

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

**CRUISE No. 37**

**27th November to 21st December, 1987**



**National Institute of Oceanography  
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NATIONAL INSTITUTE OF OCEANOGRAPHY  
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Dona Paula, Goa-403 004

REPORT ON  
37TH OCEANOGRAPHIC CRUISE OF  
O.R.V. SAGAR KANYA

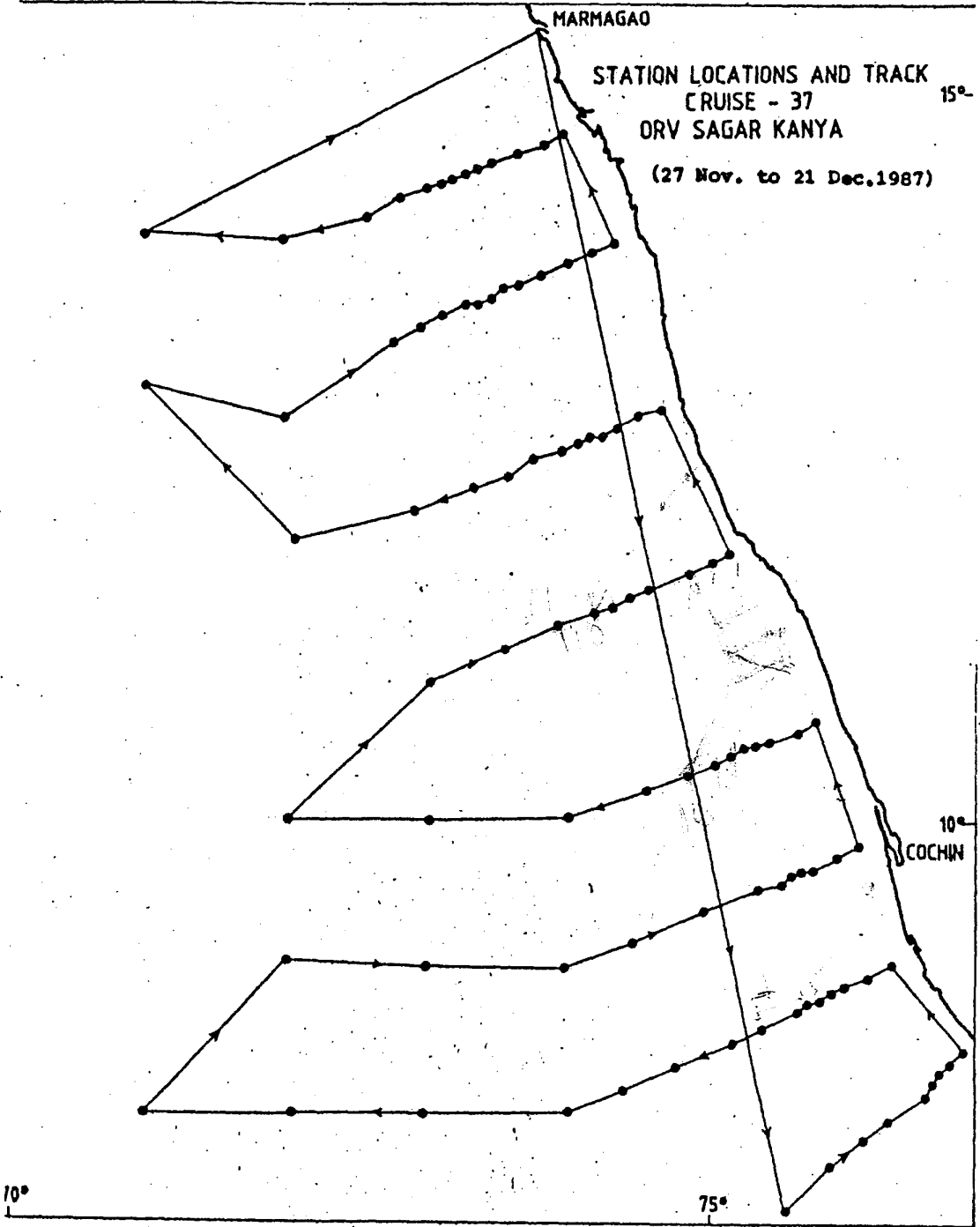
(27th November to 21st December, 1987)

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O.R.V. SAGAR KANYA

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1. CRUISE TRACK AND STATIONS



## 2. SUMMARY

ORV Sagar Kanya sailed from Mormugao harbour on the 27th of November, 1987 and returned to the same port on 21st of December, 1987. The area of operation during the cruise was off the southern portion of the west coast of India. Observations were made to study the biological, chemical and physical oceanography of the coastal region during the northeast monsoon. In addition, surface meteorological observations and radio sonde ascents were conducted. Altogether 5730 lkm were logged during the cruise and 101 oceanographic stations were worked on. At each station Nansen casts were used to measure salinity, temperature and concentration of Phosphate, silicate, nitrate, Oxygen and nitrite. Sediment samples were collected at 21 stations for microbiological and chemical studies. Water samples for trace metal studies were collected at 42 stations. Net sampling for zooplankton studies was carried out at 32 stations. Samples to study detritus, chlorophyll and POC were collected at 33 stations. Water samples to carry out radio isotope studies were collected at 38 stations.

3. PARTICIPANTS

a) Scientific component

Satish R. Shetye	...	Chief Scientist
Albert Gouveia	Y	
K. Santanam	X	
Michael Selvam	X	Physical Oceanography Division, NIO
M. Dileepkumar	X	
Blasco Fernandes	X	
S. Upadhyay	Y	
Maheashwari Nair	X	Chemical Oceanography Division, NIO
S. Sardesai	X	
K. Sawkar	X	
M. Madhu Pratap	Y	
Shanta Achuttankutty	X	Biological Oceanography Division, NIO
Krishnakumari Warriar	X	
Joseph Royan	X	
George Vithayathil	...	Marine Instrumentation & Computer Division, NIO
P. Bhattacharya	...	Data Information Division, NIO
R. Rengarajan	...	Physical Research Laboratory, Ahmedabad
D.C. Gupta	Y	
P. Shridharan	X	
T.K.Chakraborty	X	India Meteorological Dept.
P.S. Venkatraman	X	
D.R. Gota	X	

b) Ship's complement

Capt. M.V. Agarkar	...	Captain
D.K. Basu	...	Chief Engineer
I. Kharbanda	...	Chief Officer
C. Carneiro	...	Second Officer
M.A. Khot	...	Third Officer

#### 4. OBJECTIVES OF THE CRUISE

The objectives behind each component of the oceanographic data collection programme are described below.

##### 4.1 Biological Oceanography

The Biological Oceanographic studies had the following sub-components.

a) Microbiology: The main objectives was to study the sediment microbiology from the nearshore to the off-shore region. Estimates of dehydrogenase, phosphatase, amylase and protease were made. Simultaneously, the bacteria involved in these processes were enumerated. Apart from these, samples were collected to isolate streptomycetes from plankton and from sediment.

b) Zooplankton: The primary purpose was to find seasonal variation in the secondary production, in species composition and in community structures. Samples were collected in the upper 200 m with a 300 micron Bongo net. In addition, a high speed mid water trawl was operated to collect large quantities of plankton for chemical analysis and to determine effects of DSL.

c) Detritus: The objectives was to determine the concentration of suspended detritus and to evaluate its role in the food chain. Similar data were collected earlier during the southwest monsoon. The data collected during



during this cruise would thus permit the study of seasonal changes in the concentration of suspended detritus.

d) Chlorophyll and Particulate Organic Carbon (POC):  
Concentration of Chlorophyll was estimated and samples were collected to determine POC.

#### 4.2 Chemical Oceanography

One of the aims of chemical oceanographic studies was to study the spatial variability of Oxygen and of nutrients such as Phosphate, Nitrite, Nitrate and Silicate. The data would be utilised to understand the chemistry and the biochemistry of the water masses during the northeast monsoon. In addition, water and sediment samples were collected for taking them to shore laboratory to study humic substances, Aluminium, Arsenic and other trace metals with respect to biogeochemical processes. Dissolved humic substances were recovered from the surface and from 150 M at selected stations. Also, water samples were filtered off for particulate organic matter studies.

#### 4.3 Physical Oceanography

The primary objective of the physical oceanographic studies was to collect data on temperature and salinity. Nansen casts were used for the purpose. These data would then be used in dynamic computations and in

water mass analysis to infer the circulation pattern of the region. Because the spatial scale of coastal processes in the direction normal to the coast is small, of the order of 50 km. stations were spaced at a distance of about 15 km over the shelf and the slope region.

#### 4.4 Radio Isotope Studies (Physical Research Laboratory, Ahmedabad).

Four sea water vertical profiles were collected using 30 litre Niskin bottles to study the distribution of Po-210 and Pb-210 isotopes in the water column. These samples will be analysed to estimate the scavenging and sinking rates of particulates. Thirty surface sea water samples were collected to determine the concentration of Radium isotopes as a function of the distance from the coast. This will give the horizontal diffusion and advection rates. Two samples each in thirty stations above the thermocline layer were collected for the study of oxygen isotopic composition.

### 5. CRUISE DETAILS

Station locations and the type of data collected at each of the stations is listed in the Annex. The code used in the table given there is as follows:

NC : Salinity, Temperature, Phosphate, Silicate, Nitrate,  
Nitrite and Oxygen using Nansen Casts.

TM : Trace metal studies

SD : Sediment sampling using deep sea grab for microbiological and chemical studies.

ZP : Zooplankton net sampling

DC : Detritus, Chlorophyll and POC sampling

RI : Sampling for Radio Isotope studies

Besides the data summarized in the Annex, India Met. Dept. carried out 171 ship weather observations and conducted 29 radio sonde ascents.

## 6. SYNOPSIS OF OBSERVATIONS

The data collected during the cruise provide a comprehensive look at the large scale coastal oceanography of the region during the northeast monsoon. A preliminary look at the temperature and salinity data suggests that the structure of the current system in the region changes from south to north. Analysis of the data collected during the cruise should be able to reveal what these changes are and how they are reflected in the biology and chemistry of the region. The radio isotope studies would provide

clues on the rate of horizontal mixing, an important parameter that determines the water mass characteristics of the region.

7. PERFORMANCE OF ONBOARD EQUIPMENT

No major breakdown of equipment occurred during the **cr**uise .

8. LOSSES/DAMAGES

There was no loss of equipment.

9. ACKNOWLEDGEMENTS

The Chief Scientist and his colleagues are grateful to the Master and other crew members for their cooperation during the **cr**uise.

ANNEX  
 SUMMARY OF OBSERVATIONS  
 ORV SAGAR KANYA CRUISE 37

Sl No	Station Number	Location		DATE	TIME IST(HRS)	DEPTH (M)	OBSERVATIONS (SEE SEC. 5)				
		lat	long				NC	TM	SD	ZP	DC
1	37A13	07 19.51	75 33.81	29.11.87	1710-2130	1605	*	*	*	*	*
2	37A12	07 37.59	75 52.37	30.11.87	0110-0653	1670	*	*	*	*	*
3	37A11	07 47.85	76 06.88	30.11.87	0945-1318	1530	*	*	*	*	*
4	37A10	07 55.70	76 17.51	30.11.87	1500-1828	1375	*	*	*	*	*
5	37A09	08 01.42	76 26.08	30.11.87	1948-2145	1125	*	*	*	*	*
6	37A08	08 04.90	76 27.06	30.11.87	2245-0230	1012	*	*	*	*	*
7	37A07	08 08.48	76 32.73	01.12.87	0345-0545	675	*	*	*	*	*
8	37A06	08 13.16	76 35.57	01.12.87	0655-0745	205	*	*	*	*	*
9	37A05	08 16.07	76 40.26	01.12.87	0840-0947	90	*	*	*	*	*
10	37A04	08 19.26	76 43.63	01.12.87	1050-1205	64	*	*	*	*	*
11	37A02	08 24.89	76 49.91	01.12.87	1330-1417	45	*	*	*	*	*
12	37B02	08 59.16	76 18.96	02.12.87	0755-0823	47	*	*	*	*	*
13	37B04	08 54.86	76 07.73	02.12.87	1025-1123	63	*	*	*	*	*
14	37B06	08 50.81	75 57.73	02.12.87	1304-1400	315	*	*	*	*	*
15	37B07	08 49.89	75 52.71	02.12.87	1515-1705	335	*	*	*	*	*
16	37B08	08 46.94	75 48.05	02.12.87	1830-2005	363	*	*	*	*	*
17	37B09	08 44.53	75 41.71	02.12.87	2120-2245	317	*	*	*	*	*
18	37B10	08 41.56	75 37.89	03.12.87	2350-0100	300	*	*	*	*	*
19	37B11	08 34.96	75 25.54	03.12.87	0300-0518	1640	*	*	*	*	*
20	37B13	08 29.21	75 11.67	03.12.87	0717-1030	2180	*	*	*	*	*
21	37B14	08 20.00	74 47.04	03.12.87	1330-1728	2782	*	*	*	*	*
22	37B15	08 09.99	74 22.96	03.12.87	2019-0104	2740	*	*	*	*	*
23	37B16	07 59.80	73 59.67	04.12.87	0230-0647	2780	*	*	*	*	*
24	37B17	08 00.05	72 56.80	04.12.87	1254-1525	2090	*	*	*	*	*
25	37B18	08 00.16	71 58.85	04.12.87	2210-0049	2940	*	*	*	*	*
26	37B19	07 59.07	70 59.33	05.12.87	0725-1405	4055	*	*	*	*	*
27	37C16	09 02.95	71 58.70	05.12.87	2315-0743	2940	*	*	*	*	*

### SUMMARY OF OBSERVATION

SI No	Station Number	Location		DATE	TIME IST(HRS)	DEPTH (M)	OBSERVATIONS (SEE SEC. 5)					
		lat	long				NC	TH	SD	ZP	DC	RI
28	37C15	08 59.94	72 59.15	06.12.87	1345-1730	1945	*	*	*	*	*	*
29	37C14	09 00.37	73 59.18	06.12.87	2330-0553	2645	*	*	*	*	*	*
30	37C13	09 10.69	74 27.24	07.12.87	0950-1322	2720	*	*	*	*	*	*
31	37C12	09 23.94	74 58.22	07.12.87	1720-2145	2530	*	*	*	*	*	*
32	37C10	09 33.50	75 21.87	08.12.87	0112-0450	1760	*	*	*	*	*	*
33	37C08	09 36.79	75 31.87	08.12.87	0520-0800	890	*	*	*	*	*	*
34	37C07	09 38.14	75 36.17	08.12.87	0845-1200	315	*	*	*	*	*	*
35	37C06	09 39.73	75 40.13	08.12.87	1300-1327	120	*	*	*	*	*	*
36	37C05	09 41.25	75 46.01	08.12.87	1410-1505	85	*	*	*	*	*	*
37	37C03	09 45.83	75 55.19	08.12.87	1630-1705	53	*	*	*	*	*	*
38	37C01	09 50.05	76 05.02	08.12.87	1840-1902	30	*	*	*	*	*	*
39	37D01	10 46.55	75 41.08	09.12.87	0119-0235	32	*	*	*	*	*	*
40	37D03	10 37.90	75 36.10	09.12.87	0905-0427	57	*	*	*	*	*	*
41	37D05	10 33.58	75 25.17	09.12.87	0555-0628	116	*	*	*	*	*	*
42	37D06	10 31.56	75 19.28	09.12.87	0735-0926	758	*	*	*	*	*	*
43	37D07	10 30.07	75 14.92	09.12.87	1115-1504	1040	*	*	*	*	*	*
44	37D08	10 27.69	75 09.82	09.12.87	1550-1710	1372	*	*	*	*	*	*
45	37D09	10 23.95	75 01.98	09.12.87	2015-2255	1900	*	*	*	*	*	*
46	37D10	10 20.28	74 51.21	10.12.87	0015-0320	2167	*	*	*	*	*	*
47	37D11	10 12.70	74 34.38	10.12.87	0527-0930	2300	*	*	*	*	*	*
48	37D12	10 01.61	73 59.94	10.12.87	1333-1842	2320	*	*	*	*	*	*
49	37D13	09 59.82	72 59.76	11.12.87	0115-0350	1980	*	*	*	*	*	*
50	37D14	10 00.20	71 59.97	11.12.87	1030-1244	1710	*	*	*	*	*	*
51	37E14	10 58.84	73 00.73	11.12.87	2112-0230	1880	*	*	*	*	*	*
52	37E13	11 11.80	73 33.42	12.12.87	0358-0830	1870	*	*	*	*	*	*
53	37E12	11 22.08	73 55.89	12.12.87	1035-1335	1980	*	*	*	*	*	*
54	37E11	11 27.17	74 11.46	12.12.87	1518-1727	2000	*	*	*	*	*	*
55	37E10	11 30.60	74 20.27	12.12.87	1830-2103	1740	*	*	*	*	*	*
56	37E09	11 34.30	74 27.22	12.12.87	2200-2345	1530	*	*	*	*	*	*
57	37E08	11 35.73	74 33.56	12.12.87	0110-0424	730	*	*	*	*	*	*

SI No	Station Number	Location		DATE	TIME IST(HRS)	DEPTH (M)	OBSERVATIONS (SEE SEC. 5)										
		lat	long				NC	TM	SD	ZP	DC	FI					
58	37E07	11 37.85	74 38.99	13.12.87	0520-0551	143	*										
59	37E05	11 42.89	74 50.29	13.12.87	0730-0802	68	*										*
60	37E03	11 46.63	75 01.77	13.12.87	0934-0950	55	*										*
61	37E01	11 50.99	75 09.20	13.12.87	1100-1155	45	*	*	*	*	*	*	*	*	*	*	*
62	37F01	12 49.98	74 39.53	13.12.87	1823-1941	37	*	*	*	*	*	*	*	*	*	*	*
63	37F03	12 46.94	74 29.91	13.12.87	2057-2130	53	*	*	*	*	*	*	*	*	*	*	*
64	37F05	12 41.87	74 19.84	13.12.87	2250-2350	80	*	*	*	*	*	*	*	*	*	*	*
65	37F06	12 39.12	74 13.94	14.12.87	0045-0115	117	*	*	*	*	*	*	*	*	*	*	*
66	37F07	12 39.11	74 08.64	14.12.87	0155-0301	222	*	*	*	*	*	*	*	*	*	*	*
67	37F08	12 35.24	74 04.39	14.12.87	0338-0617	290	*	*	*	*	*	*	*	*	*	*	*
68	37F09	12 32.55	73 55.42	14.12.87	0745-1003	1400	*	*	*	*	*	*	*	*	*	*	*
69	37F10	12 29.94	73 43.50	14.12.87	1115-1355	1760	*	*	*	*	*	*	*	*	*	*	*
70	37F11	12 24.31	73 34.34	14.12.87	1455-1800	1920	*	*	*	*	*	*	*	*	*	*	*
71	37F12	12 17.71	73 18.53	14.12.87	1956-0010	2095	*	*	*	*	*	*	*	*	*	*	*
72	37F13	12 09.81	72 05.40	15.12.87	0225-0540	2090	*	*	*	*	*	*	*	*	*	*	*
73	37F14	11 59.64	72 03.94	15.12.87	1030-1340	1665	*	*	*	*	*	*	*	*	*	*	*
74	37F15	12 00.22	71 00.25	15.12.87	2005-0312	2640	*	*	*	*	*	*	*	*	*	*	*
75	37G14	13 00.87	70 58.98	15.12.87	1000-1245	2400	*	*	*	*	*	*	*	*	*	*	*
76	37G13	12 45.98	71 59.70	15.12.87	1940-2145	1650	*	*	*	*	*	*	*	*	*	*	*
77	37G12	13 18.55	72 46.31	17.12.87	1048-1605	1900	*	*	*	*	*	*	*	*	*	*	*
78	37G11	13 23.22	72 56.89	17.12.87	1727-1945	1860	*	*	*	*	*	*	*	*	*	*	*
79	37G10	13 27.92	73 06.73	17.12.87	2113-2324	1550	*	*	*	*	*	*	*	*	*	*	*
80	37G09	13 32.38	73 16.43	18.12.87	0048-0220	985	*	*	*	*	*	*	*	*	*	*	*
81	37G08	13 31.63	73 21.13	18.12.87	0300-0540	815	*	*	*	*	*	*	*	*	*	*	*
82	37G07	13 34.89	73 27.03	18.12.87	0700-0757	130	*	*	*	*	*	*	*	*	*	*	*
83	37G06	13 38.30	73 31.98	18.12.87	0900-0929	98	*	*	*	*	*	*	*	*	*	*	*
84	37G05	13 40.30	73 38.04	18.12.87	1024-1050	75	*	*	*	*	*	*	*	*	*	*	*
85	37G04	13 43.60	73 47.71	18.12.87	1215-1231	60	*	*	*	*	*	*	*	*	*	*	*
86	37G03	13 48.69	73 59.62	18.12.87	1405-1430	50	*	*	*	*	*	*	*	*	*	*	*
87	37G02	13 53.07	74 09.80	18.12.87	1550-1608	42	*	*	*	*	*	*	*	*	*	*	*

Sl No	Station Number	Location		DATE	TIME IST(HRS)	DEPTH (M)	OBSERVATIONS (SEE SEC. 5)						
		lat	long				NC	TM	SD	ZP	DC	RI	
88	37G01	13 57.83	74 19.27	18.12.87	1725-1816	40	*	*	*	*	*	*	
89	37H01	14 43.23	73 57.58	18.12.87	2320-2356	40	*	*	*	*	*	*	
90	37H02	14 38.07	73 49.89	18.12.87	0118-0136	42	*	*	*	*	*	*	
91	37H03	14 34.25	73 38.73	19.12.87	0245-0330	70	*	*	*	*	*	*	
92	37H04	14 29.78	73 27.82	19.12.87	0450-0514	96	*	*	*	*	*	*	
93	37H05	14 27.60	73 22.21	19.12.87	0603-0645	114	*	*	*	*	*	*	
94	37H06	14 26.11	73 15.75	19.12.87	0744-0817	175	*	*	*	*	*	*	
95	37H07	14 24.05	73 10.66	19.12.87	0911-1100	303	*	*	*	*	*	*	
96	37H08	14 20.59	73 05.96	19.12.87	1212-1340	810	*	*	*	*	*	*	
97	37H09	14 18.70	72 59.73	19.12.87	1438-1610	940	*	*	*	*	*	*	
98	37H10	14 15.89	72 49.90	19.12.87	1722-1830	360	*	*	*	*	*	*	
99	37H11	14 08.83	72 34.02	19.12.87	2014-2136	1410	*	*	*	*	*	*	
100	37H12	13 59.68	71 59.33	20.12.87	0125-0315	1920	*	*	*	*	*	*	
101	37H13	14 00.55	71 00.72	20.12.87	0837-1030	2220	*	*	*	*	*	*	