

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

**CRUISE No. 87**

**11th to 22nd September, 1993**



**National Institute of Oceanography  
Dona Paula-403 004, Goa  
INDIA**

NATIONAL INSTITUTE OF OCEANOGRAPHY  
(Council of Scientific & Industrial Research)

Dona Paula, Goa - 403 004.

REPORT ON  
87TH OCEANOGRAPHIC CRUISE OF  
O.R.V. SAGAR KANYA

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O.R.V. SAGAR KANYA

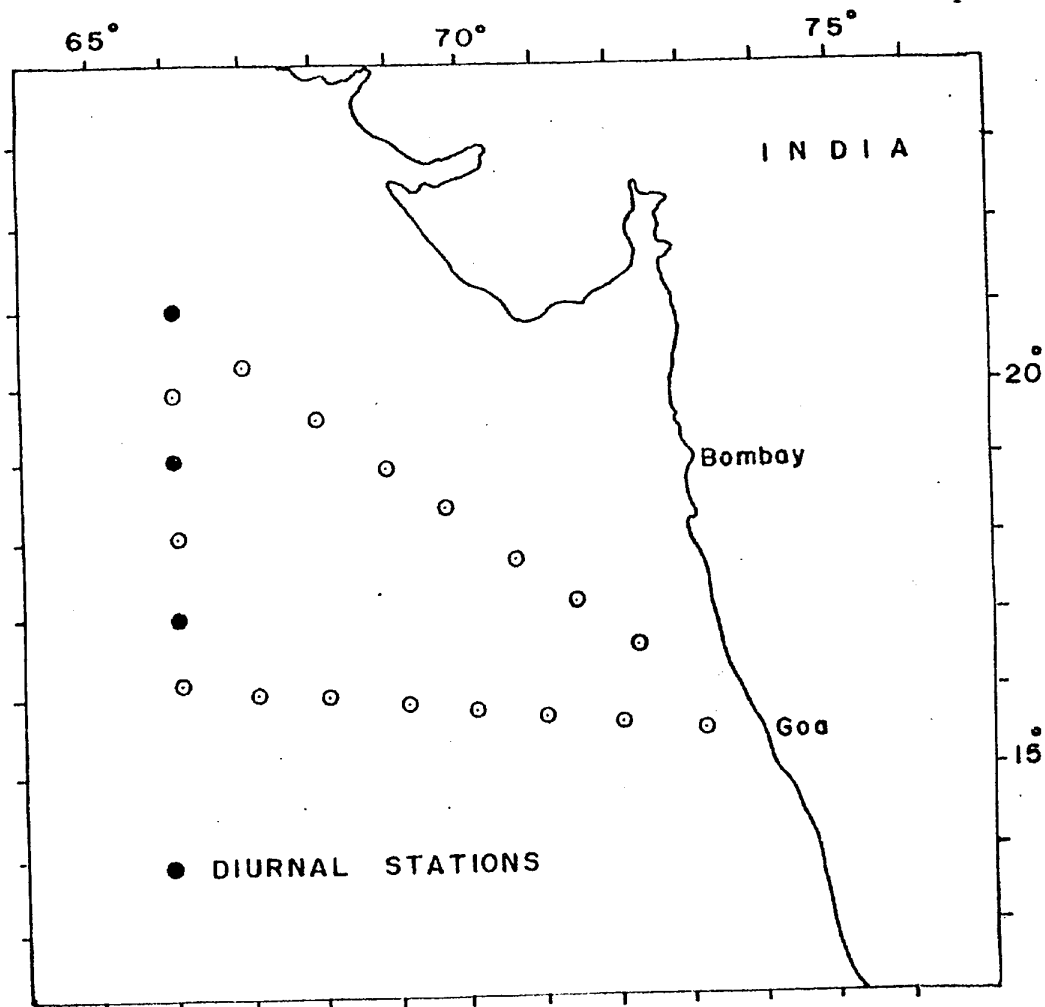
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# JG OFS-INDIA 93 STATION LOCATIONS

ORV Sagar Kanya  
Cruise 87  
11 - 22 Sept 1993



## 2. CRUISE SUMMARY

The 87th cruise of ORV SAGAR KANYA was multidisciplinary. This was the first full-fledged cruise under the JGOFS-INDIA Programme. The ship sailed from Mormugao on 11-9-1993 and proceeded to 17°N. Three diurnal observations at 17°, 19° and 21°N along 66°E were conducted. Apart from this, CTD stations were taken at every 1° throughout the cruise track. Biological and chemical sampling was conducted at some of these stations also.

Altogether 20 stations were worked out. Observations were made on primary production, zooplankton, bacteria, microplankton, zooplankton grazing, nutrients, oxygen, pH, nitrous oxide, total carbon dioxide, etc., apart from CTD. The ship returned to Mormugao on 22 Sept., 1993.

3. PARTICIPANTS

a) Scientific Component :

M. Madhupratap	)	- Chief Scientist
V.P. Devassy	)	
P.M.A. Bhattathiri	)	
C.T. Achuthankutty	)	
S.R.S. Nair	)	
N. Ramaiah	)	
S. Raghukumar	)	
A. Rajendran	)	
M. Dileepkumar	)	
M.D. George	)	
Amal Jayakumar	)	National Institute of Oceanography, Goa.
S.N. de Sousa	)	
H.S. Dalvi	)	
S. Prasanna Kumar	)	
P.M. Muralidharan	)	
M.P. Harikrishnan	)	
V. Subramaniam	)	
A.A. Almeida	)	
P.N. Aravindakshan	)	R.C. of NIO, Cochin
Shyam Lal	)	PRL, Ahmedabad
Tadashi Yoshinari	)	USA

b) Ship's complement :

K. Thankavelu	- Captain
G. Singh	- Chief Officer
V. Shivram	- Second Officer
K.B. Nayar	- Chief Engineer
K.B. Kunhimon	- Second Engineer
V.P.P. Nair	- Ebec. Officer
M. Fernandes	- Ctg. Officer

#### 4. OBJECTIVES AND WORK PLAN

The objective of this cruise was to understand and determine the processes controlling time-varying fluxes of carbon and associated biogenic elements in the Arabian Sea under the JGOFS-India Programme.

The Plan of Work was to continue observations in the northern Arabian Sea from where we had left in the previous JGOFS cruise in September 1992 (SK 77). Accordingly three diurnal stations along 66°E was taken between 17° and 21°N apart from CTD stations at 1° interval.

#### 5. SYNOPSIS OF OBSERVATIONS AND DATA COLLECTED

The ship sailed from Mormugao Harbour on 11-9-93 and arrived back on 22-9-93. The following observations were made :

##### 1. Biology

##### 1.1 Primary productivity

Chlorophyll and productivity measurements were made from 4 and 2 stations respectively. Contribution by different size groups of phytoplankton was also studied.

Vertical distribution of ultraviolet and Photosynthetically Active Radiations, was measured from 11 stations. Profiling Ultraviolet Radiometer was used. Solar light induced natural fluorescence was also measured. UV-radiation in the Arabian Sea was measured for the first time.



## 1.2 Microbiology

Studies were aimed at determining bacterial and thraustochytrid abundances and heterotrophic potential of natural microbial assemblages. Samples were collected from 13 depths at 3 stations both during day and night to understand the diurnal variations. Experiments simulating mixed layer conditions were conducted on board.

## 1.3 Zooplankton

Diurnal sampling of zooplankton from 5 depths (500-0) were done using Multiple Plankton Net. Two additional samples upto 1000 m were taken at two stations. Results indicate poor zooplankton abundance in the oxygen minimum layer and abundance of myctophid larvae at intermediate depths.

## 2. Chemical Oceanography

A total of 7 stations were studied for oxygen, nutrients, pH, total carbon dioxide, alkalinity and nitrous oxide in seawater. Water samples have also been collected for the analysis of dissolved organic carbon and nitrogen isotopes in elemental nitrogen, nitrite, nitrate and nitrous oxide. The general features observed included the northward increasing thickness of the water layers experiencing denitrification and increase in total carbon dioxide towards the north associated with relatively low oxygen concentrations. The shoaled up thermocline

in the north resulted in the higher amounts of nutrients and total carbon dioxide in the shallow layers (50 m) due to regeneration processes. For instance, at the northern stn. 13, the nitrate, phosphate and silicate concentrations at 50 m were 13, 1.26 and 2  $\mu\text{m}$ , respectively, whereas at southern stn. 8, the concentrations at 100 m were 10, 0.89 and 1  $\mu\text{m}$ , respectively. The nitrite concentration observed was 3.5  $\mu\text{m}$  around 250 m at stn. 11 (the highest of 3.9  $\mu\text{m}$  being at 200 m) coinciding with the nitrate decrease.

### 3. Physical Oceanography Programme

Altogether 20 CTD stations were occupied and the depth was on an average 3000 m. Apart from this, the surface meteorological parameters like SST, Dry bulb & wet bulb temperature, wind speed & direction and cloud type and amount was monitored. At 3 of the JGOFS stations the ship drift data was monitored to get a rough picture of the surface current. Water samples were collected at two of the stations and the salinity was estimated by measuring the conductivity with on-board autosal. Wave recorder was operated at 3 stations.

In general, in all the 3 JGOFS stations, the thermal structure showed a mixed layer upto 40-50 m followed by a thermocline upto 200-250 m depth. Salient structure showed the presence of warm high salinity water masses in the top 1000 m layer.

6. ACKNOWLEDGEMENT

The Chief Scientist and other participants of the cruise thank the Captain and his crew for their assistance and cooperation in the successful completion of the cruise.