

### **3D Geoelectrical subsurface image around Kangra re-entrant region, NW Himalaya using Magnetotelluric studies**

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#### **SUMMARY**

Magnetotelluric (MT) data were recorded at 40 sites, using BBMT and LMT instruments, from Jalandhar to Udaipur, covering the Punjab and Himachal Pradesh states of India. The major Himalayan thrusts i.e. Main Frontal Thrust (MFT), Main Boundary Thrust (MBT), Main Central Thrust (MCT) pass through the region along with the Jawalamukhi Thrust (JT), Chamba Thrust (CT), and Miyar Thrust. The main objective of the study is to image the geoelectrical subsurface structure of the area. MT data were processed using MAPROS, PROCMT, and SIGMT software, and impedance tensor and Tipper responses were obtained in the time period range of 0.001 to 1000 s. After processing, the strike calculation and dimensionality analysis of the data is done using the Phase Tensor method. The high  $|\beta|$  value and the direction of strike in the dataset indicate towards the 3D structure for most of the sites, other than a few sites in the central region which shows the 2D structure for the low time period (upto 1 Sec). After analyzing the data, the full impedance for all 40 sites and tipper for 29 sites is selected for inversion. Taking the full impedance inverted model as input for tipper inversion gives the final nRMS of 1.93. The inverted 3D geo-electrical model indicates an intra-crustal high conductive feature ( $< 10$  ohm-m) south of the MFT. Along with this, the trace of all the major fault zones is visible in the inverted model. The Indian plate shows a resistive nature. In the central and northern sections of the inverted model, conductive features are visible upto a depth of 12 km. The interface between conductive and resistivity features is the zone where most of the time high seismicity is observed. Most of the seismicity is concentrated between 30 to 90 km in the Northern section within the depth range of 0-10 km. In the nappe dominated tectonics of the Kangra–Chamba region accumulating strains are partly consumed by movements on the CT/MBT, which account for the low magnitude widespread seismicity in the upper 8–10 km of the crust.

**Keywords:** 3Dinversion, Kangra re-entrant, Seismicity,

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