P13-1 GEOPHYSICAL INVESTIGATION ON TUMULI BELONG TO ROMAN AGE, UCTEPELER VILLAGE OF KOCAELI

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It is useful to know the shape and size of buried archeological structure at the planning stage of excavation. Therefore, archeology and geophysics should study together to search buried archeological structures. There are 7 tumuli belong to Roman age in Uctepeler village of Kocaeli. The survey area is 5 km far away from centrum of the city.

At first, as a team from Istanbul University Department of Geophysical Engineering, we tried to determine the direction of dromos and then we carried on to determine the size and shapes of tomb-chamber. During survey Schlumberger, dipole-dipole, radial dipole and Wenner electrode arrays have been used and some examples of the responses of those arrays are given.

In this survey we assumed that a 3-D structure is in homogeneous and isotropic medium. Considering the location and dimensions of the probable structure the measurements were taken along the profile which is normal to direction of the structure. We chose the spacing between two potential electrodes less than the width of structure.

It is expected that the resistivity profiling anomaly resembled a dike anomaly that its resistivity is $\rho_1 < \rho_2 > \rho_1$. In measurements Schlumberger electrode array is used on Esentepe Tumulus. Fig. 1-a and 1-b shows resistivity profiling measurements on this tumulus.

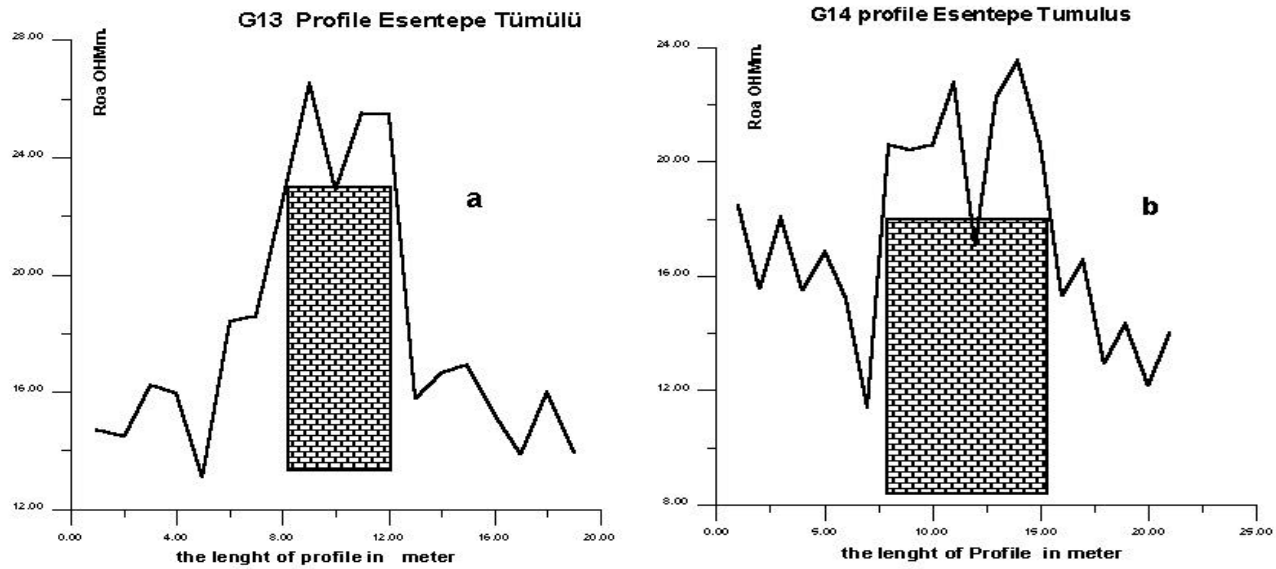

Fig. 1-a and **1-b**: Resistivity profiling measurements by Schlumberger electrode array.

The anomaly width in Fig. 1-a is smaller than Fig. 1-b. So Fig. 1-a and 1-b are interpreted as dromos and tomb-chamber, respectively. Furthermore, direction of dromos is determined by using dipole-dipole electrode array, which is sensible to lateral discontinuities. Measurements were taken at 1 meter intervals for four different apparent depths (n=1, n=2, n=3, n=4) along the profile. If the resistivity of the structure is greater than the medium this situation gives rise to the significant anomaly. Thus the location of structure might be determined by electrical method. At first we determined the direction of dromos and then we continued to identify the dimensions of structure. Measurements were taken along the profile above buried structure by dipole-dipole electrode array for two different depths (n=1, n=3) and resistivity anomalies are shown in Fig. 2-a and 2-b.

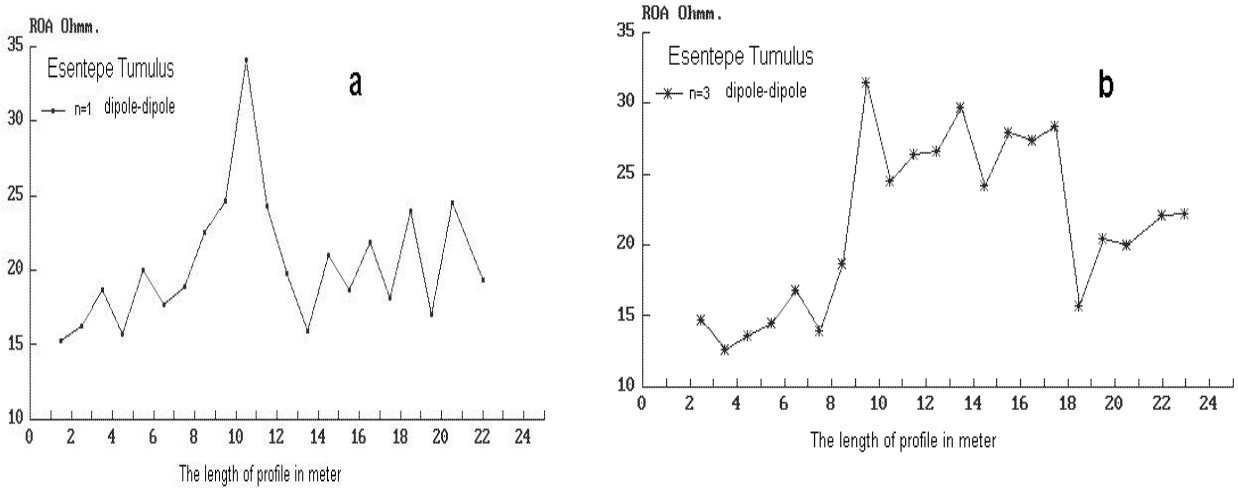

Fig. 2-a: Resistivity profiling measurements for dipole-dipole n=1, **2-b:** Resistivity profiling measurements for dipole-dipole n=3.

These anomalies may give information about the geometry and location of buried structure. Apparent depth n=1 is closer to surface of the earth than apparent depth n=3. So buried structure's effect is smaller on the measurements for n=1. Fig. 2-b has a different character than Fig. 2-a. Potential differences between potential electrodes for n=3 are influenced by deeper electric current distributions. Buried structure gives a maximum effect on the measurements since the depth of buried structure remains in the range of electrode array.

Concerning all this knowledge we can say that figure 2-b has significant information about the structure and its dimensions.

Probable structure has finite dimension so it is important to choose the following parameters; electrode array, depth and size of structure for obtaining significant and meaningful anomalies.

Acknowledgment

This work was supported by the Research Fund of the University of Istanbul. Project number: 1015/250897.