O13-3	A NEW CORRECTION TECHNIQUE IN THE SELF POTENTIAL METHODS AND ITS APPLICATION TO THE ARCHAEOLOGICAL PROSPECTION

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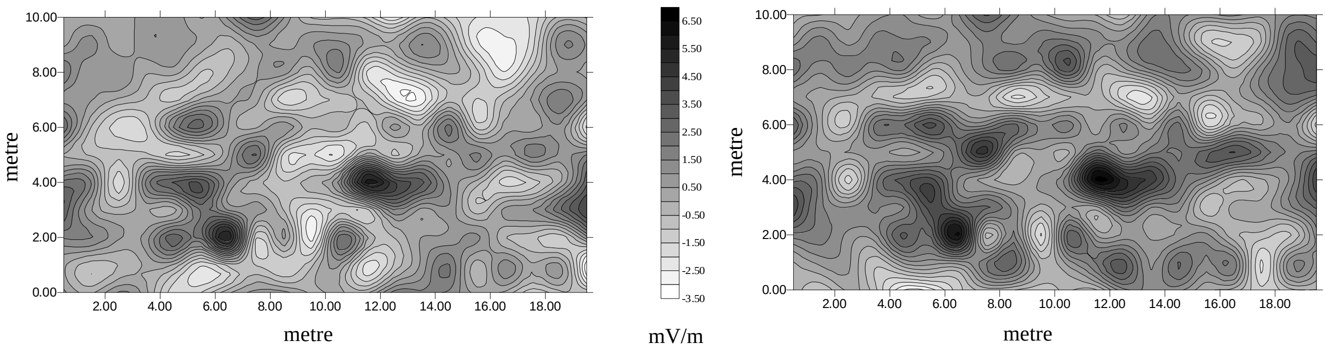
The self-potential method is very rarely used in the archaeological prospection because related phenomena are not very well known and there are many important measuring problems (Drahor, 1993; Drahor et al., 1996; Wynn and Sherwood, 1985). In this method, the main problem occurs in the physical and chemical changes within the measuring media and the non-polarizable electrodes which are used during the data acqusition. As known, the inner polarization difference of non-polarizable electrodes changes with time and other unknown factors. This phenomenon is observed as a noise during the data collection process. We think that all of these undesired factors can be eliminated by an appropriate measuring system. Thus, measuring process should be rather improved compare to classical data collection techniques.

The main purpose of this study is to eliminate the undesired measuring errors by using a new correction technique. The basic background of this technique is similar to the classical correction process used in magnetic prospection. The SP data are collected on a square grid in the archaeological prospection and the some other engineering geophysical explorations. In this case, the desired anomaly is affected by many undesired polarization problems due to the shift of non-polarizable electrodes along the survey line. Thus, the known correction techniques are not sufficient to eliminate these undesired effects. In this study, we propose a new correction system eliminating these undesired effects (inner voltage difference between the non-polarizable electrodes, drift polarization, soil contact effects etc.) from the anomaly.

As known, there are two different measurement techniques in the SP exploration as total field and gradient. This proposed technique can easily be applied with some small modifications to both the total field and gradient methods. In the total field measurement process, first of all, a main base point is determined outside the study area; and the voltage is measured between the electrodes in this point. Second of all one of the measurement electrodes is continuously kept at the base station and the other electrode is moved along the survey line. After the data acquisition, the same measurement process is repeated in the base point, and the other survey lines are measured by the same system. During the data collection on the base point, the operator must carefully observe the daily temperature and humidity changes. In the gradient measurement, two movable non-polarizable electrodes are used and the observation point is the midpoint between the two separate electrodes. The potential gradient technique has some disadvantages in the data quality, such as cumulative error, electrode polarization, drift effect, time varying potential, soil contact effect and reading errors (Corwin, 1990). Therefore, the additional base point must be chosen. During the data collection, the measurements are taken in the other base points in the survey lines, and these collected base data are reduced to the main base data. In addition, the chosen three observation points on the first profile are continuously measured after finishing the measurements of the each survey line, and these data are used for corrections.

This correction technique was used in Ulucak archeological site near Izmir in 1998. The measurements were taken on the different areas with the dimensions of 10x10 m and 20x20 m . The obtained data, corrected by the classic and new techniques, were compared to each other. As a result of this study, the present technique is better than the classical correction techniques in archeological prospection (Figure 1).



The gradient map by the classical correction technique

The gradient map by the new correction technique

Fig.1.

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