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A DEEP CRUSTAL STRUCTURE OF BHUJ EARTHQUAKE REGION (INDIA) USING MAGNETOTELLURIC STUDIES AND ITS RELATION WITH SEISMICITY

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ABSTRACT

Kutch region is well known for high seismicity with the reported occurrence of atleast three major earthquakes. Although various geological and geophysical studies have been carried out, the deep crustal structure is poorly understood. In order to understand the physical processes related to seismicity of the Bhuj earthquake, a wide-band (1000-0.001Hz) magneto telluric survey has been carried out along three profiles with 21 stations. The profiles cut across the major structural features such as Kutch Mainland Fault (KMF), Wagad Fault and Katrol fault. In the present study, deep geoelectric structure along a profile oriented in SW-NE direction i.e. Mundra-Rapar is presented. Results indicated the presence of thick sediments (1-4km) dipping towards south underlain by high resistive basement. From detailed 2-Danalysis of the data, it is observed that the resistivity of the basement shows distinct variation for the stations located towards the South compared to the north. It is interesting to observe that the well-known KMF is spatially located near the sharp variation in the basement resistivity. The deeper electrical structure shows a north-eastward dipping electrical conductor (25-50 ohm). Interestingly, the numbers of hypocenters are located in the transition zone of the resistor (brittle) and conductor (ductile) at depths of around 10-40 km. The results suggest an ongoing tectonic activity across the area with a blocked structure embedded between the North Wagad Fault and South Wagad Fault. The relative movement of these crustal blocks might be the reason for the continuous development of stresses that led to major earthquakes in the region. This deformation may be related to the present neo-tectonic compressive stress regime of the Indian Plate due to its NNE movement against the collision front in the north and its proximity to the triple junction in the western continental margin of the study area

KEYWORDS: *Magnetotellurics, Apparent Resistivity, Sediments, Seismicity, Bhuj Earthquake, Basement Depth, Dipping Conductor, Transition Zone*

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