

RV SAGAR KANYA

CRUISE SK 276

(16/09/10 – 17/10/10)

NATIONAL INSTITUTE OF OCEANOGRAPHY

(Council of Scientific and Industrial Research)

Dona Paula, Goa – 403 004

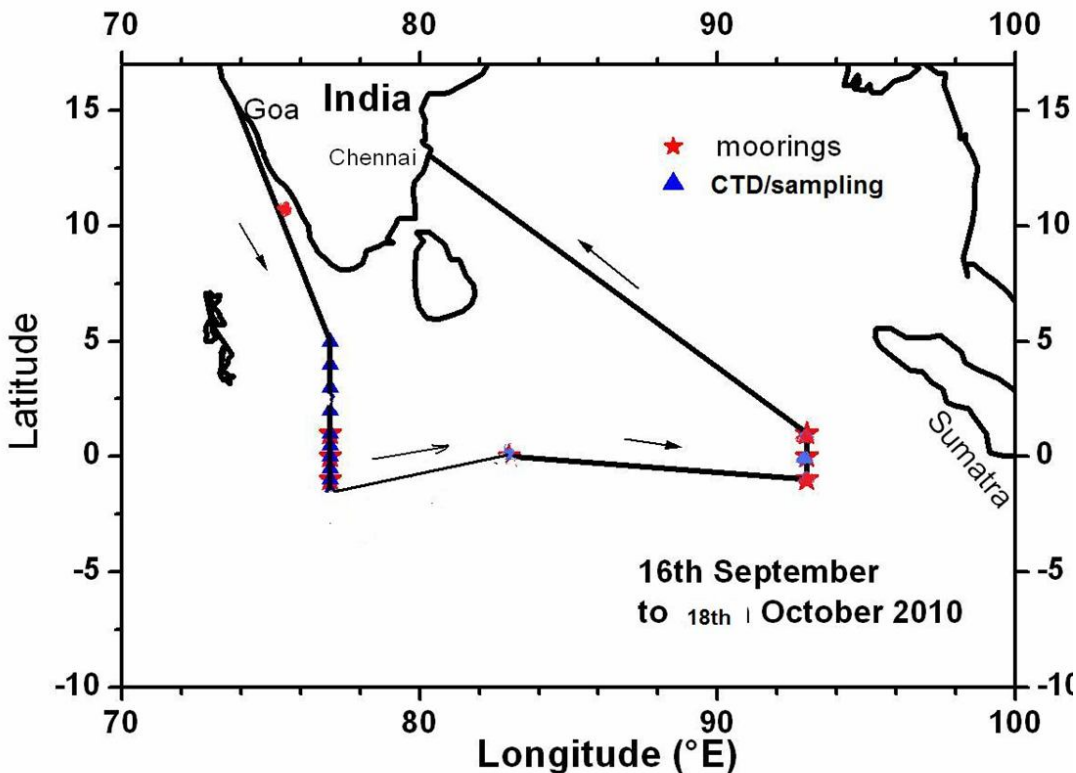
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1. SUMMARY

All the participants reached Goa on 15/09/09 and boarded the vessel ORV *Sagar Kanya* at outer anchorage of Marmugao port in the rough sea at 1430 hrs on 16/09/10. The loading of mooring equipment to the ship was completed on 13/9/2010. The Ship sailed out from the port at 1920 hrs on 16/09/10. Since bunkering was not done at Marmugao Port, the ship touched Mangalore Port for bunkering at 0930 hrs on 18/09/2010. After finishing bunkering, the vessel sailed out from Mangalore Port at 2330 hrs on 18/09/2010. The meteorological observations were carried out from 1200 hrs on 19/09/10 at every six hours interval up to 13°N (off Chennai) along the track for XBT observations program. ONE shallow water (160 m depth) mooring off Kovilthottam, Kerala coast and servicing of SEVEN existing moorings at the Equator, 93E, 00; 83E and 00°, 77E.; 1°N, 92°40'E; 1°S, 93°E; 1°N, 77°E; and 1°S, 77°E were carried out. The sediment trap (INCOIS) was also deployed along with the exiting mooring at 00°, 83E. The first CTD operation along with the biological and chemical sampling was carried out on 21/09/10. Separate water sampling was also done for the GRAZING and Respiration rate Experiments. There were total 8 CTDs and MPNs completed along 77°E from 5° N to 1° S, and at Equator, 93°E; 83E and 77E. The Primary Productivity (PP) mooring was also carried out at one location. There were total 22 XBTs were fired along the track at different locations. Three ARGOs drifters were dropped at different locations. After completing all the planned objectives successfully, the vessel arrived at Chennai port on 17/10/10.

2. CRUISE TRACK cruise Track-sk276



3. INTRODUCTION

The cruise SK-276 was the ninth of the series since 2000 for undertaking the equatorial current meter mooring operations under the Ocean Observing System (OOS) program of the Ministry of Earth Science. The cruise was organized for servicing and maintenance of the seven existing current meter moorings at 77°E, 83°E, 93°E along the Equator, and at 1°N, 93°E; 1°S, 93°E; 1°N, 77°E; and 1°S, 77°E. All the participants boarded the vessel at Marmugao port on 16 September 2010. The cruise started on 16/09/10 at Marmugao port and completed at Chennai Port on 17/10/10.

4. ITINERARY

Departure : Marmugao Port --- 16 September 2010
Arrival : Chennai Port --- 17 October 2010

5. CRUISE PARTICIPANTS

5.1 Scientific component

1. A. Suryanarayana	NIO, Goa (Chief Scientist)
2. M. S. S. Sarma	NIO, Goa (Dy. Ch.Scientist)
3. R. J. Krishnama charyulu	NIO, Goa
4. Almeida Anselm Michael	-do-
5. Vijayan Fernando	-do-
6. Mithun Gaonkar	-do-
7. Areef Sardar A	-do-
8. Suharsh S Naik	-do-
9. Shweta Halanrnekar	-do-
10. Arati verenkar	-do-
11. Muthu Kumar	-do-
12. Mangala K.R	-do-
13. Joshua D'Mello	-do-
14. Ghatkar Siddarth	NIO, Waltair
15. Anand Tari	NIO, Waltair
16. Lix John	NIO, Cochin
17. Deck Assistants/Seamen (4)	NCAOR, Goa
18. Biju Vikraman Nair	NORINCO
19. Tachezhath Baiju	-do-
20. K. Vijayaraghavan	-do-
21. Thangaraj Ramesh	Norinco
22. M.P. Durgappa	-do-

5.2 Ship's Complement

1. Capt. A.K.K. Abhyankar	Master
2. S. Suresh	Ch.Off
3. Gagandeep Singh	2 nd off
4. Dr. D. N. Rao	Med.off
5. P.V. Satheesan	Rad.off
6. Suresh Kumar Dash	Ch.Engr
7. A. C. Saini	2 nd Engr
8. A. R. Gawdey	3 th Engr
9. J. Mondal	4 th Engr
10. K. Rajendra Kumar	El.off
11. Amitab Mojumdar	CTO

6. OBJECTIVES

1. Retrieval and redeployment of seven deep-sea current meter moorings along the equator at 93°E, 83°E, 77°E, 1°N, 93°E; 1°S, 93°E; 1°N, 77°E and 1°S, 77°E
2. Deployment of one shallow water mooring off Kovilthottam, Kerala coast.
3. CTD observations along 77°E from 5°N to 1°S, 00,83E and 00, 93E.
4. Biological and Chemical sampling at all CTD stations.
5. Surface met observations along the track
6. XBT observations along 77°E and up to 13°N (off Chennai)
7. Dropping of three ARGOs drifters

7. WORK ACCOMPLISHED

The cruise participants started from NIO to board ORV *Sagar Kanya* at Marmugao Port and boarded the ship at outer anchorage at 1500 hrs on 16/09/10. The Ship sailed out from Marmugao Port at 1920 hrs on 16/09/10. Since bunkering was not taken for the vessel at Marmugao port, the same was taken at Mangalore port. Welding of plate for NIO winch was completed. Repair of AI spools was also completed. The Ship sailed out from the Mangalore port around 2330 hrs on 18/9/2010 and proceeded to the first mooring location off Kovilthottam (9N, 76E) at a depth of 200 m. as a part of the project SIP1302. The first XBT launched at 10°N, 75°45.00'E and started collecting Met observations from 1200 hrs on 19/9/2010. The vessel positioned at 9°N, 76E at 0930 hrs on 20/9/2010 and completed the deployment of ADCP at 160 m at 0953 hrs.

The ship proceeded to first CTD station, 5°N, 77°E at 1000hrs. The XBTs were launched at 8° and 6° N. IWIN samples were collected along with the met data. The vessel arrived at 05°N, 77°E at 1300 hrs on 21/9/10. We completed CTD1 up to 1000m and MPN1 up to 150 m at this station by 1600 hrs. The vessel proceeded to next station at 1605 hrs. The ship stopped at 04°N, 77°E at 0130 hrs on 22/9/10. Completed CTD2 and MPN2 at this position and proceeded to next station at 0400 hrs on 22/9/10. The ship stopped at 03°N, 77°E at 1145 hrs and completed CTD3 and MPN3. Then the ship sailed out to next station.

As per our earlier calculations for this cruise, the ship's speed was taken as 9 kts on an average. But since we sailed off Goa, the speed was only 7.5-8.0 kts. with the speed of 8.0 knts we need a minimum 40 days. After a meeting with the scientific participants it was decided to reduce some of the planned stations and moorings to maintain the cruise schedule. This has been done after thorough discussions with the ship personnel and scientific participants.

The ship arrived at 01°N, 77°E at 0330 hrs and released the buoy at 0542 hrs. The retrieval of ADCP along with two DVS was completed successfully at 1250 hrs on 23/9/10 and proceeded to the next CTD station at 2°N, 77°E. The vessel arrived at 02°N, 77°E at 2020 hrs. CTD4 and MPN4 were completed at this location and sailed back to 01°N, 77°E at 2240 hrs. The ship stopped at

01°N, 77°E at 0520 hrs on 24/9/2010. MPN5 and CTD05 were completed at 0815 hrs. ADCP and two DVS were deployed at 01°N, 77°E successfully at 1505 hrs on 24/9/2010. Ship proceeded to next station at 1700 hrs. XBT launched at the Equator, 77E. The vessel arrived at 00°, 77°E at 0230 hrs on 25/9/2010. The mooring was released at 00°, 77°E at 0720 hrs and successfully completed the retrieval of the mooring at 1510 hrs. CTD sampling was done up to 120 m for primary productivity mooring at 0300 hrs on 26/9/2010. PP mooring was started at 0445 hrs and completed at 0605 hrs. The PP mooring was retrieved at 1900 hrs. The vessel was repositioned at 00°00.63'S, 77°00.07'E at 2340 hrs on 26/9/2010. CTD, MPN were completed at 00°, 77E at 0230 hrs on 27/9/2010. The redeployment of ADCP & RCMS at 00°, 77°E started at 0720 hrs and completed successfully at 1155 hrs on 27/9/2010. After the ranges for the mooring point were taken, the ship proceeded towards 01° S, 77° E at 1400 hrs. The ship arrived at 01°S, 077°E at 0515 hrs on 28/9/10. The mooring was released at 0630 hrs. The retrieval of the mooring at 01° S, 77°E was completed successfully at 1640 hrs on 28/9/2010. MPN and CTD were completed at 2310 hrs. The Sea was rough on 29/9/2010 also. The redeployment of ADCP & DVSs at 01° S, 77°E started at 0730 hrs and completed successfully at 1130 hrs on 29/9/2010. After that the ship proceeded to 00, 83°E. An ARGO Drifter was dropped at 00° 28.75'S, 080° 07.06'E at 0735 hrs on 30/9/2010. Ship stopped at 00°, 83°E at 0100 hrs on 01/10/2010 and was positioned on the top of mooring position at 0500 hrs. The mooring was released at 0530 hrs. The weather was fair and sea was calm till 0730 hrs. After that strong winds were prevailed and sea became rough. It rained at this location. The hooking of the buoy became very difficult in these conditions. We finally hooked the buoy at around 1000 hrs and with great effort of the mooring team including **Mooring master, chief officer and ship crew**, who had taken high risk, brought the ADCP buoy on to the deck at around 1030 hrs. The servicing of ADCP & RCMS and required spooling of wire were carried out on 2/10/2010. CTD was operated up to 1000 m. Biologists had collected water sample of 60 l for grazing experiment and chemists for respiration experiment at 30 m. MPN was operated up to 150 m at 1440 hrs. After that ship was drifting. Ship was positioned at 00°, 82° 50'E at 0720 hrs on 3/10/2010. Started redeployment of mooring at 0730 hrs and completed it successfully at 00°, 83° E at 1130 hrs. After taking the ranges for the mooring location, the ship started sailing towards next mooring station 01° S, 93°E at 1230 hrs on 3/10/2010. 2nd Argos drifter dropped at 00° 11.09'S, 084°50.03'E at 2325 hrs on 3/10/2010. XBT launched at 00°13'S, 085° 18'E at 0240 hrs on 4/10/10. XBT launched at 0600 hrs. on 5/10/2010. 3rd Argos drifter was dropped at 00°43'S, 89°59'E at 0925 hrs and XBT launched at 1852 hrs on 5/10/2010. Ship stopped at 01°S, 093°E at 0415 hrs. The mooring was released at 0500 hrs. Retrieved the mooring at 01°S, 093°E and completed it successfully at 1025 hrs on 6/10/2010. The redeployment was started at 0600 hrs on 7/10/2010. After lowering ADCP & LD float to the sea surface, the deep sea winch did not respond and stopped deployment at 0645 hrs. Both the buoys were brought back to the deck at 0845 hrs. Deep sea winch was repaired. Deployment of mooring started at 0600 hrs on 8/10/2010 and completed it at 1050 hrs. After completing the ranges the ship proceeded to next station, 00°, 93°E at 1200 hrs. The ship stopped at 00°, 93°E at 0500 hrs and released the mooring at 0545 hrs. Retrieval of mooring completed successfully at 1030 hrs on 9/10/2010. Operated CTD up to 120 m for water sampling for the respiration experiment and completed at 1300 hrs. Ship positioned at 00°, 93°E at 0645 hrs on 10/10/2010 for redeployment of the mooring. The redeployment was started at 0650 hrs and completed successfully at 1125 hrs. After taking ranges to the mooring location, the ship proceeded to the next station 01° N, 93°E at 1300 hrs. Ship stopped at 01°N, 93°E at 0415 hrs on 11/10/2010. Released the mooring at 0515 hrs and ADCP and other floats were on the deck at 0610 hrs. Retrieval of mooring at this location was completed successfully at 1015 hrs. Redeployment has started at 1245 hrs and completed the deployment at 01°N, 93°E at 1700 hrs. The ship proceeded towards Chennai at 1720 hrs on 11/10/2010. The vessel reached Chennai Port and came along side at 1700 hrs on 17/10/2010.

7.1 Mooring operations:

[**Mooring Team:** *Vijayan Fernando, Mithun Gaonkar, Ghatkar Siddarth, Anand Tari, M.S.S. Sarma, R.J.K.Charyulu, Anselm Almeida, A. Suryanarayana*]

Deployment of ADCP at 09°00.193'N, 075° 57.846'E

ADCP was deployed at 160 m depth at 0953 hrs on 20/9/2010 under the project SIP 1303. The anchor drop position was 09°00.15'N, 075° 57.37'E. The details are given in the table No.7.1.A.

1. Servicing of mooring at 01° N, 077°E

a) Retrieval of mooring:

The retrieval of mooring was started by releasing the dead weight from the acoustic release at 0542 hrs on 23/09/10. The ADCP buoy of the mooring was onboard at 0748 hrs. The last equipment, the acoustic release came onboard at 1248 hrs. The details of the data and equipment are given in table Nos. 7.1.1.1-7.1.1.5

b) Redeployment of mooring:

After servicing the ADCP, the redeployment of the same was started at 1030 hr on 24/09/10 and completed at 1505 hrs. The anchor drop position of the mooring was 00°57.86'N, 076°59.25'E and the depth 4335 m. The details are mentioned in table No.7.1.1.6-7.1.1.10

2. Service of mooring at 00°, 77°E

a) Retrieval of mooring

The range was taken to release the mooring at 0707 hrs on 25/09/10. The mooring was released at 0721 hr. The buoy was hooked at 1000 hrs. The ADCP buoy was brought to the deck at 1021hrs and the retrieval of all the equipment completed successfully at 1505hrs. The details of the retrieval are mentioned in the table Nos.7.1.2.1-7.1.2.5

b) Redeployment of mooring

The servicing of ADCP, RCMs, ACR and spooling wire rope for the mooring was carried out on 26/09/10. The deployment of equipment was started at 0720 hrs on 27/09/10. The ADCP buoy was at surface at 0730 hrs. The deployment was completed at 1155hrs. The triangulation for the mooring position was completed at 1400 hrs. The anchor position of the mooring was 00°00.86'S, 077°00.11'E and depth 4756 m. The details of mooring are shown in the table Nos.7.1.2.6-7.1.2.10

3. Service of mooring at 01° S, 77°E

a) Retrieval of mooring

Ship arrived at 01°S, 077°E at 0515 hrs on 28/9/10. The mooring was released at 0630 hrs. The buoy was sited at 0645 hrs. The Sea was very rough and strong winds prevailed. We could hook the buoy at 1130hrs. ADCP & Low drag buoy were on the deck at 1205 hrs. The retrieval of the mooring at 01° S, 77°E was completed successfully at 1640 hrs on 28/9/2010. The details of the retrieval are mentioned in the table Nos.7.1.3.1-7.1.3.5

b) Redeployment of mooring

The deployment of mooring at 01°S, 077°E was started at 0715 hrs on 29/09/10. The ADCP buoy was on the sea surface at 0730 hrs and the deployment completed at 1130 hrs. The anchor drop position was 00°59.51'S, 076°57.71'E and the depth 4782 m. The triangulation for the mooring position was completed at 1320 hrs. The details of the mooring are explained in the table Nos. 7.1.3.6-7.1.3.10

4. Servicing of mooring at 00°, 083°E

a) Retrieval of mooring

The ship was on the top of the mooring at 0445 hrs on 01/10/10 during that time the range was taken to the mooring position. We released the mooring at 0530 hrs. The weather was fair and sea was calm till 0730 hrs. After that strong winds were prevailed and sea became rough. It was still raining at this location. Hooking of the buoy became very difficult in these conditions. We finally hooked the buoy at around 1000 hrs and with great effort of the mooring team including Mooring master, chief officer and ship crew, who have taken high risk, brought the ADCP buoy on to the deck at around 1030 hrs. The monsoon weather conditions were still prevailing in this region. The mooring at 00° , 83°E was retrieved successfully at 1600 hrs on 01/10/2010

The details of the retrieval are given in the table Nos.7.1.4.1-7.1.4.5

b) Redeployment of mooring.

Mr. Almeida and his group serviced the ADCP and current meters and new wire rope of 4000 m was spooled by deck hands and mooring group on 02/10/10. The deployment of ADCP, current meters was started at 0720 hrs on 03/10/10. At this location a sediment trap belongs to INCOIS was also deployed along with other instruments. The deployment was completed at 1130hrs. The anchor drop position of the mooring was $00^{\circ}00.46'\text{N}$, $083^{\circ}01.56'\text{E}$ and the depth 4430 m. The details of the deployment are shown in fig and table No.7.1.4.6-7.1.4.10

5. Service of mooring at 01°S , 93°E

a) Retrieval of mooring

The ship was stopped at 01°S , 093°E at 0415 hrs on 06/10/10. The mooring was released at 0500 hrs. The ADCP and Low drag float were on the deck at 0710 hrs. The retrieval of mooring was completed successfully at 1025 hrs on 6/10/2010. The details of the retrieval are shown in fig and table No.7.1.5.1-7.1.5.5

b) Redeployment of mooring

The redeployment was started at 0600 hrs on 7/10/2010. After lowering ADCP & LD float to the sea surface, the deep sea winch did not respond. We stopped the deployment at 0645 hrs and brought back both the buoys to the deck at 0845 hrs. The servicing of deep sea winch went on up to late evening around 2300 hrs. Finally, the deep sea winch was repaired. The deployment of mooring started at 0600 hrs on 8/10/2010. ADCP and LD float were in the water at 0608 hrs. The deployment of mooring at 01°S , 93°E was completed successfully at 1050 hrs on 8/10/2010. The anchor drop position of the mooring was $00^{\circ}58.23'\text{S}$, $092^{\circ}57.31'\text{E}$, depth 4578 m. The details of the deployment are shown in fig and table No.7.1.5.6-7.1.5.10

6. Service of mooring at 00° , 93°E

a) Retrieval of mooring

The Ship was stopped at 00° , 93°E at 0500 hrs on 09/10/2010. The ranges were taken for the mooring at 0530 hrs. The mooring was released at 0545 hrs. The retrieval of mooring was started at 0615 hrs. The retrieval of mooring was completed successfully at 1030 hrs on 9/10/2010. The details of the retrieval are shown in fig and table No.7.1.6.1-7.1.6.5

b) Redeployment of mooring

Ship positioned at 00° , 93°E at 0645 hrs on 10/10/2010 for redeployment of the mooring. The redeployment was started at 0650 hrs and completed successfully at 1125 hrs. The anchor drop position

of the mooring was 00°00.89'S, 092°57.68'E and depth 4498 m. The details of the deployment are shown in fig and table No.7.1.6.6-7.1.6.10.

7. Service of mooring at 01° N, 93°E

a) Retrieval of mooring

Ship stopped at 01°N, 93°E at 0415 hrs on 11/10/2010. Released the mooring at 0515 hrs and ADCP and other floats were on the deck at 0610 hrs. Retrieval of mooring at this location was completed successfully at 1015 hrs. The details of the retrieval are shown in fig and table No.7.1.7.1-7.1.7.5

b) Redeployment of mooring

Redeployment has been started at 1245 hrs on 11/10/2010. The ADCP and other floats and one RCM were in the water at 1410 hrs on 11/10/2010. The deployment at 01°N, 93°E was completed at 1600 hrs. The ranges were taken for the mooring at 1710 hrs. The anchor drop position of the mooring was 00°59.08'N, 092°30.29'E, depth 4386 m. The details of the deployment are shown in fig and table No.7.1.7.6-7.1.7.10

7.2 Surface meteorological measurements

(Sub-team: Lix John, Joshua D'Mello, Suharsh Naik,)

Surface meteorological parameters of Sea Surface Temperature (SST), wind speed and direction, barometric pressure (corrected to mean sea level), dry bulb and wet bulb temperature, and navigation information were collected at six hourly intervals for XBT and physical, biogeo-chemical observations respectively from 1200 hrs on 19 September 2010 along the track up to Chennai. The bucket thermometer and met kit were used for this purpose.

7.3 CTD operations

(Sub-team: Anselm Almeida, RJK Charyulu, norinco Joshua D'Mello, Lix John)

The Sea-bird CTD was operated for all the observations during the cruise. Total 9 CTD observations at nine locations were carried out through out the cruise. The CTD was operated up to 1000 m depth. The details of CTD operations are given in the table No.7.2

7.4 Biological sampling:

(Sub-team: Arati Verenkar and Shweta Halanrnekar)

1) Microzooplankton Grazing:

Dilution experiment: is used to determine rate of grazing of phytoplankton organic carbon by microzooplankton per unit volume of seawater. The dilution approach protocol is based on the experimental determination of phytoplankton growth in a dilution series. The dilution series is made up by combining the natural microbial community with seawater that has been filtered free of microbial components.

Procedure: Sampling is done at 00°00.01' N, 83°00.46'E from the depths of interest (30 m) using CTD. Dilution series is done. Samples are collected at t_0 immediately after dilution, incubated for 24 hours. Samples are collected after 24 hours of incubation and analysis done. Various

parameters such as total bacterial count, microzooplankton, chlorophyll and phytoplankton could be studied from the samples for more details.

2) **Chlorophyll a by fluorometric Analysis:**

Chl a measurements have historically provided a useful estimate of algal biomass. The fluorometric method is extensively used for the quantitative analysis of chl a & pheopigments. Water samples are collected from the below eight discrete depths i.e 0, 10, 20, 40, 60, 80, 100, 120, 150m using CTD Rosette sampler. Collected water samples (1 L) are immediately filtered through 47 mm GF/F filter paper under low vacuum & deep frozen. Filter papers are then transported to the laboratory in liquid nitrogen can. Chl a is then extracted in 10 ml 90 % acetone in dark for 24 hours in a refrigerator and concentration is determined fluorometrically.

3) **Phytoplankton count :**

The direct estimate of phytoplankton cell density as the measure of standing crop is usually made by this method. Water samples are collected from 0, 10, 20, 40, 60, 80, 100, 120, 150 m depths using CTD Rosette sampler and are then fixed with 2% lugol's iodine. A settling and siphoning procedure is followed to concentrate samples. The enumeration is done using Sedgwick Rafter.

4) **Bacterial abundance:**

Bacterial enumeration in seawater is done by using DAPI (4,6-Diamino-2-phenylindole). Water samples are collected from 0, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000 m depths using CTD Rosette sampler. Bacteria are preserved, stained with DAPI & concentrated onto a membrane filter. This causes the individual bacterial cell to fluoresce bluish white under UV on an epifluorescence microscope. The individual cells are counted in field of view of known area and the concentration of bacterial in original sample is calculated.

5) **Mesozooplankton Biomass & total count :**

Samples are collected with a Plankton Net from 0 – 150 m. The biomass of mesozooplankton is estimated by conventional displacement volume method. Sample is then splitted using Folsom splitter and the total count is estimated.

6) **Primary Production by ¹⁴C method:**

Primary productivity is defined as the uptake of inorganic carbon into particulate matter as mg C/m³/day. The rate of carbon fixation (= primary production) by autotrophs in seawater is measured by tracing the uptake of radioactive ¹⁴C from the dissolved inorganic form to the particulate organic form.

Procedure: Water samples are collected from different depths (0, 10, 20, 40, 60, 80, 100, 120m) using CTD Rosette sampler. Water samples drawn at pre-dawn were collected in four 250 ml capacity polycarbonate bottles (3 light and one dark). One ampoule of NaH¹⁴CO³ is added in each bottle containing water samples from different depths. These are then incubated in-situ using a

mooring system, at respective depths for 12 hours from just before sunrise to half an hour after sunset. Incorporation of phytoplankton is detected by filtering incubated samples with 47 mm GF/F filters (0.7 μ m). Then it is exposed to fumes of HCl (0.5 N). Then 5 ml of liquid scintillation cocktail is added to it and radioactivity is measured using a scintillation counter. The details are given table No.7.2

7.5 Chemical sampling:

(**Sub-Team:** *M. Muthukumar and K. R. Mangala*)

To study the nutrients profile and regional carbon dioxide flux in equatorial Indian ocean, water samples were collected from the top 1000 m using a seabird CTD- rosette system fixed with 5 liter Niskin bottles at each station from 5° N to 1° S (at one degree intervals) along 77° E. Sub samples were analyzed for the following parameters.

Nutrients (Nitrate, Nitrite, phosphate, silicate).; Dissolved oxygen; TCO₂.; pH

Dissolved oxygen was measured through Winkler's titration using Dosimat auto burette. TCO₂ samples were determined through coulometer by following the SCOR protocols. Spectrophotometric method (cresol red) was carried out for pH determination. Nutrients were analyzed by spectrophotometer using Grasshoff protocols.

Pelagic respiration experiment:

To measure the community respiration, water samples were collected from the subsurface chlorophyll maxima layer at 83°E equator and 93°E equator. On deck incubations were conducted using unfiltered sea water in a 15 l darkened LDPE container submerged in a flowing water tank for temperature regulation. Three subsamples for Dissolved oxygen, TCO₂, TBC and TOC were taken at an interval of 12 hours. DO and TCO₂ were measured onboard with appropriate protocols and samples for TBC and TOC were preserved for analysis. The details are given table No.7.2

7.6 XBT observations and ARGOs drifters

(**Sub-Team:** *Lix John and Joshua D'Mello*)

The expendable bathythermographs (XBTs) of 780 m range were fired along 77°E from 5°N to 1°S and up to 13°N (off Chennai) under the project GAP2018. The total number of XBTs fired were TWENTY TWO. The ARGOs drifters were dropped at three locations, 00° 28.75'S, 080° 07.06'E; 00° 11.09'S, 084° 50.03'E and 00° 43.00'S, 089° 59.00'E. The details of the data collection is given in table No.7.3

8. CONCLUSIONS

The cruise SK-276 was successful with all scientific operations completed as per the plan. The Sediment Trap belongs to INCOIS was also deployed along with the regular mooring equipment at 83°E and Equator successfully.

9. RECOMMENDATIONS

Deep-sea echo-sounder and multi-beam echo-sounder may be kept in proper condition during deep-sea beyond 3000 m depth cruises.

10.ACKNOWLEDGEMENTS

The Chief Scientist and his team are thankful to the Master, Chief Officer and other officers who were on duty during the stations, Engineers and crew for providing excellent services and cooperation for all the operations. The Chief Scientist is thankful to all participants for their cooperation and coordination for all the operations during the cruise that has made the cruise SK-276 a success. The engineers from NORINCO extended their services during all the operations. The participants including chief scientist are thankful to the Radio Officer for patiently handling the incoming and outgoing e-mails.

The chief scientist and his team are thankful to Dr. S.R.Shetye, Director, NIO and to the Secretary and Chairman, MOES, Govt. of India, Dr. Rasik Ravindra, Director, NCAOR, Vasco, Goa and Dr. Anil Kumar, NCAOR, Vasco for allotting the ship time for the time-specific mooring operations and Mr. M.M. Subramaniam, NCAOR for making all the necessary arrangements and cruise related logistics support. The Chief scientist is thankful to Dr.VSN Murty, SIC, NIO-RC, Vizag for his continuous effort to manage this OOS- EIO mooring program. The cruise team from NIO, Goa would like to thank their DU leader Dr. S. Prasanna Kumar for his interest in these studies.

The Chief Catering Officer and his associates onboard ORV *Sagar Kanya* has served variety of dishes to the satisfaction of the participants.

Table 7.1.A

		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (SIP -1307 Mooring)			
CRUISE NO: SK-276					
		Mooring System Information			
Mooring ID: OKS_3		Anchor Drop:		Deployment Date: 20.09.2010	
<i>Deployment</i>		09°00.159'N		Recovery Date	
<i>Design: Fernando V</i>		75°57.367'E			
Sea state: 2					
m.a.b	m.b.s	Mooring Diagram	Mooring Description	Remarks	Deploy Time IST
			ARGOS-# 99181	lone fishing boat	
9.5	152.5		Lowdrag ADCP Float		9:52
			CH 63		
			150Khz ADCP	<i>SL # 14585</i>	
			swivel		
			3m LLChain		
			Dual Ixsea release	<i>SL #1032</i>	
			Ixsea release	<i>SL #1030</i>	
			1M u 1/2" CHAIN		
			1/2m n1/2 "		
		2m chain/pp			
depth	162	tv	Anchor 600 Kg.		



Table 7.1.1.1

1 N, 77 E **EQCM_6.1N** Recovery

Depth meters	Instrument	Sr. no	Filenames	from	To	Bytes downloaded	Rmks
462	ADCP	13047	a. 13047000	21/10/09 05:00 hrs	08/08/10 23:30	1,02,80,960	Data breaks
			b. RDI_001	09/08/10 06:00 hrs	02/09/10 15:00	8,60,160	
			c. RDI_002	02/09/10 22:00	23/09/10 08:00	7,20,054	
2040	DVS	12798	DVS_12798	21/10/09 06:00	23/09/10 10:40	59,59,464	
4020	DVS	12895	DVS_12895	21/10/09 06:00	10/09/10 17:00	78,02,880	

Table 7.1.1.2

1 N, 77 E **EQCM_6.1N** Data Return

Depth m	Instrument	Sr. no	No of bins	Bin size	Range	Speed	Dir	Temp	Cond	Pr	days
462	ADCP	13047	29	16m	472m	OK	OK	OK	-	OK	335
2040	DVS	12798	5	0.75m	4m	OK	OK	-	-	-	336
4020	DVS	12895	5	0.75m	4m	OK	OK	-	-	-	325

Table 7.1.1.3

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOES)**

CRUISE NO: SK276

RECOVERY DATE: 23.9.2010

MOORING SYSTEM INFORMATION

Mooring I.D.:
EQCM 6.1 R

RECOVERY

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Chief Officer	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddarth
Winch operations	Baiju, biju, Ramesh, Parshuram (Norinco)
Deck Hands	Akhilesh, kumar, Santlal, Patil
Weather Condition	Sea state 0
Mooring Design	Sadashiv Khalap
Water Depth	4256 m

Release Model	Oceano AR 861 B2S	Oceano AR 861 B2S
Sr.no	723	1044
Interrogation/arm Code	4B67	187E
Diagnostic code	1849	1849
Release code	4B68	1855

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 63
Strobe Flash	Novatech
Release Armed	Mithun Gaonkar– New Batteries

ANCHOR DROP

01° 00.162' N
077° 00.325' E

RDI ADCP 75khz – LR	462 m
DVS - 2 Nos.	2020m & 4020m

Table 7.1.1.4


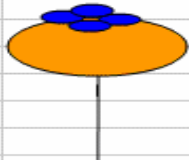
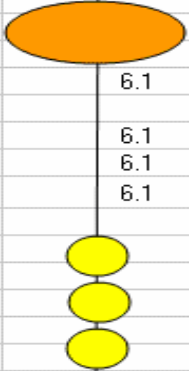

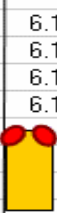


		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 6.1N <i>Recovery</i>		Anchor Drop: 01°00.162'N 77°00.325'E		Recovery Date: 23.09.10	Deployment Date: 21.10.09
Sea state: 2 m.a.b		Mooring Diagram		Mooring Description	Remarks
m.b.s					Recovery Time IST
	462		Lowdrag ADCP Float CH 63 75 Khz Adcp swivel 3m LLChain	Released 5:55 hooked 7:33 SL #13047	7:48
			low drag float 320b 1m chain 20 m Nylon /WR 6.1 500m wire 6.1 500m wire 6.1 500m wire 1m chain Hydro Float-3nos 1m chain 20m Nylon	twist change Nxt	8:15 8:47 9:13 9:42
	2020		DVS	SL #12798	9:58
			6.1 500m 6.1 500 m wire 6.1 500 m wire 6.1 500mwire DVS	change spool	10:06 10:25 to 11 11:30 11:56
	4020		DVS 6.1 100mwire 6.1 100mwire 1m chain Mclane G8800-2 * 1 nos 1m chain between Mclane G8800-3 * 1 nos	SL # 12895	12:20
			2 m Chain Ixsea release AR861B2S Ixsea release 1M u 1/2" CHAIN	Taken on capstan SL # 1044 SL # 723	12:30 12:40 12:48

Table 7.1.1.5
NIO - OOS DUAL ACOUSTIC RELEASES RETRIEVAL INFORMATION

Station ID	Deployment date/ Cruise Number	Retrieval date/ Cruise Number	AR861B 2S Serial Number	ARM code	DIAG code	RELEA SE code	SLA NT range	TIM E	ECH O sound er depth	POSITN /RMK
EQCM 6.1- N	21 -10 - 09 SK-264	23 -09- 10 SK-276	1044	187E	1849	1855	3917 3918 4402	05:16	4200	77-1 NORTH
								05:21		
								05:47		RELEAS ED - OK
EQCM 6.1- N	21 -10 - 09 SK-264	23 -09- 10 SK-276	723	4B67	----	4B68	4412	05:25		

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**

Serial No: **W-04-152**

Frequency: **160.78500 MHz / 106.72500 MHz**

Channel:

Pop up signal /flash on retrieval : Flasher working. Buoy sighted at 05:55 AM

REMARKS IF ANY : No signal from radio, but functioned fine as buoy approached closer.

AREEF A. SARDAR

Table 7.1.1.6

1 N, 77 E

EQCM 6.2N

Deployment

Depth meters	Instru-ment	Sr. no	Deploy/ Log File	Time started	Sampling	Rmks
480	ADCP	13047	13047	23/09/10 22:00	30 mins	
2015	TP	5073	-	24/09/10 10:00	10 mins	
2055	DVS	12896	12896.log	23/09/10 22:00	10 mins	
4055	DVS	12957	12957	23/09/10 22:00	10 mins	
4055	TP	5080	-	23/09/10 22:00	10 mins	

Table 7.1.1.7

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

DEPLOYMENT DATE: 24.9.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: **EQCM 6.2 N****DEPLOYMENT**

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Add. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart.
Winch operations	Baiju,biju,Ramesh,Parshuram(Norinco)
Deck Hands	Akhilesh,kumar,Santlal,Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernandes
Water Depth	4335 m

Release Model	MORS AR 861 B2S DDL	MORS AR 661 B2S DDL
Sr.no	1178	723
Interrogation/arm Code	086E	4B67
Diagnostic code	1849	-----
Release code	0855	3A42

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Areef A Sardar – New Batteries

ANCHOR DROP

00° 57.86' N
076° 59.25' E

RDI ADCP 75khz – LR	479 m
DVS- 2Nos.	2054 & 4054

Table 7.1.1.8


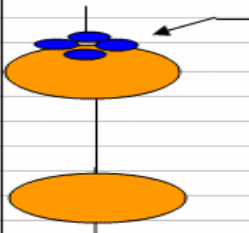
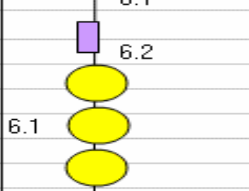

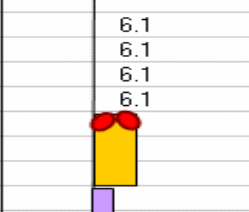
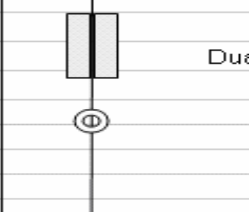
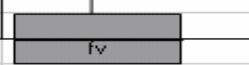
		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 6.2N <i>Deployment</i>		Anchor Drop: 00°57.892'N 76°59.033'E		Deployment Date: 24.09.2010 Recovery Date: 23.09.2010	
Design: <i>Fernando V</i> Sea state: 2					
m.a.b	m.b.s	Mooring Diagram	Mooring Description	Remarks	Deploy Time IST
				Drift-1.5K, move 8.5m	
3841	479		Lowdrag ADCP Float CH 63 75 KHz ADCP swivel 3m LLChain low drag float 1m chain	SL # 13047	10:49
		6.1	20 m Nylon / WR		10:52
		6.1	500m wire		10:54
		6.1	500m wire		11:13
		6.1	500m wire	chang spool(12-12:3	11:38
2307	2013		TP sensor 20m 1m chain Hydro Float-3nos 1m chain 20m Nylon	SL # 5073 inserted New	12:37
		6.2			
		6.1			12:56
2266	2054		DVS	SL # 12896	13:00
		6.1	500m	jkt dmgd	wire change Nxt
		6.1	500 m wire		twist,change Nxt
		6.1	500 m wire	jkt dmgd	change Nxt
		6.1	500mwire		13:47
266	4054		DVS #12957 TP sensor 50m wire 100mwire	DVS begins on 50 SL# 5080 Inserted New Thru capstan	14:25
		6.1	100mwire		14:28
		6.1	100mwire		14:38
			1m chain		15:00
			G8800-2 * 1 nos	1m chain between	
			G8800-3 *1 nos	STUDS missing	
			2 m Chain	next 3m	
7	4313		Dual Ixsea release Ixsea release 1M u 1/2" CHAIN 1/2m n1/2 " 4m chain/pp	SL # 1178 SL # 723	
depth	4320		Anchor 1500 Kg.		15:04

Table 7.1.1.9

ACOUSTIC RELEASES TURNAROUND CHECKLIST

1) Model No:-. AR 861B2S Sr.No:- **1178** Type :- OCEANO 2500 S- Universal

Function/Code :

ARM : **086E** DIAGNOSTIC: **0849** RELEASE : **0855** Frequency: **12.0 KHz**

2) Model No:-. AR 661B2S Sr.No:- **723** Type :- OCEANO 2500 S- Universal

Function/Code :

INT-RANGE : **4B67** RELEASE : **4B68** Frequency: **12.0 KHz**

Step 1	-RECOVERY Inspect exterior and clean with fresh water.		OK
Step 2	- REPLACE BATTERIES		
		# 723	# 1178
	Old battery Voltage	--	--
	New Battery Voltage (LR20)	9.66 V	9.56 V
	New Battery Voltage (6LR61)	9.49 V	9.60V
Step 3	Inspect/ clean o-rings and grooves. Very lightly grease the o-rings and metal face seal.		OK
Step 4	- Tighten all bolts.		OK
Step 5	- SYSTEM TEST		
	Release command		OK
	Acknowledgement pulse		OK
	Release after 3 seconds		OK
	Execution pulse		OK
	Interrogate/ranging command		OK
	Signal transpond		OK
Step 6	- RE- ARMING Insert release ring and fit locking shaft.		OK

Interrogation after deployment from both the Acoustic Release OK

Mooring ID : EQCM 6.2 N

Cruise No. :- ORV -SK - 276

Deployment Date : 24-09-2010

Comments: # 723 and # 1178 acoustic releases are connected in tandem.

Table 7.1.1.10

DEPLOYMENT

Mooring ID: **EQCM 6.2 N**

Deployment Date: - **24/09/2010**

Cruise No. : - **ORV -SK - 276**

Anchor Drop: - **00° 57 86 N**
76° 59 25 E

Anchor Drop time: **15:05 hrs**

Multibeam Echo sounder Depth: **4318m**

Triangulation:

First Position: **00° 57. 864 N**
76° 59. 309 E

Time:**04:54 hrs**
Slant Range: **4332 m**

Second Position: **00° 57.892 N**
76° 59. 033 E

Time:**05:10 hrs**
Slant Range: **4318 m**

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**
Serial No: **W--04-152**
Frequency: **160.72500 MHz**
Channel: **62 (C)**

Deployment Test:

- a) Deck Test: **OK**
- b) Pre-deployment Test: **OK**
- c) Battery Status: **OK**
- d) Submergence signal after anchor drop: **OK**

Name : Areef A. Sardar

National Institute Of Oceanography, Dona Paula, Goa, India.

Table 7.1.2.1

0, 77 E		EQCM_3.6		Recovery				
Depth meters	Instru-ment	Sr. no	Filename	DSU Sr. no	from	To	Bytes down-loaded	Rmks
520	RCM 7	12645	12645.dsu	15085	23/10/09 18:00	25/09/10 06:51	50549	Compass oil has air bubble
970	RCM 7	12744	12744.dsu	15088	16/12/09 :00:30	16/04/10 18:15	20988	-Compass oil leaking 4 months data
2010	RCM 8	12748	12748.dsu	15093	23/10/09 18:00	25/09/10 16:55	50556	
4015	RCM 11	82	82.dsu	15096	23/10/09 18:00	25/09/10 16:50	50556	

Table 7.1.2.2

0, 77 E		EQCM_3.6		Data Return							
Depth m	Instru-ment	Sr. no	No of bins	Bin size	Range	Speed	Dir	Temp	Cond	Pr	days
520	RCM 7	12645	-	-	-	OK	OK	OK	X	OK	336
970	RCM 7	12744	-	-	-	OK	?	OK	?	OK	121
2010	RCM 8	12748	-	-	-	OK	OK	OK	NA	OK	336
4015	RCM 11	82	-	-	-	OK	OK	OK	?	NA	336

Table 7.1.2.3

NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)

CRUISE NO: SK264

RECOVERY DATE:25.9.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: : EQCM 3.6

RECOVERY

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand,siddhart
Winch operations	Baiju,biju,Ramesh,Parshuram(Norinco)
Deck Hands	Akhilesh,kumar,Santlal,Patil
Weather Condition	Sea state 0
Mooring Design	sadashiv Khalap
Water Depth	4752 m

Release Model	Oceano AR 861 B2S	Oceano AR 861 B2S
Sr.no	611	1045
Interrogation/arm Code	3A41	187F
Diagnostic code	1849	1849
Release code	3A42	1855

Mooring Top, Description	Low drag float
Radio Frequency	Channel 62
Strobe Flash	----
Release Armed	Mithun Gaonkar – New Batteries

ANCHOR DROP

00° 00.567' S
076° 59.544' E

RCM 7 – 2 Nos.	520 m & 972 m
RCM 8 – 1 No.	2010 m
RCM 11 – 1 No.	4013 m

Table 7.1.2.4


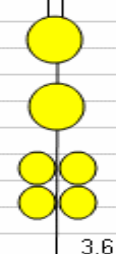



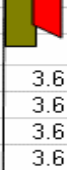

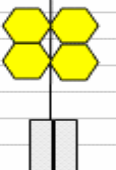

		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO SK_276		Mooring System Information			
Mooring ID: EQCM - 3.6		Anchor Drop:			
Design: <i>Khalap</i>		00°00.567'S		Recovered Date:	25.9.2010
sea state: 3		76°59.544'E		Deployed date:	24.10.2009
m.a.b	m.b.s	Mooring Diagram	Mooring Description	Remarks	Recovery Time IN
				released 7:21, sighted 7:27 preloaded 100,200m	
4277	480		Hydro float 30" 1m Chain 1/2" Chain		10:23
			Hydro float 30" 1m LLchain		
			Dual benthos (6 set) 1/2 m chain in between 20 m Nylon / WR 0.3m chain		
4237	520		current meter #1 RCM 7	SL#12645	10:32
			0.3m chain		
			50m wire rope		10:44
			400m wire rope		10:55
3785	972		0.3m chain current meter #2 RCM 7	SL # 12744	11:15
			0.3m Chain		
			500m wire rope	lot of tension on wire	11:20
			500m wire rope	Bio slides(OK)	11:40
			0.5m 1/2" chain	wire end entangled(remove)	
			Mclane G6600-3 (3x5) 1/2m chain in between		12:17-12:35
			1m LLchain		
			20m nylon rope		12:55
2747	2010		0.4m Chain current meter #3 RCM 8	SL #12748	13:00
			500m wire rope	<i>New Spool</i> Jkt scraped,change Nxt tin	13:10
			500m wire rope		13:30
			500m wire rope	Bio slides	13:55
			500m wire rope		14:14
			0.5m Chain	Bio slides	
744	4013		current meter #4 RCM 11	SL # 82	14:30
			0.5m chain		
			500m wire rope		14:38
			200m wire rope	taped (discard)	14:58
			1m chain		
			Mclane G8800-2 (2) Mclane G6600-3 (3x1)	Imploded	15:05
			2m chain 1/2" MORS release		
30	4727		# AR-661B2S # AR 861B2S	SL # 611 SL # 1045	15:10
depth	4752				
slant range	4715				

Table7.1.2.5

NIO - OOS DUAL ACOUSTIC RELEASES RETRIEVAL INFORMATION

Station ID	Deployment date/ Cruise Number	Retrieval date/Cruise Number	AR861B 2S Serial Number	ARM code	DIAG code	RELEASE code	SLANT range	TIME	ECH O sounder depth	POSITN/R MK
EQC M 3.6	24 -10 - 09 SK-264	25 -09- 10 SK-276	1045	187F	1849	1855	4576	07:19	4752	77 - EQUATOR
							4736	07:21		RELEASED - OK
EQC M 3.6	24 -10 - 09 SK-264	25 -09- 10 SK-276	611	3A41	----	3A42	4751 4759	07:07 07:09		
							4369 4294	07:23 07:25		

REMARKS IF ANY : No Novatech Radio transmitter cum Flasher as there was no top ADCP buoy deployed earlier .

**: 1st set of buoys sighted at 07:25 hrs
: 2nd set of buoys sighted at 07:55 hrs**

AREEF A. SARDAR

Table7.1.2.6

0, 77 E

EQCM_3.7

Deployment

Depth meters	Instru-ment	Sr. no	from	Sampling	Rmks
410	ADCP	5742	26/09/10 20:00	30 min	
445	SG IW	222	26/09/10 12:00	30 min	
945	SG IW	223	26/09/10 12:00	30 mins	
1980	SG DW	85	26/09/10 12:00	30 mins	
2980	RCM 11	82	26/09/10 12:00	60 mins	
3980	SG DW	86	26/09/10 12:00	30 mins	

Table 7.1.2.7

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

DEPLOYMENT DATE: 27.9.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: **EQCM 3.7****DEPLOYMENT**

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart.
Winch operations	Baiju, biju, Ramesh, Parshuram (Norinco)
Deck Hands	Akhilesh, kumar, Santlal, Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernandes
Water Depth	4756 m

Release Model	MORS AR 861 B2S DDL	MORS AR 661 B2S DDL
Sr.no	1048	611
Interrogation/arm Code	188C	3A41
Diagnostic code	1849	-----
Release code	1855	3A42

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Areef A Sardar – New Batteries

ANCHOR DROP

00° 00.86' S
077° 00.11' E

RDI ADCP 75khz – LR	412 m
DVS- 2Nos.	444,946,1978,2978,3981.

Table 7.1.2.8


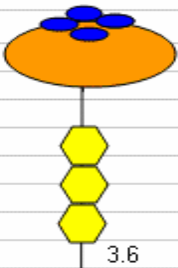








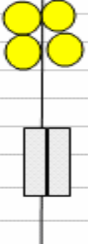
CRUISE NO SK_276		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
Mooring ID: EQCM-3.7		Mooring System Information		Anchor Drop:	Deployment date
Design: <i>Fernando V</i>		Deployment		00°00.844'S	27.9.2010
sea state: 4		77°00.053'E		Recovered Date:	25.9.2010
m.a.b	m.b.s	Mooring Diagram	Mooring Description	Remarks	deployment Time out
4344	412		Novatech Channel 62 c 75Khz ADCP 750m ellipsoi #jo6139(3) 2.0m 1/2" Chain Mclane G6600-3 (3x3) 1/2 m chain in between 20 m Nylon / WR 0.3m chain	Drift 1.7k, moved 7.5 Knm SI# 5742	7:29
4312	444		current meter #1 seaguard 0.3m chain 500m wire rope	SI# 222	7:33
3810	946		0.3m chain current meter #2 seaguard	SI# 223	8:00
	1446		0.3m Chain 500m wire rope 500m wire rope swivel 30" hydro floe 2 nos Mclane G8800-2 (2)	Bio slides	8:03 8:17
2778	1978		0.3m chain current meter #3 Seaguard	SI# 85	8:45
			500m wire rope 500m wire rope- peel	change wire nxt_3.8	8:46 9:04
1778	2978		RCM-11 current meter #4	SI# 82 bioslides	10:30
			500m wire rope 500m wire rope 0.5m Chain current meter #5	SI# 86	10:32 10:32 10:45 11:06
775	3981		Seaguard	SI# 86	11:06
			0.5m chain 400 +50 200m wire rope 100m wire Dual benthos (5 set) 2m chain 1/2" MORS release DUAL IXSEA acoustic release IXSEA acoustic release 4m chain	Bio slides	11:27 11:35 11:55
depth	4756	Anchor 1500 Kg.			

Table 7.1.2.9
ACOUSTIC RELEASES TURNAROUND CHECKLIST

1) Model No:-. AR 861B2S Sr.No:- **1048** Type :- OCEANO 2500 S- Universal

Function/Code :

ARM : **188C** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0 KHz**

2) Model No:-. AR 661B2S Sr.No:- **611** Type :- OCEANO 2500 S- Universal

Function/Code :

INT-RANGE : **3A41** RELEASE : **3A42** Frequency: **12.0 KHz**

- | | | |
|--------|---|-----------------------------|
| Step 1 | -RECOVERY
Inspect exterior and clean with fresh water. | OK |
| Step 2 | - REPLACE BATTERIES | |
| | Old battery Voltage | # 1048 # 611 |
| | New Battery Voltage (LR20) | -- -- |
| | New Battery Voltage (6LR61) | 9.57 V 9.61 V |
| | 9.67 V 9.64V | |
| Step 3 | Inspect/ clean o-rings and grooves.
Very lightly grease the o-rings and metal face seal. | OK |
| Step 4 | - Tighten all bolts. | OK |
| Step 5 | - SYSTEM TEST | |
| | Release command | OK |
| | Acknowledgement pulse | OK |
| | Release after 3 seconds | OK |
| | Execution pulse | OK |
| | Interrogate/ranging command | OK |
| | Signal transpond | OK |
| Step 6 | - RE- ARMING
Insert release ring and fit locking shaft. | OK |

Interrogation after deployment from both the Acoustic Release OK

Mooring ID : EQCM 3.7 Cruise No. :- ORV -SK - 276

Deployment Date : 27-09-2010

Comments: # 1048 and # 611 acoustic releases are connected in tandem.

Table7.1.2.10

DEPLOYMENT

Mooring ID: **EQCM 3.7**

Deployment Date: - **27/09/2010**

Cruise No. : - **ORV -SK - 276**

Anchor Drop: - **00° 00 86 S**
77° 00 11 E

Anchor Drop time: **11:55 hrs**

Multibeam Echo sounder Depth: **4756 m**

Triangulation:

First Position: **00° 00. 198 S**
76° 58. 708 E

Time:**01:35 hrs**
Slant Range: **5287 m**

Second Position: **00° 00. 333 S**
76° 59. 375 E

Time:**01:55 hrs**
Slant Range: **4872 m**

Third Position: **00° 01. 099 S**
76° 59. 764 E

Time:**02:15 hrs**
Slant Range: **4807 m**

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**

Serial No: **W--04-158**

Frequency: **160.72500 MHz**

Channel: **62 (C)**

Deployment Test:

- | | |
|--|-----------|
| a) Deck Test: | OK |
| b) Pre-deployment Test: | OK |
| c) Battery Status: | OK |
| d) Submergence signal after anchor drop: | OK |

Name : Areef A. Sardar

National Institute Of Oceanography, Dona Paula, Goa, India.

Table7.1.3.1

1 S, 77 E

EQCM_7.1S

Recovery

Depth meters	Instrument	Sr. no	File names	from	To	Bytes downloaded	Rmks
385	ADCP	5784	5784S	20/10/09 05:00	28/09/10 13:00	120,07,167	
385	TP	4339	4339.asc	20/10/09 12:00	29/09/10 16:40	4,16,611	
2045	DVS	12795	DVS_12795	20/10/09 12:00	02/07/10 06:10	61,32,736	8.5 months data
4045	DVS	12797	DVS_12797	20/10/09 06:00	01/12/09 12:30	10,16,832	1.5 month data

Table7.1.3.2

1 S, 77 E

EQCM_7.1S

Data Return

Depth m	Instrument	Sr. no	No of bins	Bin size	Range	Speed	Dir	Temp	Cond	Pr	days
385	ADCP	5784	29	16m	472m	OK	OK	OK	-	OK	342
385	TP	4339	-	-	-	-	-	OK	-	OK	343
2045	DVS	12795	5	0.75m	4m	OK	OK	-	-	-	244
4045	DVS	12797	5	0.75m	4m	OK	OK	-	-	-	42

Table 7.1.3.3

NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)

CRUISE NO: SK276

RECOVERY DATE: 28.9.2010

MOORING SYSTEM INFORMATION

Mooring I.D.:
EQCM 7.1 S

RECOVERY

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Add. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand,siddhart
Winch operations	Baiju,biju,Ramesh,Parshuram(Norinco)
Deck Hands	Akhilesh,kumar,Santlal,Patil
Weather Condition	Sea state 0
Mooring Design	sadashiv Khalap
Water Depth	4775 m

Release Model	Oceano AR 661 B2S	Oceano AR 861 B2S
Sr.no	610	1043
Interrogation/arm Code	3A40	187D
Diagnostic code	1849	1849
Release code	3A49	1855

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 63
Strobe Flash	Novatech
Release Armed	Mithun Gaonkar – New Batteries

ANCHOR DROP

- **00°59.844' S**
076° 59.146' E

RDI ADCP 75khz – LR	385 m
DVS- 2Nos.	2020m & 4045m

Table7.1.3.4


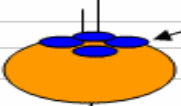





		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 7.1S	<i>Recovery</i>	Anchor Drop:		Recovery date: 28.9.2010	
		00°59.84'S		Deployment Date: 20.10.09	
		076°59.146'E			
Sea state:	5,cloudy	Mooring Diagram	Mooring Description	Remarks	Recovery Time IN
winds>20Kn	m.b.s				
				released-6:30	IST
				J06139-2	
	385		Lowdrag ADCP Float CH 63	Buoy upside-down	12:07
			75 Khz ADCP	SL# 5784	
			TP sensor	SL #4339	
			swivel		
			3m LLChain		
			low drag float	J06141-3	12:15
			.5m chain		
			20 m Nylon /WR		
		7.1	100m wire		12:30
		7.1	500m wire		13:20
		7.1	500m wire		13:40
		7.1	500m wire	to change Nxtime	14:03
	2020		DVS	SL # 12795	14:29
			1m chain		
			Hydro Float-3nos		14:37
			1m chain		
		7.1	20m Nylon		14:52
		7.1	500m		15:10
		7.1	500 m wire		15:24
		7.1	500 m wire		15:40
		7.1	500mwire		15:53
			DVS	SL #12797	16:03
	4045				
		7.1	500mwire		16:09
		7.1	100mwire		16:20
		7.1	50mwire		16:24
		7.1	50mwire		16:27
			1m chain		
			Mclane G8800-2 *1 nos		
			1m chain between		16:37
			Mclane G8800-3 *1 nos		
			2 m Chain		
	4750		Ixsea release AR861B25	SL #1043	16:38
			Ixsea release	SL # 610	
			1M u 1/2" CHAIN		

Table7.1.3.5

NIO - OOS DUAL ACOUSTIC RELEASES RETRIEVAL INFORMATION

Station ID	Deployment date/ Cruise Number	Retrieval date/ Cruise Number	AR861 B2S Serial Number	ARM code	DIAG code	RELEASE code	SLANT range	TIME	ECHO sounder depth	POSITN/RMK
EQC M 7.1 S	20 -10 - 09 SK- 264	28 -09- 10 SK-276	1043	187D	1849	1855	-		4775	77-1 SOUTH NO RANGES
							-	06:30		RELEASED - OK BUT NO ACNOWLEDGE MENT
EQC M 7.1 S	20 -10 - 09 SK- 264	28 -09- 10 SK-276	610	3A40	----	3A49	--	--		NO RANGES
							--	-		

REMARKS IF ANY : **No interrogation ranges with both the acoustic releases .
Released Sr.No.1043 but no release acknowlgmnt.
: First set of buoys sighted at 06:45 hrs
: No radio signal and flasher as buoy popped upside down.
: Weather rough, huge swells , first set of buoys onboard at 12:11 hrs.**

AREEF A. SARDAR

Table7.1.3.6

1 S, 77 E

EQCM_7.2S

Deployment

Depth meters	Instrument	Sr. no	Deploy/ Log File	Time started	Sampling	Rmks
460	ADCP	5784	S5784.log	29/09/10 08:40	30 mins	
460	TP	4339	-	29/09/10 06:00	10 mins	
2090	DVS	13060	12896.log	28/09/10 21:00	10 mins	
2090	TP	5075	-	29/09/10 12:00	10 mins	
4165	DVS	13061	13061	29/09/10 08:40	10 mins	
4170	TP	5059	-	29/09/10 12:00	10 mins	

Table 7.1.3.7

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

DEPLOYMENT DATE: 29.9.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: EQCM 7.2 S

DEPLOYMENT

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart.
Winch operations	Baiju, biju, Ramesh, Parshuram (Norinco)
Deck Hands	Akhilesh, kumar, Santlal, Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernandes
Water Depth	4782 m

Release Model	MORS AR 861 B2S DDL	MORS AR 661 B2S DDL
Sr.no	1044	610
Interrogation/arm Code	187E	3A40
Diagnostic code	1849	-----
Release code	1855	3A49

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Areef A Sardar – New Batteries

ANCHOR DROP

00° 59.51' S
076° 57.71' E

RDI ADCP 75khz – LR	457 m
DVS- 2Nos.	2089 & 4167

Table7.1.3.8


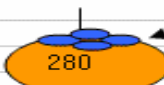




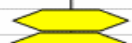
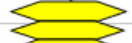


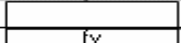
		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 7.2S		Anchor Drop:		Deployment Date: 29.09.2010	
Design: <i>Fernando V</i>		00°59.53'S		Recovery Date: 28.09.2010	
Sea state: 4		076°57.80'E			
drift-2.8K					
wind-22kn		Mooring Diagram	Mooring Description	Remarks	Deploy
m.a.b	m.b.s				Time out
4325	457		CH 63 750m ADCP Float	12.5 miles away J06139-2	7:30
			75 KHz ADCP TP sensor swivel	SL # 5784 SL # 4339	
		7.1	3m LLChain	4m next time	
			low drag float .5m chain 20 m Nylon / WR	J06141-3	
		7.1	100m wire		7:31
		7.1	500m wire		7:45
		7.1	500m wire		8:04
		7.1	500m wire		8:12
2693	2089		DVS TP	SL # 13060 SL # 5075	8:40
			50m wire 1m chain 30" Hydro Float-3nos		8:50
		7.1			
			G66003-1 20M Nylon/Swivel		
		7.1	500m		8:53
		7.1	500 m wire		9:06
		7.1	500 m wire	Tape/Nst	Change Nxt time
		7.1	500mwire		9:32
615	4167		DVS TP sensor	SL # 13061 SL # 5079	10:23
		7.1	500mwire		10:25
		7.1	100mwire	Change Nxt time	11:00
			1m chain	Rains/windy	
			Mclane G8800-2 * 1 no	Crane leak	
			Mclane G8800-3 * 1 nos		
		7.2	1m chain		
		7.1	2m chain		
7	4775		Dual Ixsea Acoustic release Ixsea release 1.5M u 1/2" CHAIN	SL # 610 SL # 1044	11:26
			1/2m n1/2 " 4m nylon/chain		
depth	4782		Anchor 1500 Kg.		11:29

Table7.1.3.9

ACOUSTIC RELEASES TURNAROUND CHECKLIST

1) Model No:-. AR 861B2S Sr.No:- **1044** Type :- OCEANO 2500 S- Universal

Function/Code :

ARM : **187E** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0 KHz**

2) Model No:-. AR 661B2S Sr.No:- **610** Type :- OCEANO 2500 S- Universal

Function/Code :

INT-RANGE : **3A40** RELEASE : **3A49** Frequency: **12.0 KHz**

Step 1	-RECOVERY Inspect exterior and clean with fresh water.		OK
Step 2	- REPLACE BATTERIES		
		# 1044	# 610
	Old battery Voltage	--	--
	New Battery Voltage (LR20)	9.68 V	9.61 V
	New Battery Voltage (6LR61)	9.66 V	9.64V
Step 3	Inspect/ clean o-rings and grooves. Very lightly grease the o-rings and metal face seal.		OK
Step 4	- Tighten all bolts.		OK
Step 5	- SYSTEM TEST		
	Release command		OK
	Acknowledgement pulse		OK
	Release after 3 seconds		OK
	Execution pulse		OK
	Interrogate/ranging command		OK
	Signal transpond		OK
Step 6	- RE- ARMING Insert release ring and fit locking shaft.		OK

Interrogation after deployment from both the Acoustic Release OK

Mooring ID : EQCM 7.2 S

Cruise No. :- ORV -SK - 276

Deployment Date : 29-09-2010

Comments: # 1044 and # 610 acoustic releases are connected in tandem.

Table7.1.3.10

DEPLOYMENT

Mooring ID: **EQCM 7.2 S**

Deployment Date: - **29/09/2010**

Cruise No. : - **ORV -SK - 276**

Anchor Drop: - **00° 59 53 S**
76° 57 80 E

Anchor Drop time: **11:29 hrs**

Multibeam Echo sounder Depth: **4782 m**

Triangulation:

First Position: **00° 59.185 S**
76° 57.768 E

Time:**12:31 hrs**
Slant Range: **4815 m**

Second Position: **00° 59.434 S**
76° 57.731 E

Time:**01:20 hrs**
Slant Range: **6574 m**

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**

Serial No: **W--04-149**

Frequency: **160.78500 MHz**

Channel: **63 (D)**

Deployment Test:

- a) Deck Test: **OK**
- b) Pre-deployment Test: **OK**
- c) Battery Status: **OK**
- d) Submergence signal after anchor drop: **OK**

Name : Areef A. Sardar

National Institute Of Oceanography, Dona Paula, Goa, India.

Table7.1.4.1

0, 83 E		EQCM_2.7		Recovery							
Depth meters	Instru-ment	Sr. no	Files name	DSU Sr. no.	from	To	Bytes downloaded	Rmks			
410	ADCP	5789	57898000	-	10/10/09 06:00	1/10/10 12:00	1,21,15,779				
410	TP	4335	4335.asc	-	10/10/09 06:00	1/10/10 13:30	51,311				
515	RCM 7	12725	12725.dsu	15098	09/10/09 12:00	17/11/09 14:00	5,874	-battery failed? 1 month data			
515	Microcat	2121	2121.asc	-	10/10/09 12:00	1/10/10 13:50	2,33,016				
765	RCM 7	12726	12726.dsu	15892	09/10/09 12:00	1/10/10 17:50	10:5066	Cond cell has started leaking			
1020	RCM 8	12734	12734.dsu	15889	10/10/09 00:18	24/12/09 2315	2:6476	-battery failed? 2.5 months data			
1970	RCM 11	21	21.dsu	15092	09/10/09 12:00	1/10/10 19:55	53,610	Case leaking from bottom			
3975	RCM 11	68	68.dsu	15082	09/10/09 12:00	1/10/10 19:55	53,608				

Table7.1.4.2

0, 83 E		EQCM_2.7		Data Return							
Depth m	Instru-ment	Sr. no	No of bins	Bin size	Range	Speed	Dir	Temp	Cond	Pr	days
410	ADCP	5789	30	16m	480m	OK	OK	OK	-	OK	356
410	TP	4335	-	-	-	-	-	OK	-	OK	356
515	RCM 7	12725	-	-	-	OK	OK	OK	NA	OK	39
515	Microcat	2121	-	-	-	-	-	OK	?	-	356
765	RCM 7	12726	-	-	-	OK	OK	OK	OK	OK	357
1020	RCM 8	12734	-	-	-	OK	OK	OK	X	OK	75
1970	RCM 11	21	-	-	-	OK	OK	OK	X	OK	357
3975	RCM 11	68	-	-	-	OK	OK	OK	?	NA	357

Table 7.1.4.3

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

RECOVERY DATE: 1.10.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: EQCM 2.7 D

RECOVERY

Captain	A.K.K. Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch. Off	S. Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart
Winch operations	Baiju, Biju, Ramesh, Parshuram (Norinco)
Deck Hands	Akhilesh, Kumar, Santlal, Patil
Weather Condition	Sea state 0
Mooring Design	Sadashiv Khalap
Water Depth	4510 m

Release Model	Oceano AR 861 B2S	Oceano AR 861 B2S
Sr.no	722	1042
Interrogation Code	4B60	187C
Diagnostic code	1849	1849
Release code	4B69	1855

Mooring Top, Description	Low drag float with ADCP 75kHz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Mithun Gaonkar – New Batteries

ANCHOR DROP

- **00°02.451' N**
083°04.485' E

RDI ADCP 75kHz – LR	408 m
RCM 7 – 2 Nos	514m & 767m
RCM 8 – 1 No.	1019 m
RCM 11 – 2 Nos.	1971 m & 3974

Table7.1.4.4


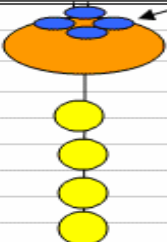











		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 2.7		Anchor Drop:		Recovery Date	01.10.2010
Currents: 2.8K		00° 02.451'N		Deployment Date:	10.10.2009
Winds: 22K		083° 04.485'E			
Sea State: 5		Mooring Diagram	Mooring Description	Remarks	Recovery Time IST
m.a.b	m.b.s			<i>released 5:35</i>	
4102	408		Lowdrag ADCP Float ADCP 75 KHz TP sensor SBE-39	<i>hooked 7:55</i> SL # 5789 SL # 4335	10:20
			Hydro float 30" 1m LLchain	4 nos	
			Hydro float 30" 1m chain		10:25
		2.6	20 m Nylon / WR		10:35
		2.7	50m wire rope		10:37
		2.4	25m wire rope		10:57
3996	514		current meter #1 RCM 7	SL # 12725 remove all rope	10:58
			Microcat SBE	SL # 2121	
		2.7	50m wire rope		11:15
		2.7	200m wire rope		11:25
			0.3m Chain		
3743	767		current meter #2 RCM 7	SL #12726	11:36
		2.5	0.3m Chain		
		2.5	250M Wire rope		11:40
3491	1019		current meter #3 RCM8	SL # 12734	11:55
		2.1	0.5m Chain		
		2.6	400m wire rope		12:02
		2.6	500m wire rope		12:20
			Mclane G6600-3 X 5		12:43
		2.7	20m nylon rope		13:10
			0.4m Chain		
2539	1971		current meter #4 RCM 11	SL # 21	13:20
		2.7	500m wire rope		13:21
		2.7	100m wire rope		13:42
		2.6	100m wire rope		13:55
		2.6	100m wire rope	load 200+100 new	14:00
		2.4	200m wire rope	New Drum	14:35
		2.4	500m wire rope	Bio slides	14:50
		2.4	500m wire	OK	15:10
			current meter #5 RCM 11	SL # 68	15:30
526	3974	2.4	500m wire rope OK		15:35
			Mclane G6600-3 X 2		15:54
			Mclane G6600-1 X 1		
			Benthos 17" 2nos		
		2.4	1.5m Chain		
26	4484		Dual IXSEA Acoustic release	SL #1042 SL #722	15:58
	4510				

Table7.1.4.5

NIO - OOS DUAL ACOUSTIC RELEASES RETRIEVAL INFORMATION

Station ID	Deployment date/ Cruise Number	Retrieval date/ Cruise Number	AR861B2 S Serial Number	ARM code	DIAG code	RELEASE code	SLANT range	TIME	ECHO sounder depth	POSITN/ RMK
EQCM 2.7	10 -10 - 09 SK-264	01 -10- 10 SK-276	1042	187C	1849	1855	4547 4590 4632	05:05 05:09 05:11	4510	83-EQUATOR
							4526 4547 4589	05:29 05:32 05:37		RELEASED - OK
EQCM 2.7	10 -10 - 09 SK-264	01 -10- 10 SK-276	722	4B60	----	4B69	---	----		

1. Novatech Radio Transmitter cum Flasher (Duo)Model No: **RF- 700 C6**Serial No: **W-08-037**Frequency: **160.72500 MHz**Channel: **62 (C)****Pop up signal /flash on retrieval : Flasher and Radio signal working fine.****REMARKS IF ANY : 1st set of buoys sighted at 05:47 hrs.****AREEF A. SARDAR**

Table7.1.4.6

0, 83 E

EQCM_2.8

Deployment

Depth meters	Instrument	Sr. no	from	Sampling	Rmks
345	ADCP	5789	02/10/10 18:00	30 min	
345	TP	4335	03/10/10 06:00	10 min	
422	Sediment trap	12346	04/10/10 00:00	21 days	INCOIS
425	SG IW	224	02/10/10 18:00	30 min	
925	RCM 8	12748	02/10/10 18:00	30 mins	
1960	RCM 11	68	02/10/10 18:00	30 mins	
3960	SG DW	89	02/10/10 18:00	30 mins	

Table 7.1.4.7

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

DEPLOYMENT DATE: 03.10.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: EQCM 2.8

DEPLOYMENT

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart.
Winch operations	Baiju, biju, Ramesh, Parshuram (Norinco)
Deck Hands	Akhilesh, kumar, Santlal, Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernando
Water Depth	4430 m

Release Model	MORS AR 861 B2S DDL	MORS AR 661 B2S DDL
Sr.no	1045	722
Interrogation/arm Code	187F	4B60
Diagnostic code	1849	-----
Release code	1855	4B69

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Areef A Sardar – New Batteries

ANCHOR DROP

00° 00.46' N
083° 01.56' E

RDI ADCP 75khz – LR	343 m
Seaguard	424 m , 3962 m.
RCM 8	927 m
RCM 11	1960 m

Table7.1.4.8


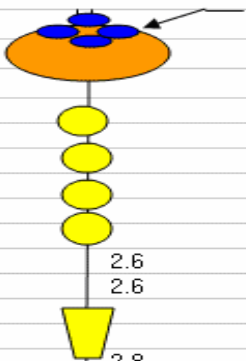
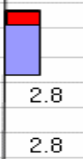
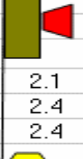
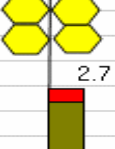
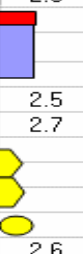
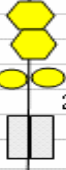
		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)					
CRUISE NO: SK-276		Mooring System Information					
Mooring ID: EQCM - 2.8		Anchor Drop:		Deployment Date:	03.10.2010		
Design: <i>Fernando V</i>		00° 00.46'N		Recovered Date	01.10.2010		
SeaState	4, cloudy	083° 01.56'E					
m.a.b	m.b.s	Mooring Diagram	Mooring Description	Remarks	Deploy Time IST		
4087	343		ch:62 Lowdrag ADCP Float ADCP 75 KHz TP sensor SBE-39	drift-2.8k, Move 10k <i>change buoy nextim</i> <i>SL #5789</i> <i>SL #4335</i>	7:38		
			Hydro float 30"-4 nos 1m LLchain		Buoy close to ship		
			2.6 2.6	20 m Nylon / WR 1m chain 50m wire rope 2m chain			
	422		2.8	Sediment trap 2m chain	INCOIS	8:02	
4006	424			current meter #1 Seaguard	<i>SL # 224</i>		
				2.8	3 links		
				2.8	500M Wire rope	New	8:03
3503	927			current meter #2 RCM8	<i>SL # 12748</i>	8:24	
				2.1	0.5m Chain		
				2.4	500m wire rope		8:25
		2.4		500m wire rope		8:36	
				Mclane G6600-3 X 5 all shackles-2.8 20m nylon rope 0.4m Chain	CHANGE DRUM	15min 9:20	
2470	1960		2.7	current meter #3 RCM 11	<i>SL # 68</i>	9:21	
		2.8	100m wire rope	New	9:22		
		2.8	200m wire rope	New	9:27		
		2.6	100m wire rope		9:37		
		2.6	100m wire rope		9:41		
		2.7	100m wire rope		9:44		
	2600	2.7	500m wire rope	Bio slide-100m afr 500	9:46		
	3000	2.6	500m wire	Bio slide	10:02		
		2.6	400m wire		10:18		
468	3960		current meter #4 Seaguard	<i>SL # 89</i>	10:45		
	3962		2.5	250m wire	Bio slides	10:45	
			2.7	200m wire rope			
				Mclane G6600-3 X 2 Mclane G6600-1 X 1 Benthos 17" 2nos 2.5m Chain		11:12	
				2.6			
8	4422			Dual IXSEA Acoustic release	<i>SL #1045</i> <i>SL #722</i>		
depth	4430		4m chain/nylon Anchor 1500kg		11:15		

Table7.1.4.9

ACOUSTIC RELEASES TURNAROUND CHECKLIST

1) Model No:-. AR 861B2S Sr.No:- **1045** Type :- OCEANO 2500 S- Universal

Function/Code :

ARM : **187F** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0 KHz**

2) Model No:-. AR 661B2S Sr.No:- **722** Type :- OCEANO 2500 S- Universal

Function/Code :

INT-RANGE : **4B60** RELEASE : **4B69** Frequency: **12.0 KHz**

Step 1	-RECOVERY Inspect exterior and clean with fresh water.		OK
Step 2	- REPLACE BATTERIES		
		# 1045	# 722
	Old battery Voltage	--	--
	New Battery Voltage (LR20)	9.55 V	9.67 V
	New Battery Voltage (6LR61)	9.65 V	9.46V
Step 3	Inspect/ clean o-rings and grooves. Very lightly grease the o-rings and metal face seal.		OK
Step 4	- Tighten all bolts.		OK
Step 5	- SYSTEM TEST		
	Release command		OK
	Acknowledgement pulse		OK
	Release after 3 seconds		OK
	Execution pulse		OK
	Interrogate/ranging command		OK
	Signal transpond		OK
Step 6	- RE- ARMING Insert release ring and fit locking shaft.		OK

Interrogation after deployment from both the Acoustic Release OK

Mooring ID : EQCM 2.8

Cruise No. :- ORV -SK - 276

Deployment Date : 03-10-2010

Comments: # 1045 and # 722 acoustic releases are connected in tandem.

Table7.1.4.10

DEPLOYMENT

Mooring ID: **EQCM 2.8**

Deployment Date: - **03/10/2010**

Cruise No. : - **ORV -SK - 276**

Anchor Drop: - **00° 00 46 N**
83° 01 56 E

Anchor Drop time: **11:15 hrs**

Multibeam Echo sounder Depth: **4430 m**

Triangulation:

First Position: **00° 00. 583' N**
83° 01. 347' E

Time:**12:04 hrs**
Slant Range: **4425 m**

Second Position: **00° 00. 610'N**
83° 01. 832'E

Time:**12:09 hrs**
Slant Range: **4474 m**

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**

Serial No: **S--08-037**

Frequency: **160.72500 MHz**

Channel: **62 (C)**

Deployment Test:

- a) Deck Test: **OK**
- b) Pre-deployment Test: **OK**
- c) Battery Status: **OK**
- d) Submergence signal after anchor drop: **OK**

Name : Areef A. Sardar

National Institute Of Oceanography, Dona Paula, Goa, India.

Table7.1.5.1

1 S, 93 E

EQCM_5.1S

Recovery

Depth meters	Instru-ment	Sr. no	File names	from	To	Bytes downloaded	Rmks
400	ADCP	13046	13046000	02/10/10 00:00	6/10/10 08:00	11,59,47,626	
400	TP	4337	4337.asc	02/10/10 06:00	09/10/10 09:40	53,158	
1960	DVS	12710	Dvs_12710	02/10/10 00:00	12/05/10 05:30	53,43,488	8 months data
3960	DVS	12711	Dvs_12711	02/10/10 00:00	13/10/10 16:20	2,80,064	< 0.5 months data

Table7.1.5.2

1 S, 93 E

EQCM_5.1S

Data Return

Depth m	Instru-ment	Sr. no	No of bins	Bin size	Range	Speed	Dir	Temp	Cond	Pr	days
400	ADCP	13046	25	16	410	OK	OK	OK	-	OK	369
400	TP	4337	-	-	-	-	-	OK	-	OK	372
1960	DVS	12710	5	0.75m	4m	OK	OK	-	-	-	222
3960	DVS	12711	5	0.75m	4m	OK	OK	-	-	-	11

Table 7.1.5.3

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

RECOVERY DATE: 06.10.2010

MOORING SYSTEM INFORMATION

Mooring I.D.:
EQCM 5.1 S

RECOVERY

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand,siddhart
Winch operations	Baiju,biju,Ramesh,Parshuram(Norinco)
Deck Hands	Akhilesh,kumar,Santlal,Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernandes
Water Depth	4591 m

Release Model	Oceano AR 861 B2S	Oceano AR 861 B2S
Sr.no	1040	1039
Interrogation/arm Code	187A	186F
Diagnostic code	1849	1849
Release code	1855	1855

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Mithun– New Batteries

ANCHOR DROP

00° 59 401' S
92° 59 597' E

RDI ADCP 75khz – LR	403m
DVS – 2 Nos.	1960 m & 3961 m

Table7.1.5.4


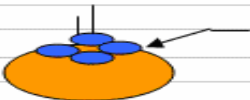


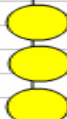

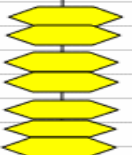

		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 5.1S <i>Recovery</i>		Anchor Drop: 00°59.401'S 92°59.597 ' E		Recovery Date: 6.10.2010	Deployment Date: 2.10.09
Sea state: 2, Cloudy					
m.a.b	m.b.s	Mooring Diagram	Mooring Description	Remarks	Recovery
			CH 63	Popped-5:45 (LT) sighted-6:00 <i>Buoy upside down</i>	Time IN IST
#5514-2	403		RDI 75 KHz ADCP Lowdrag ADCP Float TP sensor swivel	SL # 13046 SL # 4337	7:00
J0 6141-5			3m LLChain low drag float		
			.5m chain		7:10
		5.1	20 m Nylon / WR		
		5.1	500m wire	lightly taped	7:28
		5.1	500m wire		7:52
		5.1	500m wire		8:09
#5520-14	1936		DVS	SL # 12710 Wire twisted during removal of dvs	8:31
#5520-19			1m chain Hydro Float-3nos 1m chain between		8:45
#5520-20		5.1	20m Nylon		
		5.1	500m		8:55
		5.1	100m		9:13
		5.1	500 m wire		9:19
		5.1	500 m wire		9:33
		5.1	400m wire	Wire twisted during	9:45
			DVS	SL #12711	9:55
	3961				
		5.1	400m wire	heqvy tape	10:00
		5.1	200m	slightly taped	10:10
			1m chain		
					10:24
			Mclane G8800-2 * 2	1m chain betwin	
			Mclane G8800-3 * 1		
			2 m Chain		
	4566		Ixsea acoustic release Ixsea acoustic release 1M u 1/2" CHAIN	SL # 1039 SL # 1040	10:25
depth	4591				

Table 7.1.5.5

NIO - OOS DUAL ACOUSTIC RELEASES RETRIEVAL INFORMATION

Station ID	Deployment date/ Cruise Number	Retrieval date/ Cruise Number	AR861 B2S Serial Number	ARM code	DIAG code	RELEASE code	SLANT range	TIME	ECHO sounder depth	POSITN/RMK
EQCM 5.1 S	02 -10 - 09 SK-264	06 -10- 10 SK-276	1039	186F	1849	1855	4571	04:48	4591	93- 1- SOUTH
							--	04:52		RELEASED OK
EQCM 5.1 S	02 -10 - 09 SK-264	06 -10- 10 SK-276	1040	187A	1849	1855	---	----		No ranges from both acoustic releases but released function OK

1. Novatech Radio Transmitter cum Flasher (Duo)Model No: **RF- 700 C6**Serial No: **W-04-144**Frequency: **160.72500 MHz**Channel: **62 (C)****Pop up signal /flash on retrieval : No Flasher/ radio signal as buoy popped upside down.**REMARKS IF ANY : **1st set of buoys sighted at 05:00 hrs.
2nd set of buoys sighted at 06:15 hrs.****AREEF A. SARDAR**

Table7.1.5.6

1 S, 93 E

EQCM_5.2S

Deployment

Depth meters	Instrument	Sr. no	Deploy/ Log File	Time started	Sampling	Rmks
410	ADCP	13046	S5784.log	29/09/10 08:40	30 mins	
410	TP	4337	-	29/09/10 06:00	10 mins	
1940	DVS	13062	13062.log	28/09/10 21:00	10 mins	
1940	TP	5074	-	29/09/10 12:00	10 mins	
4065	DVS	13063	13063.log	29/09/10 08:40	10 mins	
4065	TP	5078	-	29/09/10 12:00	10 mins	

Table 7.1.5.7

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

DEPLOYMENT DATE: 08.10.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: EQCM 5.2 S

DEPLOYMENT

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart.
Winch operations	Baiju, biju, Ramesh, Parshuram (Norinco)
Deck Hands	Akhilesh, kumar, Santlal, Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernandes
Water Depth	4578 m

Release Model	MORS AR 861 B2S DDL	MORS AR 661 B2S DDL
Sr.no	1042	1043
Interrogation/arm Code	187C	187D
Diagnostic code	1849	1849
Release code	1855	1855

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Areef A Sardar – New Batteries

ANCHOR DROP

00° 58.23' S
092° 57.31' E

RDI ADCP 75khz – LR	409 m
DVS- 2Nos.	1938 & 4063

Table7.1.5.8


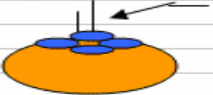








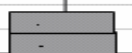
		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 5.2S <i>Deployment</i>		Anchor Drop: 00°58.239'S 92°57.381 ' E		Deployment Date: 8.10.09 Recovery Date: 6.10.2010	
Design: <i>Fernando V</i>					
Sea state: 1, Cloudy					
m.b.s		Mooring Diagram		Remarks	
				Deploy Time Out IST	
#5514-2	409		CH 62 Lowdrag ADCP Float 75 Khz ADCP TP sensor swivel	1500 DR SL # 13046 SL # 4337	6:08
J0 6141-5			low drag float		6:08
			5m LLChain		
			.5m chain		
		5.1	20 m Nylon / WR	lightly taped	6:10
		5.1	200m wire	heavy tape(5.1)	6:35
		5.1	400m wire	400 end twisted(5.1 R)	6:50
		5.1	400m wire		7:05
	1938		5.1 DVS	SL # 13062	7:25
			TP Sensor Miller Swivel	SL # 5074	
#5520-14		5.2			
#5520-19			1m chain Hydro Float-3nos	6miles to go drift @1Kn	7:35
#5520-20			1m chain between		
		5.1	20m Nylon		
		5.1	500m		7:36
		5.1	100m		8:00
		5.1	500 m wire		8:09
		5.1	500 m wire	Wire twisted(5.1R)	8:42
		5.1	500m wire		9:17
	4063		DVS	SL # 13063	9:55
			TP Sensor	SL # 5078	
		5.1	500m wire		10:00
			1m chain		
			Mclane G8800-2 * 2	Drift rate reduced target pos>3 hrs	10:50
			Mclane G8800-3 * 1	1m chain betwin	
			2 m Chain		
	4571		DUAL Ixsea acoustic release Ixsea acoustic release	SL # 1042 SL #1043	
			1M u 1/2" CHAIN 4m chain/pp		
			1500 Kg Anchor		10:51
depth	4578				

Table7.1.5.9

ACOUSTIC RELEASES TURNAROUND CHECKLIST

1) Model No:-. AR 861B2S Sr.No:- **1042** Type :- OCEANO 2500 S- Universal

Function/Code :

ARM : **187C** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0 KHz**

2) Model No:-. AR 861B2S Sr.No:- **1043** Type :- OCEANO 2500 S- Universal

Function/Code :

ARM : **187D** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0 KHz**

Step 1	-RECOVERY Inspect exterior and clean with fresh water.		OK
Step 2	- REPLACE BATTERIES		
		# 1042	# 1043
	Old battery Voltage	--	--
	New Battery Voltage (LR20)	9.65 V	9.68 V
	New Battery Voltage (6LR61)	9.50 V	9.51V
Step 3	Inspect/ clean o-rings and grooves. Very lightly grease the o-rings and metal face seal.		OK
Step 4	- Tighten all bolts.		OK
Step 5	- SYSTEM TEST		
	Release command		OK
	Acknowledgement pulse		OK
	Release after 3 seconds		OK
	Execution pulse		OK
	Interrogate/ranging command		OK
	Signal transpond		OK
Step 6	- RE- ARMING Insert release ring and fit locking shaft.		OK

Interrogation after deployment from both the Acoustic Release OK

Mooring ID : EQCM 5.2 S

Cruise No. :- ORV -SK - 276

Deployment Date : 08-10-2010

Comments: # 1042 and # 1043 acoustic releases are connected in tandem.

Table7.1.5.10

DEPLOYMENT

Mooring ID: **EQCM 5.2 S**

Deployment Date: - **08/10/2010**

Cruise No. : - **ORV -SK - 276**

Anchor Drop: - **00° 58 23 S**
92° 57 39 E

Anchor Drop time:**10:52 hrs**

Multibeam Echo sounder Depth: **4578 m**

Triangulation:

First Position: **00° 58. 547 S**
92° 57. 926 E

Time:**11:28 hrs**
Slant Range: **4729 m**

Second Position: **00° 57. 949 S**
92° 56. 979 E

Time:**11:59 hrs**
Slant Range: **4640 m**

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**

Serial No: **W--04-144**

Frequency: **160.72500 MHz**

Channel: **62 (C)**

Deployment Test:

- a) Deck Test: **OK**
- b) Pre-deployment Test: **OK**
- c) Battery Status: **OK**
- d) Submergence signal after anchor drop: **OK**

Name : Areef A. Sardar

National Institute Of Oceanography, Dona Paula, Goa, India.

Table7.1.6.1

0, 93 E

EQCM_1.8

Recovery

Depth meters	Instru-ment	Sr. no	Files name	DSU Sr. no.	from	To	Bytes down-loaded	Rmks
385	ADCP	10638	10638000	-	05/10/09 06:00	09/10/10 06:00	1,15,84,302	
385	TP	4338	4338.asc	-	05/10/09 06:00	09/10/10 07:40	22,86,652	
450	Microcat	2414	2414.asc	-	05/10/09 12:00	09/10/10 09:30	22,32,379	Pump disconnect- ed from cell
961	RCM 7	12633	12633.dsu	15097	04/10/09 14:00	09/10/10 11:00	55,494	
2062	RCM 7	12607	12607.dsu	15091	05/10/09 00:00	09/10/10 11:05	53,641	Cond cell leaked salt deposit on terminals
4065	RCM 8	12604	12604.dsu	15090	04/10/09 14:01	10/10/09 09:01	882	Cond cell leaked. Battery terminals shorted. < 1 week

Table7.1.6.2

0, 93 E

EQCM_1.8

Data Return

Depth m	Instru-ment	Sr. no	No of bins	Bin size	Range	Speed	Dir	Temp	Cond	Pr	days
385	ADCP	10638	25	16m	410m	OK	OK	OK	-	OK	369
385	TP	4338	-	-	-	-	-	OK	-	OK	369
450	Microcat	2414	-	-	-	-	-	OK	OK	-	369
961	RCM 7	12633	-	-	-	OK	OK	OK	OK	OK	370
2062	RCM 7	12607	-	-	-	OK	OK	OK	✗	OK	369
4065	RCM 8	12604	-	-	-	OK	OK	OK	✗	OK	6

Table7.1.6.3

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

RECOVERY DATE: 09.10.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: EQCM 1.8R

RECOVERY

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand,siddhart
Winch operations	Baiju,biju,Ramesh,Parshuram(Norinco)
Deck Hands	Akhilesh,kumar,Santlal,Patil
Weather Condition	Sea state 0
Mooring Design	sadashiv Khalap
Water Depth	4750 m

Release Model	Oceano AR 861 B2S	Oceano AR 861 B2S
Sr.no	789	1041
Interrogation/arm Code	3AA3	187B
Diagnostic code	1849	1849
Release code	3AA4	1855

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Mithun Gaonkar– New Batteries

ANCHOR DROP

00° 00 322' N
93° 00 631'E

RDI ADCP 75khz – LR	383 m
RCM 7 –	961 m
RCM 8 – 2 Nos.	2062 m & 4065 m

Table 7.1.6.4


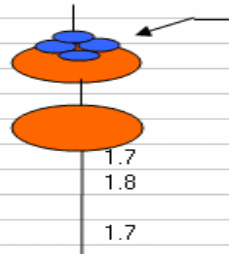


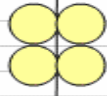




		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO	SK-276	Mooring System Information			
Mooring- I.D.:	EQCM -1.8R <i>Recovery</i>	Anchor Drop:	00° 00.322' N 93° 00.631' E	Recovered Date	09.10.2010
Sea state :	1	Deployment Date:	05.10.2009	Recovery	
m.a.b.	m.b.s	Mooring Diagram	Mooring Description	Remarks	time IN IST
4114	383		Released 4:35 ADCP Ellipsoid float LR-75, SL# 10638 3 m 1/2" Chain TP Sensor	Flash sighted 4:45 <i>first attempt</i> CH 63(160.785) SL # 4338	6:30
		1.7	20 m Nylon / WR		
		1.8	50m 3/16" wire rope	rope corroded	6:32
		1.7	500m Wire rope	SI-2414 Pump hose loose	
	961		current meter #1	EQCM7-ID # 633	7:05
		1.7	400m		7:06
		1.7	20m	<i>remove</i>	7:25
		1.7	500m,		7:30
		1.8	50m	<i>Change spool</i>	8:00
		1.8	100m		8:13
			1m chain		
			HydroFloat	2nos	8:30
			1 m chain between		
			17" glass balls (6)	Dual benthos	
			3.5 m chain		
			swivel		
		1.7	20m nylon		
			0.3m Chain		
2435	2062		current meter #2	RCM-8 ID # 607	8:41
			0.5m Chain		
		1.8	100m wire		8:46
		1.8	200m wire		8:58
		1.7	400m wire		9:10
		1.7	500m		9:25
		1.7	250m wire	bio slides end of 25	9:40
		1.7	500m wire		9:51
		1.7	50m wire	change Nxt ime	
			.5m chain	unspooled	10:15
432	4065		current meter # 3	RCM 8 SL # 604	10:10
			0.5m Chain		
		1.7	400m wire rope		10:16
			1m chain		
			Mclane G 8800-2 * 1 nos	bio slides betwin floats	
			Mclane G 6600 * 4 nos		
			1m chain between		
		1.7	2 m Chain 1/2" chain		
20	4477		Dual Ixsea # 1041 release # 789		10:30

Table 7.1.6.5

NIO - OOS DUAL ACOUSTIC RELEASES RETRIEVAL INFORMATION

Station ID	Deployment date/ Cruise Number	Retrieval date/Cruise Number	AR861 B2S Serial Number	ARM code	DIAG code	RELEASE code	SLANT range	TIME	ECHO sounder depth	POSITION/RMK
EQCM 1.8	05 -10 -09 SK-264	09 -10-10 SK-276	1041	187B	1849	1855	4744 4749 4734	04:14 04:15 04:30	4504	93-EQUATOR
							4651 4124	04:34 04:40		RELEASED OK
EQCM 1.8	05 -10 -09 SK-264	09 -10-10 SK-276	789	3AA3	----	3AA 4				

1. Novatech Radio Transmitter cum Flasher (Duo)Model No: **RF- 700 C6**Serial No: **S-12-002**Frequency: **160.72500 MHz**Channel: **62 (C)****Pop up signal /flash on retrieval : Flasher/ radio signal working fine.**

**REMARKS IF ANY : 1st set of buoys sighted at 04:45 hrs.
2nd set of buoys sighted at 05:35 hrs.
Acoustic releases on deck at 11:33 hrs**

AREEF A. SARDAR

Table7.1.6.6

0, 93 E		EQCM_1.9		Deployment		
Depth meters	Instru-ment	Sr. no	Deploy/ Log File	from	Sampling	Rmks
420	ADCP	10638	10638.log	9/10/10 18:00	30 mins	
420	TP	4338	-	10/10/10 06:00	10 mins	
500	SG IW	230	-	9/10/10 14:30	30 mins	
1000	RCM 7	12633	-	9/10/10 14:30	30 mins	
1980	RCM 8	12607	-	9/10/10 14:30	30 mins	
4035	SG DW	90	-	9/10/10 14:30	30 mins	

Table7.1.6.7

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

DEPLOYMENT DATE: 10.10.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: **EQCM 1.9****DEPLOYMENT**

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart.
Winch operations	Baiju,biju,Ramesh,Parshuram(Norinco)
Deck Hands	Akhilesh,kumar,Santlal,Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernandes
Water Depth	4498 m

Release Model	MORS AR 861 B2S DDL	MORS AR 661 B2S DDL
Sr.no	1040	789
Interrogation/arm Code	187A	3AA3
Diagnostic code	1849	-----
Release code	1855	3AA4

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Areef A Sardar – New Batteries

ANCHOR DROP

00° 00.89' S
092° 57.68' E

RDI ADCP 75khz – LR	418 m
RCM Seaguard	499, 4033 m
RCM 7	1002 m
RCM 8	1980 m

Table7.1.6.8


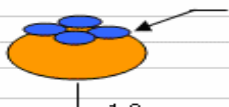




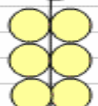





		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO SK-276		Mooring System Information			
Mooring-I.D.: EQCM -1.9D	<i>Deployment</i>	Anchor Drop:	Deployment Date: 10.10.2010		
Design: <i>Fernando V</i>		00° 00.742' S	Recovered Date 09.10.2010		
92° 57.706' E					
Sea state :1	Mooring Diagram	Mooring Description	Remarks	Deploy Time IST	
m.b.s					
		RDI-75 KHz ADCP Ellipsoid float FG finish CH 62(c)	SL# 10638 Bottom clamp welded OK		6:51
418	1.9	TP Sensor 4 m 1/2"Chain	SL- 4338		
		ADCP Ellipsoid float-old			6:52
	1.7	20 m Nylon / WR			
	1.8	50m 3/16" wire rope			6:55
499		current meter #1	Seaguard-SL# 230		7:06
	1.7	500m Wire rope			7:10
1002		current meter #2	RCM-7 SL #12633		7:34
	1.7	400m			7:35
	1.7	500m,			8:02
	1.7	50m 1m chain, Miller swivel	<i>Change spool</i> new spool 3.5 miles away		8:30-8:41
		HydroFloat 2nos			8:57
	1 m chain between				
		17" glass balls (6) 3.5 m chain swivel	Dual benthos/shakle good		
	1.7	20m nylon 0.3m Chain			9:01
1980		current meter #3 RCM 8	SL# 12607		9:02
	1.7	400 m wire			9:04
	1.7	500m wire			9:16
	1.7	250 m wire			9:36
ioslide dep	3233	500m	bio slides-100m after		9:48
	1.7	400m wire	Taped-Change Next		10:08
		.5m chain	bio slides		
4033		current meter # 4	Seaguard SL# 90		10:36
	1.8	200 m wire			10:37
	1.8	100m wire			10:46
	1.8	100m wire rope			10:50
ioslide dep	4482	50m wire	added at end		11:09
	1m chain		bio slides		
		Mclane G 8800-2 * 1nos			
	1m chain between				11:22
		Mclane G 6600 -3 * 2nos			
	1.9	3 m 1/2" chain			
4492		Dual Ixsea acoustic release	SL# 1040 SL # 789		
depth	4500	4m chain + PP rope 1500Kgs			11:23

Table7.1.6.9

ACOUSTIC RELEASES TURNAROUND CHECKLIST

1) Model No:-. AR 861B2S Sr.No:- **1040** Type :- OCEANO 2500 S-
Universal

Function/Code :

ARM : **187A** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0**
KHz

2) Model No:-. AR 661B2S Sr.No:- **789** Type :- OCEANO 2500 S-
Universal

Function/Code :

INT-RANGE : **3AA3** RELEASE : **3AA4** Frequency: **12.0 KHz**

Step 1	-RECOVERY Inspect exterior and clean with fresh water.		OK
Step 2	- REPLACE BATTERIES		
		# 1040	# 789
	Old battery Voltage	--	--
	New Battery Voltage (LR20)	9.68 V	9.66 V
	New Battery Voltage (6LR61)	9.46 V	9.42 V
Step 3	Inspect/ clean o-rings and grooves. Very lightly grease the o-rings and metal face seal.		OK
Step 4	- Tighten all bolts.		OK
Step 5	- SYSTEM TEST		
	Release command		OK
	Acknowledgement pulse		OK
	Release after 3 seconds		OK
	Execution pulse		OK
	Interrogate/ranging command		OK
	Signal transpond		OK
Step 6	- RE- ARMING Insert release ring and fit locking shaft.		OK
	Interrogation after deployment from both the Acoustic Release		OK

Mooring ID : EQCM 1.9

Cruise No. :- ORV -SK - 276

Deployment Date : 10-10-2010

Comments: # 1040 and # 789 acoustic releases are connected in tandem.

DEPLOYMENT

Mooring ID: **EQCM 1.9**

Deployment Date: - **10/10/2010**

Cruise No. : - **ORV -SK - 276**

Anchor Drop: - **00° 00 89 S**
92° 57 71 E

Anchor Drop time:**11:25 hrs**

Multibeam Echo sounder Depth: **4498 m**

Triangulation:

First Position: **00° 00. 574 S**
92° 58. 342 E

Time:**12:08 hrs**
Slant Range: **4750 m**

Second Position: **00° 00. 742 S**
92° 57. 613 E

Time:**12:30 hrs**
Slant Range: **4507 m**

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**
Serial No: **S--12-002**
Frequency: **160.72500 MHz**
Channel: **62 (C)**

Deployment Test:

a) Deck Test: **OK**
b) Pre-deployment Test: **OK**
c) Battery Status: **OK**
d) Submergence signal after anchor drop: **OK**

Name : Areef A. Sardar

National Institute Of Oceanography, Dona Paula, Goa, India.

Table7.1.7.1

1 N, 93 E		EQCM_4.1N		Recovery			
Depth meters	Instru-ment	Sr. no	File names	from	To	Bytes downloaded	Rmks
510	ADCP	10640	10640000	01/10/09 00:00	11/10/10 06:00	1,14,20,242	
510	TP	4336	4336.asc	01/10/09 00:00	11/10/10 06:30	23,25,019	
2046	DVS	12640	dvs_12640	01/10/09 01:00	12/06/10 09:09	61,16,864	8 months
3970	DVS	12709	dvs_12709	01/10/09 01:00	16/06/10 19:40	62,23,360	8 months

Table7.1.7.2

1 N, 93 E		EQCM_4.1N		Data Return							
Depth m	Instru-ment	Sr. no	No of bins	Bin size	Range	Speed	Dir	Temp	Cond	Pr	days
510	ADCP	10640	24	16	390	OK	OK	OK	-	OK	375
510	TP	4336	-	-	-	-	-	OK	-	OK	375
2046	DVS	12640	5	0.75m	4m	OK	OK	-	-	-	252
3970	DVS	12709	5	0.75m	4m	OK	OK	-	-	-	256

Table7.1.7.4


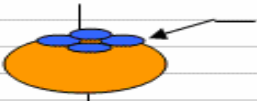


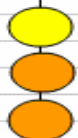

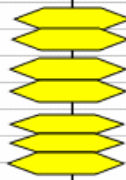

		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 4.1N		Anchor Drop:		Recovered date	11.10.10
	<i>Recovery</i>	00°57.835' N 92°35.809' E		Deployment Date:	1.10.09
Sea state:	1				
	m.b.s	Mooring Diagram	Mooring Description	Remarks	Recovery Time IN IST
	510		CH 63 OK Lowdrag ADCP Float RDI 75 KHz ADCP TP sensor swivel	<i>Hooked 1st attempt</i> SI # 10640 SI # 4336	6:10
	J 6141-1		3.25m LLChain low drag float		
			.5m chain 20 m Nylon /WR 500m wire		6:20
wire damaged	2046		500m wire 500m wire DVS	<i>Entanglement</i> SI #12640	6:29 6:50 7:25
				No swivel	
	2046		Hydro Float-3nos 1m chain		
wire damaged			20m Nylon 500m	entangled <i>Online replacement</i>	
			500 m wire 500 m wire		9:15 9:35
	3970		400m wire DVS	SI #12709	9:47 10:00
			400m wire 1m chain		10:04
			Mclane G8800-2 * 2 nos 1m chain between Mclane G8800-3 * 1 nos		
			2 m Chain		
Both released	4375		Ixsea acoustic release Ixsea acoustic release 1M u 1/2" CHAIN	SI #724 SI #1038	10:15
depth	4400				

Table 7.1.7.5
NIO - OOS DUAL ACOUSTIC RELEASES RETRIEVAL INFORMATION

Station ID	Deployment date/ Cruise Number	Retrieval date/ Cruise Number	AR861B2 S Serial Number	ARM code	DIAG code	RELEASE code	SLANT range	TIME	ECHO sounder depth	POSITN/RMK
EQCM 4.1 N	01 -10 -09 SK-264	11 -10-10 SK-276	1038	186E	1849	1855	4608	03:55	4400	93-1 NORTH
							4679	04:03		
							4531	04:29		
							4544	04:30		RELEASED OK
EQCM 4.1 N	01-10 -09 SK-264	11 -10-10 SK-276	724	4B70	----	4B79	4449 4452 4073	05:05 05:15 05:19		RELEASED OK

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**
 Serial No: **W-04-143**
 Frequency: **160.72500 MHz**
 Channel: **62 (C)**

Pop up signal /flash on retrieval : Flasher/ radio signal working fine.

REMARKS IF ANY : 1st set of buoys sighted at 05:25 hrs.

Acoustic releases on deck at 11:30 hrs

#1038 acknowledged release command but mooring was not released, may be some entanglement with hook, chain, ring etc.

724 was released and the mooring started popping up. Lost a pair Acoustic release hook rings.

AREEF A. SARDAR

Table7.1.7.6

1 N, 93 E		EQCM 4.2N		Deployment		
Depth meters	Instrument	Sr. no	Deploy/ Log File	Time started	Sampling	Rmks
460	ADCP	10640	10640.log	11/10/10 10:00	30 mins	
460	TP	4336	-	11/10/10 11:00	10 mins	
1965	RCM7	12725		10/10/10 19:00	60 mins	
1965	TP	5076	-	10/10/10 20:00	10 mins	
3865	DVS	13246	13246.log	10/10/10 16:30	10 mins	
3865	TP	5077	-	10/10/10 20:00	10 mins	

Table7.1.7.7

**NATIONAL INSTITUTE OF OCEANOGRAPHY; GOA-INDIA
(Ocean Observing System Programme MOD)**

CRUISE NO: SK276

DEPLOYMENT DATE: 11.10.2010

MOORING SYSTEM INFORMATION

Mooring I.D.: **EQCM 4.2 N****DEPLOYMENT**

Captain	A.K.K.Abhayankar
Chief Scientist	A. Suryanarayana
Addl. Master/Ch.Off	S.Suresh
Mooring Master	Vijayan Fernando
Scientific Hands	Sarma, Charyulu, Almeida, Mithun, Anand, Siddhart.
Winch operations	Baiju,biju,Ramesh,Parshuram(Norinco)
Deck Hands	Akhilesh,kumar,Santlal,Patil
Weather Condition	Sea state 0
Mooring Design	Vijayan Fernandes
Water Depth	4386 m

Release Model	MORS AR 861 B2S DDL	MORS AR 661 B2S DDL
Sr.no	1039	1041
Interrogation/arm Code	186F	187B
Diagnostic code	1849	1849
Release code	1855	1855

Mooring Top, Description	Low drag float with ADCP 75khz-LR
Radio Frequency	Channel 62
Strobe Flash	Novatech
Release Armed	Areef A Sardar – New Batteries

ANCHOR DROP

00° 59.08' N
092° 30.29' E

RDI ADCP 75khz – LR	460 m
DVS- 1Nos.	3867 m
RCM 7	1967 m

Table7.1.7.8


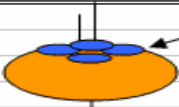

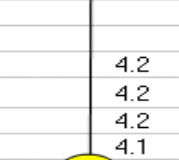
















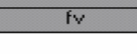



		NATIONAL INSTITUTE OF OCEANOGRAPHY, GOA. (Ocean Observing System, MOES)			
CRUISE NO: SK-276		Mooring System Information			
Mooring ID: EQCM - 4.2N	<i>Deployment</i>	Anchor Drop:	Deployment Date: 11.10.10		
Design: <i>Ronaldo V</i>		00°59.065' N	Recovered date	11.10.10	
Sea state: 2		92°30.227 ' E			
	m.b.s	Mooring Diagram	Mooring Description	Remarks	Deploy Time IST
	460		CH 62 Lowdrag ADCP Float 75 Khz ADCP TP sensor swivel	<i>Ideal drift-1.5Kyr</i> SI # 10640 SI # 4336	12:55
			3.75m LLChain low drag float-320kg		
			.5m chain 20 m Nylon / WR 50m wire		13:00
			4.2 500m wire		13:09
			4.2 500m wire		13:26
			4.1 400m wire		13:44
	yellow		4.2 Miller swivel		
			Hydro Float-3nos		14:05
	orange		1m chain	2000m DR	
	orange		17" Benthos	2000m DR	
			G6600-1		
			20m Nylon		
	1967		Current m#1 RCM 7	SI #12725	14:06
			TP Sensor	SI # 5076	14:07
			400m		14:21
			500 m wire		14:36
			500 m wire		14:55
	3867		Current m#2 DVS	SI # 13246	15:20
			TP Sensor	SI # 5077	15:21
			500m wire		
	4366		Mclane G8800-2 * 2 nos		15:44
			1m chain		
			Mclane G8800-3 * 1 nos		
			2 m Chain		
	4375		DUAL Ixsea acoustic release Ixsea acoustic release	SI # 1039 SI # 1041	
			1M u 1/2" CHAIN		
			1/2m n1/2 "		
			4m nylon/chain		15:56
depth	4400		Anchor 1500 Kg.		

Table7.1.7.9

ACOUSTIC RELEASES TURNAROUND CHECKLIST

1) Model No:-. AR 861B2S Sr.No:- **1039** Type :- OCEANO 2500 S-
Universal

Function/Code :

ARM : **186F** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0**
KHz

2) Model No:-. AR 861B2S Sr.No:- **1041** Type :- OCEANO 2500 S-
Universal

Function/Code :

ARM : **187B** DIAGNOSTIC: **1849** RELEASE : **1855** Frequency: **12.0**
KHz

Step 1	-RECOVERY Inspect exterior and clean with fresh water.		OK
Step 2	- REPLACE BATTERIES		
		# 1039	# 1041
	Old battery Voltage	--	--
	New Battery Voltage (LR20)	9.66 V	9.66 V
	New Battery Voltage (6LR61)	9.42V	9.49V
Step 3	Inspect/ clean o-rings and grooves. Very lightly grease the o-rings and metal face seal.		OK
Step 4	- Tighten all bolts.		OK
Step 5	- SYSTEM TEST		
	Release command		OK
	Acknowledgement pulse		OK
	Release after 3 seconds		OK
	Execution pulse		OK
	Interrogate/ranging command		OK
	Signal transpond		OK
Step 6	- RE- ARMING Insert release ring and fit locking shaft.		OK
	Interrogation after deployment from both the Acoustic Release		OK

Mooring ID : EQCM 4.2 N

Cruise No. :- ORV -SK - 276

Deployment Date : 11-10-2010

Comments: # 1039 and # 1041 acoustic releases are connected in tandem.

DEPLOYMENT

Mooring ID: **EQCM 4.2 N**

Deployment Date: - **11/10/2010**

Cruise No. : - **ORV -SK - 276**

Anchor Drop: - **00° 59 08 N**
92° 30 29 E

Anchor Drop time:**03:56 hrs**

Multibeam Echo sounder Depth: **4386 m**

Triangulation:

First Position: **00° 59. 014 N**
92° 30. 162 E

Time:**04:46 hrs**
Slant Range: **4381 m**

Second Position: **00° 59. 224 N**
92° 30. 205 E

Time:**04:55 hrs**
Slant Range: **4405 m**

Third Position: **00° 59. 455 N**
92° 30. 293 E

Time:**05:04 hrs**
Slant Range: **4480 m**

1. Novatech Radio Transmitter cum Flasher (Duo)

Model No: **RF- 700 C6**

Serial No: **W--04-143**

Frequency: **160.72500 MHz**

Channel: **62 (C)**

Deployment Test:

- | | |
|--|-----------|
| a) Deck Test: | OK |
| b) Pre-deployment Test: | OK |
| c) Battery Status: | OK |
| d) Submergence signal after anchor drop: | OK |

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Table 2

S r. N o.	CTD/ Station position		Stn. Depth (m)	CTD Depth (m)	Biological Sampling Depths (m)				Chemical Sampling Depth (m)	XB T Dep th (m)	Met. Data
	Lat.	Long.			Chl., Zoo., Phyto.	TBC	MPN	PP Mooring			
1	04° 59.95' N	77° 00.05' E	3160	1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	-	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	-	collected
2	03° 59.75' N	77° 00.13' E	3652	1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	-	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	-	collected
3	2°59.77'N	77°00.13'E	4036	1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	-	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	-	collected
4	1°59.91'N	77°00.00'E	4195	1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	-	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	-	collected
5	1°00.00'N	77°02'E	4252	1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	-	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	-	collected
6	00° 00.65' S	76° 59.91' E		1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	1, 10, 20, 40, 60, 80, 100, 120 SAMPLING DONE	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	760	collected
7	00°59'S	77°02'E	4781	1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	-	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	760	collected
8	00°00.01'N	83°00.46'E	4400	1000	1, 10, 20, 40, 60, 80, 100, 120, 150	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	0- 150	-	, 1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 300, 400, 500, 600, 800, 1000	760	collected
9	00°00.06'N	92°57.08'E		120	-	-	-	-	65	760	collected

Table 7.3

XBT stations

Station No:	Latitude (deg.)	Longitude (deg.)	Date	Time (IST)
1	11°42'N	74°33'E	19-9-10	12:05
2	10°10'N	75°22'E	20-9-10	00:07
3	08°09'N	76°10'E	20-9-10	15:37
4	06°10'N	76°40'E	21-9-10	04:43
5	04°09'N	76°59'E	21-9-10	23:51
6	02°11'N	76°59'E	22-9-10	19:44
7	00°11'N	76°58'E	25-9-10	00:18
8	00°59'N	77°02'E	28-9-10	19:28
9	00°34'N	79°24'E	30-9-10	03:30
10	00°16'N	81°22'E	30-9-10	14:45
11	00°01'N	83°22'E	3-10-10	14:10
12	00°13'N	85°18'E	4-10-10	02:41
13	00°25'N	87°20'E	4-10-10	16:38
14	00°39'N	89°30'E	5-10-10	06:17
15	00°50'S	91°30'E	5-10-10	18:52
16	00°00'S	93°00'E	8-10-10	21:11
17	01°30'N	92°00'E	11-10-10	22:10
18	03°30'N	90°00'E	12-10-10	21:20
19	05°39'N	87°58'E	13-10-10	23:04
20	07°30'N	86°00'E	14-10-10	21:29
21	09°26'N	84°02'E	15-10-10	22:08
22	11°28'N	82°00'E	16-10-10	19:13