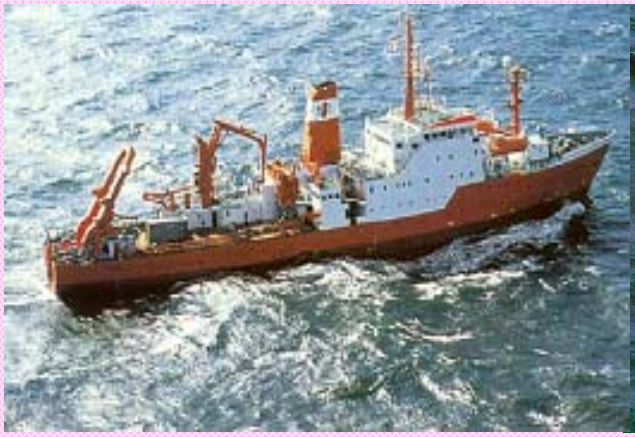
MARINE SEISMIC AND MARINE MAGNETOTELLURICS IN GULF OF KUTCH REGION, GUJARAT, INDIA



PROJECT SUPPORTED
by
COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
and
DIRECTORATE GENERAL OF HYDROCARBONS

PROJECT EXECUTED
by
NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
HYDERABAD – 500 007, INDIA
and
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Dona Paula, Goa–403 004, INDIA

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Project Coordinator: Dr. T. Harinarayana

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ABSTRACT

In view of the successful detection of buried sedimentary basins below the trap cover in northwestern part of the Saurashtra region and subsequent detection of large thickness of buried sediments in southern part of the Kutch region by NGRI, it was planned to initiate marine investigations in the Gulf of Kutch region located between the Saurashtra region towards south and the Kutch region towards north. For this purpose, a new geophysical technique namely marine magnetotellurics is planned on an 'experimental basis'. Additionally, marine seismics has also been planned in this region. Accordingly, NGRI, Hyderabad has taken up the marine magnetotelluric studies and National Institute of Oceanography (NIO), Goa has taken up marine seismic studies. The funding support for this project has come from CSIR as a part of network project. During discussions with DGH officials, NGRI and NIO have planned to take up a few additional profiles for DGH in the same region. The two surveys – marine magnetotellurics and marine seismics - are taken up in different dates as marine seismic signals may pose a problem to the marine magnetotelluric signals. Accordingly, 'RV Sonne' vessel has been engaged for marine seismics where as 'Akademic Boris Petrov' vessel has been utilized for marine magnetotelluric studies. Since the project involves introduction of a new geophysical technology in India, many problems have been faced before and during the execution of the project. Additionally, Gulf of Kutch region seems to be a problematic region due to high tides and high-speed backwaters etc.,

A total of 39 sites are occupied with MMT equipment of Scripps institution of Oceanography, San Diago, USA. A total of 282 line km of seismic reflection data and 356 line km of refraction data have been acquired using ocean bottom seismometers and using air gun as the seismic source. Due to various problems encountered during the operations as many as 13 OBS have been lost during the survey. Due to same logistic problems, similar to marine seismics as many as 9 MMT equipment have been lost in this region. The data are acquired along the selected profiles oriented in near E-W direction and also along NW-SE direction. The Tertiary sediment thickness is about 1 km towards western part and thinning towards eastern part in the Gulf followed by 1-2 km thick Deccan traps, 2-2.5 km. thick sub-trappean sediments followed by resistive basement. The thickness of sub-trappean sediments in deep (2 km) waters is estimated to be about 3 km. From the regional profile study oriented in NW-SE direction, covering the Saurashtra region towards south, Gulf in the middle and the Kutch region towards north, it is observed that large thickness of sediments (4-5 km) are observed in Kutch region. A deep borehole up to at least 3 km is recommended close to the Kutch sea-shore in the Gulf.

CHAPTER-1

MARINE MAGNETOTELLURIC STUDIES

Project Leader: T.Harinarayana

Party chief: Prof. T. Harinarayana **Chief Scientist: Prof. Steven C. Constable**

National Geophysical Research Institute Hyderabad **Scripps Institution of Oceanography San Diego**

Participants

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