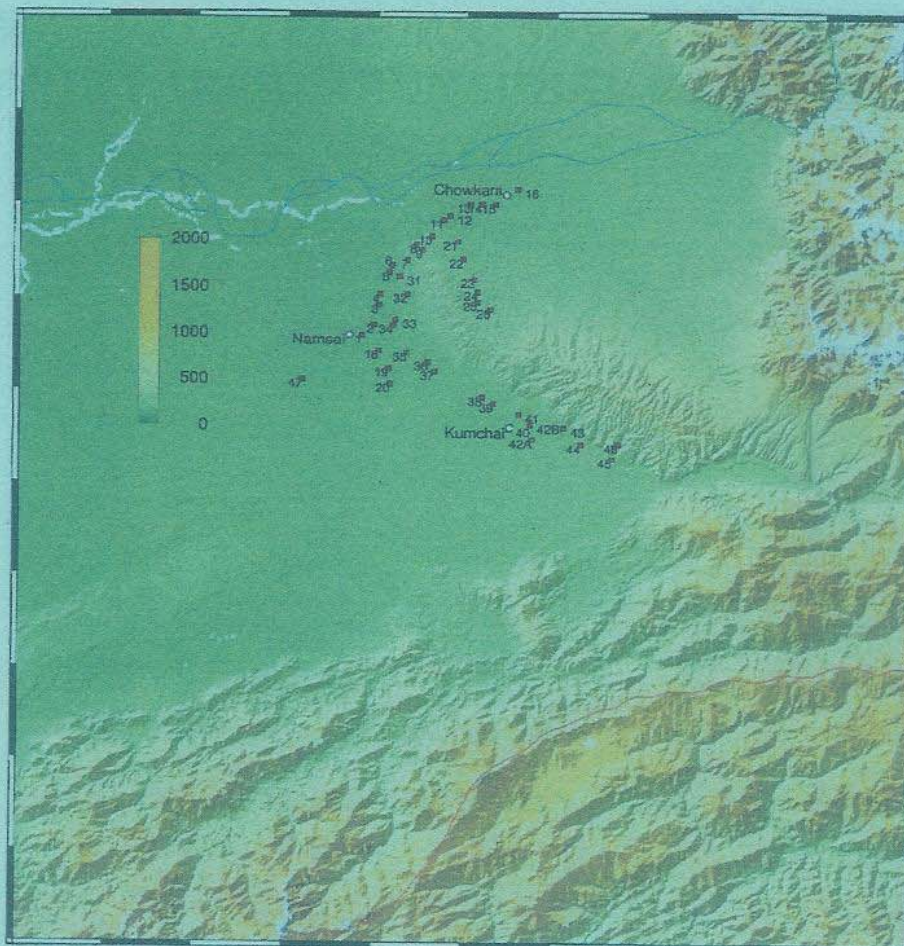


MAGNETOTELLURIC SURVEY IN THE MANABHUM AREA, ARUNACHAL PRADESH, INDIA



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**NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
(COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH)
HYDERABAD – 500 007, INDIA
MAY, 2005**

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MAGNETOTELLURICS GROUP

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8. SUMMARY

Magnetotelluric field investigations have been carried out on experimental basis in the logistically difficult Manabhum area, Arunachal Pradesh. This area due to complex geology posed a greater problem to the well known geophysical technique for oil exploration, namely seismics. For this purpose, for the first time MT study was made to map the different formations, with a more focussed attention to map the Girujan top. A total of 42 soundings with a station interval of about 2-3 km have been occupied along 3 selected profiles, namely Chowkham to Namsai, Namsai to Kumchai and NS profile in North Manabhum area (Tengapani forest region) as shown in the location map. Additionally, another 40 stations using profiling method at 2 short lines with a closed station interval of 100m have also been occupied. The frequency of the recorded signals ranges from about 1KHz to more than 100 sec and few stations up to 500 sec. at places. This facilitates to probe the earth from shallow depths of a few meters to few tens of kilometres. The objective of the present study is to delineate and map the conductive formations and also to map the electrical basement, with more emphasis on Girujan top.

Magnetotelluric data from 1-D modelling studies have clearly indicated the presence of various major formations with differing electrical resistivity. The top layer with a resistivity range of 50-300 Ohm m represents Alluvium/Dhekiajuli formations embedded probably with boulders. The Namsang formation is moderately resistive (20-65 Ohm. m) and is present all along the three profiles with varying thickness (few hundreds of meters to as much as 4 Km) followed by more conductive formation of Girijan, Tipam, Barail etc., with a resistivity range of 10-20 Ohm.m. Such a resistivity contrast between these formations has provided a favourable situation for magnetotelluric technique in this area. These sedimentary formations are underlain by more resistive formation of about 65-700 Ohm m probably corresponds to the basement. The depth to the top of Girijan, Tipam, Barail etc., formations are in the range of 2 to 6 km followed by basement with a depth varying from 5-12 km as shown in different subsurface geoelectric sections provided in this report.

9. RECOMMENDATIONS

As mentioned above, the MT method has shown its usefulness in delineating different subsurface layers, mainly the interfaces between Dhekiajulis/Namsang, Namsangs/Girujans and the conductive sediments (Girujan/Tipam/Barails/Eocene) and the basement. The MT method when calibrated with Kumchai-I well data at station 40 has shown a very good correlation between the lithological layers observed in the well, i.e., Namsang top and Girujan top. Additionally the MT method has brought a high resistive basement at a depth of about 9 km.

In view of the above interesting and successful results obtained from the present survey, the potential of the MT methodology need to be further exploited in the region for oil exploration. This is more pertinent in Kumchai which is a producing field for OIL. The information of basement structure is very crucial in the region for further planning and exploitation of the resources. In view of this, a detailed MT survey is recommended with a regular grid fashion with a closed station interval to resolve more layers, if any within the conductive formation above the basement structure.