CRUISE REPORT

ORV SAGAR KANYA

Cruise No. 108

(14 - 31 December, 1995)

राष्ट्रीय समुद्र विज्ञान
संस्थान
NATIONAL INSTITUTE
OF
OCEANOGRAPHY

ORV SAGAR KANYA

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(14 - 31 December, 1995)

NATIONAL INSTITUTE OF OCEANOGRAPHY

(Council of Scientific and Industrial Research)

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REPORT ON THE 108TH OCEANOGRAPHIC CRUISE OF O.R.V. SAGAR KANYA

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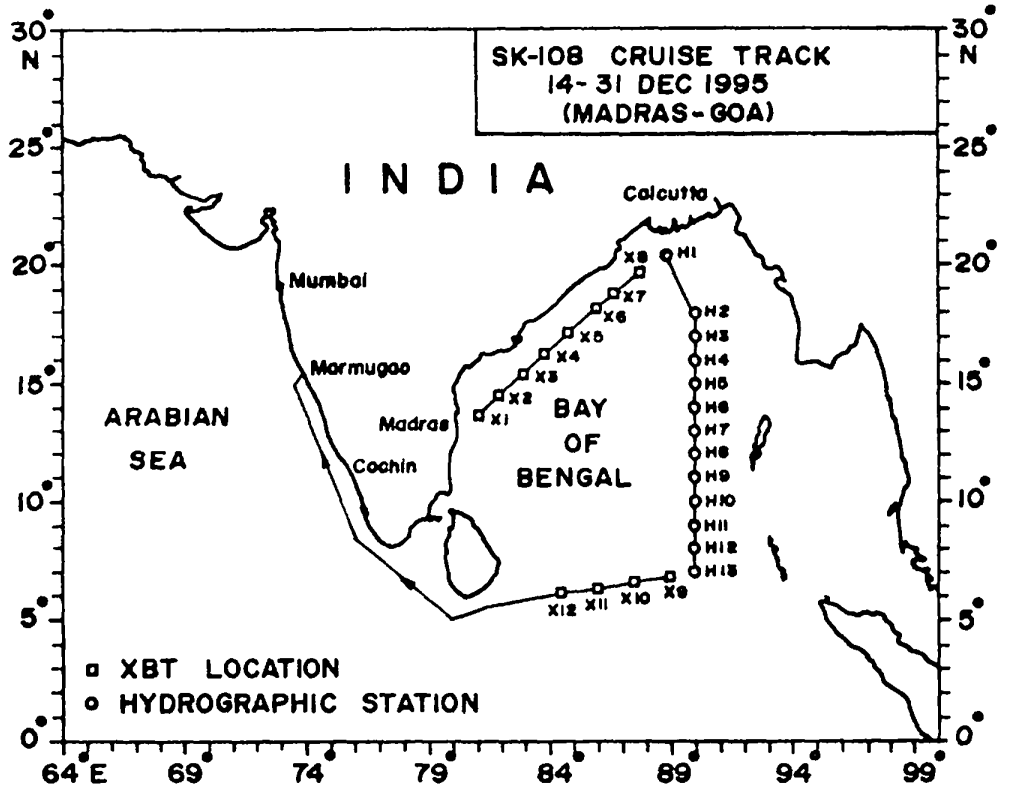
SK-108 CRUISE TRACK
14- 31 DEC 1995
(MADRAS-GOA)
INDIA
Calcutta
Mumbai
Marmugao
Madras
Cochin
ARABIAN
SEA
BAY
OF
BENGAL
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
H1
H2
H3
H4
H5
H6
H7
H8
H9
H10
H11
H12
H13
XBT LOCATION
HYDROGRAPHIC STATION
30° N
25°
20°
15°
10°
5°
0°
64° E
69°
74°
79°
84°
89°
94°
99°

2. CRUISE SUMMARY

The observational area for the cruise 108 of ORV Sagar Kanya was in the Bay of Bengal. The cruise was planned to collect the depth profiles of temperature and salinity at one degree interval along WOCE designated IR5 section which runs from the northern Bay of Bengal towards south along 90°E for estimating the zonal volume transport during winter monsoon. A total of 13 stations were occupied for CTD operations. Biological and water samples were collected at some locations along the section for primary and secondary productions, microbiological and chemical studies. A shallow station at 20°24'N and 88°40'E in the northern Bay of Bengal was occupied for 24 hours and sediment traps at three different depths (70, 125 & 175m) were deployed for microbiological assay and chemical analysis of the suspended sediment matter. The ship sailed from Madras on 14 December 1995 and reached Mormugao on 31 December, 1995 at the end of the cruise.

3. PARTICIPANTS

3.1 Scientific Component

V. Ramesh Babu, *Chief Scientist*	)	
G. Nampoothiri	)	
Sunoj Raikar	)	
A.L. Rao	)	
P.V. Bhaskar	) —	NIO, Goa
Sindhu Ramachandran	)	
Yashoshri Srivastava	)	
Linete Martins	)	
Ganesh Chandavale	)	
Sameer Terdelkar	) —	Goa University
Cdr. M. Sarangapani	) —	Indian Navy
S.A.S. Mohammad	)	
V.S. Rajaraman	) —	Norinco Pvt. Ltd.
Biju V. Nair		

3.2 Ship's Complement

Capt. K.K. Reddy	) Master
M.S. Pangtey	) Chief Officer
S. Swaminathan	) Addl. Chief Officer
A. Jayakumar	) Navigating Officer
V.C. Chandran	) Radio Officer
S. Murthy	) Medical Officer
R. Saldanha	) Purser
S. Janaka	) Chief Engineer
G.J. Rao	) 2nd Engineer
R.P. Ghosh	) 3nd Engineer
M.N. Muraleedharan	) 3nd Engineer
D. Singh	) 4th Engineer
K.P. Mishra	) 5th Engineer
K. Pandey	) Electrical Officer
P.J. Valsan	) -do-
R.M. Fernandes	) Catering Officer

4. OBJECTIVES AND CRUISE PLAN

This cruise was originally proposed to achieve the following objects:

(i) to estimate the zonal volume transport across WOCE section IR5 in the Bay of Bengal during summer monsoon season.

(ii) to evaluate the secondary productivity in the Bay of Bengal.

The original plan was to collect the depth profiles of temperature and salinity at 28 hydrographic stations at one degree interval along WOCE section upto 8°S latitude. Studies on primary production, chemical and microbiological assay of the suspended matter were also included at a later stage since concerned investigators had shown keen interest to take observeations along the proposed cruise track. However, due to delay in the commencement of cruise by nine days from Madras on account of ship's operational (mainly port congestion) problems, the section upto 7°N was covered by occuping 13 hydrographical stations.

The Norinco engineers took inventory of all the scientific equipment and their manuals & spares on board the ship. They also carried out repairs and servicing of some of the equipment in various ship laboratories in connection with their annual maintenance contract with DOD.

5. CRUISE DETAILS

Thirteen hydrographic stations including a 24 hour duration station (No.1) were occupied during the cruise. The ship left Madras on 14 December 1995. On way to first station eight expendable bathythermogrph (XBT) observations were taken up at a spatial interval of one degree latitude approximately as a part of Indian-TOGA programme. Surface meteorological observations were also made every day at standard three-hourly synoptic hours except at 2330 hrs IST under NIO's sea-truth collection programme. The ship reached the first hydrographic station at 20°24'N and 88°40'E on 18 December 95 and sediment traps at 70, 125 and 175 m depths were deployed for 24 hours after the operations of CTD, zooplankton net and water sampling. It was estimated that the ship had drifted a total distance of about 7 nautical miles towards southwest during 24-hourly interval. On way to station 2, the ship was diverted to Paradip for disembarking the Assistant Catering Officer after receiving a message that his wife was seriously ill. The ship had reached station 2 on the night of 20 December, 1995 and resumed scientific operations. The last hydrographical station (No.13) was occupied at 7°N, 90°E during the morning of 25 December, 1995. On way to Goa, a WOCE drifting buoy with identification No.1510 was deployed at 5°N & 80°E on 26 December. The cruise was ended at Mormugao port on 31 December, 1995.

The CTD data were processed on board the ship using Sea Bird's software provided with CTD system. Water samples collected at seven stations (0,50,150,250,500,1000 and 1500 m depths) were analysed for nutrients and carbohydrate concentrations both in dissolved and particulate states. The nutrient estimations were carried out by spectrophotometric method and dissolved oxygen by Winkler's sodium thiosulphate titration method. The filtered water samples were used for the analysis of Particulate Organic Carbon (POC) and stored at -20°C for carrying out total polysaccharide analysis by MBTH method and for dissolved carbohydrate studies. The particulate sediment samples obtained from the first hydrographical station were used for microbiological assay, chlorophyll *a* analysis and for estimating total carbohydrate and POC. In addition, chlorophyll *a* meas-

urements in the water column of the upper 250 m layer was also made by both spectrophotometric and fluorometric analysis.

Zooplankton samples were collected using vertical haul of H.T. net from 200m depth and also by a horizontal trawling of a Bongo net at the surface for 15-20 minutes. Flowmeters were attached to the nets for estimating the amount of water passed across the mouths of the nets. A splitter was used to split the samples into two sub-samples. One sub-sample was fixed in 4% formalin for the purpose of identification and enumeration of the zooplankton species while the other sub-sample was fixed for cytogenetic studies later. A part of the zooplankton samples of each station was also shared by Goa University. The participant from the Goa University carried out analysis of water samples collected at surface and 150 m depths for estimating parameters like pH, chloride, alkalinity, hardness, calcium, magnesium and sulphate using a water testing kit.

6. PRELIMINARY RESULTS

Intensive thermal inversions of about 1.5°C rise in temperature in the upper 75 m layer were conspicuous towards the north of 17°N along WOCE section IR5. Except in the northern part, the mixed layer temperature varied between 27° and 28°C. Further, the thermocline was somewhat intensive in the southern part between 7° and 10°N. The density (Sigma-t) structure showed the presence of lighter surface waters in the north indicating that surface dilution was the main influencing factor of the density structure in the upper 50 m.

Chlorophyll *a* estimates were quite high reaching peak values in the layer of 50-75 m depth. In general, in the upper 1500 m, the NO_2-level was found to be negligible in all depths whereas NO_3-level was found to increase upto 250 m and thereafter, it decreased. The minimum dissolved oxygen levels were encountered between 150 and 500 meters.

The biomass of zooplankton gradually decreased southward along WOCE IR5 section and it was also observed that night and early morning collection samples had more biomass and species composition than those of the day time. Of all the groups, copepods were the most abundant.

7. WEATHER

The sea state was, in general, characterised with small and medium waves in the first week of the cruise while during the second week, the sea became moderately rough with sea state number reaching upto 5. However, the sea state number fell down to 2 while ship was travelling along the west coast of India during last few days of the cruise. Weather was fair most of the time.

8. SUGGESTIONS

It is suggested that,

a) Spare PCB's for HCL PCS in the Dry lab (Port side) may be provided together with a system diskette.

b) Necessary step may be taken up to arrange the repair of the units/systems (For eg: INS computer) which are not presently under annual maintenance contract of NORINCO.

c) Special provisions may be applied for ORV Sagar Kanya in order to treat the vessel on par with passenger and naval ships regarding berthing facilities and other supplies at every port of call. This is very important at some of the congested ports like Madras where delays due to ship's waiting for berth are considerably affecting the cruise schedules beyond our control and thereby the scientific work.

9. ACKNOWLEDGEMENTS

The Chief Scientist and other participants acknowledge with thanks, the cooperation given by the ship's officers and crew during the cruise.

Table 1: Details of hydrographic stations during Sagar Kanya Cruise 108

STATION NO.	DATE	TIME (IST)	LAT. (N)	LONG. (E)	SONIC DEPTH (m)	CTD SAMP-LING DEPTH (m)	WATER SAMPLING DEPTHS		ZOOPLANKTON		OTHERS
							PRIMARY PRODUCT-IVITY (0,5,10, 25,50,75, 100 M)	CHEMICAL & CARBOHYDR-ATE ANALY-SIS (75, 100,150,250, 500,1000, 1500 M)	HT NET (0-200 M)	BONGO NET (SURFACE)	
XBT/01	15.12.95	0724	13°42'	81°04'	3145	X	X	X	X	X	X
XBT/02	15.12.95	1953	14°31'	81°56'	3300	X	X	X	X	X	X
XBT/03	16.12.95	0612	15°25'	82°54'	3300	X	X	X	X	X	X
XBT/04	16.12.95	1511	16°14'	83°45'	3000	X	X	X	X	X	X
XBT/05	16.12.95	2324	17°01'	84°45'	2900	X	X	X	X	X	X
XBT/06	17.12.95	0827	18°07'	85°55'	2300	X	X	X	X	X	X
XBT/07	17.12.95	1402	18°44'	86°37'	2100	X	X	X	X	X	X
XBT/08	17.12.95	2334	19°40'	87°46	1800	X	X	X	X	X	X
H/01	18.12.95	0712-1050	20°24'	88°40'	205	(190)	#	X	#	#	Sediment trap(70, 125,175m)
H/02	20.12.95	2100-0130	18°00'	90°00'	2070	(2000)	#	#	#	#	X
H/03	21.12.95	0730-1025	17°00'	90°00'	2350	(2200)	#	X	#	#	X
H/04	21.12.95	1630-2030	16°00'	90°00'	2520	(2350)	#	X	#	#	X
H/05	22.12.95	0310-0635	15°00'	90°00'	2590	(2400)	#	#	#	#	X
H/06	22.12.95	1305-1600	14°00'	90°00'	2800	(2600)	#	#	#	#	X
H/07	22.12.95	2145-0125	13°00'	90°00'	2950	(2800)	#	#	#	#	X
H/08	23.12.95	0720-1035	12°00'	90°00'	3100	(2900)	#	#	#	#	X
H/09	23.12.95	1650-1905	11°00'	90°00'	3200	(3000)	#	X	#	#	X
H/10	24.12.95	0135-0425	10°00'	90°00'	3280	(3000)	#	#	#	#	X
H/11	24.12.95	1135-1400	09°00'	90°00'	3000	(2800)	#	X	#	#	X
H/12	24.12.95	2010-2345	08°00'	90°00'	3275	(3000)	#	X	#	#	X
H/13	25.12.95	0550-0855	07°00'	90°00'	2600	(2400)	#	#	#	#	ˇ
XBT/09	25.12.95	1412	06°53'	89°00'	3700	X	X	X	X	X	X
XBT/10	25.12.95	2322	06°40'	87°30'	3800	X	X	X	X	X	X
XBT/11	26.12.95	0818	06°28'	86°00'	3750	X	X	X	X	X	X
XBT/12	26.12.95	1623	06°08'	84°30'	3950	X	X	X	X	X	X

X = not operated
# = operated