

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

CRUISE No. 41

22nd April to 16th May 1988



**National Institute of Oceanography
Dona Paula-403 004, Goa
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NATIONAL INSTITUTE OF OCEANOGRAPHY
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41st Oceanographic cruise of O.R.V.
Sagar Kanya

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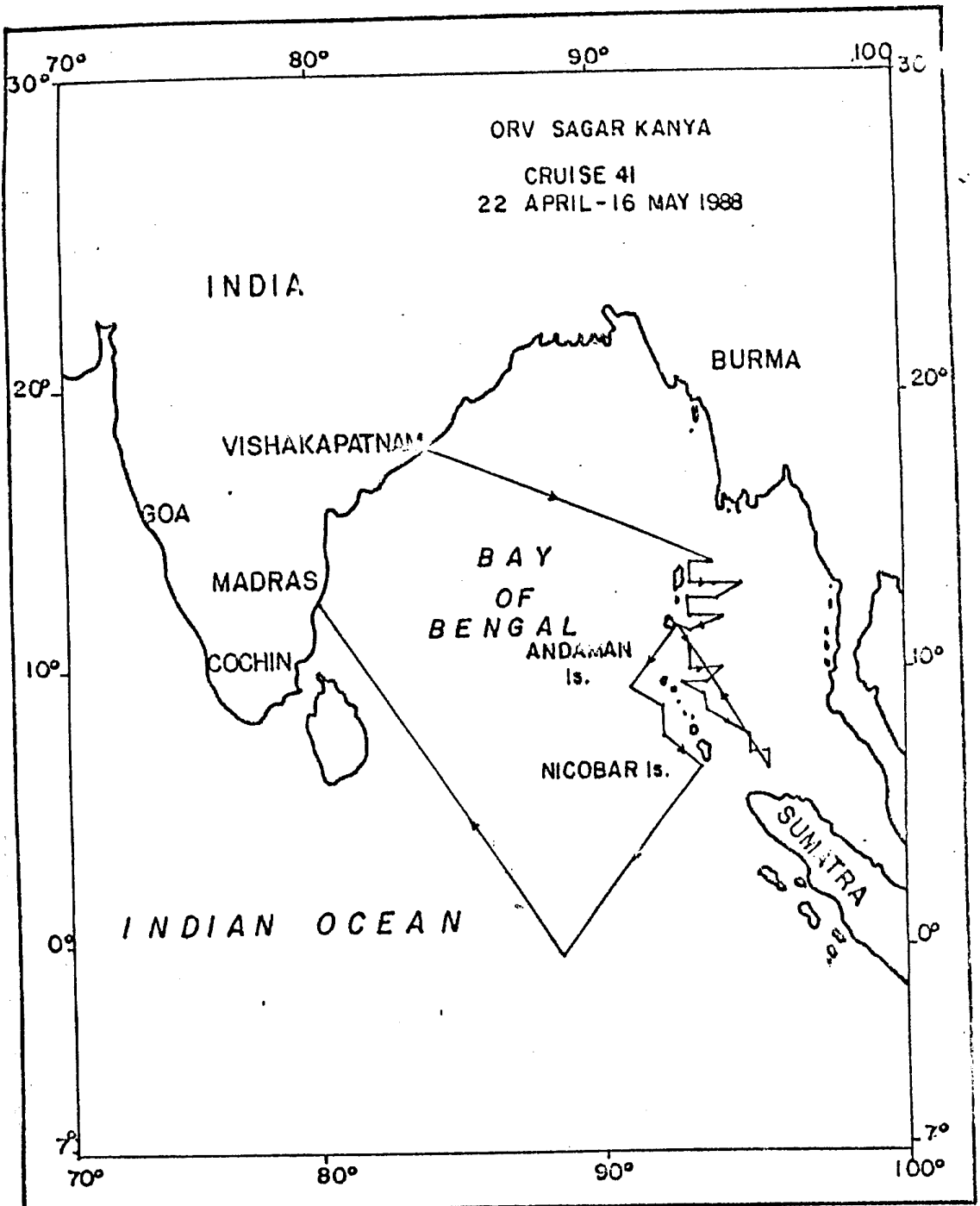
REPORT ON THE 41st OCEANOGRAPHIC CRUISE OF O.R.V. SAGAR KANYA

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Table 1: Performance chart

1. CRUISE TRACK AND STATION LOCATIONS



2. CRUISE SUMMARY

The duration of the cruise was 25 days from 22nd April to 16th May, 1988. The port of embarkation was Visakhapatnam and the party disembarked at Madras port. During this cruise, 26 oceanographic stations were occupied in the Andaman Sea with a view to understand the biological productivity and food chain of the area. Twenty two stations were occupied in the Eastern Andaman Sea and four in the western Andaman Sea. Meteorological observations from the Southern Bay of Bengal, just prior to the onset of the South West Monsoon, was the other objective of the cruise which was attained. Two balloon flights were conducted every day from 14°N Equator except when the vessel was within 100 km of Port Blair, another meteorological observation centre. In addition, a shore team of 9 scientists carried out onshore studies in and around Port Blair, visiting five sites, on the rich and varied fauna and flora of the Andaman Islands.

3. PARTICIPANTS

a) Scientific component

S.R. Sreekumaran Nair

- Chief Scientist

Joseph P. Royan
L. Krishnakumari
Lata Raghukumar
Maria M. Menezes
Joaquim I. Goes
V. Subramaniam
Helga R. Gomes
Vijaya Ambiyé
M.S. Hussain
Pradeep Joshi

Biological Oceanography
Division, N.I.O., Goa

S.S. Sawant
T.V. Raveendran
Seema Potdar

Marine Corrosion & Materials
Research Division, N.I.O.

A. Sarkar

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Division, N.I.O.

Corneil L. Rodrigues
Debbi F. Fernandes

Marine Science Dept.,
Goa University, Goa

M. Vishnumurthy

Dept. of Chemistry,
Andhra Univ., Waltair

B. Simon

Meteorological Dept.
SAC, Ahmedabad

R. Goel
C.V. Zende
S.K. Dey
K. Gupta
Rajni Kant
D.P. Dubey

India Meteorological Dept.
New Delhi.

b) Ship's complement

M.V. Agarkar	Master
C. Carneiro	Chief Officer
M.A. Khot	Second Officer
A. Nayyar	Second Officer
S.D. Warke	Chief Radio Officer
P.P.R. Nair	Radio Officer
D.S. Murty	Medical Officer
R.G.S. D'Silva	Purser
R.V. Lad	Chief Engineer
K.I. Singh	Second Engineer
C.T. Dharmik	Third engineer
T. Dasgupta	Fifth Engineer
Mohan Awardi	Electrical Officer
O.P. Bharadwaj	Electrical Officer
R. Fernandes	Catering Officer

4. OBJECTIVES

This cruise was planned to study the oceanography around the Andaman Islands with particular emphasis on biological oceanography and to determine the biological productivity and food chain dynamics of the region. It was also planned to undertake meteorological observations near the Equator around a time near to the onset of the South West Monsoon, and to conduct onshore studies around Port Blair and the Great Nicobar Islands.

5. CRUISE DETAILS

Dep. Visakhapatnam - 22nd April, 1988
Arr. Madras - 16th May, 1988

During this cruise, data on temperature and salinity were collected from 26 and 23 stations respectively. Underwater light measurements within the euphotic column were undertaken at six stations using a Licor quantum sensor. The hydrocast with Niskin bottles was operated to collect salinity samples along with other biological parameters studied while the temperature profile upto 200m was studied with the help of a MBT. Hydrocast samplings were also made to obtain samples for primary productivity estimations, phytoplankton distribution, particulate organic carbon, total suspended matter and chlorophyll estimation. Nutrients viz. nitrate-N, nitrite-N and phosphate-P were estimated from the upper 200 m of the water column at 23 stations. The neuston net was operated to collect the neuston of Andaman Sea and the WP net in vertical hauls to ascertain the zooplankton distribution. Dissolved and particulate trace metals, pH and alkalinity, fluoride and iodide in sea water and pesticides in zooplankton of Andaman Sea were other parameters studied during this cruise. Van Veen grab was operated at all shallow stations to collect sediments for pesticide analysis and macrofaunal composition.

A shore party consisting of 9 scientists worked in and around Port Blair from 29th April to 5th May 1988 and collected samples of various fauna and flora occurring along the rocky and sandy shores.

Scientists from India Meteorological Department conducted surface, (8 per day) upper air(2 per day) meteorological observations all along the cruise track except when the vessel was within 100 km from Port Blair. At the end of the cruise track, a run to the Equator was undertaken to make meteorological observations on the onset of the South West Monsoon.

6. SYNOPSIS OF OBSERVATIONS AND DATA COLLECTED

The synopsis of all stations covered during the cruise along with the observations and its schedule at each station are given in Table 1. A total of 6890 line kilometers were covered during this cruise. Twenty six oceanographic stations were occupied in addition to a run to the Equator to study the upper atmospheric characteristics of the region just around the onset of South West Monsoon.

7. SIGNIFICANT FINDINGS

a) Onshore studies in and around Port Blair:

This work was undertaken by a team of nine scientists, six from N.I.O., two from Goa University and one from Andhra University. The sampling sites were Aberdeen jetty, North Bay, New Wandoor, Corbyn's Cove and Ross Island.

Collections on the dominant fouling and boring organisms of Andaman Island revealed that oysters and barnacles were the most dominant members of the fouling community. Lithophagous coral borers were also observed from the coral beds. Tissues of fouling organisms were collected and preserved for assessing the trace metal accumulation potential of these organisms. Sea water samples were also collected to determine the trace metal concentrations in the seas around the islands and to compare them with those in the organisms studied. Attempts to study the extent and nature of microfouling of metals in Andaman waters could not be continued due to loss of sets of aluminium and stainless steel panels.

Collections were made to study the macro and meiofauna community and sediment characteristics at New Wandoor and Corbyn's Cove beaches. All sampling were made using a quadrat at five meters intervals along a transect extending from High Tide Level to Low Tide Level.

Seaweed samplings made at the above mentioned stations revealed the presence of 39 species of which 14 belonged to Chlorophyta, seven to Phaeophyta and eighteen to Rhodophyta. Galaxaura sp., Halimeda sp., Turbinaria sp. and Padina sp. were found to be the most dominant species. Thalassia sp. was the only sea grass observed in the area of New Wandoor. Species of Galaxaura, Halimeda and Actinotrichia were washed and air dried for studying bioactive substances present in them.

From the intertidal rocky shores region, several algal specimens were collected for examining the occurrence of parasitic and pathogenic fungi. These live algal samples were taken to shore laboratory for further examination. Live specimens of various sponges and corals were processed for associated fungal flora. Also, shells of oysters and barnacles were examined for the presence of shell boring fungi. Several corals in the coral beds around Port Blair were found to be affected by a "black band" type of disease. A cyanobacterium Phorinidium corallyticum is known to have caused similar syndrome in the Atlantic and Pacific coasts. Although detailed study is still required for confirmation, microscopic observations revealed the causal organism to be a cyanobacterium.

Ninety specimens of Rastrelliger kanagurta and A. brachyosoma were collected from Port Blair for population genetic studies and for comparison with those from Goa waters to study genetic diversity.

b) Oceanographic studies around Andaman Islands:

Total suspended matter (detritus) plays an important role in the marine food chain especially in the coralline environs. To assess this from the Andaman Sea, water samples were collected from 20 stations at standard depths ranging from surface to 200 m. Along with this, estimations were carried out for particulate organic carbon and chlorophyll a. Further analysis in shore laboratory will help to quantify the contribution of detritus to the food chain of the region.

Phytoplankton, zooplankton and whole and fragments of shells from sediments were analysed for associated fungal flora. Shell boring fungi in the disphotic zone and the shell boring cyanobacteria in the euphotic zone play an important role in the biodegradation of calcareous matter in the sea. The nitrogen fixing cyanobacterium, the causal organism of red tides, Trichodesmium erythraeum was observed to be present at several stations. T. thiebautii, another related species was found to be abundant at one of the stations. Attempts to culture the former species on board using a special medium enriched with vitamin B-12 as reported earlier by Japanese scientists were made which proved unsuccessful.

Zooplankton samples collected from 26 stations show that these waters are not very rich in them. Neuston samples collected from 21 stations also revealed poor plankton population in the thin surface layer.

Eighteen zooplankton samples and four sediment samples were collected to identify and quantify the residue levels of organochlorine pesticides in this region.

Twenty three stations were occupied for estimation of phytoplankton biomass and primary productivity. Samples were drawn from five discrete depths within the euphotic zone and two within the disphotic zone. From twelve stations phytoplankton samples were fractionated into different size classes viz. (a) picoplankton ($< 1 \mu\text{m}$), (b) nanoplankton ($> 1 \leq 20 \mu\text{m}$) and (c) net plankton ($> 20 \mu\text{m}$). Primary production and biomass estimates were made to assess the contribution of each of these fractions to the total standing crop and total primary productivity of the area studied. Spectral characteristics of natural phytoplankton assemblages within the water column were studied from 12 stations on the basis of their pigment ratios viz. chlorophylls a, b and c, carotenoids and phaeopigments. All estimates were carried out spectrophotometrically. The rate of extracellular production was measured at nine stations in order to assess the impact of environmental stress viz. high light intensity and low nutrients as observed in this area.

The photosynthetic response of natural phytoplankton population subjected to different levels of light intensity was examined in a specially fabricated water cooled incubator using artificial illumination. Light saturation curves

obtained from these series of experiments will be used as a tool to quantify the effects of environmental conditions on phytoplankton photosynthesis and primary production.

8. COMMENTS ON PERFORMANCE AND SUGGESTIONS

Because of rough weather encountered in South Eastern Andaman Sea and also due to the non-availability of full engine power, the effective speed of the vessel had come down. Hence, few stations had to be deleted from the original plan. Considerable delay in obtaining water at Port Blair eventually cost us more than one day. This has forced us to drop the onshore work at Nicobar Island.

The wire rope in the hydrographic winch has rusted and is peeling off preventing smooth passage of messengers and threatens to snap off. About 450 m of it was cut off during this cruise. This needs to be replaced completely and a register be maintained for wire cut off record.

9. LOSSES/DAMAGES

About 400 m of wire rope had to be cut off as it prevented smooth passage of messengers.

10. ACKNOWLEDGEMENTS

The chief scientist and other scientific participants of the cruise wish to express their sincere thanks to the Master, Officers and Crew of O.R.V. Sagar Kanya for their excellent cooperation during the cruise. This report also puts on record the hard work put in by the Engineering Section of the vessel in setting right an engine crisis which was threatening the successful completion of the cruise programme. The help extended to the shore-party scientists by the Director and Superintendent of Fisheries, Port Blair is gratefully acknowledged.

Table 1. Performance chart and synopsis of observations

STN NO.	LATITUDE (N)	LONGITUDE (E)	ARRIVAL		DEPARTURE		DEPTH (m)	MBT	SAL	PHYT.	DETR.	OBSERVATIONS		
			date	time	date	time						MICRO	SED	CHEM
A1	1°59'98"	92°30'	25-4-88	13.15	25-4-88	17.00	2000	X	X	X	X	X	X	X
B1	1°59'62"	93°11'40"	26-4-88	13.00	26-4-88	15.10	80	X	X	X	X	X	X	X
B2	1°59'62"	94°00'02"	26-4-88	03.30	26-4-88	07.15	1500	X	X	X	X	X	X	X
C1	1°59'69"	93°03'33"	26-4-88	20.00	26-4-88	22.15	110	X	X	X	X	X	X	X
C2	1°59'30"	96°00'66"	27-4-88	04.30	27-4-88	07.40	1400	X	X	X	X	X	X	X
C3	1°59'00"	95°00'11"	27-4-88	13.30	27-4-88	17.00	1180	X	X	X	X	X	X	X
D1	1°59'30"	93°05'96"	28-4-88	08.30	28-4-88	11.45	110	X	X	X	X	X	X	X
D2	1°59'86"	93°59'96"	28-4-88	00.50	28-4-88	02.45	2273	X	X	X	X	X	X	X
E1	1°59'42"	93°10'01"	28-4-88	15.00	28-4-88	17.00	100	X	X	X	X	X	X	X
E2	1°59'81"	94°00'05"	30-4-88	02.30	30-4-88	05.00	1726	X	X	X	X	X	X	X
F1	1°59'69"	93°07'80"	28-4-88	20.00	28-4-88	22.15	1500	X	X	X	X	X	X	X
G1	10°30'	93°00'39"	30-4-88	17.00	30-4-88	19.00	1200	X	X	X	X	X	X	X
H1	10°00'	93°00'	30-4-88	7.00	1-5-88	00.30	1500	X	X	X	X	X	X	X
H2	10°00'	92°00'	1-5-88	08.00	1-5-88	10.45	1300	X	X	X	X	X	X	X
I1	9°30'	92°30'	7-5-88	10.00	7-5-88	12.45	850	X	X	X	X	X	X	X
I2	9°30'	93°30'	1-5-88	15.30	1-5-88	18.00	2300	X	X	X	X	X	X	X
J1	9°00'	93°30'	1-5-88	22.00	1-5-88	23.15	1000	X	X	X	X	X	X	X
K1	8°30'	92°30'	7-5-88	20.45	7-5-88	23.00	1500	X	X	X	X	X	X	X
K2	8°29'78"	93°30'	2-5-88	08.00	2-5-88	10.30	1000	X	X	X	X	X	X	X
L1	7°59'75"	94°00'	2-5-88	16.00	2-5-88	18.00	1000	X	X	X	X	X	X	X
M1	7°30'	92°30'	8-5-88	07.45	8-5-88	10.00	1000	X	X	X	X	X	X	X
M2	7°30'	94°00'	2-5-88	22.00	2-5-88	23.20	3000	X	X	X	X	X	X	X
N1	7°00'38"	94°00'79"	3-5-88	02.40	3-5-88	04.14	300	X	X	X	X	X	X	X
N2	6°59'39"	94°30'	3-5-88	08.45	3-5-88	11.00	2000	X	X	X	X	X	X	X
O1	6°29'75"	93°00'48"	8-5-88	18.40	8-5-88	21.10	1280	X	X	X	X	X	X	X
O2	6°29'93"	94°30'07"	3-5-88	14.10	3-5-88	15.30	1440	X	X	X	X	X	X	X