

# Report on Oceanographic Cruise of O. R. V. Sagar Kanya

**CRUISE No. 96**

**12th to 28th October, 1994**



**National Institute of Oceanography  
Dona Paula-403 004, Goa  
INDIA**

NATIONAL INSTITUTE OF OCEANOGRAPHY  
(Council of Scientific and Industrial Research)  
DONA PAULA, GOA - 403 004

REPORT ON THE  
96TH OCEANOGRAPHIC CRUISE OF  
O.R.V. SAGAR KANYA

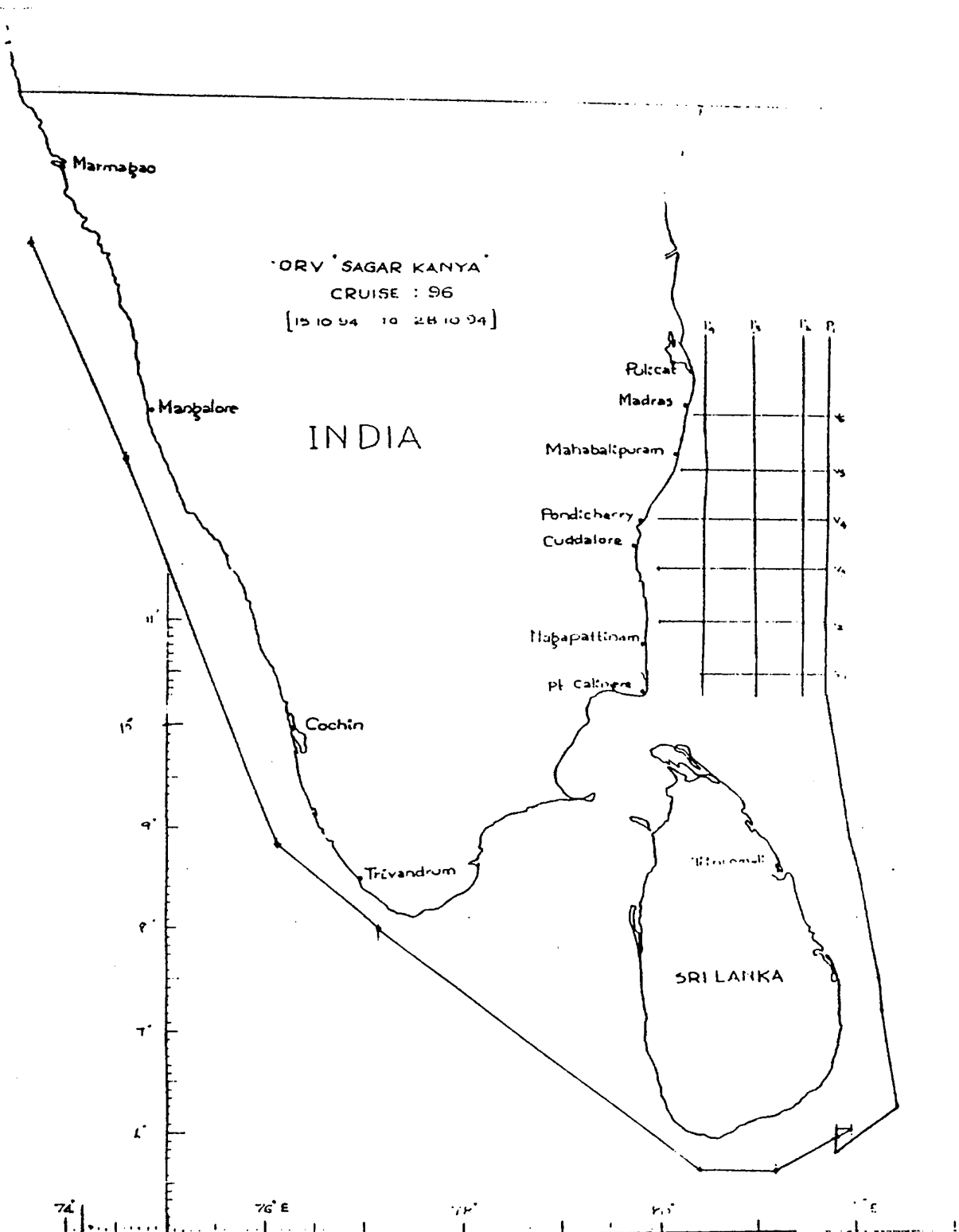
(12th to 28th October, 1994)

REPORT ON THE 96TH OCEANOGRAPHIC CRUISE OF

C.R.V. DABIR LADYA

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## 2. CRUISE SUMMARY

The main objective of the cruise was to cover the eastern continental margin of India (ECMI) with gravity surveys.

The participants boarded the vessel on 12.10.94 at Mormugao Harbour and it sailed off on 15.10.1994. The area of study was in the Bay of Bengal along the Tamil Nadu margin between  $10^{\circ}$  -  $13^{\circ}45'N$  and  $80^{\circ}$  -  $82^{\circ}E$ .

Bathymetric, magnetic and gravity data were collected along four coast parallel and six coast perpendicular traverses in a rectangular grid. Geophysical data were also collected along a long range section from Mormugao to study area.

Magnetic and gravity data revealed significant anomalies that might be related to the structural lineaments over the Tamil Nadu margin. An isolated Topographic Rise having a relief of nearly 1200 m was recorded at deep waters of Sri Lanka Margin (around 4000 m water depth) on the way from Goa to the study area, along the Sri Lankan margin. Significant gravity and a low amplitude magnetic anomalies were recorded over this feature, though it is too early to predict about the nature of this anomalous topographic high in deeper waters of more than 4000 m.

The cruise ended at Madras Port on 28.10.94.

3. PARTICIPANTS

a) Scientific Component :

K.S.R. Murthy	)	- Chief Scientist
M.M. Malleswara Rao	)	
A.S. Subrahmanyam	)	
N.P.C. Reddy	)	
K. Mohana Rao	)	Regional Centre of NIO,
D.V. Chandrasekhar	)	Waltair.
M.K. Prem Kumar	)	
K. Venkateswarlu	)	
Y.S.N. Raju	)	
Ch. Jawahar Kumar	)	
A. Koteswara Rao	)	
A. Suri Babu	)	
U.B. Pramod Kumar	)	
C. Ravi	)	Ship Cell, NIO, Goa.
Tushar Malaonkar	-	C.M.C., Bombay

b) Ship's Complement :

Captain Chidananda Pal	- Master
C.P. Girilal	- Chief Officer
Vinu Govind Topale	- Second Officer
T.J. Trojan	- Radio Officer
C.C. Pinto	- Purser
Dr. Dinesh Kumar Tpagi	- Medical Officer
C. Krishna	- T.N.O.
M. Thangamani	- NWKO
Kamal Kumar Dutta	- Chief Engineer
S. Janaka	- Second Engineer
Anwar A.S. Mistry	- Electrical Officer
V.A. Fernandes	- Catering Officer

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#### 4. OBJECTIVES OF THE CRUISE

The Regional Centre of NIC at Visakhapatnam has made extensive coverage of the eastern continental margin of India (ECMI) with bathymetry, magnetic and high resolution seismic surveys so far. This cruise was intended to study the ECMI with gravity data. To start with, the Tamil Nadu margin between Nagapatnam and Madras ( $10^{\circ}$  to  $13^{\circ}45'N$  and  $80^{\circ}$  to  $82^{\circ}E$ ) was covered by four coast parallel and six coast perpendicular traverses. The objective of these surveys is to test the validity of the models derived for the structural lineaments over ECMI inferred earlier from magnetic and bathymetry data, by an additional parameter i.e. gravity data.

#### 5. SAILING SCHEDULE AND OPERATIONAL PROGRAMME

The participants boarded the ship on 12.10.94 at Mormugao Harbour and it sailed off on 15.10.94.

The area of study was in the Bay of Bengal along the Tamil Nadu margin between  $10^{\circ}N$  to  $13^{\circ}45'N$  and  $80^{\circ}$  to  $82^{\circ}E$ . Immediately after sailing from Mormugao Port, collection of bathymetry and gravity data along a long range section from Mormugao to the study area was started. This section was taken mostly parallel to the western margin in the Arabian Sea, then passing south of Sri Lanka before reaching the study area. On the way, an additional short traverse in a N-S direction was also taken with bathymetry, magnetic, gravity, south of Sri Lanka, where an



interesting bathymetry feature was recorded.

In the study area off Tamil Nadu margin, four coast parallel profiles (P1 to P4) were covered by magnetic, gravity and bathymetry between latitudes 10°15'N and 13°45'N and longitudes 80°E to 82°E. These were followed by six vertical profiles (V1 to V6) at 30° nautical mile interval covering latitudes 10°30'N to 13°N and 80°E to 82°E. Thus, the south-eastern margin comprising of Cauvery basin and northern Tamil Nadu shelf was covered by bathymetry/magnetic/gravity in a detailed rectangular grid of nearly 3.5° x 2° at a traverse interval of nearly 30 nautical miles.

Bathymetry, magnetic and gravity data were recorded on analogue charts whereas magnetic and gravity data were recorded in digital form on magnetic tapes along with position information; from INS/GPS.

## 6. SALIENT FEATURES

### Topographic Rise:

Bathymetry data along the long range section from Mormugao to the study area revealed significant topographic rise over the deeper waters (around 4000 m) off Sri Lanka. This feature was also recorded in an earlier cruise. It is an isolated topographic rise, with relief of about 1200 m in an overall seabed depth of more than 4000 m. A significant gravity high of about 35 mgol was recorded over the rise, though magnetic

anomaly over this feature is of low (40 nT) amplitude. In this cruise, this rise was traversed by both SW - NE and N-S sections. This feature is located within the EEZ of Sri Lanka.

Cauvery Basin :

Magnetic data revealed significant high amplitude anomalies (more than 200 nT) over the northern Tamil Nadu margin between 13°45' to 12°N. Gravity anomalies over the Cauvery basin (South of 12°N) were of the order of more than 60 to 70 m gals, though magnetic anomalies over this basin were relatively subdued. The long range gravity section over the western margin between Mormugao and the southern tip located a significant gravity low having broad wavelength (amplitude nearly 50 m gals) off Cochin.

7. PERFORMANCE OF EQUIPMENT ON BOARD

The sea state throughout this cruise was extremely favourable. The vessel speed was mostly kept at 8 to 10 knots. There was some defect in the transfer of magnetometer values to INS. Magnetic values with digits eight or nine, either in units (Ex. 41208, 41209) or hundreds (Ex. 41802, 41902) were not taken properly in INS. The display from INS gave an altogether erratic value. Rest of the data were taken properly to INS. Since the CMC Engineer on board felt it was a software problem, no attempt was made to rectify it.

While the observed gravidata was satisfactory, the free-air anomalies appeared to be erroneous. Gravimeter Time display

sometimes skipped to 2 secs. instead of one second interval, though the time was correct.

Gravity display/Printer sometimes gave "WRONG NAVIGATIONAL DATA" though INS gave no such error. However, this problem occurred only for a couple of hours for one day in the entire cruise.

The slave unit of the ELAC deep sea echosounder in Geophysics Lab. gave some motor drive problem. Though some attempts were made to rectify it, they were not successful since it was felt that the Motor Panel had to be removed and checked thoroughly. The data was recorded from the Master unit in echosounder Lab.

#### 8. RECOMMENDATIONS

1. The IEM PC in chart and drawing room has to be rectified, as there is no other PC for use during geophysical cruises.
2. Most of the Printer ribbons, both in INS room and Chart and Drawing room were worn out and need to be replaced.
3. It is preferable to install Intercoms, at least in some scientist cabins since sometimes it was felt difficult to communicate between Labs./scientists and Chief Scientist.

#### 9. ACKNOWLEDGEMENTS

The Chief Scientist and his team members are grateful to Dr. E. Desa, Director, NIO, Goa, and also to the Ship Management Committee, for allotting this cruise to R.C., Waltair. They are

also grateful to Shri R.R. Nair, Head, G.O.D., NIO, Goa, for providing the opportunity to our members of R.C., Waltair, to take part in the trial cruise (Off: Shri L.V. Subba Raju, Chief Scientist) which helped a lot in getting acquainted with geophysical operations. They are also thankful to the shipboard trainees and CMC Engineer for their help. Finally, the excellent cooperation rendered by the Master, Officers and crew of O.R.V. SAGAR KANYA is gratefully acknowledged.

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