# Resolution of 3-D Electrical Resistivity Images from Inversions of 2-D Orthogonal Lines

Mehran Gharibi*, and Laurence R. Bentley
Department of Geology & Geophysics, University of Calgary
Calgary, AB, T2N 1N4, Canada
gharibi@geo.ucalgary.ca

**ABSTRACT**

Three-D electrical resistivity imaging (ERI) data can be collected using sets of orthogonal 2-D ERI lines. Three-D surveying using sparse sets of orthogonal ERI lines can significantly reduce the data acquisition time, but there is a trade off between image resolution and the separation distance between survey lines. The question is, – “What is the maximum line spacing in a survey that produces an image that will yield an acceptable 3-D map of the subsurface?” The factors that contribute to the quality of the final image are the size, depth and relative locations of targets with respect to the ERI lines and the resistivity contrast between background and targets. In addition, the electrode configuration that is used in survey will affect the final image, because different configurations give rise to different sensitivity patterns both horizontally and vertically.

The effects of increased line spacing on the resolution of 3-D electrical resistivity imaging surveys were investigated using synthetic and field dipole-dipole and Wenner configurations data. Using synthetic data, we found that dipole-dipole configuration produces a more accurate map of the subsurface than the Wenner array. Results from inversion of real and synthetic data show that, as a rule of thumb, the maximum spacing between lines should be on the order of the depth of investigation for a given array type.