ELECTRICAL RESISTIVITY IMAGING OF SEISMICALLY ACTIVE FRONTAL HIMALAYA

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Given the sensitivity of resistivity to rheology, magnetotelluric measurement are undertaken to study deep crustal electrical structures and their possible linkage to the space-depth distribution of seismicity. Magnetotelluric investigations at Thirty three sites along Bijnaur-Mallari profile cutting across major litho tectonic units of Himalaya starting from Indo Ganges plain, Siwalik, Lesser, Higher Himalaya to Tethys Himalaya. Observing the low solar activity during the survey period each site was occupied for five days. Longer occupancy allowed estimation of impedance tensor at periods greater than 500 sec at most of the stations. However at few stations electric field recordings were very noisy perhaps due to unbalanced power network of the region. This is reflected in larger error bars in estimated impedance tensors. Skewness and other dimensionality parameter indicate the validity of 2-D regional model. Robust impedance decomposition for the period band of 10 Hz- 1000 sec of eleven stations reveal that EM strike coincides with the geologic fabric. Considering regional strike EM field were decoupled in TE, TM mode and then inverted for frequency dependent conductivity distribution along the profile. The most conspicuous feature of the inverted resistivity section is the low resistivity zone at a shallow depth of 10 km beneath the Indo-Gangetic Plains that dips down at a low-angle and extends as a continuous plane right up to the northern limit of the profile. The geometry of this layer is correlated with the basement thrust separating the top of the under thrusting Indian Plate from the over-riding sedimentary wedge of lesser Himalaya. The paper will discuss the tectonic and rheological significance of the results of resistivity imaging using magnetotelluric method along the profile from Bijnaur to Mallari.

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