Enhancement of Resolution in Electrical Resistivity Tomography (ERT)

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The resolution in Electrical Resistivity Tomography (ERT) depends on the number of apparent resistivity measurements acquired from unit cube of sub surface. If the number of apparent resistivity measurements from the unit cube is high, then the resolution of resistivity cross section image will be proportionately high. In automatic multi-electrode survey , the resolution depends on three factors, namely type of configuration profile length and inter-electrode spacing. With Dipole-Dipole configuration, we will get high lateral resolution, but lower depth of investigation(Roy and Apparao 1971). On the other hand in Wenner-Schlumberger configuration, depth wise resolution is high, in the sense we can scan the subsurface up to greater depth with the same profile length compared to Dipole- Dipole. Depth wise resolution can be improved by increasing the profile length and array size. We can get more lateral resolution by decreasing the inter-electrode spacing, but this will decrease the depth wise resolution. Increasing lateral resolution will have effect on depth-wise resolution and vice versa. With the new refined processing methodology, we can get both lateral and depth wise resolution in one cross- section image with high precision .

This new refined methodology is applicable to both 2D and 3D resistivity and Induced Polarization (IP) imaging studies. The data used for this study was acquired using Syscal Pro -96 with 96 electrodes and 5m inter-electrode separation. This procedure has been successfully applied in different geological environs for understanding subsurface stratal architecture with good precision and reasonable accuracy .

Key Words: Multi-electrode, lateral resolution, inter-electrode spacing, electrical resistivity tomography