High-Resolution Electrical Resistivity Tomography (HERT) for Studying Sub-surface Stratal Architecture in Different Geological Environs

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High Resolution Electrical Resistivity Tomography (HERT) plays a significant role in such a way that subsurface signatures can be recorded from the inhomogeneities both in lateral and depth-wise directions. Further, 2D and 3D imaging methodologies are possible by planting the electrodes in different 'pre-set' positions .The survey area can be expanded by 'roll-along / roll-on' procedures in which case the line of survey can be extended in segment-wise.

A multi-electrode system (Griffiths and Turnbull,1985;Griffiths et al.1990 and Barker,1992) with Syscal Pro-96 (IRIS make) measuring unit, consisting of 96 electrodes with the facility of availing up to 5m inter-electrode separation has been used for the field survey. Three-electrode, Dipole–Dipole ,Wenner-Schlumberger and Pole-pole configurations have been applied for the present survey in different geological terrains. An in-depth study has been carried out in different identified zones from Brahmaputra plains and Cauvery delta region to understand the nature of subsurface formations. RES2DINV ans RES3DINV have been applied for interpretation of the data.

In Brahmaputra alluvium, the sites were selected to cover three geomorphic components viz., active floodplain, high level terrace composed of older Alluvium and alluvial plains .With topographic position between the former two, subsurface 2D images have been prepared with each electrode configuration after scanning the subsurface in the above selected locations. A better lateral and depth-wise resolution has been observed in the case of Dipole-dipole images compared to the other ones. 3D imaging was also carried out at three of the locations . Calibration and correlation of the resistivity images with few drilled wells in the area shows acceptable corroboration. In the case of Cauvery corridor also, both 2D and 3D images have been calibrated with the geo-electrical sections. In some significant zones 1D substrata information has corroborated with borehole lithologs especially in Uttarangudi ,Nannilam etc. Further ,the slicer images in the identified zones have helped to have an in-depth understanding of the sub-surface at desected depths. By and large ,an optimum corroboration is achieved between the geo-electrical sections and lithologs .

Key words: HERT ,Slicer-dicer, vertical electrical sounding, lithologs ,dipole-dipole.