

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

**CRUISE No. 79**

**6th November to 31st November, 1992**



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REPORT ON  
79TH OCEANOGRAPHIC CRUISE OF  
O.R.V. SAGAR KANYA

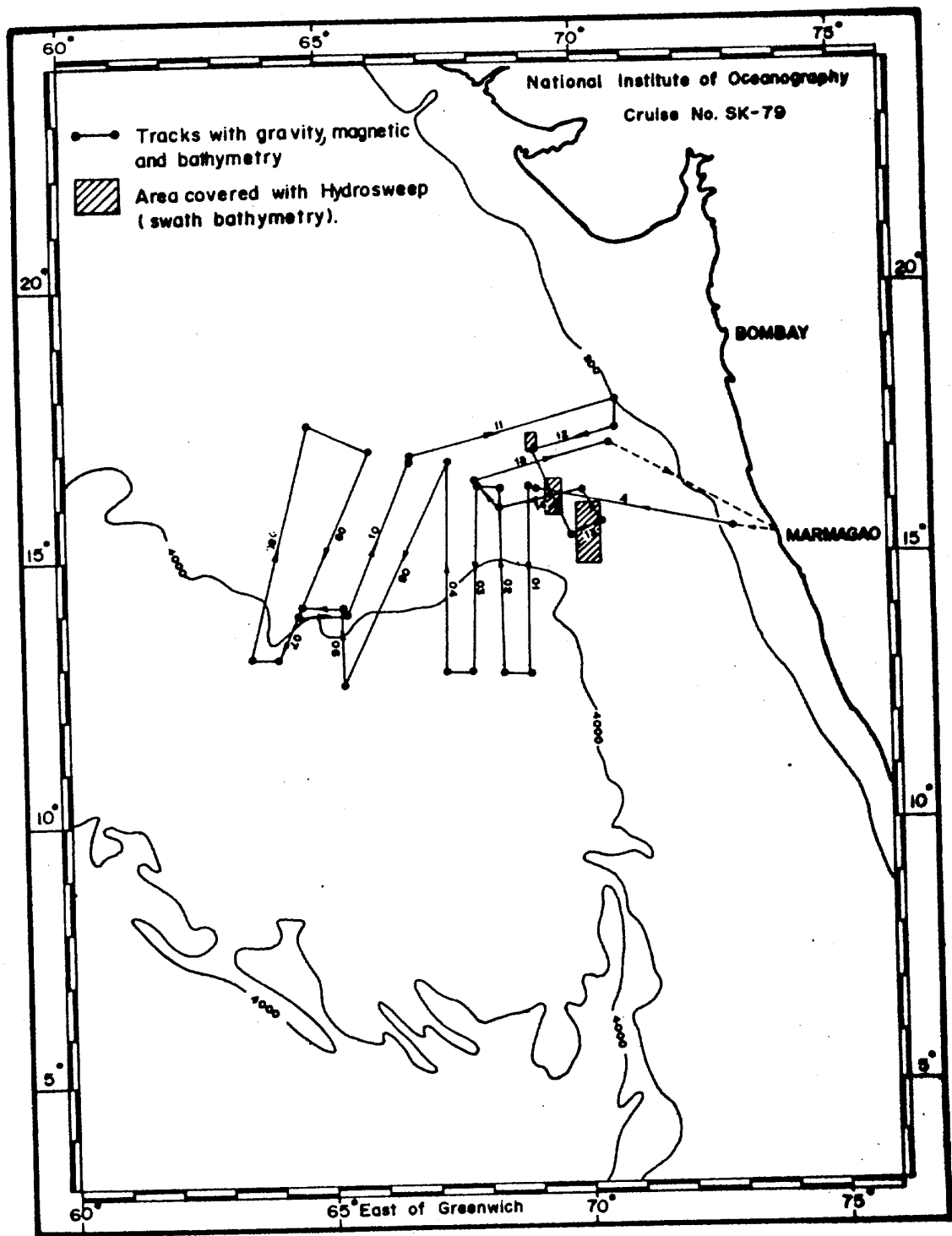
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## 2. CRUISE SUMMARY

The cruise was primarily planned to study i) the seafloor spreading type magnetic anomalies in the immediate vicinity of the Laxmi-Laccadive Ridges; and ii) to carry out swath bathymetric survey over some selected bathymetric shoals over the continental margin. Within the available time frame, major portions of both these objectives were met. About 7020 lkm of bathymetric, 5740 lkm of gravity and magnetic data were collected and about 7300 sq.km of continental margin area was covered with swath bathymetric surveys. Preliminary onboard interpretation of the magnetic data revealed the presence of several new fracture zones and indicated the possibility of identifying some new magnetic anomalies in the vicinity of Laxmi Ridge. The swath bathymetric data revealed the detailed morphology and areal extent of the RAMAN Seamount and two other prominent isolated bathymetric highs.

Certain physical oceanographic and meteorological data were also collected during the cruise in addition to the main geoscientific data acquisition programme.

3. PARTICIPANTS

a) Scientific component

G.C. Bhattacharya	)	- Chief Scientist
A.K. Chaubey	)	
G.P.S. Murty	)	
K. Srinivas	)	
G.M. Phadte	)	
K. Ramani	)	Geological Oceanography
G.A. Prabhu	)	Division, N.I.O.
T. Sudhakar	)	
K.L. Kotnala	)	
D.K. Naik	)	
S.K. Nanyasi	)	
B. Subrahmanyam	)	Physical Oceanography Division, N.I.O.
Viren S. Walavalkar	)	CMC, Bombay
Anthony George	)	
Arun Chelvan	)	Shipboard Trainees

b) Ship's complement

Capt. Rajinder Singh Soni	- Master
Shailananda Bage	- Chief Officer
Naresh Suchakar Nafrey	- Third Officer
Kirti Kiwekar	- Trainee Navigational Officer
Chandrakant M. Patel	- Chief Eng. Officer
Jehangir Madon	- Second Eng. Officer
Sukanta Dutta	- Third Eng. Officer
P.R. Rajilal	- Fifth Eng. Officer
Albert Rocha	- Radio Officer
Kottayil Mathew John	- Electrical Officer
Parbat Lal Chauhan	- Electrical Officer
Shakti Bhadran	- Purser
Wilfred Mascarenhas	- Catering Officer
Dr. Vilas D. Turbādkar	- Medical Officer

#### 4. INTRODUCTION

4.1 Background : During the 22nd, 50th and 64th cruises of O.R.V. Sagar Kanya, gravity, magnetic and bathymetric (GMB) data were collected along several profiles in the areas adjacent to Laxmi-Laccadive Ridge system. Preliminary study of these data indicated the following :

- i) the post A28 anomalies possibly extend much eastward than believed so far;
- ii) several prominent isolated bathymetric highs exist in the areas east of Laxmi Ridge.

The present cruise was planned to collect additional GMB data which can be used to confirm the first inference. Swath bathymetric data collection over the isolated bathymetric highs were also planned to determine their shape, extension and interrelationship (if any).

4.2 Quantum of work : During the cruise, the following data were collected :

i) Underway GMB Data :

Bathymetric	:	7020 Lkm
Gravimetric	:	5740 Lkm
Magnetic	:	5740 Lkm



ii) Coverage over the bathymetric features by swath bathymetry : 7300 sq.km

iii) Physical oceanographic and meteorological data :

The SST, dry/wet bulb air temperatures, wind speed, wind direction, cloud type and cloud amount data were collected at three-hourly intervals during the voyage (a total of 135 observations).

#### 4.3 Itinerary

<u>Date</u>	<u>GMT</u>	<u>Schedule</u>
10.11.92	0200	Dep. : Mormugao for the survey area
30.11.92	1000	Arr. : Moemugao at the end of the cruise

### 5. DATA ACQUISITION

5.1 Navigation : The positions during the survey were obtained by an Integrated Navigation System (INS) using a Global Positioning System (GPS, Model MX4400) as primary navigation aid. The GPS is a satellite based radio navigation system. The survey lines were shot in a "distance along track" mode with 250 m as shot point interval. The navigation and other underway geophysical data were recorded on magnetic tape at every shot point. The printout of the data is also obtained at every one kilometer interval.

5.2 Ech sounding : During the cruise, the bathymetric data were obtained using a deep sea echosounder (M/s. Honeywell Elac). The data were recorded in analog form on a 25.5 cm wide electrostatic paper.

5.3 Gravimetry : The gravity data were collected using a marine gravity meter (Bodenseewerk, Model KSS-30). To ensure the accuracy of the gravity data, recommended tests such as parabola and ball calibration tests were carried out prior to commencement of the cruise. Hard copy printout of the gravity data was taken at every 5 minute interval. In addition, analog record of the measured gravity values were also obtained on a strip chart recorder.

5.4 Magnetics : Earth's total magnetic field intensity values were recorded along the tracks using a Geometrics Proton Precession Magnetometer (Model G801/3). The sensor was towed about 250 m aft of the vessel to nullify ship's effect. The data were recorded in analog form on a strip chart recorder.

5.5 Swath Bathymetry : The swath bathymetric data were collected over the Raman Seamount and two other bathymetric highs using multibeam Hydrosweep System. The tracks were planned with variable line spacing to obtain a hundred percent coverage of the bathymetric features.

## 6. PRELIMINARY RESULTS

Following are some of the salient observations which could be made from the preliminary onboard interpretation of the collected data.

a) In the areas immediate south of Laxmi Ridge, post A28 anomalies extend possibly upto  $68^{\circ}30'E$  longitude. These anomalies are right laterally offset along a number of fracture zones. Most of these fracture zones are new findings.

b) In the areas south of Laxmi Ridge, the gravity field is relatively smooth. Over the Laxmi Ridge the characteristic negative gravity anomaly was observed on all the profiles crossings. This gravity anomaly possibly can be used to trace the Laxmi Ridge even in the areas where the Ridge has got no bathymetric expression.

c) In the areas between Laxmi-Laccadive Ridge and western continental shelf of India, three bathymetric highs were mapped in detail with the hydrosweep system. These three seamount-like features appear to be extending as a linear chain within a narrow band with their southern limit abutting against the Laccadive Ridge.

The northernmost of these features is the RAMAN Seamount. The feature immediate south of the RAMAN Seamount was tentatively named as K-Seamount for the purpose of reference. On the similar ground the southernmost bathymetric high covered in the present study was named as W-Seamount.

The steep-sided RAMAN Seamount is remarkably elliptical in plan. Its more or less flat summit plateau contains a secondary spine like feature. The least depth over this feature is about 2045 m.

The K-Seamount is relatively elongated in plan and has multiple peaks. The least depth over this seamount was observed to be about 2632 m.

The W-Seamount was also observed to be an elongated feature. The least depth observed over this seamount is about 1461 m.

The heights of these seamounts (i.e. the height of the shallowest point over the complex relative to the surrounding seafloor) are as follows :

RAMAN Seamount	---	1610 m
K-Seamount	--	1180 m
W-Seamount	--	2350 m

7. ACKNOWLEDGEMENTS

The Chief Scientist and all the members of the scientific team would like to express their sincere thanks to Capt. Rajinder Singh Soni, Master, other officers and crew members of O.R.V. Sagar Kanya, for their co-operation in the successful completion of the cruise.

## ANNEXURE - I

SUMMARY OF LINES  
(Along which GMB data were acquired during 79th  
cruise of R/V Sagar Kanya)

Line Id.	Shot No.	Date DDMMYY(Jday)	GMT	Lat (N)	Long (E)
SK79-A					
B.O.L.	12	101192(315)	07:10	15 33.78'	72 59.78'
E.O.L.	1710	111192(316)	06:09	16 16.91'	69 06.38'
SK79-01					
B.O.L.	1	111192(316)	08:36	16 18.26'	68 59.96'
E.O.L.	1547	121192(317)	05:19	12 48.96'	68 59.97'
SK79-02					
B.O.L.	1	121192(317)	08:38	12 49.00'	68 26.03'
E.O.L.	1533	131192(318)	06:31	16 16.69'	68 25.96'
SK79-03					
B.O.L.	1	131192(318)	09:11	16 19.99'	67 59.99'
E.O.L.	1546	141192(319)	05:29	12 50.78'	67 49.92'
SK79-04					
B.O.L.	3	141192(319)	08:43	12 50.26'	67 19.97'
E.O.L.	1756	151192(320)	09:26	16 47.87'	67 25.01'
SK79-05					
B.O.L.	1	151192(320)	09:37	16 48.01'	67 24.99'
E.O.L.	2062	161192(321)	12:14	12 36.00'	65 20.99'
SK79-06					
B.O.L.	1	161192(321)	12:20	12 36.00'	65 21.25'
E.O.L.	654	161192(321)	22:02	14 04.54'	65 20.99'
SK79-0607					
B.O.L.	1	161192(321)	22:16	14 05.00'	65 20.99'
E.O.L.	339	171192(322)	02:44	14 05.05'	64 34.06'
SK79-07					
B.O.L.	2	171192(322)	02:45	14 04.95'	64 33.81'
E.O.L.	489	171192(322)	09:02	13 05.05'	64 05.40'
SK79-0708					
B.O.L.	1	171192(322)	09:02	13 04.93'	64 05.33'
E.O.L.	55	171192(322)	09:45	13 05.00'	64 57.93'
SK79-08					
B.O.L.	15	171192(322)	12:20	13 06.85'	63 34.44'
E.O.L.	2019	181192(323)	18:43	17 30.00'	64 43.97'

Line Id.	Shot No.	Date DDMMYY(Jday)	GMT	Lat (N)	Long (E)
SK79-0809					
B.O.L.	1	181192(323)	18:45	17 30.28'	64 44.13'
E.O.L.	564	191192(324)	03:00	16 59.98'	65 57.01'
SK79-09					
B.O.L.	1	191192(324)	03:06	17 00.00'	65 56.99'
E.O.L.	1501	201192(325)	00:15	13 55.21'	64 29.51'
SK79-0910					
B.O.L.	1	201192(325)	00:24	13 55.03'	64 29.51'
E.O.L.	415	201192(325)	06:07	13 55.18'	65 26.96'
SK79-10					
B.O.L.	2	201192(325)	06:17	13 55.30'	65 27.11'
E.O.L.	1367	211192(326)	02:17	16 45.92'	66 40.94'
SK79-11					
B.O.L.	4	211192(326)	03:07	16 53.22'	66 41.38'
E.O.L.	1761	221192(327)	05:13	17 54.98'	70 40.93'
SK79-1112					
B.O.L.	2	221192(327)	05:15	17 54.87'	70 41.23'
E.O.L.	208	221192(327)	07:59	17 26.95'	70 41.02'
SK79-12					
B.O.L.	3	221192(327)	08:10	17 26.93'	70 40.72'
E.O.L.	708	221192(327)	17:16	16 59.76'	69 05.40'
SK79-13					
B.O.L.	1	271192(332)	13:58	15 23.00'	69 48.01'
E.O.L.	291	271192(332)	18:17	15 39.81'	70 24.65'
SK79-1314					
B.O.L.	1	271192(332)	18:20	15 40.03'	70 25.05'
E.O.L.	300	271192(332)	22:29	16 14.97'	70 03.81'
SK79-14					
B.O.L.	6	271192(332)	22:31	16 14.86'	70 03.31'
E.O.L.	720	281192(333)	07:50	15 56.98'	68 24.93'
SK79-1415					
B.O.L.	2	281192(333)	07:51	15 57.02'	68 24.82'
E.O.L.	289	281192(333)	11:48	16 26.01'	67 57.97'
SK79-15					
B.O.L.	1	281192(333)	11:59	16 25.99'	67 57.99'
E.O.L.	1164	291192(334)	04:57	17 07.87'	70 35.75'