

CRUISE REPORT

ORV SAGAR KANYA

Cruise No. 113

(23 May to 21 June, 1996)



राष्ट्रीय समुद्र विज्ञान
संस्थान

NATIONAL INSTITUTE
OF
OCEANOGRAPHY

 **ORV SAGAR KANYA**

Cruise No. 113

(23 May to 21 June, 1996)

NATIONAL INSTITUTE OF OCEANOGRAPHY

(Council of Scientific and Industrial Research)

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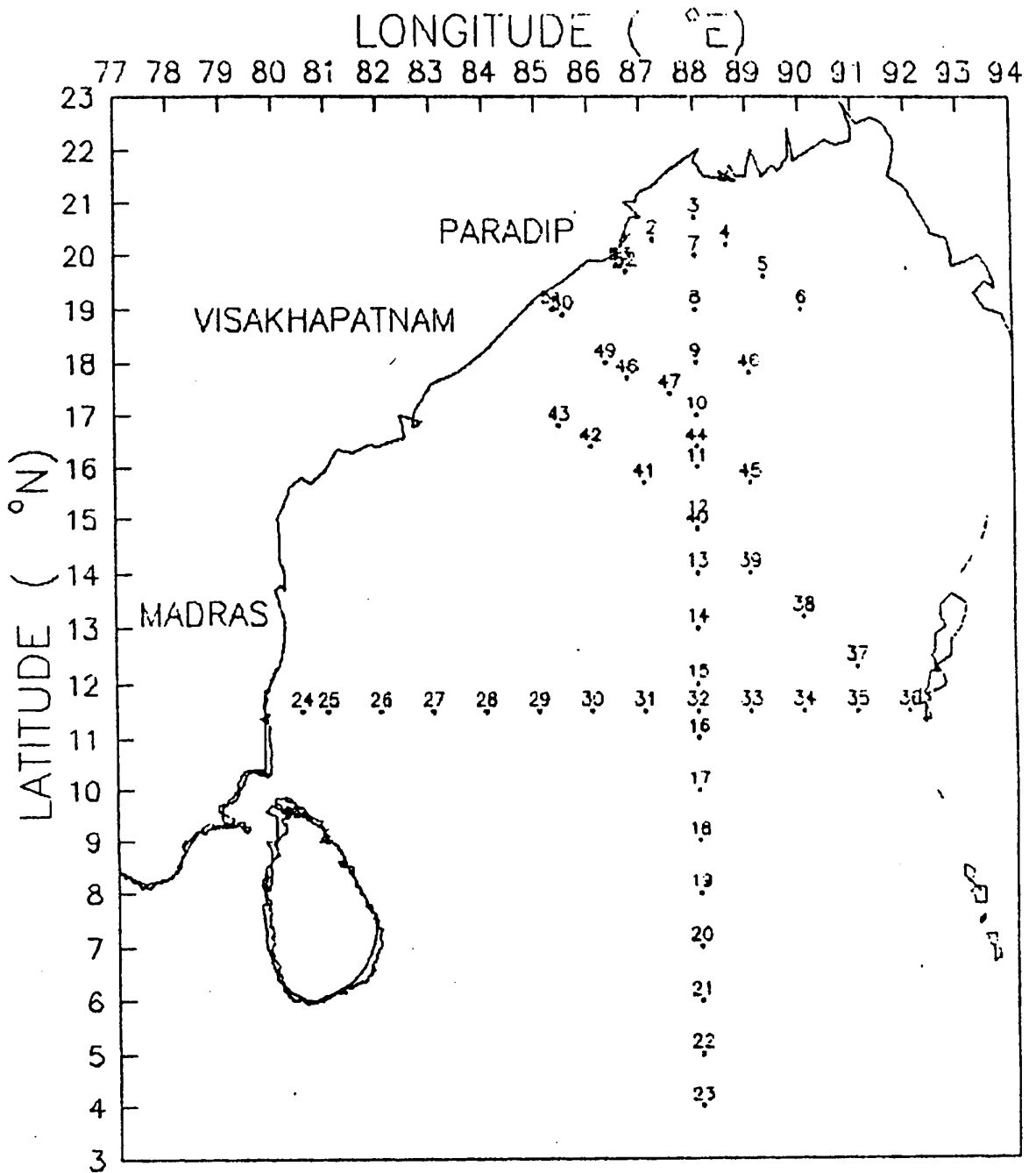
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REPORT ON THE 113TH OCEANOGRAPHIC CRUISE OF ORV SAGAR KANYA

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CRUISE TRACK OF ORV SK 113

2. CRUISE SUMMARY

Cruise 113 of ORV Sagar Kanya was organised in the Bay of Bengal to investigate the oceanographic conditions during the pre- monsoon season. The cruise started from Paradip Port on 23 May, 1996 and terminated at the same port on 21 June. Fifty three hydrographic stations were covered using Sea-Bird C.T.D. system (model SBE-II). Hydrocasts were also done using 51 capacity Niskin bottles at selected stations to study the particulate matter composition. Routine nutrient analyses were made onboard from the water samples collected using Rossette samplers of 1.71 capacity. Zooplankton samples were collected by horizontal towing for 30-60 minutes at each station to know the zooplankton diversity and their biochemical composition. Surface meteorological data were collected at 3 hourly intervals and at the CTD stations. Upper air data were also collected daily at synoptic hours (0000 Z and 1200 Z) throughout the observation period.

3. PARTICIPANTS

3.1 Scientific component

V.V. Sarma,	) —	Chief Scientist
B. Prabhakara Rao)	
G.V.M. Gupta)	
M.N. Srinivas	) —	NIO Regional Centre,
P.M.N. Shastri	) —	Visakhapatnam.
M.V. Subrahmanyam)	
D. Jyothi)	
Y. Supraveena)	
V.S.N. Murty	) —	NIO, Goa
C. Ganesh)	
I. Nageswara Rao)	
R. Ratna Kumari	) —	Andhra University
Ch.Ch. Satyanarayana)	
G. Krupanidhi)	
B.M. Nayal)	
K.C. Kori	) —	India Meteorological
G.S. Murti	) —	Department
D.K. Borthakur)	
A.Y. Satam)	
S. Chandrasekharan	) —	Indian Navy
C.V. Rama Rao)	
C. Rajagopalan	) —	NORINCO
M. Mohandas)	
G.R. Mangalorekar	) —	CMC Ltd.

3.2 Ship's complement

Capt. R.M. Verma	) —	Master
M.S. Pangtey	) —	Chief Officer
S.K. Jha	) —	2nd Officer
A. Jeykumar	) —	AWKO
U. Gurayya	) —	AWKO
S. Roy	) —	Medical Officer
V.C. Chandran	) —	Radio Officer
R.G.S. D'Silva	) —	Purser
D. Sen	) —	Ch. Eng. Officer
B. Singhe	) —	2nd Eng. Officer
R.P. Ghosh	) —	3rd Eng. Officer
H.K. Jain	) —	3rd Eng. Officer
P.K. Ekka	) —	4th Eng. Officer
N. Tomar	) —	5th Eng. Officer
P.J. Valsan	) —	Elec. Officer
D.P. Sharma	) —	Elec. Officer

4. OBJECTIVES

The main objectives of the cruise were to study (i) the surface heat fluxes, circulation and volume transport with respect to warm-pool and (ii) the composition of particulate matter and zooplankton diversity during the premonsoon season in the scheduled transects of the Bay of Bengal. A meridional section along 88°E from 20°N to 4°N, a latitudinal section along 11°30'N from 80°30'E to 92°E and four transects covering the central and northern Bay of Bengal were selected for the present study. These studies will be useful to evaluate the circulation pattern, volume transports and chemical composition of particulate matter in the Bay of Bengal.

5. CRUISE DETAILS

All the participants boarded the vessel on 21 May 1996 at Paradip Port and the ship sailed off at 0900 hrs on 23 May. CTD operations started after reaching the first station of the study area (19°48.3'N and 86°29.5'E) on the same day.

Data were collected on temperature and salinity at all the 53 stations during the cruise. Water sampling for nutrient analysis was done for every alternate station by CTD Rossette System for routine analysis of chemical parameters onboard. Hydrocast operations were made at selected stations to collect the samples for particulate matter. Zooplankton samples were collected at 45 stations. Surface meteorological data was collected at three hourly intervals for computation of fluxes. A surface drifting buoy was deployed during the cruise. After completing the work, the vessel berthed at Paradip Port at 1200 hrs of 21 June, 1996.

6. SYNOPSIS OF OBSERVATIONS

The following operations were carried out:

1. CTD operations for hydrographic data up to 2500 m along the cruise track.
2. Water sampling with CTD Rossette system using 1.7 l Niskin samples at selected stations and the sample analysis for dissolved oxygen, nitrate, nitrite, ammonia, phosphate and silicate. The samples were also filtered and preconcentrated to estimate the particulate and dissolved trace metals.
3. Hydrocast operations were made at selected stations and water samples collected at 10,30,50,75,100,150 and 200 m depths in the euphotic zone were filtered on separate filter papers to estimate five different parameters, viz., POC, POP, PON, BSi and LSi to know the particulate matter composition.
4. Zooplankton samples were collected at 45 stations and the samples were preserved separately to study their diversity and chemical composition.
5. Primary productivity experiments, vertical hauling of plankton net for zooplankton and phytoplankton samples in the different depths of euphotic zone at few stations were also made.
6. Surface meteorological observations at three hourly intervals were made to study the surface heat energy fluxes. Radiosonde ascents were taken at 0530 and 1730 hrs daily. A total of 52 radiosonde ascents were taken.
7. A drifting buoy with I.D. No. 11353 was deployed at 11°30'N and 84°E on 7 June. The salient features of preliminary data analysis during this cruise are as follows:

- a) The sea surface temperature varied between 29.8°C and 31.7°C during the period of observations with higher SST in the southern bay where 'glossy' surface conditions prevailed under low winds and intense insolation. The northern bay (16°N) experienced higher winds and clouds both at the beginning (23 to 27 May) and at the end (9 to 19 June) of observations.
- b) The geostrophic flow pattern in the study area showed a "double gyre" circulation with anticyclonic gyre in the northern bay (13°N-17°N) and a cyclonic gyre in the southern bay (6°N- 13°N) with an east-west extension between 85°E and 92°E along 11°30'N. A "front-like structure" was noticed at 18°N at the northern periphery of the northern anticyclonic gyre. The flow pattern further showed the presence of northeastward flowing western boundary current (WBC) of Bay of Bengal.
- c) A well developed subsurface chlorophyll maximum coincides with the depth of the mixed layer, depth of the top of the thermocline and the depth of the static stability in the entire study region.
- d) The computed geostrophic volume transports across 88°E indicate a weak westward transport of $1.35 \times 10^6 \text{ m}^3/\text{s}$ in the upper 1000 m between 4°N and 20°N whereas an influx (northward transport) of about $7 \times 10^6 \text{ m}^3/\text{s}$ across 11°30'N section between 80°30'N and 92°E. A two layer structure in the transport with eastward transport in the upper 200 m and a slightly higher westward transport between 200 m and 1000 m was noticed across 88°E. The volume transport across Visakhapatnam - Port Blair transect is about $4 \times 10^6 \text{ m}^3/\text{s}$ and directed towards western bay. This together with the above influx gives rise to the northeastward transport of the WBC to be about $11 \times 10^6 \text{ m}^3/\text{s}$.

7. PERFORMANCE OF ONBOARD EQUIPMENT

1. CTD system worked well throughout the study period. However, a cable length of 400 m was cut off keeping in view of the safety of the equipment as the wire appeared to be worn out.
2. PC-Floppy drive was malfunctioning.
3. Hydrographic winch was working well even though oil leakage problem persisted.
4. INS, echosounder and wave recorder worked well.
5. Autoanalyser was used only for silicate system. Even though the instrument was kept in operation, the setting of zero in the photometers gave occasional problem for nitrite, nitrate channels and hence most of the nutrient estimations were done by spectrophotometer.

8. LOSS/DAMAGE OF EQUIPMENT

A plankton net with flowmeter was lost during the operations at station 46 on 15 June.

9. ACKNOWLEDGEMENT

The Chief Scientist is grateful to the Master, Officers and crew members of Sagar Kanya for their cooperation in making the cruise a success.

SUMMARY OF OBSERVATIONS

SHIP: ORV SACAREANYA

CRUISE NO: SK113

STN	LATITUDE		LONGITUDE		DATE	TIME (LST)	SONIC DEPTH (m)	OBSERVATIONS					NET		
	(N)		(E)					CTD	MP	WR	NC	HO	ST	HOR	VER
01	19	48.5	86	29.5	23.5.96	1300-1410	0045	X	X	X	X	-	-	X	-
02	20	18.2	87	11.9	23.5.96	1935-2030	0045	X	X	X	X	-	-	X	-
03	20	41.6	88	00.0	24.5.96	0220-0400	0080	X	X	-	X	-	-	X	-
04	20	11.9	88	35.7	24.5.96	0935-1155	0400	X	X	-	X	-	-	X	-
05	19	35.9	89	18.4	24.5.96	1745-2000	1700	X	X	-	X	-	-	X	-
06	19	01.1	90	00.0	25.5.96	0200-0420	1700	X	X	X	X	-	-	X	-
07	19	59.9	87	59.8	25.5.96	1920-2230	0220	X	X	X	X	X	X	X	-
08	19	00.0	88	00.0	26.5.96	0600-0825	2156	X	X	X	X	-	-	X	-
09	18	00.0	88	00.0	26.5.96	1555-2020	2200	X	X	X	X	X	X	X	-
10	17	00.0	88	00.0	27.5.96	0500-0730	2500	X	X	X	X	-	-	X	-
11	16	00.0	88	00.0	27.5.96	1640-2145	2734	X	X	X	X	X	X	X	-
12	15	00.0	88	00.0	28.5.96	0720-1015	2800	X	X	X	X	-	-	X	-
13	14	00.0	88	00.0	28.5.96	1720-2055	3000	X	X	X	X	X	X	X	-
14	13	00.0	88	00.0	29.5.96	0410-0705	3000	X	X	X	X	-	-	X	-
15	12	00.0	88	00.0	29.5.96	1355-1800	3100	X	X	X	X	X	X	X	-
16	11	00.0	88	00.0	30.5.96	0100-0415	3100	X	X	X	X	X	X	X	-
17	10	00.0	88	00.0	30.5.96	1130-1600	3400	X	X	X	X	X	X	X	-
18	09	00.0	88	00.0	30.5.96	2330-0500	3500	X	X	X	X	-	-	X	-
19	08	00.0	88	00.0	31.5.96	1155-1600	4050	X	X	X	X	X	X	X	-
20	07	00.0	88	00.0	31.5.96	2220-0120	3700	X	X	X	X	-	-	X	-
21	06	00.0	88	00.0	01.6.96	0725-1110	3850	X	X	X	X	X	X	X	-
22	05	00.0	88	00.0	01.6.96	1730-2200	4000	X	X	X	X	-	-	X	-
23	04	00.0	88	00.0	02.6.96	0450-0940	3900	X	X	X	X	X	X	X	-
24	11	30.0	80	30.0	05.6.96	1025-1145	0650	X	X	X	X	X	X	X	-
25	11	30.0	81	00.0	05.6.96	1700-2030	3200	X	X	X	X	-	-	X	-
26	11	30.0	82	00.0	06.6.96	0240-0705	3520	X	X	X	X	X	X	X	-
27	11	30.0	83	00.0	06.6.96	1400-2200	3500	X	X	X	X	X	X	X	-
28	11	30.0	84	00.0	07.6.96	0540-0800	3520	X	X	X	X	-	-	X	-
29	11	30.0	85	00.0	07.6.96	2000-2350	3450	X	X	X	X	X	X	X	-
30	11	30.0	86	00.0	08.6.96	0600-1130	3500	X	X	X	X	X	X	X	-
31	11	30.0	87	00.0	08.6.96	1915-2115	3400	X	X	X	X	-	-	X	-
32	11	30.0	88	00.0	09.6.96	0345-0635	3300	X	X	X	X	X	X	X	-
33	11	30.0	89	00.0	09.6.96	1310-1535	3200	X	X	X	X	-	-	X	-
34	11	30.0	90	00.0	09.6.96	2215-0115	3100	X	X	X	X	X	X	X	-
35	11	30.0	91	00.0	10.6.96	0100-1000	3200	X	X	X	X	-	-	X	-
36	11	30.1	91	59.6	10.6.96	1810-2100	0900	X	X	X	X	X	X	X	-
37	12	17.9	91	00.0	11.6.96	0503-0835	3100	X	X	X	X	X	X	X	-
38	13	12.0	89	59.9	11.6.96	1555-1930	2900	X	X	X	X	X	X	X	-
39	14	00.0	89	00.0	12.6.96	0230-0520	2900	X	X	X	X	-	-	X	-
40	14	47.8	88	00.0	12.6.96	1225-1530	2800	X	X	X	X	X	X	X	-
41	15	42.0	87	00.0	12.6.96	2325-0125	2800	X	X	X	X	-	-	X	-
42	16	25.3	85	58.0	13.6.96	1000-1208	2800	X	X	X	X	-	-	X	-
43	16	45.9	85	20.9	13.6.96	1750-1920	2800	X	X	X	X	-	-	X	-
44	16	29.9	88	00.0	14.6.96	1500-1720	2700	X	X	X	X	-	-	X	-
45	15	42.1	88	59.9	15.6.96	0130-0300	2700	X	X	X	X	-	-	X	-
46	17	47.9	89	00.0	15.6.96	1710-1845	2200	X	X	X	X	-	-	X	-
47	17	23.3	87	28.3	17.6.96	1640-1755	2400	X	X	X	X	-	-	X	-
48	17	42.5	86	42.5	18.6.96	0200-0330	2600	X	X	X	X	-	-	X	-
49	18	00.0	86	18.9	18.6.96	0920-1030	2700	X	X	X	X	-	-	X	-
50	18	52.0	85	28.3	18.6.96	2030-2145	1200	X	X	X	X	-	-	X	-
51	18	59.5	85	17.3	18.6.96	2335-0000	0200	X	X	X	X	-	-	X	-
52	19	41.1	86	41.7	19.6.96	1105-1155	0900	X	X	X	X	-	-	X	-
53	19	46.8	86	36.0	19.6.96	1305-1330	0200	X	X	X	X	-	-	X	-