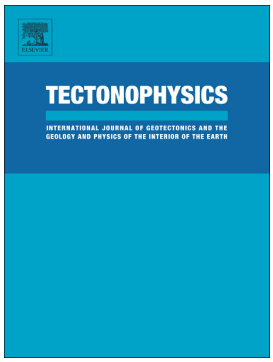

Electrical resistivity cross-section across northern part of Saurashtra region: An insight to crystallized magma and fluids

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Electrical resistivity cross-section across northern part of Saurashtra region: An insight to crystallized magma and fluids

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Abstract

Saurashtra region forms the Western part of the Deccan volcanic province (DVP) in India and is bounded by the Cambay rift basin (CRB) in the east, Narmada rift basin (NRB) in the South and Kachchh rift basin (KRB) in the north. This region is uplifted due to different stages of inter-continental breakup (Madagascar-India & Seychelles-India), different stages of rifting, reactivation of fault zones and Deccan volcanism. The major portion of Saurashtra region is covered by Deccan basalts underlain by Mesozoic sediments. Detailed MT and long period magnetotelluric (LMT) soundings have been carried out in the northern part of Saurashtra with an aim to bring out the geoelectrical configuration of different basins (Jamnagar, Jasdan, and Cambay) along the profile. 2D inversion carried out for different modes: transverse electric (TE), transverse magnetic mode (TM) and TE+TM independently. The inversion of different modes shows distinct electrical signatures. Due to the 3D nature of the data, we have considered the TM mode of interpretation because it is less prone to 3D distortions. The final model represents large-scale heterogeneities in the crust due to the presence of different resistive and conductive blocks. High conductive lithosphere denotes the thermal influx of the mantle material to the base of the crust. Exchange of heat with the lower crust during basaltic magmatic underplating released carbonate fluids and/or dehydration of minerals resulting in high conductivity anomalies. A prominent conductive feature on the east side of the profile at upper crustal depths may be due to partial melts associated with mafic/ultra-mafic intrusions related to the Reunion plume activity. Different resistive blocks in conjunction with seismic tomography studies represent recrystallized older Precambrian crust that forms the uplifted blocks of Jamnagar, Jasdan and western part of Cambay basins.

Key words: Magnetotelluric, Deccan Volcanic Province, 2D inversion