DEEP ELECTRICAL RESISTIVITY SURVEY IN FAULTS MAPPING USING MULTI ARRAY COMBINATIONS AND 3D INVERSION FOR CORRECTING CROOKED LINE EFFECTS

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Abstract

Electrical resistivity survey was carried out on three survey lines for mapping faults in Kyungju City, Korea. This area is where the largest earthquake occurred on September 12, 2016, recorded on the Korean Peninsula. Verification by electrode array combinations (alpha : outmost current poles, beta : separation between current poles and potential poles, gamma : crossing in current pole and potential poles) was performed to check the quality of the acquired data. Each survey line of length, 4 km consists of selectable electrodes spaced 100 m apart and the survey using the line is expected to show the resistivity structure for the depth of more than 1 km. Inversions using data from combination arrays and using data from separate arrays were performed. The inversion results using data from the combination arrays show nearly vertical resistivity boundaries, which are believed to be associated with the faulted structures in the study area. Although there are some differences in inversion results according to the kind of arrays in the survey, the overall underground resistivity distribution shows a similar pattern. Also three dimensional inversions were performed by the method developed by Kim et al. (2016) in order to compensate for crooked line effects caused by the failure to maintain the survey line in a straight line. The three dimensional inversion results also show nearly vertical resistivity boundaries similar to the conventional two dimensional inversions. This indicates that the survey results reveal very well overall underground resistivity structure of inferred faults in the study area.

Reference

Kim, J.-H., Tsourlos, P., Karmis, P., Vargemezis, G., and Yi, M.-J., 2016, 3D inversion of irregular gridded 2D electrical resistivity tomography lines: Application to sinkhole mapping at the Island of Corfu (West Greece), Near Surface Geophysics, 14, 275-285.