CRUISE REPORT

ORV SAGAR KANYA

Cruise No. 119

5 November to 7 December, 1996

राष्ट्रीय समुद्र विज्ञान संस्थान

NATIONAL INSTITUTE OF OCEANOGRAPHY

ORV SAGAR KANYA

Cruise No. 119

(15 November to 7 December, 1996)

NATIONAL INSTITUTE OF OCEANOGRAPHY

(Council of Scientific and Industrial Research)

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REPORT ON THE 119TH OCEANOGRAPHIC CRUISE OF ORV SAGAR KANYA

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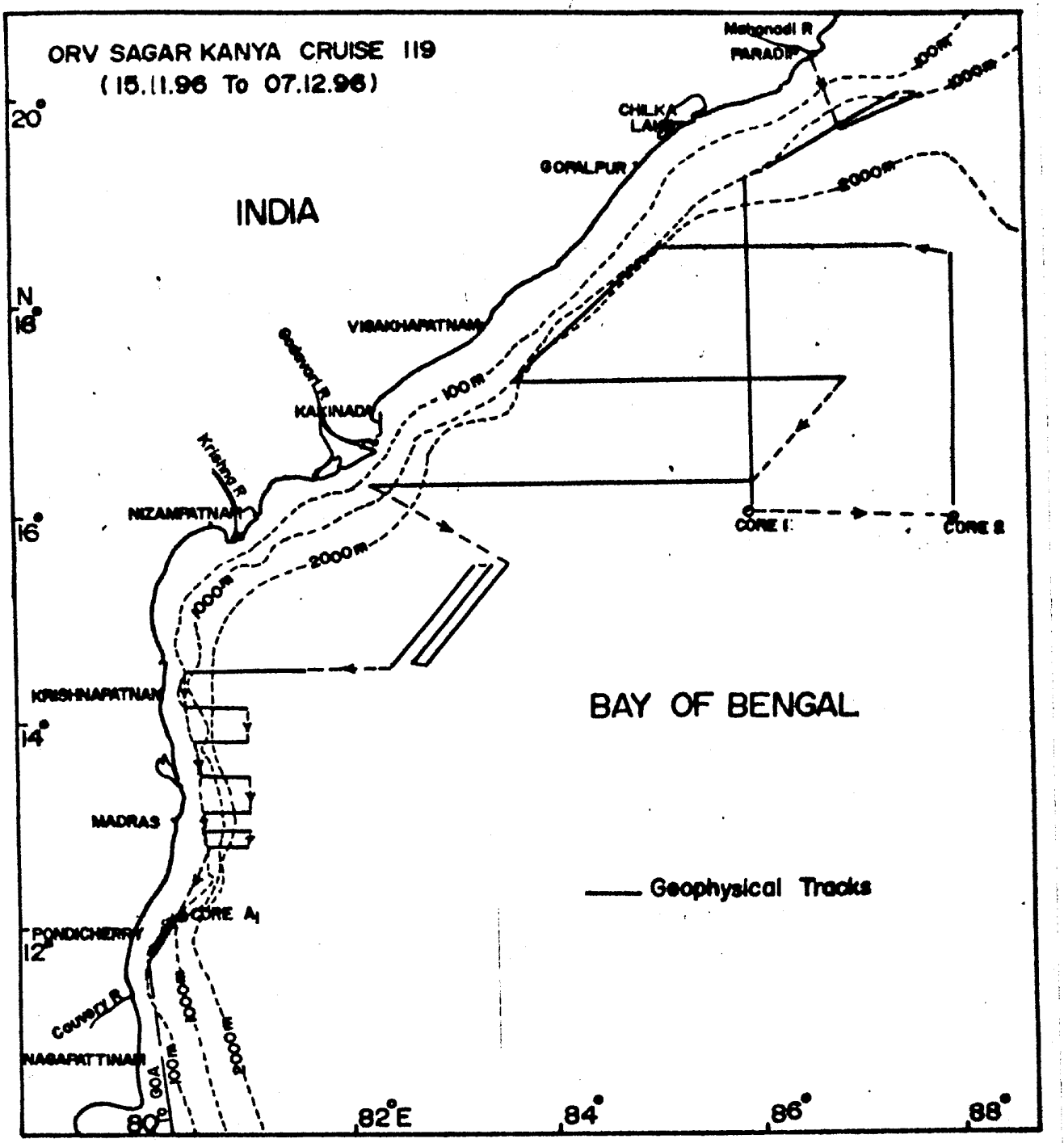
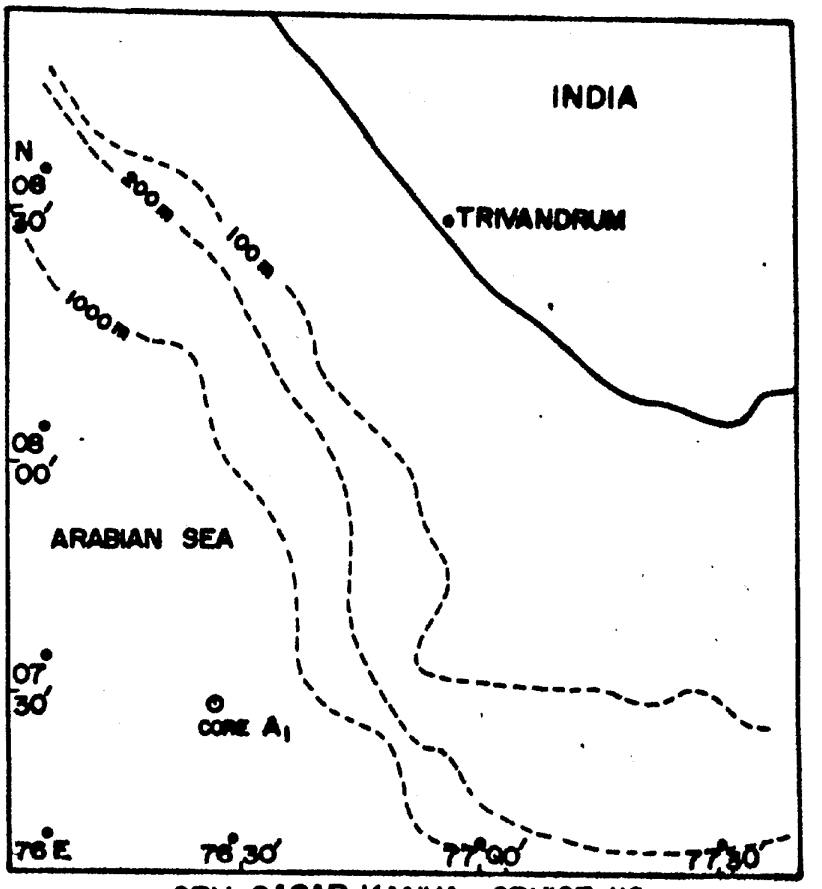

ORV SAGAR KANYA CRUISE 119
(15.11.96 To 07.12.96)
INDIA
BAY OF BENGAL
Mahanadi R
PARADIP
CHILKA LAKE
GOPALPUR
VISAKHAPATNAM
Godavari R
KAKINADA
Krishna R
NIZAMPATNAM
KRISHNAPATNAM
MADRAS
PONDICHERRY
CUDDALR
NAGAPATTINAM
GOA
CORE A1
CORE 1
CORE 2
100m
1000m
2000m
Geophysical Tracks
20°
N
18°
16°
14°
12°
80°
82°E
84°
86°
88°



ORV SAGAR KANYA CRUISE 119

2. CRUISE SUMMARY

The cruise was organised to collect gravity, magnetic, bathymetric and hydrosweep data of eastern continental margin of India, i.e. Visakhapatnam - Gopalpur shelf, Krishna-Godavari and Cauvery margins. The ship sailed off Paradip port on 15 Nov. 1996. Magnetic, bathymetry and hydrosweep online data were collected along 20 profiles trending N-S, E-W and NE-SW. In addition, four core samples were collected over K-G basin, Cauvery basin and off Trivandrum.

An anomaly of about 200 nT was recorded along 85°E over three latitudinal profiles in Bengal Fan and west of the 85°E was devoid of any significant anomalies. The parallel profiles off Machilipatnam were characterised by a broad anomaly of 100 nT between 14°55'N, 82°45'E and 14°30'N, 82°35'E. Magnetic anomalies of Nellore-Madras shelf indicated a NW-SE trend. Bathymetric data indicated a channel of 200 m depth along 88°E longitude at 3000 m water depth. Two canyons of 650 m and 1250 m depth were covered off Pondicherry.

The vessel returned to Mormugao port on 7 December after completion of the cruise.

3. PARTICIPANTS

3.1 Scientific component

A.S. Subrahmanyam M.M. Malleswara Rao	)	Chief Scientist
K. Mohana Rao Y.S.N. Raju Ch. Jawahar Kumar T.V. Ranga Prasad A. Koteswara Rao A. Suri Babu	)	NIO, RC Visakhapatnam
V.N. Kodagali Ganesh Chandvale	)	NIO, Goa
S. Jagannatha Rao P.V.V. Satyanarayana P. Satyababu	)	Andhra University
N. Angusamy R. Karikalan	)	Tamil University
M.P. Jonathan	)	Madras University
P.S. Bindu R. Rajani A. Sivasaravanan P. Harikumar Suja Alex	)	Cochin University
I.P. Joseph Shellak Davis Jayakrishan P. Bhoopathy	)	NORINCO, Goa

3.2 Ship's complement

R.M. Verma	)	Master
Sam Abraham	)	Chief Officer
R. Pandey	)	3rd Officer
B. Kumar	)	TNOC
S. Roy	)	Med. Officer
J.M. Pinto	)	Radio Officer
R.G.S. D'Silva	)	Purser
S. Janaka	)	C/E/O
V. Singh	)	2/E/O

4. OBJECTIVES OF THE CRUISE

To collect gravity, magnetic, bathymetry and hydrosweep data of eastern continental margin of India (ECMI) pertaining to Visakhapatnam - Gopalpur shelf, Krishna-Godavari and Cauvery margins. In this cruise gravimeter did not work due to technical problem. Hydrosweep data also could not be stored in tapes because of interface problem. Hence only magnetic, bathymetry and hydrosweep online data were collected along 20 profiles trending N-S, E-W and NE-SW (Fig 1). In addition 4 core samples were collected over K-G basin, Cauvery basin and off Trivandrum (Fig. 1). Locations of profiles and coring positions are given in annexure I and II.

5. SAILING SCHEDULE

All the participants boarded the vessel on 14 Nov. 1996 and the vessel sailed off Paradip port on 15 Nov. The study area in the Bay of Bengal covered (i) three profiles along E-W upto 88°E in Bengal Fan (ii) two N-S profiles along 86° and 88°E (iii) one NE- SW profile between Kalingapatnam and Narasapur (iv) three NE-SW profiles off K-G Basin (v) seven E-W profiles of Nellore - Madras shelf.

Four profiles trending NE-SW over two canyons off Pondicherry using hydrosweep and bathymetry were covered.

Five sediment core samples were recovered over K-G basin, Cauvery basin and off Trivandrum.

Details of tracks and core positions are given in annexure I and II respectively.

6. SALIENT FEATURES

a) **Geological data:** Observed magnetic data were corrected for IGRF and residual anomalies and contour map of Nellore Madras shelf was prepared. Some of the significant observations are as follows:

(i) An anomaly of about 200 nT was recorded along 85°E over three latitudinal profiles in Bengal Fan. Along 16°15'N latitudinal profile off Narasapur a positive anomaly of about 200 nT was observed at 83°E and west of the 85°E was devoid of any significant anomalies.

(ii) Parallel profiles of K-G basin covered to delineate the seaward extension of isolated anomaly identified earlier off Machilipatnam were characterised by a broad anomaly of 100 nT between 14°55'N, 82°45'E and 14°30'N, 82°35'E indicating a deep seated causative source of limited areal extent.

(iii) Magnetic anomalies of Nellore-Madras shelf between 12°50'N and 14°30'N indicated a NW-SE trend separating the positive (north) and negative (south) anomaly zones off Pulicat Lake at 13°30'N which may be a significant structural discontinuity to be analysed in detail. Two isolated anomaly features were observed at 13°30'N, 80°30' and 14°05'N, 80°30'E.

b) **Bathymetry:** A channel of 200 m depth was recorded along 88°E longitude at 3000 m water depth. The trend of this channel was NW-SE delineated from hydrosweep online data lying between 17°53'N, 88°00'E and 17°55'N, 88°00'E. Two canyons were covered off Pondicherry using bathymetry and hydroweep. Maximum depth of canyon of Pondicherry is 650 m and that of north of Pondicherry is 1250 m.

c) **Sediment samples:** Three sediment core samples in the Bay of Bengal and one core sample in the Arabian Sea were collected. The grab and dredge samplings that were planned over the shelf off Madras could not be done as the Vanveen grabs available on board were not in working condition. About 15 attempts were made to obtain the grab samples, but not even a single sample were recovered as the grab did not close even after touching the seabed. The description of the core samples is as follows:

Core No:

SK 119/1: About 4.5 m long sediment core was collected at 2780 m depth along 16°N latitude. The core is more or less monotonous with slight variation at one or two depths. Top 30 cm of the core is brownish in colour and texturally silty clay. Silt content increase downwards upto 180 cm length of the core. Coarse fraction of the core appears to be forums. A hard patch of about 15 cm thick is noticed from 315 to 330 cm.

SK 119/2: This core is of 2.5 m length collected at the depth of 2670 m. The entire length of the core is soft clayey in texture but stiffness of the sediment increased from 100 cm downward. A hard dry pocket of sediment is found at 160 to 165 cm depth. There is no significant variation in the texture of the core.

SK 119/3: Sediment core could not be recovered. However, a small rock piece could be recovered in the corecatcher.

SK 119/4: This core is of 2.3 m in length recovered at the depth of 710 m off Tamilnadu coast. The colour of the sediment from 20 cm downward of the core is pale olive green. The top 20 cm is brownish in colour. Entire core is soft clayey in texture with traces of foraminiferal grains.

SK 119/A1: This sediment core of 4.37 m long was collected off Trivandrum at a depth of 1600 m in the Arabian Sea. The general colour of the core is olive green. The top 40 cm of the sediment is calcareous oozy sediment in nature. Thick accumulation of coarse calcareous material of mollusc shells and oolites are noticed at the core depth of 40 to 45 cm. From 45 cm downward, the stiffness of the sediment increases and the fauna content is comparatively less.

7. PERFORMANCE OF EQUIPMENT

a) Magnetometer, echosounder master and slave units, gravity corer and deep sea winch worked satisfactorily.

b) Frequent failures of GPS are observed. At one occasion GPS did not function for 28 hrs. (from 20.11.96).

c) INS system also failed frequently. It did not work for 30 hrs. from 28.11.96.

d) Hydrosweep system - data not logging to the tape, because of interfaced problem between INS and hydrosweep. As a result position coordinates were not received at hydrosweep end, only on-line data received.

e) HP 1000 system was not in working condition due to hard disk problem.

f) Vanveen grab did not work due to mechanical problem.

g) Gravimeter started functioning only during last three days. It has to be tested and confirmed before start of any geophysical cruise.

8. SUGGESTIONS AND RECOMMENDATION

a) GPS and INS systems are to be maintained properly as they are vital for any geophysical cruise involving continuous profiling and gravimeter operations. Frequent failures of INS will hamper the geophysical work.

b) Vanveen grabs should be kept in working condition and minimum three numbers of big grabs are to be kept onboard for successful sampling.

c) Sufficient number of core liners are to be loaded on board as only two core liners are there on board in working condition.

d) HP 1000 system should be rectified at the earliest.

e) Gravity and navigation data from INS are to be linked to the computer system of the magnetometer, so that the integrated data set could be taken on floppies.

f) Two well experienced mechanical personnel are required for core operations.

g) For hydrosweep, spare cards of Synch-unit are most essential.

9. ACKNOWLEDGEMENTS

The Chief Scientist and his team are grateful to Capt. R.M. Verma and other officers and crew for their cooperation throughout the cruise.

Annexure - I

Following are the details of Hydrosweep/Magnetic/Bathymetry Profiles covered during ORV SAGAR KANYA cruise 119 of RC,Visakhapatnam (NOV-DEC 1996).

Sl No	JD	Time	Profile ID	BOL/EOL	LAT N°	LONG E°	DEP (m)
1.	321	0805	HSMB1	BOL	19° 34.83	86° 56.73	1440
	322	0015		EOL	19° 57.51	87° 40.13	1232
2.	322	1330	HSMB2	BOL	19° 51.57	87° 32.62	1404
	322	1654		EOL	19° 12.28	86° 12.86	1654
3.	322	0235	SK119NS	BOL	19° 09.00	85° 58.00	1700
	323	0330		EOL	16° 01.79	85° 59.96	2790
4.	324	0416	SK119SN	BOL	16° 01.97	87° 57.52	2680
	324	2000		EOL	18° 25.34	88° 00.10	2334
5.	325	0040	SK119EW1	BOL	18° 29.92	87° 28.84	2350
	325	1710		EOL	18° 29.95	85° 10.31	1170
6.	325	1745	SK119P1	BOL	18° 30.37	85° 06.98	1130
	326	0710		EOL	17° 18.90	83° 44.27	1100
7.	326	0735	SK119WE1	BOL	17° 14.69	83° 36.81	1250
	327	0920		EOL	17° 14.35	86° 58.70	2500
8.	327	1710	SK119EW2	BOL	16° 15.32	86° 59.52	2700
	329	0100		EOL	16° 15.00	82° 13.67	0475
9.	329	1040	SK119KP1	BOL	15° 28.97	83° 13.60	3040
	329	2146		EOL	14° 30.25	82° 25.18	3235
10.	329	2315	SK119KP2	BOL	14° 29.47	82° 15.35	3287
	330	0828		EOL	15° 29.87	83° 25.32	3110
11.	330	0950	SK119KP3	BOL	15° 29.78	83° 35.66	3120
	330	1950		EOL	14° 30.09	82° 45.93	3245
12.	331	0510	SK119NM1	BOL	14° 29.97	81° 29.69	3020
	331	0310		EOL	14° 29.84	80° 24.71	800
13.	331	1510	SK119NM2	BOL	14° 10.41	80° 25.41	230
	331	1958		EOL	14° 09.81	80° 59.82	3000
14.	331	2205	SK119NM3	BOL	13° 49.70	80° 59.60	3100
	332	0210		EOL	13° 49.99	80° 30.61	400

Sl No	JD	Time	Profile ID	BOL/EOL	LAT N°	LONG E°	DEP (m)
15.	332	0400	SK119NM4	BOL	13° 30.71	80° 31.77	200
	332	0816		EOL	13° 29.98	80° 59.66	3200
16.	332	1030	SK119NM5	BOL	13° 09.81	80° 59.57	3380
		1330		EOL	13° 09.97	80° 38.10	280
17.	332	1430	SK119NM6	BOL	12° 58.81	80° 38.53	200
		1830		EOL	12° 59.97	80° 59.94	3421
18.	332	1950	SK119NM7	BOL	12° 49.78	80° 57.68	3390
		2200		EOL	12° 49.77	80° 41.30	240
19.	334	1830	SK119PC1	BOL	12° 05.80	80° 07.80	813
	334	2045		EOL	11° 11.45	79° 57.70	2045
20.	334	2100	SK119PC2	BOL	11° 46.10	79° 58.80	95
	335	0020		EOL	12° 10.50	80° 11.80	40
21.	335	0030	SK119PC3	BOL	12° 10.40	80° 12.60	44
	335			EOL	11° 45.60	80° 00.00	71
22.	335	0330	SK119PC4	BOL	11° 47.00	80° 01.00	270
	335			EOL	12° 10.90	80° 13.90	49

Annexure - II

Following are the details of sediment samples collected during ORV SAGAR KANYA cruise SK119 in Bay Bengal during Nov-Dec, 1996.

Sl No	Sample ID	Lat ° ' N	Long ° 'E	Length of core(m)	Depth (m)	Type of sample
1.	SK119-1	15° 59.04	85° 58.14	4.5	2800	core
2.	SK119-2	15° 56.36	87° 58.37	2.3	2675	core
3.	SK119-3	12° 53.39	80° 42.90	no recovery	350	a small rock piece
4.	SK119-4	12° 07.80	80° 16.60	2.3	710	core
5.	SK119-A1	07 29.83	76° 26.44	4.3	1600	core