

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

**CRUISE No. 31**

**24th March to 21st April, 1987**



**National Institute of Oceanography  
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NATIONAL INSTITUTE OF OCEANOGRAPHY  
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REPORT ON  
31ST OCEANOGRAPHIC CRUISE OF  
O.R.V. SAGAR KANYA

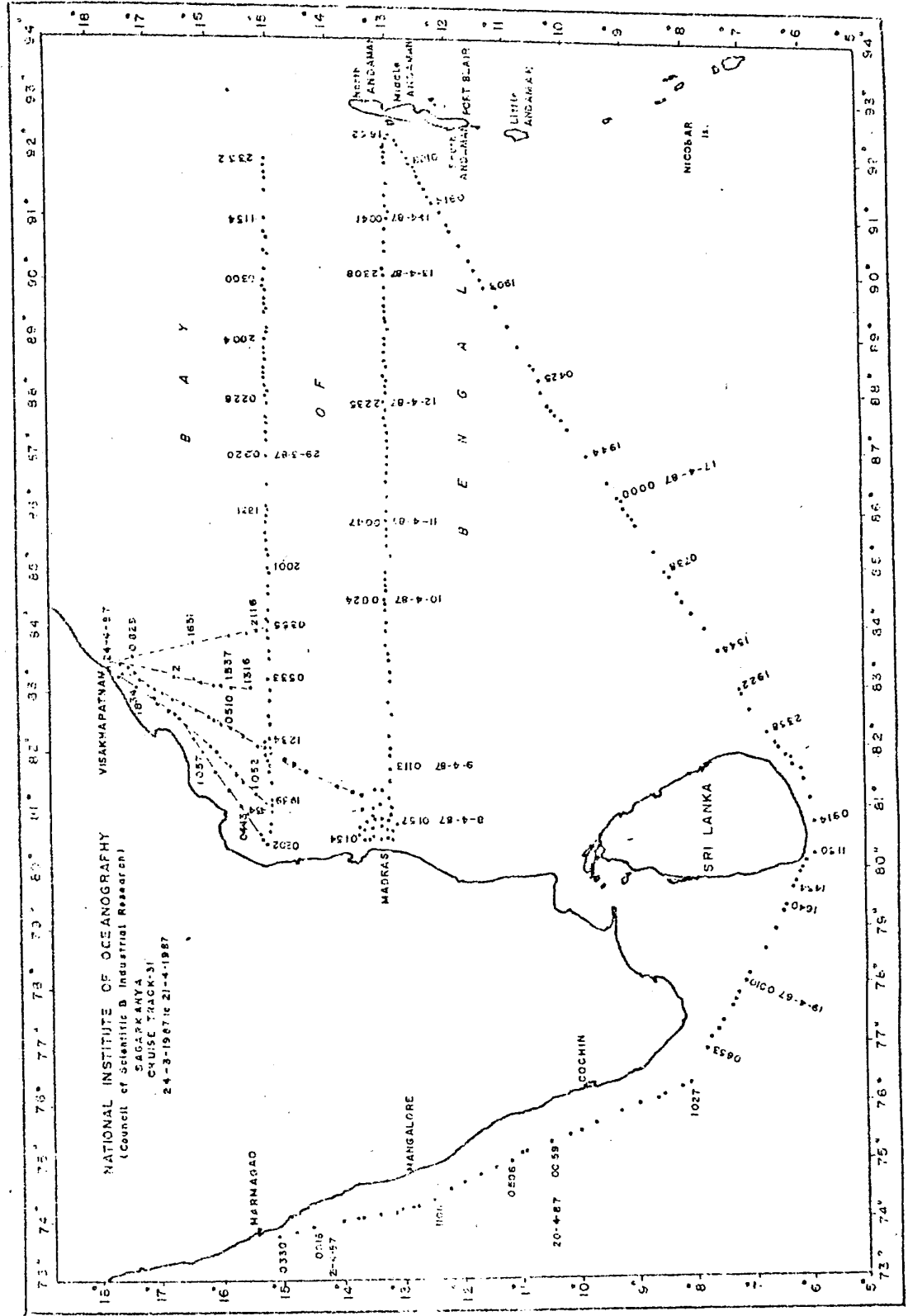
(24th March to 21st April, 1987)

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O.R.V. SAGAR KANYA

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## 2. CRUISE SUMMARY

Cruise 31st of ORV Sagar Kanya was organised as a part of the geological and geophysical surveys of the eastern continental margin and the Deep Sea Fans of the Bay of Bengal. These studies would help in understanding (i) the geomorphological setting of the area, (ii) the thickness and stratigraphy of the sedimentary column, (iii) the sedimentary and geochemical processes in space and time (iv) the nature of the basement, (v) the evolutionary history of the fan and the continental margin and (vi) the mineral potential they hold.

The positions during the cruise were obtained by the integrated Satellite Navigation System. Two lines were surveyed along 13°N. Lat. and 15°N. Lat. covering 9081 lkm of echosounding, 1428 lkm of seismics and 4130 lkm of magnetics. Since the duration of the cruise is short seismic surveys were carried out on line 13°N. Lat. In addition to these two lines, few lines were covered between Visakha-  
patnam and 15°N. Lat. On these lines only bathymetric and magnetic surveys were carried out. Ten sediment cores (1 box, 9 gravity) were collected on 15° N Lat. at 12 stations. At two stations cores could not be recovered due to strong currents. Further sampling could not be carried out due to failure of the deep sea winch. Immediately after retrieval of the cores, Ph and temperature were measured at different intervals. Later subsampling

was done for mineralogical, geochemical, micropaleontological and geotechnical studies. Water samples were collected at two stations with a 5 litre capacity Niskin sampler for chemical parameters. After completion of the surveys on line 13°N Lat. the ship sailed back to Mormugao. During return journey along the course of the ship bathymetric data was collected.

3. CONCLUSION

### 3. PARTICIPANTS

#### a) Scientific component

Ch. Madhusudhana Rao - Chief Scientist

D. Gopala Rao

M. Veerayya

A.L. Paropkari

G.C. Bhattacharya

M.V. Ramana

V. Subramanyam

K. Sreekrishna

B. Chakraborty

P.G. Mislankar

G.P.S. Murty

G.M. Phadte

Tony Thottam

V.D. Khedekar

G. Janakiraman

A.V. Sonewane

Fernando Vijayan

S.S. Pattanshetti

S.S. Gaonkar

Geological Oceanography  
Division

S.I. Reddy

C. Subramanyam

R.K. Drelia

A.K. Roy

S.P. Mittal

National Geophysical Research  
Institute, Hyderabad

K.D. Dwivedi

R. Majumdar

Y.V. Ramana

- ONGC, Hyderabad

- Jadavpur University, Calcutta

- Andhra University, Waltair

b) Ship's complement

Amrit Rai Parti	- Master
Gurdeep Singh	- Chief Officer
Paramjit Singh Saini	- Second Officer
Jesuinho A. Coutinho	- Third Officer
Bhaskhar S. Kher	- Chief Radio Officer
P. Dillon Pinto	- Radio Officer
Hemantkumar K.Vichare	- Purser
Haresh K. Jumani	- Medical Officer
Dipak Kumar Basu	- Chief Engineer
R.V.Balakrishnan Nair	- Second Engineer
Nikhilkumar Sen	- Third Engineer
Neville J. D'Sousa	- Fourth Engineer
S. Ravi	- Fifth Engineer
R.P. Yadav	- Electrical Engineer
Mohan Awardi	- Electrical Engineer
D. Carneiro	- Catering Officer



#### 4. INTRODUCTION

##### 4.1 Background

This cruise was mainly planned to carry out geological and geophysical surveys as a part of the project "Integrated Oceanographic studies of the Deep Sea Fans of the Bay of Bengal". This is the first geological & geophysical cruise organised under this programme. During the present cruise two lines were covered i.e. along 13°N lat. and 15°N Lat. Sampling is carried out beyond the shelf region along 15°N Lat.

##### 4.2 Itinerary

24.3.1987	All the participants boarded the ship at Visakhapatnam.
24.3.1987	Dep: Visakhapatnam Harbour
27.3.1987	Arr: Visakhapatnam outer anchorage for collection of Hard disc for computer.
27.3.1987	Dep: Visakhapatnam outer Anchorage
4.4.1987	Arr: Visakhapatnam outer Anchorage for collection of spares for DES V.
4.4.1987	Dep: Visakhapatnam outer anchorage.
21.4.1987	Arr: Mormugao Harbour

#### 4.3 Quantum of work planned and carried out

Geological and Geophysical surveys on some parts of the shelf region of the Eastern continental margin of India has already been covered by R.V. Gaveshani. Hence this cruise is planned to cover the deeper parts of the Bay of Bengal (beyond shelf region). The cruise was originally planned for 31 days to complete the geological and geophysical surveys on two lines along 15°N Lat. and 13°N Lat. extending from 81°E Long. to 92°E Long. As planned the surveys could not be completed due to the later arrival of spares for DES V and hard disc required for computer has not been supplied by agent inspite of our best efforts to get it before the start of cruise. Hence seismic surveys could not be completed on 15°N.Lat. and sampling on line 13°N.Lat.

Echosounding	9081 lkm
Magnetics	4130 lkm
Seismics	1428 lkm
Cores	10 nos.

### 5. EQUIPMENT USED AND RESULTS OF SURVEYS

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##### 5.1 Position Fixing

The positions during the cruise were obtained by an Integrated Satellite Navigation System with HP 2117

computer. The computer provides accurate positioning from integration of the Navigation Satellite System, the Anschutz gyro and other associated navigation sensors. The navigation computer is the main processing and control element of the Integrated Navigation System. It accepts data and provides control to the devices attached to it and communicates with the system operator. The computer facility provides a time hard copy print out of information comprising of position, time, speed, heading and alternate range and bearing with position. It also includes other navigational information like Omega receiver output.

## 5.2 Echosounding

During the cruise Honeywell Elac Narrowbeam echosounder and Deep Sea echosounder were operated. N B echosounder was operated on 12 KHz and 20 KHz frequencies whereas Deep Sea echosounder on 12 KHz frequency.

Bathymetric records indicate interesting features like palaeochannels, V-shaped valleys and Ridges and these features were recorded in both the lines. These V-shaped valleys vary in dimension and appears to have been carved out by turbidity currents. These valleys are bigger in size in the deeper parts of the Bay and smaller in the shallower regions. These valleys extend in N-S direction. Two ridges were recorded, one is at 85°E and another is at 90°E.

### 5.3 Seabed Sampling

During this cruise sampling was carried out along 13°N Lat. beyond shelf region. At 12 stations coring operation was carried but at 10 stations sediment cores of varying length could be recovered. Gravity corer was operated in all stations except at one station, wherein the box corer was operated. The length of the recovered cores varies from 4 m to 6.8 m. All the cores were subsampled onboard the vessel for mineralogical, geochemical, sedimentological and micropalaeontological studies. Cores in the slope region exhibit lamination. Some of the laminae are black in colour and few mm in thickness. The cores consists of various lithological units of clay, clayey sand, silty sand and sands with shades of green and grey in colour. Texturally clay is dominant from top to bottom. In most of the cores turbidite layers were noticed at different intervals.

The temperature of the surficial sediments vary from 2°C to 13°C and pH from 7.3 to 8.0.

### 5.4 Magnetics

Magnetics surveys were carried out by Geometrics, Proton Precision Magnetometer Model G801/3. During the surveys magnetic data has been collected in analog form on Hewlett Packard Recorder Model 71304 at 3 sec. interval

and also stored in digital form on magnetic tapes along with navigational data on AP1000 computer. The magnetic data varies from 40326 to 42537 gammas and anomalies of broad wavelength of the order of hundred to few hundred gammas have been recorded in several places. In magnetic data also a positive anomaly is recorded on the two ridges noticed in the bathymetric records.

#### 5.5 Seismics-Multichannel Seismic Reflection Shooting

The reflection shooting was done with Airgun D-array of VLF and VLA series sound energy from M/s. Prakla Seismos GMBH, Hannover and the Digital Field System for recording from M/s. Texas Instruments, U.S.A.

The SHHN type streamer of 24 sections was used to receive the reflected seismic signals. Each section is 25 m long and consists of 32 pressure sensitive transducers. It is provided with two damping lead sections of 25 m long each. The streamer was towed at a constant depth of 10 m below water surface with 'cable levellers model 200' which could be monitored on HZTE-211 and leakages in streamer on distributor HZ01-0.

The D-array of seven airguns sound source of 7.8 litres total capacity were filled with compressed air from six compressors from M/s. Junkera, West Germany at 150 bars and fired in distance mode (25 m interval) and gun offset for firing interval of 30 mill. sec. The

150 bars and fired in distance mode (25 m interval) and guns offset for firing interval of 30 mill. sec. The offset interval time and feedback time break signals were monitored through airgun synchroniser VZAD-13 and leakage indicator HZOL-03.

The digital recording system comprises of analog module, control module, two tape transports 110, EPC graphic recorder model 4603, camera SOW 4008, central control module ZXCC, ZRAC timer, airgun synchronizer VZAD-13 and the associated digital storage oscilloscope OS 4020. The data was recorded at 8 seconds record length and sampling interval 4 m which resulted in low high cut filters, 64 c/s. The received multiplexed seismic signals were recorded on magnetic tapes (10.5" diameter 2400' length, 1/2" width and 9 tracks) in SEGE format 1600 BPI after applying online filters, low cut of 12 c/s at 18 DB/Octy and high cut 16 Hz at 72 DB/Octy. At this rate of sampling each magnetic tape could record 30 minutes data. Test records of analog outputs of each channel form galvoes at 20 to 100 shot intervals were also produced on camera to monitor seismic signals from all channels. The first channel output in analog form has also been recorded on the graphic recorder.

The reflection measurements of 12 folds with the above said configuration were made along 13°N Lat. from

81°E Long. to 92°E Long. covering about 1428 lkm. A maximum penetration of around 4 secs (two way travel time) could be obtained on the analog record. The two ridges which are associated with positive magnetic anomalies were also recorded in the seismic records. In addition a graben like feature was noticed with a maximum sedimentation between the two ridges.

#### ACKNOWLEDGEMENTS

The Chief Scientist and his colleagues express their grateful thanks to the Master, ORV Sagar Kanya and other crew members for their co-operation during the cruise.