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A wide band magnetotelluric investigation to delineate the deep crustal conductivity structure in Antarctica

D.N.MURTHY[1], K.VEERASWAMY[1], UPENDRA SINGH[2] and T.HARINARAYANA[1]

[1]*National Geophysical Research Institute, Hyderabad – 500 007, India*
[2]*National Cenre for Antarctica and Ocean Research, Goa, India*

Although, India has completed 23 expeditions to Antarctica since 1981 and carried out various geological and geophysical investigations in the past, for the first time, a wide band magnetotelluric (MT) experiment has been initiated. The aim of the study is to map the deep electrical structure of Antarctica around the Indian Maitri station. Although, long period MT studies were taken up earlier in Antarctica by other countries, wide band data (1000-0.001 Hz) including short and long period signals covering both AMT and MT signals were faced with problems related to data acquisition. These problems were overcome in the present study with computer aided online processing facility using internally heated lap top computer and with the novel methods of using special electrodes. A total of eight stations have been occupied with a station interval of about 5 km. The stations are occupied along a profile oriented in a NNE-SSW direction. The signals were recorded for about 5 days at each station to acquire long period signals and also to obtain good quality of short period signals. Use of titanium electrodes has reduced the contact resistance and facilitated to record the high frequency signals. In the present study the data acquisition procedures and field logistics of the wide band magnetotelluric study is presented along with preliminary modeling results of the electrical conductivity at deep crustal depths. The deep electrical structure is compared with crustal structure obtained earlier from gravity and seismic studies.