

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

CRUISE No. 50

23rd February to 19th March 1983



National Institute of Oceanography

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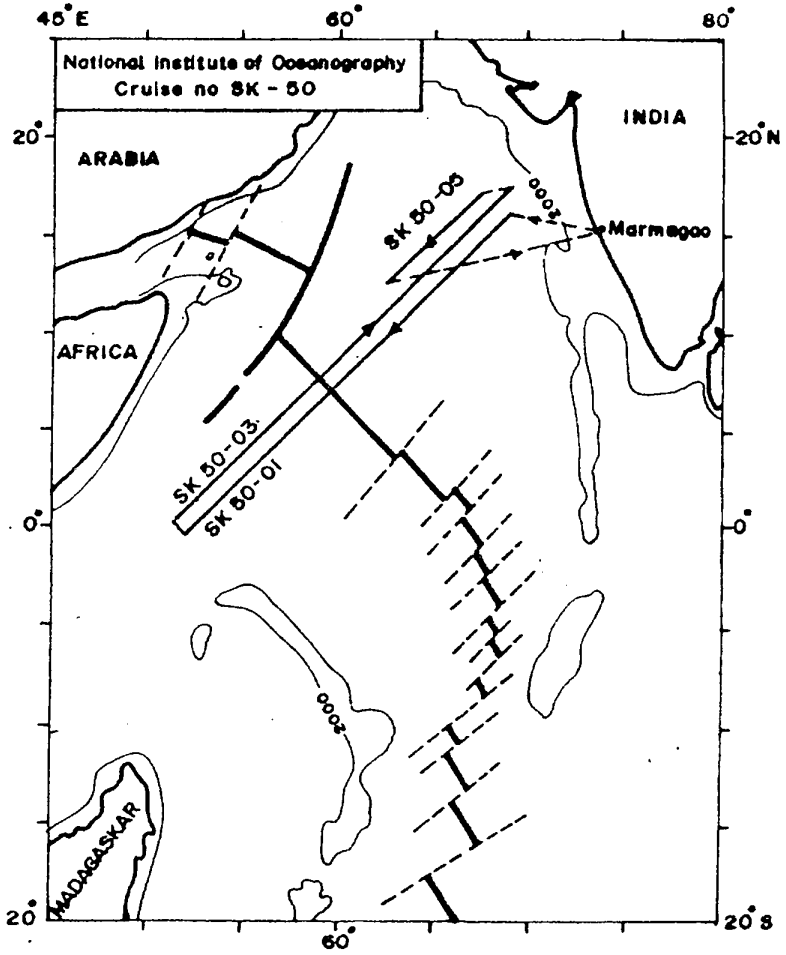
REPORT ON
50TH OCEANOGRAPHIC CRUISE OF
O.R.V. SAGAR KANYA

(23rd February to 19th March, 1989)

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O.R.V. SAGAR KANYA

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2. CRUISE SUMMARY

The ship sailed off Mormugao harbour on 24.2.1989 towards northern Arabian Sea with 17 participants. The objective of the cruise was to acquire underway gravity, magnetic and bathymetric data along 3 transects across the northern Arabian sea. This programme was a part of the joint INDO-USSR TIOG Project. The USSR scientists collected magnetic gradient data along the transects. Within the available time frame, major portions of both these objectives were met. About 6900 lkm of underway gravity, magnetic and bathymetric data were collected. In addition, the USSR scientists collected about 5500 lkm of magnetic gradient data. Several transects were also made over a seamount to investigate its morphological features. After collecting the required data, the ship returned to Mormugao harbour on 19.3.1989.

3. PARTICIPANTS

a) Scientific component

G.C. Bhattacharya	Chief Scientist
A.K. Chaubey		
G.P.S. Murty)	
Maria A. D'Cruz		
B. Chakraborty		Geological Oceanography
D.B. Pathak		Division, NIO
T.J. Thottam		
K. Ramani		
G.A. Walker		
K.M. Sivakolundu		
S. Jai Shankar		
C. Moraes		
Rajesh Singh		CMC Engineer
A.I. Philipenko		
V.A. Lygin		Yuzhmoregeologiya, Gelend-
A.P. Bogomyagkov		zhik, U.S.S.R.
I.V. Pirozhenko)	

b) Ship's Complement

Capt. M.S.L. Fernandes	...	Master
N.K. Paul	...	Chief Officer
S.J. Shekhadkar	...	Third Officer
R.V. Lad	...	Chief Eng. Officer
S.D. Warke	...	Chief Radio Officer
N.K. Chatteraj	...	Radio Officer
A.N. Mistry	...	Electrical Officer
G.S. D'Silva	...	Purser Officer
R.M. Fernandes	...	Catering Officer
S. Gokulnath	...	Medical Officer

4. INTRODUCTION

a) Background : This cruise was planned as a part of the Indo-USSR collaboration in Oceanology Project entitled "Trans Indian Ocean Geotraverse (TIOG)".

The following were the main objectives of the cruise:

- i. to collect gravity, magnetic and bathymetric data along three long transects (across the Carlsberg Ridge in the Northern Arabian Sea) spanning from the western continental margin of India to the eastern Somali Basin and
- ii. collection of magnetic gradient data along the transects by the Russian scientists.

b) Quantum of work : During the cruise the following data were collected:

Underway Geophysical Data:

Bathymetric : 6900 lkm

Gravimetric : 6900 lkm

Magnetic : 6900 lkm

In addition, the USSR Scientists collected about 5500 lkm of magnetic gradient data along the transects.

c) Itinerary

Date

Schedule

24.02.89

Dep. Mormugao for the survey area

19.03.89

Arr. Mormugao at the end of the cruise

5. ACQUISITION OF UNDERWAY DATA

a) Navigation : The positions during the survey were obtained by using a MAGNAVOX series 5000 Integrated Navigation System (INS). This INS system used a MAGNAVOX (Model 1107 RXT) dual channel satellite navigator as primary navigation aid. The survey lines were shot in a "total distance" mode with 250 m as shot point interval. The raw navigation, and underway bathymetric, gravity and magnetic data were recorded on magnetic tape at every shot point. A hard copy printout of all the data recorded in the tape was also obtained at every one kilometer interval.

b) Echosounding : During the cruise, the bathymetric data were obtained using a narrow beam echosounder (M/s.Honeywell Elac.). The data were recorded in analog form on a 25.5 cm wide **electrostatic paper**.

c) Gravimetry : The gravity data were collected using a marine gravimeter (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 2 minutes interval. In addition, analog record of the measured gravity values were also obtained with a strip chart recorder.

d) 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.

e) Other Pertinent Information :

i. The magnetic data was found to be extremely noisy during the following period:

From : 13.03.89 (JDAY 72) GMT 0130 Hrs.

To : 13.03.89 (JDAY 72) GMT 1800 Hrs.

It was suspected that this disturbance in the magnetic field might be due to a magnetic storm activity. Later from Indian Institute of Geomagnetism, it was confirmed that a severe magnetic storm started on 13.03.89 at 0200 Hrs.GMT.

ii. To all the bathymetric data collected during the cruise, 5.0 m. should be added as transducer correction.

6. PRELIMINARY RESULTS

Following are some of the salient observations made from the preliminary onboard interpretation of the data:-

a) The magnetic anomaly profiles across the Carlsberg Ridge showed large negative central magnetic anomaly (-500 nT) associated with the prominent bathymetric depression of the median valley.

b) Over the axial part of the Carlsberg Ridge a zone of relative high frequency short wavelength magnetic anomalies were present. Among the anomalies A3 and A5 appeared to be easily recognizable.

c) On both the extremities of the profiles (i.e. over the western Arabian Basin and eastern Somali Basin) large distinctive magnetic anomalies were present. Possibly these anomalies represent the sequence A20 - A28.

d) The Laxmi Ridge was observed to be associated with about 50 mgal gravity low. This characteristic gravity low can be used to delineate the extent of the Laxmi Ridge on the transect where the bathymetric expression of the Laxmi Ridge is subtle or absent. It appears that over the Laxmi Ridge and in the areas immediate east of it prominent magnetic anomalies are present. These anomalies appear to be comparable both in magnitude and wavelength with the seafloor spreading type magnetic anomalies of the western Arabian Basin.

e) The hydrographic chart (No.7705, Indian Naval Hydrographic Office) indicate the presence of an isolated positive bathymetric feature centred around $17^{\circ} 06' N$, $69^{\circ} 00' E$. During the cruise this feature was criss-crossed by 6 lines and it was found to be a 1480 m high seamount with a relatively flat summit plateau. The least depth over the feature was found to be about 2070 m. It was worthwhile to note that the least depth measured over this feature during this cruise showed that the feature was about 463 m shallower than whatever was reported in the existing hydrographic charts.

Another 600 m high bathymetric feature was encountered towards the eastern end of transect SK50-01 (near $16^{\circ} 16' 16'' N$ $69^{\circ} 23' 39'' E$). The hydrographic chart did not indicate the presence of any such feature in this area. However, the transect SK50-01 only traversed the western end of the feature, therefore, its shape and aerial extent could not be ascertained. The same hydrographic chart depicted one more isolated positive bathymetric feature centered around $15^{\circ} 42' N$, $70^{\circ} 03' E$. Together, these three bathymetric features possibly indicate the existence of a chain of seamounts in this area.

7. ACKNOWLEDGEMENTS

The Chief Scientist and all the members of the scientific team would like to express their sincere thanks to Captain M.S.L. Fernandes, Officers and crew members of O.R.V. SAGAR KANYA for their co-operation which lead to successful completion of the cruise.

ANNEXURE - I

SUMMARY OF LINES
(Along which Gravity, Magnetic and Bathymetric (GMB) data
were acquired during 50th cruise of K/V Sagar Kanya)

Line ID	SHOT POINT	Date DDMMYY(JDAY)	GMT	Lat (N) DD MM SS.S	Long (E) DD MM SS.S
Line No. SK 50-01					
B.O.L.	70	250289(56)	12:03	16 16 16.8	69 23 39.0
E.O.L.	10441	040389(63)	20:30	0 0 3.6	52 25 6.0
Line No. SK 50-03					
B.O.L.	860	050389(64)	02:08	0 40 15.0	51 49 52.7
E.O.L.	11409	120389(71)	16:20	17 24 43.2	69 18 09.0
Line No. SK 50-EX 01					
B.O.L.	1423	120389(71)	16:30	17 23 55.2	69 19 33.6
E.O.L.	1511	120389(71)	17:53	17 16 12.6	69 25 5.4
Line No. SK 50-EX 02					
B.O.L.	1530	120389(71)	18:13	17 14 59.4	69 21 55.2
E.O.L.	1811	120389(71)	22:22	16 47 30.6	68 54 54.6
Line No. SK 50-EX 03					
B.O.L.	1896	120389(71)	23:25	16 49 1.2	68 49 3.0
E.O.L.	2244	130389(72)	05:01	17 30 10.2	68 55 27.0
Line No. SK 50-EX 04					
B.O.L.	2347	130389(72)	07:04	17 20 24.6	69 02 53.4
E.O.L.	2507	130389(72)	09:32	17 5 47.4	68 43 53.4
Line No. SK 50-EX 05					
B.O.L.	2554	130389(72)	10:16	17 7 26.4	68 47 56.4
E.O.L.	2771	130389(72)	13:56	17 9 14.5	69 17 22.7
Line No. SK 50-04					
B.O.L.	2884	130389(72)	15:39	16 55 33.6	69 14 35.4
E.O.L.	2244	130389(72)	05:01	17 30 10.2	68 55 27.0
Line No. SK 50-05					
B.O.L.	1	130389(72)	23:48	17 39 24.0	68 11 14.4
E.O.L.	3268	160389(75)	05:28	12 33 56.4	62 47 43.2
Line No. SK 50-06					
B.O.L.	3291	160389(75)	06:03	12 40 47.6	62 47 13.4
E.O.L.	5068	170389(76)	08:30	13 41 15.6	66 45 49.8