

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

CRUISE No. 20A

18th to 22nd November, 1985



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

NATIONAL INSTITUTE OF OCEANOGRAPHY
(Council of Scientific & Industrial Research)
Dona Paula- 403 004, Goa

REPORT ON
20 - A OCEANOGRAPHIC CRUISE OF
O.R.V. SAGAR KANYA

(18th to 22nd November, 1985)

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O.R.V. SAGAR KANYA

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Fig. 1 : Map showing positions of profiles surveyed

1. SUMMARY

About 785 line kms bathymetric, magnetic and gravity surveys were carried out on the continental margin off Goa between 47 m and 2048 m water depth during the ORV Sagor Kanya Cruise No. 20A from 18th to 22nd November, 1985. The surveys were carried with M/s Honeywell Elac, echosounders, Geometrics, Proton magnetometer Model G801/3 and Bodenseewerk, Model KSS-30 gravimeter. The underway analog and digital data were recorded on chart/electrostatic paper and magnetic tapes respectively. Even and uneven topography of the seabed was noticed on the shelf and slope regions respectively. The total magnetic intensity values varied from 40397 nT and 40970 nT. The Free-air and Bouguer anomalies varied from -64.6 mgals to +26.3 mgals and -40.9 mgals to +113.2 mgals respectively. 1.21 mgals drift in gravity was measured from 22nd to 25th November, 1985 at berth No.10 of the Mormugao Harbour, Goa. Speed calibration of the ship's electromagnetic log could not be completed as it was not interfaced to the Navigation computer.

2. PARTICIPANTS

(a) Scientific component

- | | | |
|------------------|---|---|
| D. Gopala Rao | - | Chief Scientist |
| V.P.C. Rao |) | |
| J. N. Pattan |) | |
| S. Afzulpurkar |) | |
| K. Sree Krishna |) | |
| B.J. Reddy |) | |
| G. Ganeshan |) | Geological Oceanography, |
| N. Prabhakaran |) | Division, N.I.O. |
| A. Gosh |) | |
| K.M. Sivakulundu |) | |
| V.S. Rajaraman |) | |
| V. Venkateshan |) | |
| V. Khedekar |) | |
| B.U. Rao |) | |
| D. Gracias |) | |
| O. D'Souza | - | Marine Instrumentation &
Computer Division |
| R. Bhushan |) | Physical Research Laboratory, |
| A. Sarkar |) | Ahmedabad |
| H.D. Vaidya | - | C.M.C., Madras |

(b) Ship's complement

Capt. S.K. Oberoi	- Master
K.V. Pathak	- Chief Officer
A.M. Dube	- Second Officer
M.A. Gardonis	- Third Officer
J.A. Coutinho	- Fourth Officer
J.L.M. Nazreth	- Chief Radio Officer
G. Mandal	- Radio Officer
D.S. Roy	- Medical Officer
E. Syed	- Purser
P.P.S. Brar	- Chief Engineer Officer
P. Mallya B.	- Second Engineer Officer
R.K. Talwar	- Third Engineer Officer
M.C. Mouli	- Fourth Engineer Officer
N.A. Dhamankar	- Fifth Engineer Officer
N.A. Kapadi	- Electrical Officer
A.V. Ramdasan	- Electrical Officer
R.N. Govil	- Catering Officer

3.0 INTRODUCTION

1.1 Objectives

Cruise 20A of ORV Sagar Kanya was taken up during 18th and 22nd November, 1985 with some of the following objectives: 1) To carry out trails of bathymetric, magnetic and gravity equipment on the continental shelf off Goa Coast as per the requirement of the Oil and Natural Gas Commission of India and examine the data repeatability at the intersections of different profiles and in water depths exceeding 1000 m. and (2) Speed Calibration of the Electro-magnetic log of the ship using the M/s Motorola Mini-ranger Model MRS- III system.

1.2 Itinerary

<u>Date</u>	<u>Time</u> (GMT)	<u>Surveys Schedule</u>
18th Nov. 85	1230	<u>Dep:</u> Mormugao Harbour
"	1430	Electromagnetic log speed calibration
20th Nov. 85	0026	Bathymetric, magnetic and gravity surveys commenced
22nd Nov. 85	0430	Bathymetric, magnetic and gravity surveys completion
22nd Nov. 85	0800	<u>Arr:</u> Mormugao Harbour

4.0 NAVIGATION

4.1 Position fixing

Position fixing along the profiles (Fig. 1) was carried out with an integrated navigation system of M/s Magnavox, USA comprising of M/s Hewlett Packard 1000 series (sr. No. 2117F) computer. It integrates positions of the vessel obtained from the Magnavox, MX1107 Satellite Navigator, speed of the vessel from the doppler sonar and course of the vessel from the gyrocompass of the vessel and determines the vessel's position continuously. The navigational data is stored on magnetic tapes along with time and geophysical data like gravity, magnetic and bathymetric data obtained from its input and output extenders. The navigation data is also fed to the various computers of the onboard scientific equipment like KSS-30 gravimeter etc., thereby, facilitating online computations and printing of Botvos corrected gravity, Free-air and Bouguer anomalies etc. The navigational data is referenced with time or space or both. The positions thus obtained are accurate upto ± 50 m.

4.2 Electromagnetic log speed calibration

The vessel is equipped with the M/s SAGEM LHS Electromagnetic log for measuring the speed of the vessel. A M/s Motorola, USA Miniranger Model MRS III system was operated to determine the positions of the vessel within the 40 Nm range from the coast and speed more accurately. The speed thus

obtained was compared with the EM log speed. As the digital speed output of the log was not interfaced to the navigation computer it has been suggested for interfacing before 10th January 1986. However, the speed measured by the M/s Krupp ATLAS Elektronik doppler sonar which is relatively more accurate was fed to the navigation computer and continuously positions were obtained. The doppler sonar tracks the speed with reference to the bottom down 200 m and beyond with reference to 200 m depth water column.

5.0 UNDERWAY DATA RECORDING

5.1 Bathymetry

The vessel is equipped with three M/s Honeywell Elac, shallow water, narrow beam sounder (NES) and deep Pinger system (DPS) echosounders. The shallow water echosounder operates on 200 KHz frequency. The NBS with gyrostabilised transducer and LA272 master recorder/controller operates on three 10KHz, 20KHz and 30KHz frequencies. The DPS sounder consists of a master controller/recorder, a Pinger synchroniser and a tracker and echostrength measuring unit. The three systems facilitates bathymetric measurements with optional delay and selected resolution setting.

During the surveys the three echosounders were operated and analog recordings of the bathymetric data were done on a 10 wide electrostatic paper. The data in digital form upto 2

a decimal is also displayed and relayed to the navigation computer and recorded on the slave/repeater recorders provided in all the onboard laboratories.

About 785 line km of bathymetric data were collected in the survey area and the water depth varies from 47m to 2048m. The seabed topography is even on the shelf and uneven to rugged on the slope region.

5.2 Magnetics

Total magnetic intensity values along 785 line kms were collected on the continental margin off Goa between 47 and 2048m water depth with Geometrics, Model C801/3 Proton magnetometer. The Sensor of the magnetometer was towed 270 m astern of the 100.34 m long vessel to avoid extraneous magnetic disturbances due to the vessel etc. The magnetic values varied between 40397 nT and 40970 nT. The magnetic anomalies of the inner-shelf, midshelf and outershelf and slope are distinct. The anomalies are characterised by high frequency and amplitude on the inner shelf, gentle gradient high amplitude on the midshelf and steep gradient high amplitude on the outer-shelf and slope

5.3 Gravity

Gravity surveys along 785 line kms on the continental margin off Goa were carried out with KSS-30 gravimeter of the M/s Bodenseewerk, FRG. The system consists of a GSS-30 gravity sensor system, KT-30 stabilisation subsystem and ZE-30 data hand-

ling system. The GSS Gravity sensor consists of a nonstatised spring mass assembly as a basic gravity detector mounted on the gyrostabilized KT-30 platform. It measures the differences in gravity from the measured gravity at Travemunde, FRG. The ZE-30 subsystem software enables computation of Eotvos effect corrected gravity, Free-air and Bouguer anomalies after taking into account the navigational data from the navigation computer. Besides an absolute gravity value of the place at which the vessel was docked was also determined with reference to a gravity base at the standard bench mark near the CMC Office at Mormugao Harbour with a portable land Worden type gravimeter of M/s Texas instruments. The gravity base at the C.M.C. Office has been established by the survey of India, Geodetic and Research Branch Dehra Dun and the Osmania University, Hyderabad at the NIO's request. The gravity value was fed to the gravimeter data handling system, ZE-30 before the vessel sailed for surveys reducing all the data to a known onshore gravity base, the standard bench mark at the C.M.C. Office at Mormugao Harbour, Goa. The dynamic accuracy of the data will be 0.05 mgal as per manufacturers.

The gravity surveys covering 785 line were carried out. The profiles were placed in such a way that at least 8 to 10 cross over points were obtained (Fig. 1) to examine the data repeatability. The data were printed at every 60 seconds interval (optional) on line with the M/s Seimen's, Teletype Printer (PT80). The analog data of Free-air and Bouguer anomalies were

recorded on the Phillip's dual channel recorder with 10" wide chart paper. The Free-air and Bouguer anomalies varied from -64.6 mgals to +26.3 mgals and -40.9 mgals to +113.12 mgals respectively.

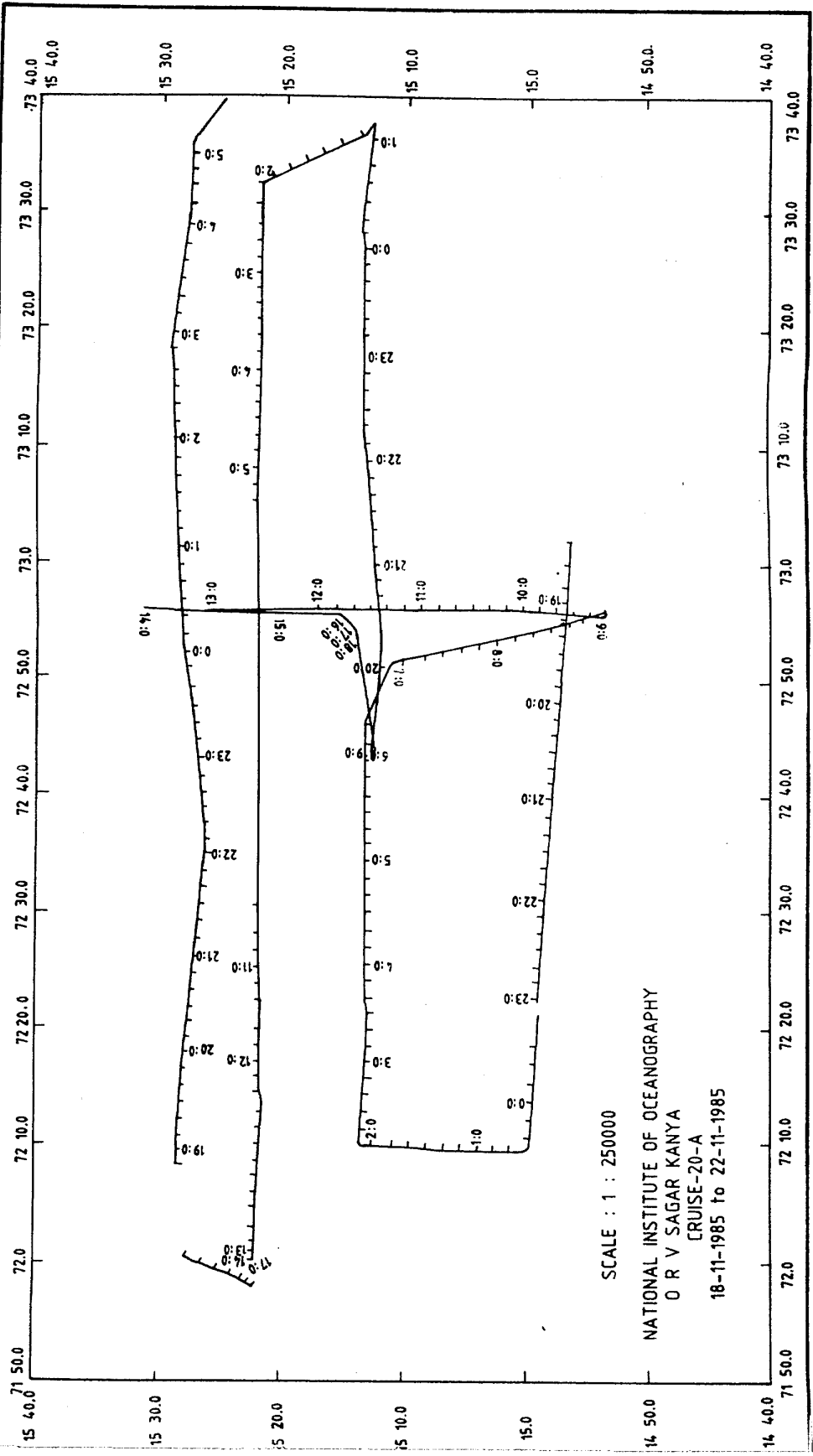
The anomalies at the cross overs of the East-West and North-South profiles are within \pm 3 mgal variations. On examination of the data an order of 2.9 to 5.0 mgals variations are found which may be due to limitations in positioning. At the end of the cruise, raw gravity, G in mgals was recorded at berth No. 10 of Mormugao Harbour, Goa during 22nd and 25th November 1985 to examine the drift in measured gravity. The gravity varied from -2271.32 mgals to +2270.11 mgals.

6.0 RECOMMENDATIONS

Interfacing of the ship's EM log speed to the navigation computer is suggested.

7.0 ACKNOWLEDGEMENTS

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



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