

DISTRIBUTION RESTRICTED

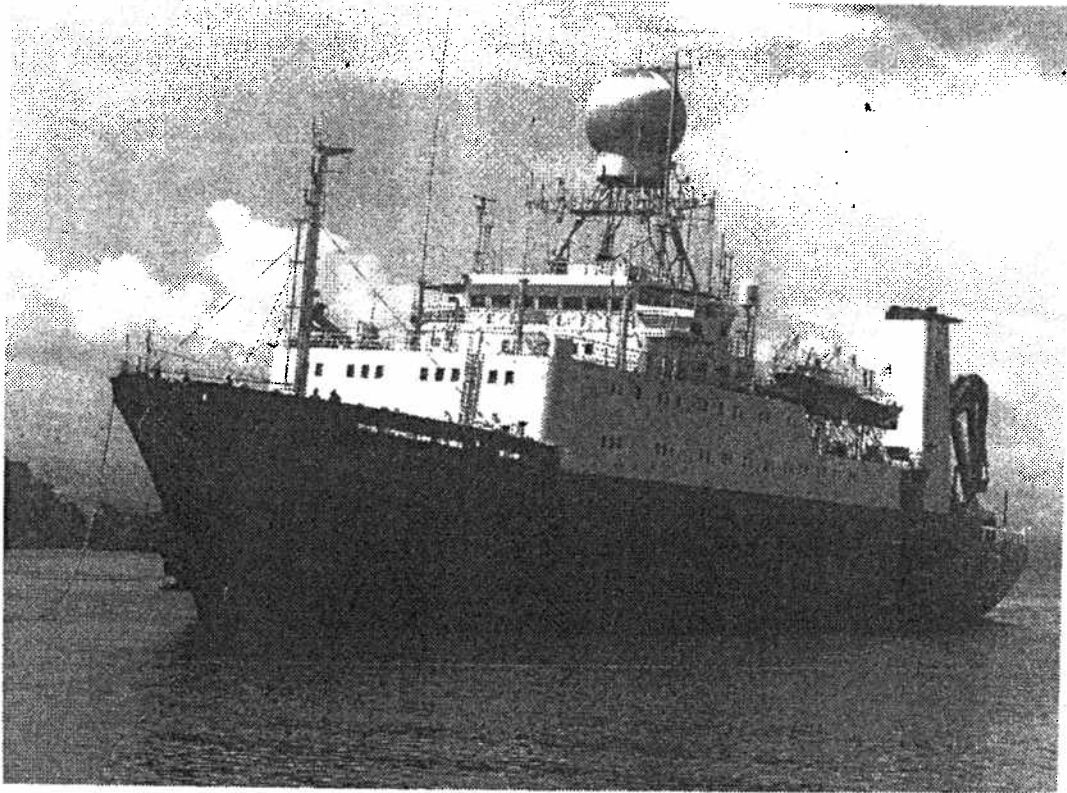
CRUISE REPORT



राष्ट्रीय समुद्र विज्ञान
संस्थान

**NATIONAL INSTITUTE
OF
OCEANOGRAPHY**

Cruise Report
ORV *Sagar Kanya*
Cruise No: 211
Date: 3rd to 7th Oct 2004



National Institute of Oceanography.
Dona Paula. Goa

<u>Contents</u>	Page no.
1. Cruise track	3
2. Introduction	4
3. Itinerary	5
4. Cruise participants	5
5. Objectives	6
6. Work carried out on board	6
7. Sampling techniques	8
8. Work accomplished	9
9. Acknowledgement	10

Annexure I- List of the equipments used on board.

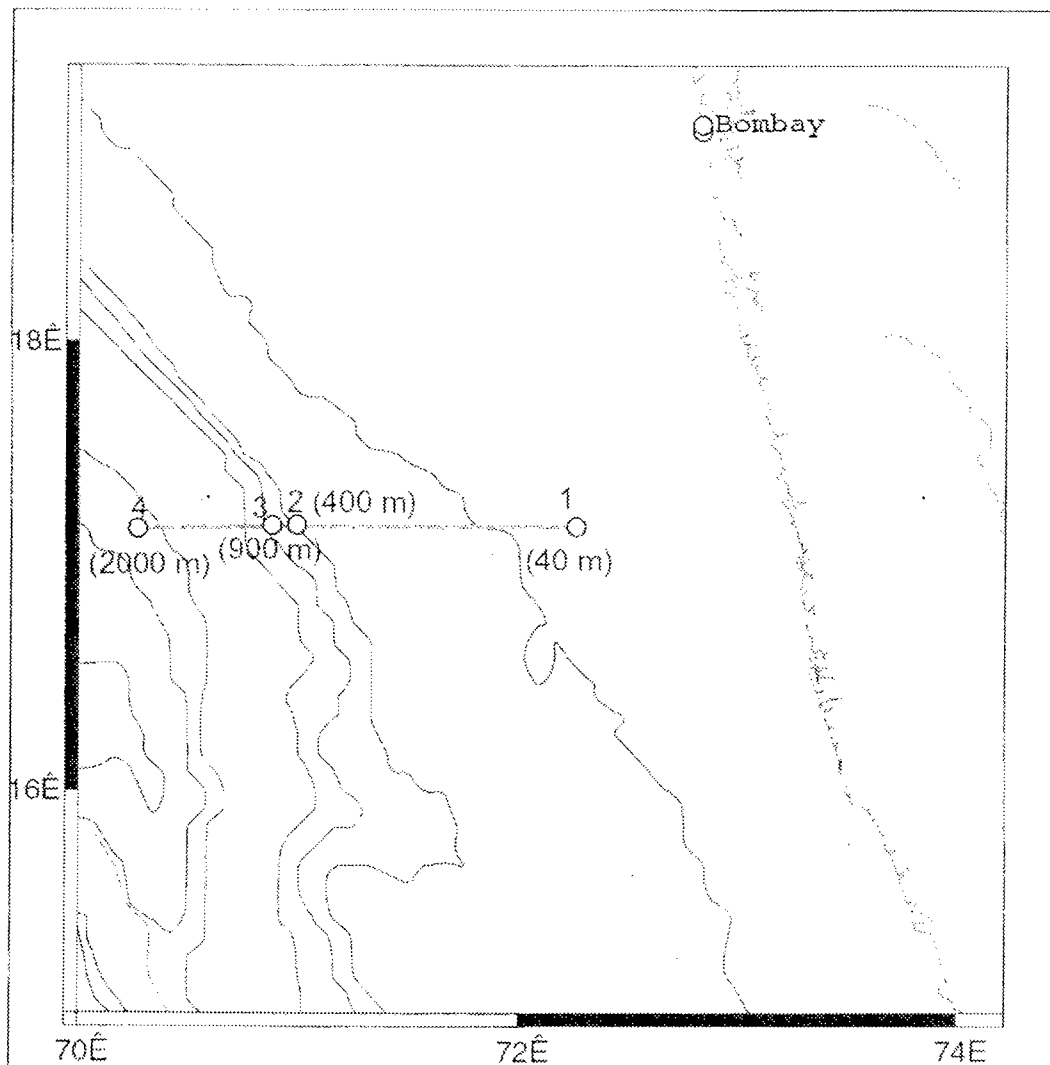


Fig.1. Cruise track of the SK-211 cruise

2.Introduction:

As global warming and eutrophication reduce oxygenation of the world ocean, there is a pressing need to understand the functional consequence of oxygen depletion in marine ecosystems. Changes in the marine environment are evident on a global scale and densities and distributions of species have changed. Human activities can cause large-scale changes in marine ecosystems, including the diverse communities of organisms living in marine sediments, the most extensive habitat on Earth. However, science is currently unable to forecast, with an acceptable degree of certainty, the response of marine ecosystems to global change.

Our planned research is also aimed at developing our ability to assess and forecast changes in marine biodiversity. In terms of density and diversity, the meiofauna (small sized metazoans and foraminifera) are prominent members of the sediment community. Due to their small size and short life cycle, they are potential biological monitors of the marine environment, adequately sampled with a small volume of sediment. Additionally, meiofauna taxa that have fossil remains (foraminifera and ostracods) not only extend the utility of this group of organisms as environmental indicators at decadal as well as geological time scale but may also provide the often unknown, pre-anthropocene baseline patterns. Even at low taxonomic level, significant differences in community composition, related to environmental fluctuation, can be observed. However, it is necessary to link meiofauna structure to overall benthic community structure and functioning. Experiments are required to validate and refine meiofauna, especially foraminifera as environmental proxies present and past. Linking foraminifera (diversity and morphological characteristics and their built-in geochemical signals (in their calcium carbonate shells) to benthic community structure and functioning is in fact one of the few proxies available to distinguish anthropogenic versus natural driven evolution in the marine environment and organism community structure and composition.

This pioneering integration both in field studies and long-term laboratory manipulation experiments was the basis of this research project. The planned research will significantly advance our understanding of ecological processes in the OMZ.

Not only can modern OMZs provide clues about the past, but they may also tell us how shallow-water systems could change should they shift from episodic or seasonal to permanent hypoxia due to eutrophication. In addition to the gaining urgent insight into the relationship between biodiversity and ecosystem functioning.

3. Cruise Itinerary:

EDD: 3rd October 2004 Karwar port.

ETA: 7th October 2004 Karwar port.

4. Cruise Participants:

1. Dr Baban Ingole	Scientist 'EII' (Chief Scientist)
2. Dr Rajiv Nigam	Scientist 'F'
3. Dr Prakash Babu	Technical Officer 'C'
4. Mr Avinash Sonawane	Technical Officer 'C'
5. Mr S. Khalap	JTA
6. Mr Abhijit Mujumdar	SRF
7. Mr S S Rana	JRF
8. Ms Mahua Ghosh	JRF
9. Ms Rajani Panchang	PT III
10. Ms V Linshy	PT III
11. Ms Reshma Goltekar	PT III
12. Mr Mandar Nanajkar	PT III
13. Mr Pawan Govil	PT III

5. Objectives:

1. Establish the relationship between biodiversity (bacteria, foraminifera, macro- and meiofauna) and ecosystem functioning (secondary carbon production and carbon recycling).
2. Link sediment community structure and functioning to biological and biogeochemical proxies (sediment and foraminifera). In order to:
Distinguish anthropogenic versus natural driven evolution in the benthic environment (sediment) and community structure (composition and diversity).

6. Work carried out on board:

Field collection:

- Sediment samples were collected from shallow (appr. 50 m) and deeper depth (appr. 800m) for following laboratory study at NIO, Goa:
- Sediment bacterial abundance and diversity.
- Community structure of benthic macro- and meiofauna
- Diversity and abundance of the benthic Foraminifera
- Sediment chlorophyll and organic carbon content

On board Laboratory Experiments:

Labial diatoms were inoculated to the sediment cores collected on board and were incubated under controlled laboratory temperature (11°C) at NIO Goa for 07 days. All the cores were processed after one week of the experiment. All the preserved and frozen faunal samples were sorted up to group level following the standard methods and preserved/stored for further analysis.

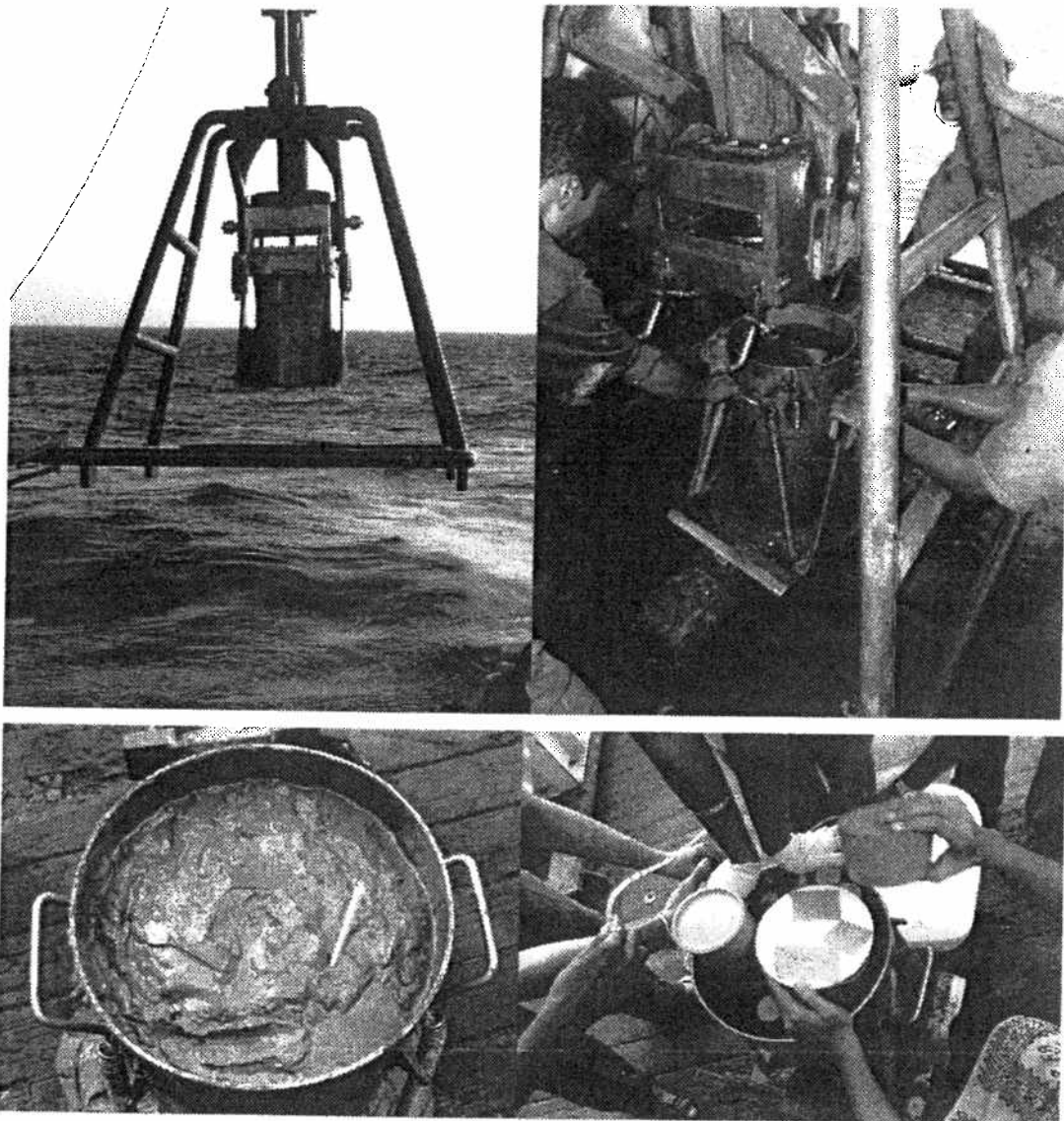


Plate 1: Box core in operation on board 'ORV Sagar-Kanya'- 211.

Station No.	Lat (N)	Long (E)	Depth (m.)	Distance (N. Miles)	Remarks
1	17 30	72 44	40	140	From Goa to Stn 1
2	17 30	71 12	400	92	Stn 1 to stn 2
3	17 30	71 08	900	04	Stan 2 to stn 3
4	17 30	70 45	2000	12	Stn 3 to stn 4
				226	Stn 4 to Goa.

6. Sampling techniques:

Box corer:

During the cruise, box corer of 50 x 50 x 50 cm dimension (sampling area = 025nf, Plate: 1) was used. The sediment was used for benthos purpose and the station repeated 5-6 times. Total numbers of box core operations were 15 out of which 7 were successful.

Deep-sea hydraulic winch on stem was used during the cruise for all box core operations. The lowering speed was slower than while hauling.

Satellite Navigation

Accurate positioning of sampling stations during cruise was one of the most important requirements. The vessel gave very good positions of sampling stations using GPS.

Sediments were obtained at all the sampling stations. Big and small diameter core liners were used to collect the sediments from the box for further sub-sampling. The cores were sub-sampled at 2 cm interval up to 10 cm and at 5 cm for the remaining length of the core.

Work accomplished:

Sample collection and analysis:

Sediments were sub-sampled using acrylic core liners of small (3.6 cm dia.) and large (12 cm dia.) size. Sediments were further sub-sampled at 0-1, 1-3, 3-5, 5-7 and 7-10 cm interval. Sub-cores were collected for different studies and shared among the geological and biological disciplines (Plate: 1).

These sub-samples later used to undertake sedimentological studies such as determination of sand, silt, clay percentages and clay mineralogy. The stained samples were later used for foraminiferal contents.

One set of sediments was stored in deep-freezer for further analyses of water content, carbon, nitrogen and organic phosphorus and other set was collected for isotopic.

Benthic Biology

Benthos samples were collected from all the stations. The benthos parameters included:

Macrobenthos:

First core: Samples for macrobenthos were collected with the help of large core.

Second core: For the experimental studies the samples were immediately taken to the incubator.

Third core: The samples were sieved in filtered seawater with the sieve size of 300 micron and preserved in formalin and one set was kept in -20°C

Foraminifera & Meiobenthos: The samples for meiobenthos were collected using a core of 3.6 cm diameter. The sectioning was as follows, 0-1, 1-3, 3-5, 5-7 and 7-10 cm interval.

The replicated cores were taken for meiofauna, foraminifera and isotopic studies.

The samples were immediately preserved in the prepared 7% buffered seawater formalin rose Bengal solution. The other cores were taken to the cold room,

sectioned and sieved immediately and preserved in formalin and also kept at – 20°C. Duplicate cores were taken for all the above-mentioned parameters.

Chlorophyll: The top 1 cm section was frozen for chlorophyll analysis on shore using fluorimetric method.

Microbiology and biochemistry

Biochemical parameters:

For biochemical analysis and Labile Organic Matter (L.O.M.)

Microbial Ecology: In addition to regular studies being carried out, it was attempted to include a few more additional studies.

Acknowledgement:

We wish to thank to the Director NIO Dr S R Shetye and the former director Dr E. Desa for providing the lab facilities. We are also thankful to Dr P C Pandey and Dr M Sudhakar of NCAOR for allotting the cruise *Sagar-Kanya* and also Mr. Subramaniam for day-to-day management help. We duly acknowledge Dr L Moodley from the NIOO, The Netherlands for the laboratory support for carrying out the operations. We are thankful to the *Sagar-Kanya* Captain and crewmembers for their help in the field collection. Our special thanks are due to Mr. Jonny Mascarenas, Purchase Officer of NIO, Goa for his untiring support for arranging the custom formalities to export-import of some of the scientific equipments used during the present study.

Annexure I

List of equipment used:

- Box corer
- Niskin water sampler
- CTD
- Hydraulic winch
- Deep-sea winch
- Deep-sea Eco sounder
- Deep freezer