

ORV SAGARKANYA CRUISE SK-136
PROJECT SURVEYS FOR POLYMETALLIC NODULES- SURVEY AND EXPLORATION

Chennai to Marmagao
Daily log

List of Participants:

a. From National Institute of Oceanography, Dona Paula, Goa.

Dr. Vijay N Kodagali
Dr. Anil B Valsangkar
Dr. P Shivsankar Rao
Dr. Shyam Murti Gupta
Dr. Pratima Jauhari
Mr. Vijay D Khedekar

b. From M/s Norinco Ltd., Vasco-da-Gama.

Mr. Biju V Nair
Mr. K Jaikrishnana
Mr. Praveen Rodrigues
Mr. Rajeev

Itinerary:

14-06-1998	Participants boarded the vessel at Chennai
16-06-1998	Scheduled departure of vessel delayed due to delay in bunkering.
17-06-1998	Ship sailed off at 1600 hrs.

Main objectives of the cruise:

- Detailed polymetallic nodule (PMN) sampling in the Central Indian Basin using the free fall grabs at 5 km grid spacing.
- Detailed multibeam (Hydrosweep) survey in selected areas and in the PMN -Environmental Impact Assessment (EIA) areas.
- Hydrosweep survey off Chennai Port to identify sites for testing the mining system (at National Institute of Ocean Technology's request).
- Hydrosweep survey for identifying sites for trap mooring and sediment core collection off Goa coast (for LOICZ project).

17.06.1998

Ship sailed from Chennai at 1600 hrs. Permission received from Antarctic Study Center Vasco to carry out multibeam Hydrosweep surveys off Chennai for selecting sites for testing mining trawler (NIOT's request).

18.06.1998

Hydrosweep survey in 13° 18' to 13° 22' N at 80° 25' to 80° 32' E block. Six lines each with a speed of 7-8 knots surveys conducted. INS-GPS to Hydrosweep interface working well. Proceeding to Central Indian Basin (CIB).

19-06-1998 to 26-6-1998 (eight days):

Sailing to Central Indian Basin- 12° S, 76° E. Average ship speed 8.4 knots. Weather during this period- rough sea conditions and strong winds.

a. Processed Hydrosweep data collected off Chennai for NIOT. Problem with the Hydromap system to HP plotter interface. In spite of best efforts could not rectify the problem. The interface card faulty. Message sent to Norinco headquarters and ASC. The interface card and the boot record card on Hydromap system computer interchanged with necessary changes in switch settings. System not booting in this state. Data processing hence not possible during the cruise as the output generation is not possible.

b. Prepared the Free fall grabs (FFG) with proper nets for the grabs, flags etc.

c. Tested the Benthos USA make Radio markers and found that the ship's VHF direction finder can receive only one of the seven channels available. Message sent to NIO to order for Radio marker VHF direction finder with proper channels. The lamp beacons working well.

Meeting of participants held 3 times during the period to evolve strategy for sampling operations.

26-06-1998

Arrived at station 1. Launched 4 FFG. Two of the four didn't pop up (one with Radio marker). Prepared two more FFG for launching. Completed 3 stations with no further loss. Seastate 4-5, strong winds (30 knot speed)

27-06-1998

Continued FFG nodule sampling. 4 more stations completed. Station 6- one FFG with lamp beacon popped up but while recovering, went in to propeller and got lost. Rough sea conditions- seastate 5-6 winds over 35-40 knots. Recovery of buoys getting difficult. The collected net for FFG is small and not suited. Most of the FFG are recovered by hand using the grapnel by pulling by scientists.

28-06-1998

Rough sea conditions waves 1-2 m in the morning. Continued FFG nodule sampling. Evening at 1730 hrs, 4 FFG launched at station 12. Buoys popped up around 1930 hrs. However, the sea condition had worsened and it was very difficult to work. Master instructed to stay clear of the deck. Wind reached 60 knot speed. Even with 120 rpm and 3 generators, the ship was making negative headway. Master entered into the ship's log book instructing navigating officers to head into the wind and move away for 5-10 nautical miles. The FFG were in sight till 2330 hrs.

29-06-1998

Ship moved over 7 nautical miles from station 12. Sea is still rough. By 0530 hrs, Chief officer on duty had brought the ship back to station 12. The Buoys were not visible. The search continued systematically for the missing FFG. 4 lines of 10 miles each in the direction of drift with all men on strict vigil conducted. Later another four lines in the direction of current (westerly direction) with additional criss cross lines done. Search continued till midnight, after which it was decided to abandon search and move over to Hydrosweep survey in a block containing two seamount chains.

30-06-1998.

Arrived at area for Hydrosweep mapping. Rough sea conditions continued. East west lines of 30 nautical mile length and 4.5 nautical mile separation planned. 12°30'S to 13° 30'S, 75° 25'E to 75° 55'E. Power supply (5V) in Hydrosweep system monitor went bad. As no spares were available, replaced it with one from Hydromap system.

1-07-98 to 3-7-98

Continued Hydrosweep mapping completed 11 lines. 3 July midnight, returned again for FFG sampling.

4-07-98

FFG stations 6 completed in one day. Sample collection good.

5-07-1998.

FFG nodule sampling continued. Lost one FFG with lamp beacon- didn't pop up.

6-07-1998.

Completed total FFG stations including station 12. Proceeded to PMN EIA for disturbed and reference site Hydrosweep mapping. (75° E-76° 15'E to 10° S-10° 15'S)

7-06-1998.

Completed 4 lines in EIA block. East west lines each 75 nautical mil length with 4.5 nautical mile interval. Proceeding back to Marmagoa 1100 hrs.

8-07-1998 to 14-07-1998

Sailing continued. Sea state 3-4, ship speed 8 to 8.5 knots. Carried out Hydrosweep survey along 14° 30' N longitude (between 73° E and 72° 30'E). Another line from end of this line to Marmagoa harbor in progress.

15-07-98

A sediment core (using gravity corer) of 5.5 m length was collected at 14° 52.258N- 72° 58.799E (depth 340m). Reached Marmagoa harbor 1000 hrs.



(V N Kodagali)

Chief Scientist

ORV Sagarkanya cruise 136.

Status of equipment:

Integrated Navigation system: The Integrated Navigation System (INS) with the Global Positioning system (GPS) as primary sensor was used through out the cruise for accurate position fixing. The INS and GPS worked well during the cruise except for occasional loss of satellite tracking by the GPS system.

Hydrosweep System: The Hydrosweep system was provided the navigation data through the INS directly. It was observed that, at rough sea conditions, there was frequent loss of beams especially the outer beams. The power supply to the keyboard of the Hydrosweep monitor (SV) failed during the initial stages of survey. As spares were not available, existing power supply from the Hydromap system was used and later, the power supply was repaired by the Norinco Engineers. Later, a spare power supply for the keyboard was found and now both Hydrosweep and Hydromap have functional power supplies. The printer, the tape drive etc. worked without any breakdown. In the previous cruise (SK 134) when DGPS data was directly input to the Hydrosweep system, the calibration mode of Hydrosweep system was not functioning. However, during this cruise, with direct INS data, the system calibration was functioning and calculation of average velocity of sound in the water column was calculated by the system.

Hydromap System. The post processing system for the Hydrosweep data- the Hydromap system had major problems of interfacing the HP plotter. Although the plotter was working independently, it was not possible to interface it with the Hydromap computer. The problem was traced to the Interface card on the EPR 1300 computer. As no spare card was available, the problem could not be rectified. However, as the Interface card and the system Boot card were similar with few dip switch changes, the two cards were interchanged to test the plotter interface. With this change, the system didn't boot and hence the problem with the interface card was confirmed. The problem was notified to Norinco headquarters and to Antarctic Study Center, Vasco and from there to the manufacturers M/s STN Atlas Elektronik, Germany. The graphic monitor of the Hydromap system is showing strange colors and needs repairs. The magnetic tape drive didn't work in the beginning but worked well later after head cleaning.

Deep sea echosounder. The Elac deep sea echosounder was used at EFG stations and during Hydrosweep survey and worked well.

Deck and sampling equipment: The Atlas crane was extensively used for the deployment and recovery of the free fall grabs and it worked well during the cruise except for occasional leaking of the oil on the

deck. The free fall grabs in spite being not in use for over ten years, worked well. The gravity corer with six meter core liner was used at a depth of 340 m and the operation was successful.

Recommendations.

- a. Proper latching of equipment on the deck, removal of unwanted equipment on the deck should be carried out on priority.
- b. The lighting on the deck, especially on the port and starboard sides- outside the ship should be improved.
- c. Safety lines should be provided during cruises like this when deck usage is extensive.
- d. The number of scientific personnel in the cruise should be increased to utilize ship time and for sharing the work load on the ship.
- e. The existing INS system needs to be replaced with newer system preferably with DGPS system as the HP1000 computer used for present INS is obsolete.
- f. A workstation- with magnetic tape reader and plotter should be procured and installed in chart & drawing room for general purpose data processing.
- g. A couple of personal computers to be arranged in the chart and drawing room.
- h. Deck crew should be instructed to help without grumbling, scientists in manual and physical work on the deck.
- i. The deep sea winch operation being a specialized job, should better be done by deck crew and not scientists.

SUMMARY:

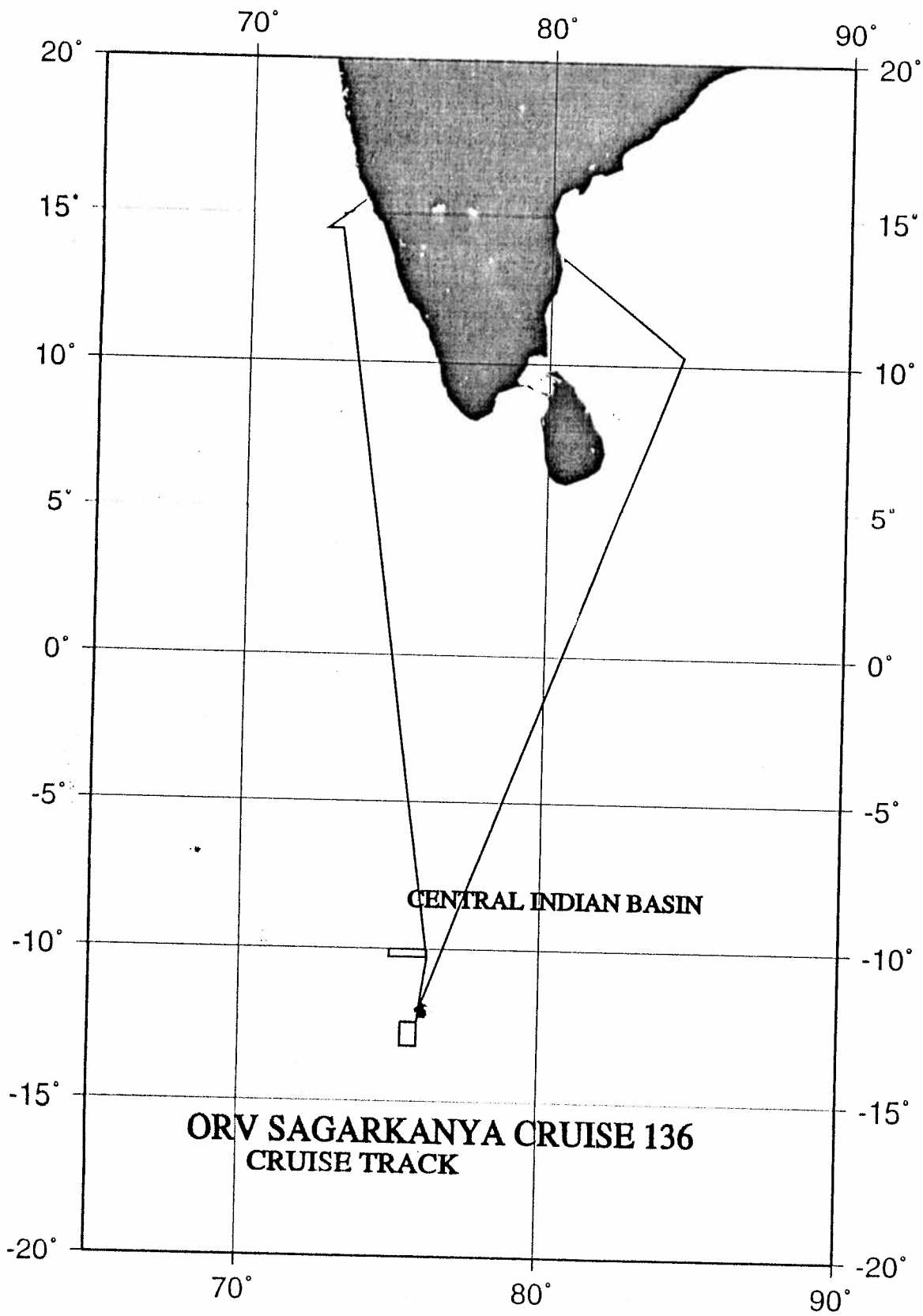
135th cruise of JORV Sagarkanya was planned for detailed sampling and Multibeam swath bathymetric mapping using Hydrosweep system in the Central Indian Basin (CIB). The main objectives of the cruise were as under:

- Detailed polymetallic nodule (PMN) sampling in the Central Indian Basin using the free fall grabs at 5 km grid spacing.
- Detailed multibeam (Hydrosweep) survey in selected areas and in the PMN -Environmental Impact Assessment (EIA) areas.
- Hydrosweep survey off Chennai Port to identify sites for testing the mining system (at National Institute of Ocean Technology's request).
- Hydrosweep survey/sediment core collection off Goa coast (for LOICZ project).

The cruise commenced on 17 June, 1998 from Chennai with a scientific component of six scientists from National Institute of Oceanography, Donapaula, Goa and four maintenance engineers from M/S Norinco Ltd., Vasco-da-Gama, Goa. Hydrosweep mapping of area off Chennai (at NIO's request) was completed during 17-18 June, 1998 within the block 13° 18' N-13° 22' N and 80° 25' E 80°32' E. Six east west survey lines were occupied during this survey.

Detailed nodule sampling using free fall grabs was carried out at 26 stations- with four free fall grabs operated in each station. The results are likely to throw more light on distribution pattern of the polymetallic nodules and on advantage or otherwise of carrying out detailed sampling at 5 km grid intervals. In addition, an area of 4800 sq.km comprising two chains of seamounts was mapped using the Hydrosweep system. As part of the PMN-EIA program the disturbed area and the reference site in the block 10°S-10° 15'S and 75°-76° 15' S was also mapped during the cruise.

Off Goa coast, Hydrosweep mapping along 14° 30'N longitude from 73° E to 72° E was carried out as part of the Land Ocean Interaction in coastal Zone (LOICZ) program. A 5.5 m long sediment core using the gravity corer was also collected (depth 340 m). The cruise concluded at Mormugoa Harbor on 18 July 1998.



ORV SAGARKANYA CRUISE SK-136

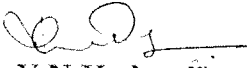
LOSS REPORT

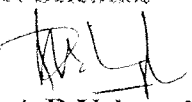
14 July, 1998

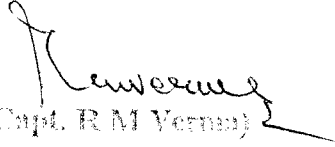
During the cruise (17-06-98 to 15-07-98), extensive polymetallic nodule sampling using Free fall grabs (FFG) was carried out in the Central Indian Basin. Twenty six stations, with mostly 4 FFG in each station were completed. The following equipment were lost at sea during the cruise.

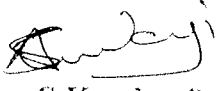
S.No.	Equipment	Make	Unit cost (Approximate)	Number of equipment lost
1	Free fall grab full set with buoys, buckets etc.	Preussag, Germany	Rs. 50,000/-	8
2	Free fall grab buckets	Local	Rs. 5000/-	2
3	Radio Markers	Benthos Inc. USA	Rs. 38,000/-	1
4	Lamp Beacons	-do-	Rs. 35,000/-	6

Before launching the free fall grabs(FFG), the glass spheres, weight release mechanism etc. Were tested onboard. Four of the FFG didn't pop up. Mandatory search in and around the launching position was carried out for over 3 hours. Four of the FFG launched in station 12 did pop up but could not be recovered due to very rough sea conditions. (seastate 7-8, wind speed over 60 knots). On Masters instructions, the ship moved away from the station for up to 7 nautical miles (extract of ship's log is enclosed). After improvement in the sea condition, ship returned to the location and missing FFG were systematically searched for over 18 hours- with over 8 people on look out for the FFG. The search was conducted in the direction of the drift and known surface currents. The losses at sea were due to unforeseen circumstances and not due to human negligence.


(Dr. V N Kodagali)
Chief Scientist


(Dr. A B Valsangkar)
Scientist


(Capt. R M Verma)
Master


(Ajay S Kundargi)
Chief Officer