technique