Three-dimensional electrical imaging of the hot springs in the southern part of west coast geothermal province of India

Abstract: Geothermal zones represent localized heat transfer systems within the Earth's crust, where heat is exchanged from its source to various geological formations, often leading to thermal manifestations like hot springs. Understanding these zones is crucial for energy exploration and understanding associated geological processes. Geophysical exploration of geothermal systems utilizes various techniques, with electromagnetic (EM) methods, particularly Magnetotelluric (MT), standing out due to their effectiveness in identifying conductive zones. This is because subsurface electrical conductivity plays a key role in characterizing geothermal environments, often associated with geological features such as faults, fractures, and shear zones.

The West Coast geothermal system, situated in the Indian subcontinent, is a notable geothermal region. In this study, we conducted Audio and broadband Magnetotelluric (AMT & MT) surveys across the Aravali, Tural, Rajawadi, and Rajapur geothermal regions to gain deeper insights into this complex area. Employing advanced 3D modeling techniques, we analyzed the acquired data to better understand the characteristics of geothermal reservoirs within the West Coast geothermal region.

Our results from 3D inversion of AMT and MT data revealed significant findings. We identified distinct conductivity anomalies and delineated the subsurface structures in detail. These findings contribute to a better understanding of the geothermal reservoir characteristics and the geological processes governing heat transfer within the West Coast geothermal system.