

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

**CRUISE No. 29**

**19th January to 14th February, 1987**



**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  
29TH OCEANOGRAPHIC CRUISE OF  
O.R.V. SARDA KANYA

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O.R.V. SAGAR KANYA

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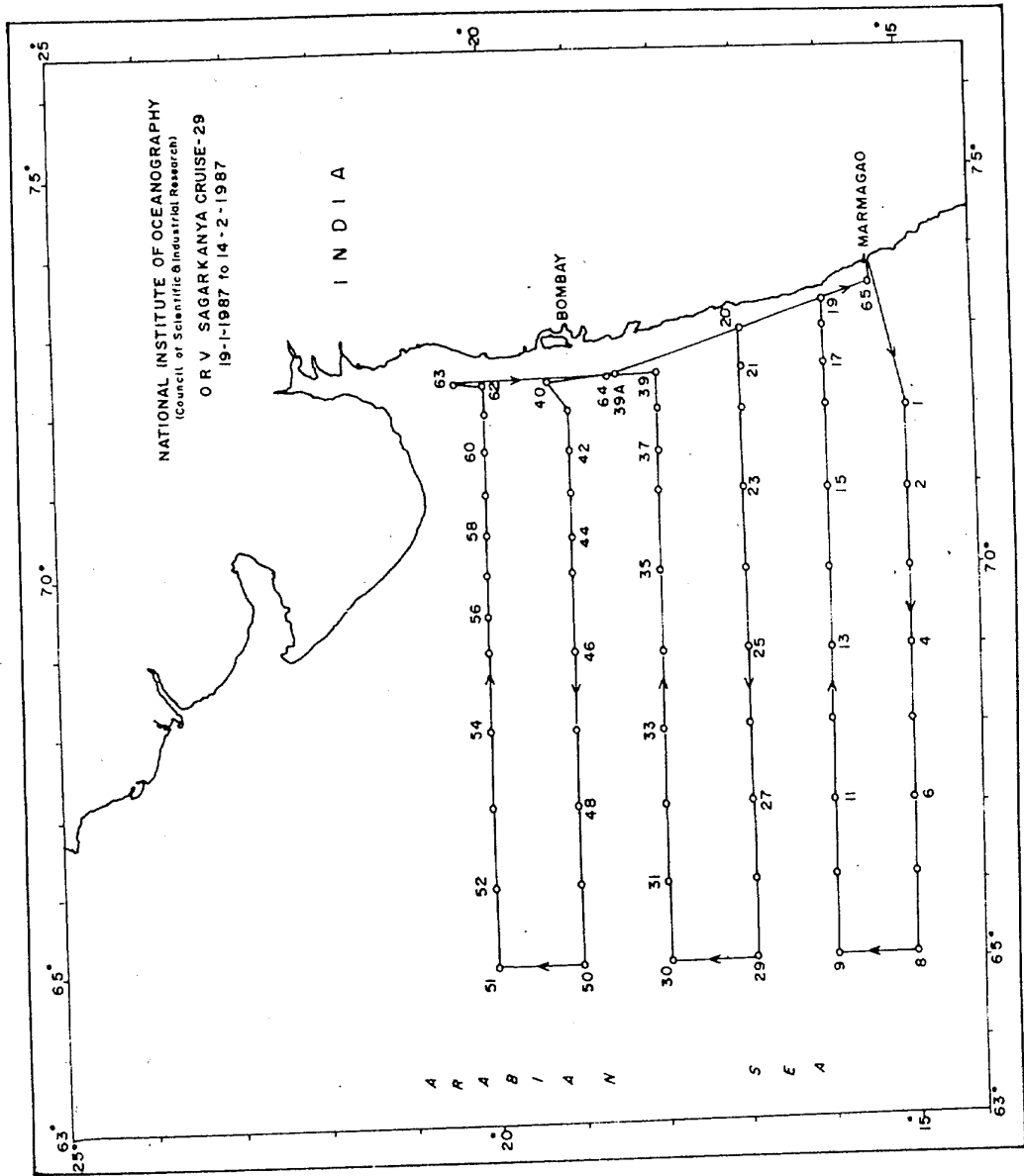


Fig. 1

2. SUMMARY

The cruise was carried out from 19th January to 14 February 1987 in the Central and north west coast of India to find out a) distribution of trace metals in particulate and dissolved forms in water and sediments and b) assessing the levels and seasonal variability of primary, secondary, benthic and bacterial productivity in the EEZ.

In the euphotic column chl. a varied from 0.05 to 1.53 at the surface and from 2.82 to 49.34 mg m<sup>-3</sup> at the column. Zooplankton biomass varied from 5 to 82 ml while Pyrosomes dominated at Stn. 31, it was Ostrocods at stns. 52 & 54 and Acetes sp. at stn. 47.

A 3050 m high submerged mount was observed at lat. 16°N and 69°E long. at a depth of 3700 m.

3. PARTICIPANTS

(a) Scientific component

V.P. Devassy	-	Chief Scientist
P.M.A. Bhattathiri	-	Dy. Chief Scientist
M.D. George	)	
T.W. Kureshi	)	
Analia Mesquita	)	
S. Sardesai	)	
M. Manoharan	)	Chemical Oceanography Division
P.V. Shirodkar	)	
R.A. Sarkar	)	
M.S. Shailaja	)	
S. Upadhyaya	)	
R. Upadhyaya	)	
R. Noronha	)	
Maheswari Nair	)	
S.N. Harkantra	)	
S. Raghukumar	)	Biological Oceanography Division
N. Ramaiah	)	
P. Selvam	-	M.I.C.D.
T. Balachandran	)	
P.N. ARavindakshan	)	R.C. of N.I.O., Cochin
P.M. Muralidharan Ravibhushan-		P.R.L., Ahmedabad
D.C. Shetty	-	Karnataka University
Y.V. Ramana	-	Andhra University
C.M. Misra	-	O.N.G.C.

(b) Ship's complement

J.S. Bawa	- Master
Gurdeep Singh	- Chief Officer
P.S. Saini	- Second Officer
R.V. Iyer	- Third Officer
J.A. Countinho	- Fourth Officer
B.S. Kher	- Chief Radio Officer
R.S. Patil	- Radio Officer
H.K. Jumani	- Medical Officer
K.G. Krishnan	- Chief Engineer
R.V.B. Nair	- Second Engineer
R.K. Diwakar	- Third Engineer
N.O. D'Souza	- Fourth Engineer
S. Ravi	- Fifth Engineer
R.P. Yadav	- Electrical Officer
P.S. Dhillon	- Electrical Officer
I.E. Fernandes	- Purser
A.D. Carneiro	- Catering Officer
J. Fernandes	- Asst. Catering Officer

4. OBJECTIVES

- a) Study the distribution of some trace metals in particulate and dissolved forms in water and sediments.
- b) Determine and monitor the extent of oil pollution in the northern Arabian Sea.
- c) Assess the levels and seasonal variability of primary, secondary, benthic and bacterial productivity within the EEZ of the central west coast and northeast Arabian Sea.
- d) Estimate organochlorine residues in the sea water.

5. BRIEF DESCRIPTION AND PRELIMINARY RESULTS OF WORK CARRIED OUT

This was a multidisciplinary cruise in which 20 scientists from N.I.O. and 5 from outside organizations participated. The vessel sailed from the Mormugao harbour on 19th Jan. 1987 at 1630 hrs and work started on the first transect.

The area studied during this cruise is situated between lat. 15° to 20° N and long. 65° and 73°E. A total



number of 6 transects and 66 stations were occupied during this cruise. The line nautical miles covered was 3421.

The investigations carried out during this cruise were biological (primary, secondary, benthic and bacterial productions), . . . chemical (nutrients, trace metals, petroleum hydrocarbon, organochlorine) & water samples for nutrients (phosphate-p, Nitrate-N, Nitrite-N and Silicate-Si).

Dissolved oxygen, salinity and pH were collected from 21 stations. Samples were also collected from 12 stations to study the chemical speciation of cadmium, lead and copper. Work was carried out at 8 stations to concentrate different kinds of chlorinated hydrocarbons such as Aldrins, BHC, Dieldrine, Endrine, Toxaphin, D.D.T., D.D.E. and D.D.D. Work was also carried out to determine the effect of environmental petroleum hydrocarbon residues on the growth and metabolism of phytoplankton. Sediment samples from 33 stations were collected to study organic carbon and nitrogen and at few stations for analyses of fomic and fulvic acids. The scientists from ONGC collected samples to study distribution of organic matter, palynofacies, paleontological studies for developing ecological and depositional model of the Holocene sedimentation in the area. The scientists from P.R.L. collected water samples

for measurements of  $^{210}\text{Pb}$  and  $^{226}\text{Ra}$ . Samples were also collected for studying the activity of  $^{234}\text{Th}$  and  $^{238}\text{V}$ . Further, the activity of  $^{224}\text{Ra}$  has been measured in the near coastal waters to study the short term lateral mixing and surface current pattern. The Research scholar from Andhra University collected 61 surface samples for analyses of trace metals in particulate and dissolved fractions, organochlorine and grain size in sediments, mineralogical studies, organic matter, total phosphorus and total nitrogen.

In the euphotic zone chl. a varied from 0.05 to 1.53 at the surface and from 2.82 to 49.34  $\text{mgm}^{-3}$  at the column. The zooplankton biomass (collected from 200-0 m) varied from 5 to 82 ml. The biomass of samples collected by the Hamburg plankton net from mid-depth (350-0) varied from 300 to 8000 ml. While Pyrosomes dominated at stn 31, it was Acetes sp. at stn 47, ostracods at stns 52 and 54. Due to predominance of ostracods, bioluminescence was noticed at the above two stations viz. 52 and 54. Stns 61 and 62 were dominated by sipunculoid worms. It was interesting to note that though large numbers of ostracods were present in the Neuston net samples, the vertical sampling failed to retrieve any significant ostracod population which warrants the use of Neuston net at every station. Further it was also observed that compared to the samplings done in 1985 in the same area the population of salps and doliolids was too low.

## 6. HIGHLIGHTS OF THE CRUISE

During this cruise the following samplers/net were operated for the first time.

- a) Smith-McIntyre grab which is a spring-leaded sampler, functioned efficiently in hard or soft-bottom sediments, shallow or deep areas and retrieved sediment samples.
- b) Hamburg plankton net was operated at midwater. This collected large quantities of zooplankton samples for e.g. 8 kgs at one station during one hour operation. This is an ideal net which can be used when large quantities of samples are required.
- c) In situ water sampler (Sea Star) was deployed at 7 stations which pumped volumes of seawater varying from 100 to 143 litres for a duration of 15 hours.

A submerged mount was located at lat. 16°N and long. 69°E at a depth of 3700 m. The mount was of 3050 m and has a sharp pinnacle. This has not been charted in the Admiralty Chart.

## 7. LOSS REPORT

One depth depresser weighing 18 kg (brass) used as dead weight was lost at station 2 (lat. 10°N long. 71°E)

since the hydrographic winch wire got snapped. 10 m of P.V.C. coated hydrographic winch wire was cut since found weak and the remaining length of the wire is 3000 m.

8. ACKNOWLEDGEMENTS

The participants wish to express sincere thanks to the Master, his officers and crew for the excellent cooperation extended throughout the cruise.

ORV SAGAR KANYA - Cruise 29

Table 1 : Station positions and other details

Stn. No.	Date	Time of collection (hrs)		Position		Sounding
				Lat.	Long.	
1	20-1-87	0800	1320	15°N	72°E	2040
2	20-1-87	1830	0130	15°N	71°E	2600
3	21-1-87	0630	1900	15°N	70°E	3450
4	22-1-87	0632	0130	15°N	69°E	3900
5	22-1-87	0645	1045	15°N	68°E	3910
6	22-1-87	1555	1740	15°N	67°E	3920
7	22-1-87	2300	2345	15°N	66°E	3820
8	23-1-87	0455	1200	15°N	65°E	3840
9	23-1-87	1750	2120	16°N	65°E	3700
10	24-1-87	0240	0325	16°N	66°E	3810
11	24-1-87	0850	1135	16°N	67°E	3775
12	24-1-87	1655	2230	16°N	68°E	3200
13	25-1-87	0330	0415	16°N	69°E	2600
14	25-1-87	0855	1445	16°N	70°E	3700
15	25-1-87	1945	2035	16°N	71°E	2600
16	26-1-87	0120	0208	16°N	72°E	1400
17	26-1-87	0435	0520	16°N	72°E 0'E	445
18	26-1-87	0800	1030	16°N	73°E	75
19	26/27-1-87	1220	0600	16°N	73°20'E	40
20	27/28-1-87	1205	0645	17°N	73°08'E	40
21	28-1-87	1015	1200	17°N	72°30'N	80
22	28-1-87	1450	1910	17°N	72°E	220
23	28/29-1-87	2345	0330	17°N	71°E	2500
24	29-1-87	0810	1140	17°N	70°E	3450
25	29-1-87	1640	2050	17°N	69°E	2500
26	30-1-87	0128	0220	17°N	68°E	3525
27	30-1-87	0720	1130	17°N	67°E	3575
28	30-1-87	1645	1830	17°N	66°E	3550
29	30/31-1-87	2250	0200	17°N	65°E	3500
30	31-1-87	0655	1150	18°N	65°E	3400
31	31-1-87	1810	2100	18°N	66°E	3300
32	1-2-87	0135	0215	18°N	67°E	3200
33	1-2-87	0730	1200	18°N	68°E	3400

1	2	3	4	5	6	7
34	1-2-87	1700	2330	18°N	69°E	3400
35	2-2-87	0450	0645	18°N	70°E	2600
36	2-2-87	1140	1430	18°N	71°E	85
37	2-2-87	1700	1900	18°N	71°30'E	90
38	3-2-87	0130	0330	18°N	72°30'E	42
39A	3-2-87	0730	2230	18°29.61'N	72°38.47'E	40
40	4-2-87	0350	1900	19°15'N	72°25'E	40
41	4-2-87	2330	0030	19°N	72°E	65
42	5-2-87	0330	0445	19°N	71°30'E	78
43	5-2-87	0730	0925	19°N	71°E	78
44	5-2-87	1200	1330	19°N	70°30'E	88
45	5-2-87	1610	1920	19°N	70°E	195
46	6-2-87	0010	0315	19°N	69°E	2770
47	6-2-87	0835	1630	19°N	68°E	3300
48	6/7-2-87	2205	0130	19°N	68°E	3200
49	7-2-87	0635	0940	19°N	66°E	3200
50	7-2-87	1430	2000	19°N	65°E	3250
51	8-2-87	0100	0415	20°N	65°E	3100
52	8-2-87	0900	1215	20°N	66°E	2900
53	8/9-2-87	1830	0030	20°N	67°E	2900
54	9-2-87	0545	1025	20°N	68°E	3100
55	9-2-87	1600	2015	20°N	69°E	1900
56	9/10-2-87	2335	0055	20°N	69°30'E	150
57	10-2-87	0325	0430	20°N	70°E	80
58	10-2-87	0700	0840	20°N	70°30'E	88
59	10-2-87	1130	1230	20°N	71°E	70
60	10-2-87	1515	1655	20°N	71°30'E	33
61	10-2-87	1920	2145	20°N	72°E	28
62	11-2-87	0015	0125	20°N	72°30'E	31
63	11-2-87	0330	1330	20°15'N	72°35'E	28
64	12-2-87	0030	1030	18°29.61'N	72°38.47'E	40
65	13-2-87	0605	1605	15°22'N	73°33'E	55

Table 2 - Performance Chart

Stn. No.	(For P, P, Ch, H, S, L, G) Microbial (Depth in m)	Hydrocarbon (Depth in m)	Trace metals (Depth in m)	Sea Star in situ water sample (Depth in m)	Microbiology (Depth in m)	Zooplankton Y.O.S.M./Hamburg W.P. net (m)	Benthos Peterson Grab	Neuston net	Remarks
1	0-40					200-0 (1)			
2	0-2000 (2 casts)		0-2600 (2 casts)		0-100	200-0 (1)			
3	0-75					200-0 (1)	Van Veen		Grab failed which not operation
4						200-0 (2)			
5	0-75		0-3000 (2 casts)		0-100	200-0 (2)			
6						200-0 (2)			
7						200-0 (2)			
8	0-75	0-3000	0-30			200-0 (2)			
9	0-2000 (2 casts)					200-0 (2)			
10						200-0 (2)			Surface (15 min.)
11	0-75				0-100	200-0 (2)			Surface (15 min.)
12	0-2000 (2 casts)					200-0 (2)	Smith-McIntyre sampler (1)		Surface (15 min.)
13						200-0 (2)			
14	0-75					200-0 (2)	S-McIntyre sampler (1)		Surface (15 min.)
15						200-0 (2)			
16						200-0 (2)			
17						200-0 (2)			
18	0-30				0-50	50-0 (2)	Van Veen Grab (2)		Surface (15 min.)
19				0-10	0-25	30-0 (1)	Van Veen (1)		
20				0-10	0-30	35-0 (2)	Grab (2)		Surface (15 min.)
21	0-40				0-50	50-0 (2)	Grab (2)		
22	0-200 (2 casts)		0-200			100-0 (2)	Grab (2)		Surface (15 min.)
23		0-2500				200-0 (2)			
24	0-60					200-0 (2)	S-McIntyre sampler (1)		Surface (15 min.)
25			0-2500 (2 casts)		0-100	200-0 (2)			
26						200-0 (2)			
27	0-80					200-0 (2)	S-McIntyre sampler (1)		Surface (15 min.)
28						200-0 (2)			
29			0-3000 (2 casts)		0-100	200-0 (2)	S-McIntyre		
30	0-1500 (2 casts)					200-0 (2)			
31						200-0 (2) 300-0			

Stn. No.	(For P.P., Chlorophyll a & Hydrocarbon in m) Depth (For P.P., A.L.)	Hydrocarbon (Depth in m)	Trace metals Niskin (Depth in m)	Sea Star In situ water sampler (Depth in m)	Microbiology (Zobell) (Depth in m)	Zooplankton		Benthos Grab	Neuston Net	Remarks
						I.O.S.N./W.P. net	Hamburger net			
32	-	-	-	-	-	200-0 (2)	-	S-McIntyre	-	
33	0-80	0-20	-	-	0-100	200-0 (2)	-	S-McIntyre sampler (2)	-	
34	0-3000	-	-	-	-	200-0 (2) 300-0	-	-	-	
35	0-80	-	-	-	0-100	200-0 (2)	-	-	-	
36	0-75 (2 casts)	-	-	-	-	200-0 (2) 300-0	-	Van Veen (2) S-McIntyre (2)	Surface (15 mins)	
37	-	-	-	-	0-75	200-0 (2)	-	Van Veen (2)	-	
38	-	-	-	-	-	50-0 (2)	-	Van Veen (1)	-	
39	0-30	-	-	-	-	-	-	Van Veen (1)	-	
39 A	-	-	-	0-10	-	-	-	Van Veen (1)	-	
40	0-20	0-20	0-20	0-10	0-25	-	-	-	-	
41	-	-	0-60	-	0-50	-	-	Van Veen (1)	-	
42	0-75	-	0-75	-	-	50-0 (2)	-	Van Veen (1)	-	
43	0-40	-	0-75	-	0-75	50-0 (2)	-	Van Veen (1)	-	
44	0-75	0-20	0-82	-	-	50-0 (2)	-	Van Veen (1)	-	
45	0-150	-	0-190	-	0-100	180-0 (2)	-	S-McIntyre (1)	Surface (15 min.)	
46	0-70	-	-	-	-	200-0 (2)	-	S-McIntyre (1)	-	
47	0-80	-	0-2900	-	-	200-0 (2) 300-0	-	S-McIntyre (1)	-	
48	-	-	-	-	-	200-0 (2)	-	S-McIntyre (1)	-	
49	-	-	-	-	-	200-0 (2) 300-0	-	-	-	
50	0-80	0-20	-	-	0-100	200-0 (2)	-	-	Surface (15 min.)	
51	-	-	0-2900	-	-	200-0 (2)	-	-	-	
52	0-80	0-20	-	-	-	200-0 (2) 300-0	-	-	-	
53	-	0-20	-	-	0-100	200-0 (2) 50-0	-	S-McIntyre (1)	-	
54	-	-	-	-	-	200-0 (2) 100-0	-	S-McIntyre (1)	-	
55	-	0-20	-	-	0-100	200-0 (2)	-	S-McIntyre (1)	Surface (15 min.)	
56	0-100	-	-	-	-	100-0 (2) 50-0	-	S-McIntyre (1)	-	
57	-	0-20	0-80	-	-	50-0 (2)	-	Van Veen (1)	-	
58	0-50	-	0-85	-	0-75	50-0 (2)	-	Van Veen (1)	-	
59	0-40	0-20	0-65	-	-	50-0 (2)	-	Van Veen (1)	-	
60	0-30	-	0-30	-	0-30	20-0 (3)	-	Van Veen (1)	-	
61	0-15	0-10	-	-	-	15-0 (2)	-	Van Veen (1)	-	
62	0-20	-	-	-	0-25	20-0 (2)	-	Van Veen (1)	-	
63	-	-	-	0-10	-	-	-	-	-	
64	-	-	-	0-10	-	-	-	-	-	
65	-	-	-	0-10	-	-	-	-	-	