



Exploration of geothermal structure in Puga geothermal field, Ladakh Himalayas, India by magnetotelluric studies

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Abstract

To understand the crustal electric structure of the Puga geothermal field located in the Ladakh Himalayas, wide band (1000 Hz–0.001 Hz) magnetotelluric (MT) study have been carried out in the Puga area. Thirty-five MT sites were occupied with site spacing varying from 0.4 to 1 km. The measurements were carried out along three profiles oriented in east–west direction. After the preliminary analysis, the MT data were subjected to decomposition techniques. The one-dimensional inversion of the effective impedance data and the two-dimensional inversion of the TE (transverse electric) and TM (transverse magnetic) data confirm the presence of low resistive (5–25 Ω m) near surface region of 200–300 m thick in the anomalous geothermal part of the area related to the shallow geothermal reservoir. Additionally, the present study delineated an anomalous conductive zone (resistivity less than 10 Ω m) at a depth of about 2 km which is possibly related to the geothermal source in the area. A highly resistive basement layer separates the surface low resistive region and anomalous conductive part. The estimated minimum temperature at the top of conductive part is about 250 °C. The significance of the deeper conductive zone and its relation to the geothermal anomaly in the area is discussed.

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1. Introduction

The Puga geothermal field, located in the north-western part of Himalayas, is recognized as the most promising area among the various geothermal zones

identified in the Indian Sub-continent. It forms a part of the Himalayan geothermal belt, located in the southeastern part of Ladakh district, Jammu and Kashmir state in India, at an altitude of about 4400 m. The Puga valley is surrounded by hills rising up to an altitude of about 6000 m, forming the Puga region as a valley. The 15 km long and about 1 km wide valley trends nearly east–west in direction between Sumdo village in the east and Polokongka La in the

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