

Mapping lithology and assessing recharge characteristics in a granitic hard rock aquifer: Inference from 2D resistivity, induced polarization, tracer and moisture measurements

Research Highlights

Two dimensional Electrical Resistivity Tomography (ERT) along with Time Domain Induced Polarization (TDIP) investigation covering 1.6 km line were carried out at 3 natural recharge sites in a granite watershed, situated in a semi arid region of Midjil Mandal, in Mahbubnagar district, state of Telangana. The high resolution electrical resistivity tomography results are found to be useful in delineating soil/ highly weathered, moderately weathered zones and deeper massive granites. The resistivity contrast is significant between the near surface lithological layers and the deeper massive granites. The model resistivity value of the order of $\sim 10\text{-}50$ Ohm.m as revealed up to the depth of 12m at the recharge sites suggests higher infiltration and percolation capacity of the near surface layers. The tritium and depth moisture dataset of shallow zone corroborated with the resistivity tomography dataset in terms of moisture variation. The 2D inverted models show increase in resistivity values in the zone of 22-78 m depths. In the present study the characteristics resistivity range for the major granitic formations is established based on the drilled lithologs, electrical logging and the electrical tomography study. Nevertheless, the substantial resistivity contrast and a uniform increase in resistivity with depth can be attributed to minor fracture zones in the present hard rock aquifer system. The inverted models show that the massive granite formation at a deeper depth has a resistivity value of the order of $\sim 1500\text{-}11000$ Ohm.m, indicating absence of any major fissures and fractures zone while the time domain induced polarization results indicates low magnitude chargeability values $\sim 1\text{-}7$ mV/V, which probably indicates poor to moderate moisture and groundwater potential at the investigated sites.

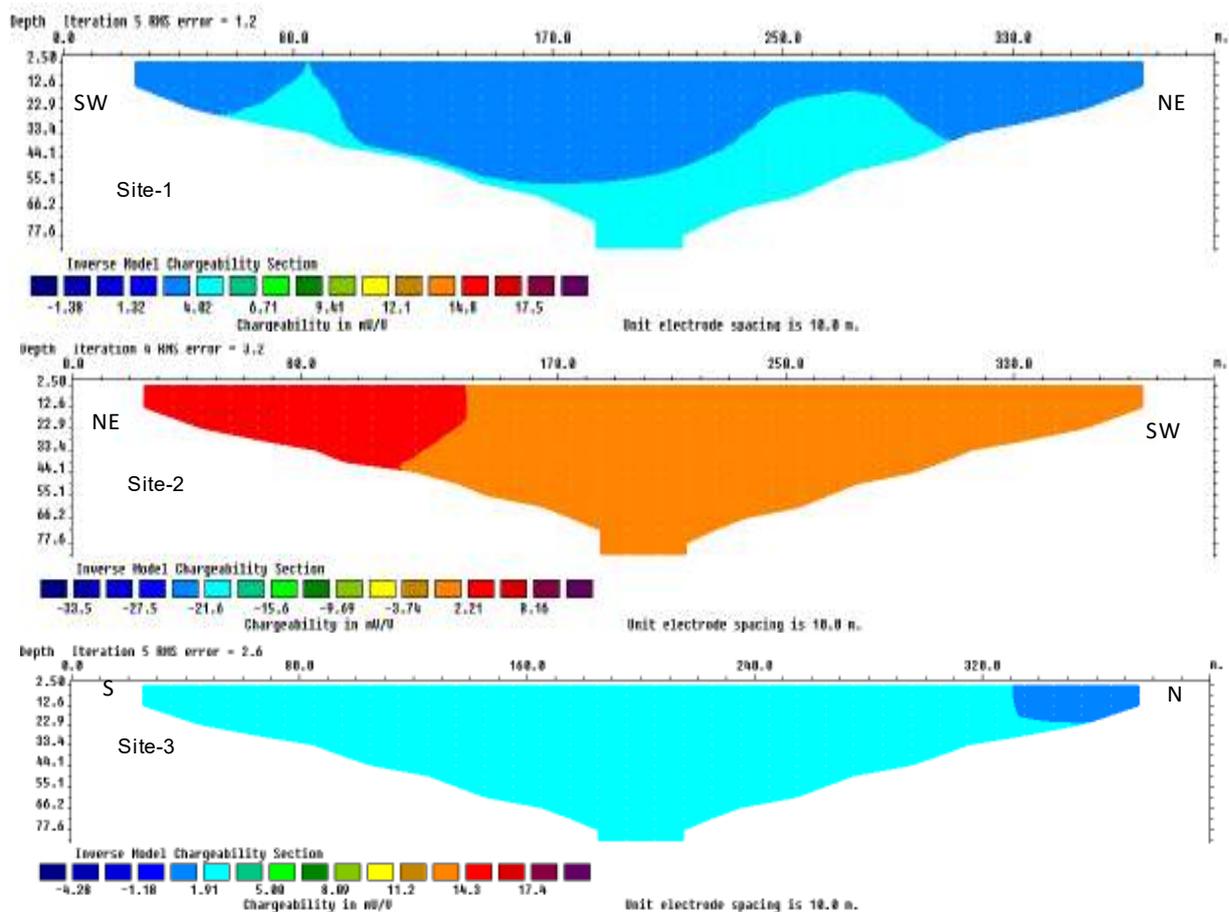


Fig.3 Shows the time domain induced polarization (TDIP) 2D inverted chargeability models at the recharge sites showing gentle variation of chargeability values at all the 3 sites.

For further details of the research article, kindly refer to the given link:

<http://link.springer.com/article/10.1007/s12594-016-0455-0>

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