

सागरकन्याकूजविवरणी/ SAGAR KANYA CRUISE REPORT
अरबसागर मेंओमनी बोया / सुनामी बोया की तैनाती और पुनर्प्राप्ति
OMNI BUOY / TSUNAMI BUOY DEPLOYMENT AND RETRIEVAL IN
ARABIAN SEA
(22nd OCT 2018 to 22nd NOV 2018)

Report No. : NIOT/OOS/CR-SK353/2018/11



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अध्ययन / CHAPTER 1
क्रुजलक्ष्य / OBJECTIVES OF THE CRUISE

क्रुजलक्ष्य / OBJECTIVES OF THE CRUISE:

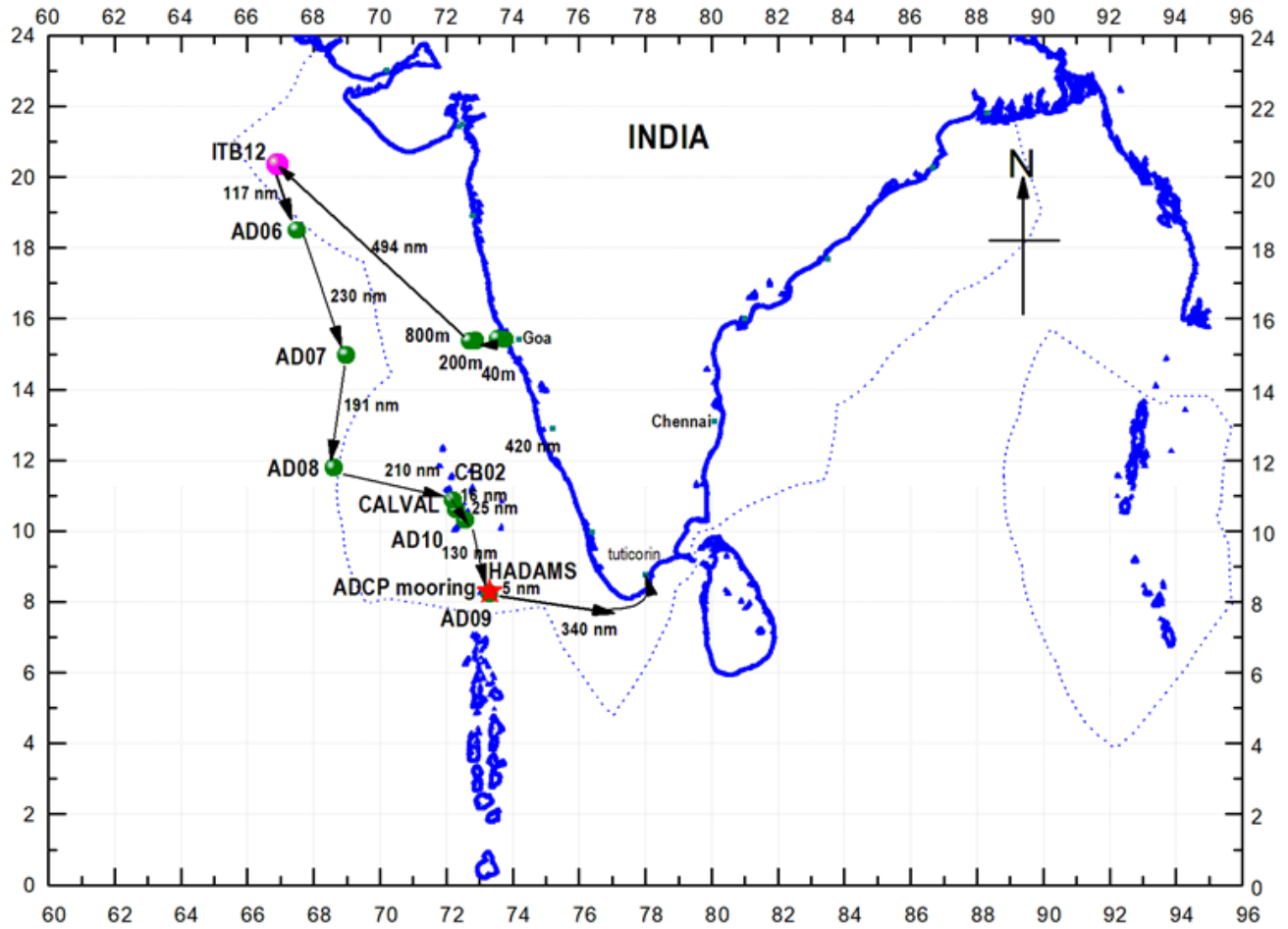
- Retrieval and Deployment of One Tsunami buoys (TB12)
- Retrieval and Deployment of five OMNI buoys (AD06, AD07, AD08,AD09 and AD10)
- Retrieval and deployment of one coastal buoy (CB02) and one CALVAL buoy
- Retrieval of ADCP Mooring
- Field test of HADAMS

अध्ययन/ CHAPTER 2

क्रुज टीम/ CRUISE TEAM

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अध्ययन/ CHAPTER 3
क्रुज़ ट्रैक / CRUISE TRACK



Final Cruise Track

कुज़सारांश / CRUISE SUMMARY

Expedition Background and Summary

SK353 cruise commenced on 22nd October 2018 with the objectives of Tsunami and data buoy retrieval and deployment operations in AD06, AD07, AD08, AD09, AD10, CB02 and TB12. The cruise team signed on 22nd October 2018 to the ORV Sagar kanya vessel at Mormugao port Goa, all the cruise material was loaded on board safely and secured for sailing. Cruise team comprises of 19 nos. of participants, started sailing towards TB12 location on 26th October 2018 morning and reached TB12 anchor drop point on 29th October 2018. As planned the surface buoy was swapped in the existing mooring and ensured the proper data transmission with shore station. Along the cruise track CUSAT scholars collected the water and sediment samples for their research activities in selected locations of Arabian sea and at each locations water samples and zooplankton samples are collected from different depth of water column. The water samples collected from 4 different depths, i.e.; 10 m, 250 m, 500 m and 750 m using Rosette sea water sampler. The water samples for methane, nitrous oxide and carbon dioxide analysis were collected directly from outlet of water sampler bottle using disposable 50 ml syringe and fixed with 10% Mercuric Chloride. Water samples for the physico-chemical parameters and total carbon were collected in pre-cleaned acid-washed 250 ml and 50 ml polythene bottles respectively. After adding proper fixatives all water samples were kept in the freezer. Vertical profiling of parameters such as temperature, salinity, density and dissolved oxygen was acquired using Conductivity-Temperature-Depth profiler (CTD, Sea Bird Electronics).

The Zooplankton samples should be taken from selected stations using a Multiple Opening and Closing Net (MPN) equipped with 50 cm diameter and 200 µm mesh size nets. Generally, four depth strata were sampled (0-250, 250- 500, 500-750, and 750-1000 m) and the number of sample levels depends on the bathymetry. After recovering the nets and they were immediately examined and major portion of sample was in the cod end bucket, the sample left on the walls of the net was washed with water and transferred into two different bottles in equal volumes for preservation and magnesium chloride (7-10%) was used as narcotizing agent. Immediately after sampling, those for DNA analysis were fixed in 95% ethyl alcohol and those for morphological examination were preserved in 4% buffered

formaldehyde in high quality air tight bottles labelled with date, time, location of the station and season.

Our team started collecting the micro-plastic samples along with CUSAT team which includes 20 litre water samples at 10m, 100m and 100m depths at 40m, 200m and 800m depth contours enroute to the cruise. Also vertical hauling from 100 m depth using MPN and horizontal towing at surface using bongo net for 20 minutes at the vessel speed of 2 kn. throughout the cruise at selected points.

OMNI buoys consist of surface and subsurface sensors hence the full mooring need to be retrieved accordingly all AD series buoys maintenance carried out, in AD 07 additional CTD sensors added near seabed, 3000 and 2000 meters as the requirement of ocean site.

Similarly to AD06 other OMNI buoy maintenance carried out successfully. To deploy the coastal buoy CB02 near Agatti vessel reached on 10th November 2018 also divers arrived to location on time as planned, the new buoy with mooring lowered from vessel and towed to location. The existing old buoy detached from anchor and new buoy attached with the existing sinker successfully. The old buoy towed to vessel and lifted to main deck and vessel started sailing towards next location.

Vessel reached CALVAL buoy location on 10th November after noon and recovered the surface buoy as per the standard procedure. The new buoy and mooring preparation carried out and deployed on 11th November 2018. After data confirmation vessel started sailing to next location.

Similar to the earlier OMNI buoy AD10 buoy was successfully deployed on 12th November 2018 and obtained the data confirmation from the shore station. Post deployment and data confirmation vessel sailed towards AD09 for buoy recovery accordingly buoy recovered on 13th November 2018.

Field team reached ADCP subsurface moored location on 14th November 2018 mornings. Mooring releaser was communicated and released from anchor. The float was surfaced near the vessel with in short period of time. Boat lowered and picked the float towed towards vessel and lifted to the vessel. The float, sensor and full mooring recovered successfully and moved to next location.

HADAMS (Tsunami buoy) final assembly carried out, mooring prepared and deployed on the same day (14th November 2018). The BPR assembly was lowered on next day (15th) and checked the communication between surface modem and BPR, after the field test BPR and buoy was recovered safely and sailed to next location.

Similar to the earlier buoy AD09 buoy was successfully deployed on 16th November 2018 along with OA hydrophone and ensured the proper communication and data transmission with shore team.

On the way back to Tuticorin port Vessel has received the cyclone warning on the track, hence vessel diverted to 5 degree which is away from the cyclonic track and waited till the cyclone crossing and proceeded to port.

Deck Gears Used

All Cranes, A frame, CTD winch, Deep sea winch, Multi beam survey

Operation Details

SI. No	DATE	STATION ID	OPERATION	LOCATION		STATION DEPTH(m)
				Latitude	Longitude	
1.	29/10/2018	TB12	BuoySwapping	20°21.165' N	066°54.821' E	2518
2.	30/10/2018	AD06	Retrieval	18° 26.42' N	067° 29.15' E	3340
3.	31/10/2018	AD06	Deployment	18° 29.89' N	067° 27.33' E	3340
4.	02/11/2018	AD07	Retrieval	14° 57.20' N	068° 59.4' E	4020
5.	03/11/2018	AD07	Deployment	14° 55.92' N	068° 58.82' E	4020
6.	05/11/2018	AD08	Retrieval	11° 47.18' N	068° 36.47' E	4300
7.	06/11/2018	AD08	Deployment	11° 47.42' N	068° 35.12' E	4325
8.	13/11/2018	AD09	Retrieval	08° 13.37' N	073° 17.28' E	2100
9.	16/11/2018	AD09	Deployment	08° 08.93' N	073° 17.04' E	2154
10.	14/11/2018	ADCP	Retrieval	08° 17.62' N	073° 18.13' E	1965
11.	12/11/2018	AD10	Retrieval	10° 18.247' N	072° 35.403' E	1620
12.	12/11/2018	AD10	Deployment	10° 19.099' N	072° 35.299' E	1620
13.	10/11/2018	CALVAL	Retrieval	10° 36.83' N	072° 17.48' E	2060
14.	11/11/2018	CALVAL	Deployment	10° 36.565' N	072° 17.796' E	2100
15.	10/11/2018	CB02	Retrieval	10° 51.730' N	072° 13.112' E	20
16.	10/11/2018	CB02	Deployment	10° 52.26' N	072° 12.32' E	20
17.	14/11/2018	HADAMS	Field Trail	08° 16.07' N	073° 16.81' E	2100

Micro Plastic Details

Water and Sediment sample details

SI No	Location ID	Depth contour (m)	GPS		Water Samples: Bottle Number			Sediment Sample	Remarks
			Latitude	Longitude	10 m	100m	500m		
1	Off Goa (Stn1)	40	15°26.54'N	073°33.61'E	1			S1	Oct 26 2018 11:08:42
2		200	15°23.63'N	072°53.95'E	2	3			Oct 26 2018 17:57:07
3		800	15°22.76'N	072°42.95'E	4	5	6		Oct 26 2018 22:21:31
4	Off Agatti (Stn2)	200	10°53.15 'N	072°13.52'E	7	8		-NA-	Nov 10 2018 12:19:29
5		800	10°51.33'N	072°14.60'E	9	10	11		Nov 09 2018 19:50:38
6	Off Tuticorin (Stn3)	40	08°39.00 'N	078°26.24 'E	12			S2	Nov 20 2018 18:37:24
7		800	08°39.85'N	078°40.36 'E	13	14	15		Nov 20 2018 15:11:54
8	68.5°E 19.2°N (AS_MP01)	Deep Sea Stations	20°25.69'N	066°57.21'E	16	17	18		29 Oct 2018 2015 hrs Stn 04 off tb12
9	67.85°E 18°N (AS_MP02)		18°31.83'N	067°28.96'E	19*	20*	21*		31 oct 2018 (1815 hrs) Stn05 AD06
10	68.4°E 15°N (AS_MP03)		14°53.79'N	068°59.05 'E	25	26	30*		Nov 02 2018 17:53:30 STN06 AD07
11	68.4°E, 12°N (AS_MP04)		11°44.51'N	068°32.81'E	22**	23**	24**		05 Nov 2018 1830 hrs Stn 08 AD08
12	73°E, 10°N (AS_MP05)		10°51.33'N	072°14.60'E	9	10	11		09 Nov 2018 2110 hrs Off Agatti locn2
13	74°E, 08°N (AS_MP06)		08°16.07'N	073°16.81'E	27	28	29		14 Nov 2018 1427 hrs

									Off AD09
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#NOTE: 23 Nos. 20 liters water canes, *4 Nos. 1 liter Glass Bottles, **3 Nos. 1 liter Plastic Bottles.

Horizontal trawling using Bongo Net

SI. NO	DATE	TIME (Hrs)	LOCATION-ID	GPS-INITIAL	GPS-FINIAL	SPEED (NM)
1	26 Oct 2018	1155-1215	off Goa 40m	15°26.21'N / 73°32.2'E	15°26.06'N / 73°31.52'E	2
2	26 Oct 2018	1905-1920	off Goa 200m	15°23.5'N / 72°53.3'E	15°24.5'N / 72°53.4'E	2
3	26 Oct 2018	2304-2324	off Goa 800m	15°22.22'N / 72°42.01'E	15°22.78'N / 72°41.74'E	2
4	29 Oct 2018	2205-2225	Near TB12	20°24.59'N / 66°56.56'E	20°23.77'N / 66°56.74'E	2
5	31 Oct 2018	0952-1012	Near AD06	18°23.05'N / 67°27.01'E	18°24.26'N / 66°26.07'E	2
6	3 Nov 2018	2025-2045	Near AD07	15°01.22'N / 68°59.65'E	15°01.92'N / 68°59.55'E	2
7	5 Nov 2018	1941-2001	Near AD08	11°43.88'N / 68°31.75'E	11°43.21'N / 68°37.07'E	2
8	9 Nov 2018	2230-2250	Off Agatti_800m	10°50.63'N / 72°13.98'E	10°50.45'N / 72°14.70'E	2
9	10 Nov 2018	1252-1312	Off Agatti_100m	10°52.48'N / 72°12.97'E	10°52.05'N / 72°13.50'E	2
10	11 Nov 2018	2020-2042	Near AD10	10°23.06'N / 72°31.29'E	10°23.64'N / 72°31.55'E	2
11	14 Nov 2018	2035-2055	ADCP mooring	05°17.8'N / 73°16.80'E	05°18.32'N / 73°16.60'E	2
12	19 Nov 2018	1630-1652	8 deg channel	7°55.12'N / 76°42.18'E	7°55.10 'N / 76°43.03'E	2
13	20 Nov 2018	1620-1640	Off Tuticorin_800m	8°39.15'N / 078°39.46'E	8°39.12'N / 078°38.69E	2
14	20 Nov 2018	1940-2000	Off Tuticorin_40m	8°38.56'N / 078°24.54'E	8°37.06'N / 078°24.01'E	2

Vertical Hauling using MPN

SI No.	Date	Time Hrs	Station ID	Location	Bottle S.No.	Lowered Depth	Winch hoisting speed
1	26 Oct 2018	1856	Off Goa_40	15°23.63'N / 072°53.95'E	MPN1	100m	20 Mtr/min
2	26 Oct 2018	2210	Off Goa_200	15°22.76'N / 072°42.95'E	MPN2	100m	20 Mtr/min
3	29 Oct 2018	2145	Near TB12	20°25.69'N / 066°57.21'E	MPN3	100m	20Mtr/min
4	30 Oct 2018	2230	Near AD06	18°25.99'N / 066°31.76'E	MPN4	100m	20 Mtr/min
5	02 Nov 2018	2132	Near AD07	14°53.79'N / 068°59.05'E	MPN5	100m	20 Mtr/min

6	04 Nov 2018	1740	AD07-AD08	13°35.40'N / 068°46.47'E	MPN6	100m	20 Mtr/min
7	05 Nov 2018	1730	Near AD08	11°44.54'N / 068°46.47'E	MPN7	100m	20 Mtr/min
8	09 Nov 2018	2218	Off Agatti_800m	10°51.33'N / 072°14.60'E	MPN8	100m	20 Mtr/min
9	10 Nov 2018	1125	Off Agatti_100m	10°53.160'N / 072°13.52'E	MPN09	100m	20 Mtr/min
10	11Nov 2018	2015	Near AD10	10°23.599'N / 072°31.90'E	MPN10	100m	20 Mtr/min
11	14 Nov 2018	2025	Near AD09	8°18.589'N / 073°18.559'E	MPN11	100m	20 Mtr/min
12	19 Nov 2018	1620	8 degree channel	7°55.81'N / 076°43.24'E	MPN12	100m	20 Mtr/min
13	20 Nov 2018	1500	Off Tuticorin_800 m	08°39.85'N / 078°40.36'E	MPN13	100m	20 Mtr/min

अध्ययन/ CHAPTER 5

दैनिक गतिविधियों का विवरण / DETAILS OF DAY BY DAY ACTIVITIES

This chapter describes the details of day to activities carried out during the cruise.

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
22-10-2018 Monday	1100	Final sign-on list handed over to master for his concurrence
	1200	All Field team signed on and immigration clearance obtained
	1430	Field team reached Sagar Kanya vessel and handed over the entire participant passport to master.
	1500	Cabins allotted to all the members
	1530	All main deck materials are shifted to appropriate places and secured for sailing
	1600	Power supply was given to portable capstan winch and test run was carried out
	1700	Mooring handling Pulley block installed on A frame. 6 out of 21 truck with materials reached port and loaded.
23-10-2018 Tuesday	0830	14 more truck reached port and all the materials loaded to the vessel. Vessel was waited for one remaining truck materials,
	1100	Keel frame and keel weight assembled with buoy system for on board testing.
	1300	
	1400	All sensors assembled with sensor arm.
	1630	Upper mast installed with buoy.
24-10-2018 Wednesday	0900	Balance one truck arrived and materials loaded to vessel
	0930	Vessel did not able to sail due to breakdown in LT cooling line
25-10-2018 Thursday	0830	Vessel team continuously working to fix the cooling line problem. TB 12 Buoy assembled and argo transmission started.
	1000	DVS battery changed, CT sensor battery changed for AD06 buoy testing
	1330	Main deck repair work carried out for the ease of buoy assembly.
26-10-2018 Friday	1000	Vessel maintenance completed and sailing started by 0900. Micro-plastic sample collected at 40 meter depth contour including sediment sample
	1200	Micro-plastic sample collected at 200 meter depth contour including sediment sample
	1600	Micro-plastic sample collected at 800 meter depth contour HADAMS BPR battery enclosure work carried out.

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
27-10-2018 Saturday	0900 1000 1100 1600	All materials are rearranged as per the cruise retrieval and deployment sequence. Inductive wire uncoiled to mark CT sensor mounting location and re-coiled in spool. Discussions were carried out with Captain, Chief Officer regarding the buoy retrieval strategy and utility of crane and other on-board equipment. AD06 buoy assembly carried out Safety drill carried out with all crew members
28-10-2018 Sunday	0830 1030 1130 1400 1530 1745	Semi rigid boat air filled, OBM assembled with boat and checked the lifting orientation. Deep sea winch cable routed through A frame pulley for buoy recovery and deployment activities. Fixed rubber fender for AD06 CT sensor battery replaced and labelled all available CT sensors with no. of days used in field. Deep sea winch corrected and made ready for operation. Sagar bhoomi side fender fixed TB 12 surface modem clamp assembled. Transmission delay log recorded and inspected.
29-10-2018 Monday	0800 0930 1230 1530 1605	Carried out final buoy assembly for TB12, log file recorded for transmission issue. Reached the TB12 location at 1300 and vessel made into DP. Boat lowered and Retrieved the TB12 without mooring at 1605 and shifted to safe location. New TB12 surface buoy attached with same mooring, adding 25 meter combination rope at Lat : 20° 20.708' N / Long : 066° 54.706' E Vessel moved 5 miles from buoy location and collected samples for micro plastic study.
30-10-2018 Tuesday	0930 1100 1400 1500	Meeting with master for AD06 buoy operation briefing. Final buoy assembly carried out for AD06 Inductive cable uncoiled and marking was done for CT sensor fitment. Vessel positioned with buoy and communication established with releaser

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
30-10-2018 Tuesday	1630 1730 1745 2130	Boat lowered and working line tied with buoy and lifted to main deck at Lat : 18° 28.037' N / Long : 067° 27.580' E Boat lifted to main deck Recovered all sensors and floats in good condition and found a cut on IC coupler cable. AD 06 retrieval completed on 20:50. CTD, MNP carried out and samples collected for micro plastic study and CTD winch cable wrapped and recovered the unit by late night using other winches.
31-10-2018 Wednesday	0930 1100 1200 1400 1510 1645 1730	Micro-plastic sample collected –horizontal trawling Sensor integration with AD06 buoy and buoy configuration updated and checked the data transmission from Shore team to for deployment clearance Keel frame and Keel weight assembled with AD06 buoy Deployment preparation work like induction coil routing, mooring preparation and deck cleaning was done After data confirmation, buoy dropped in water at Lat : 18° 27.941' N / Long : 067° 26.118' E Anchor dropped at Lat : 18° 29.89' N / Long : 067° 27.33' E BIO-GEO sensor (Seabird 16plus) provided by INCOIS deployed along with AD06 OMNI buoy Retrieved Buoy and its components cleaning works carried out All sub surface sensors cleaning was carried out Retrieval and deployment observation prepared for AD06 buoy
01-11-2018 Thursday	0900 1030 1130 1400 1510 1730 1930	Retrieved buoy and sensor cleaning work carried out. ADCP of AD 06 dismantled with keel frame and downloaded log and changed battery. ADCP for AD 07 assembled with frame. CT sensor battery and anti-foulant changed All the components from AD 06 hull removed and prepared for AD 08. Tail mooring components connected with buoy assembly for AD07 buoy. Meeting with master for AD07 operation

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
02-11-2018 Friday	0600	Vessel reached the AD 07 location and waited for daylight to find the actual position of the buoy.
	0830	Surface modem lowered to communicate with releaser and
	0930	released from the anchor at Lat : 14°57.2' N / Long : 068° 59.4' E
	1045	Boat lowered, established the working line with Buoy. While lifting the buoy to the deck, the deep sea winch wire rope got cut and lifted buoy fall down to sea by 1055 hrs. immediately vessel move away from the buoy
	1120	Boat lifted to main deck and winch rope rectified.
	1230	Load test carried out for 4 tons after rectification.
	1310	Boat lowered to pick the surface buoy, established the lifting and tag line with buoy.
	1340	Then buoy lifted to deck and secured in main deck. Mooring load transferred to capstan winch and retrieved all sensors.
	1600	Retrieval of AD 07 buoy completed by 16:15 hrs.
	1750	CTD and HADAMS battery enclosure pressure test carried out.
2100	Data collected from all retrieved sensors(CT,ADCP,DVS) of AD	
2130	07	
03-11-2018 Saturday	0045	Bathymetry carried out for 6 miles.
	0830	Involved in preparatory work on main deck for AD07 buoy deployment.
	1100	Final buoy assembly carried out and prepared 3 additional CT sensor for seabed(0 m),1000 and 2000 m.
	1130	Vessel reached AD 07 buoy location and 10 ton crane got electrical break down and cleared by noon.
	1200	Induction cable uncoiled and sensors fitted to the respective depth marking
	1430	After data confirmation Buoy dropped in water at Lat : 14°53.53' N / Long : 068° 59.22' E. Full mooring uncoiled, lowered all surface sensors and remaining mooring rope paid out till the sinker point
	1715	Sinker weight dropped at Lat : 14°55.92' N / Long : 068° 58.82' E
	1900	After buoy settlement, data reception confirmation received from the shore station.
1930	CTD, MPN and horizontal towing carried out	

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
04-11-2018 Sunday	0830 1030 1100 1130 1330 1410 1630	Retrieved ADCP serviced with new battery Field calibration carried out retrieved CT sensors. HADAMS Surface buoy preparation work carried out AD 08 mast prepared and fitted met sensors Costal buoy CB 02 assembling carried out. CTD,MPN, vertical towing carried out CT sensor battery changed on the retrieved sensors
05-11-2018 Monday	0450 0730 0900 1000 1135 1200 1610 1800 1830 2000	Location reached by morning and Waited for day light. Benthos lowered and checked the communication with releaser and mooring released from sinker at Lat : 11°47.5' N / Long : 068° 36.89' E Boat lowered to establish the lifting and tag line with buoy system Buoy lifted to main deck at Lat : 11°47.18' N / Long : 068° 36.47' E Boat lifted to main deck and started heaving the mooring and all subsurface sensors retrieved successfully by 16:05. All sensors were in physically good condition. Found a cut at I cable. Cleaning of all sensors and buoy from bio fouling were carried out Carried out the field calibration of CT sensors using CTD frame. The data obtained from the field calibration analysed and found the reusable CT with lesser drift. CTD, MNP carried out and collected water samples.
06-11-2018 Tuesday	0750 0930 1000 1030 1145 1230 1320	Field bathymetry completed and final check-up of AD 08 carried out. Mooring prepared and deck cleaning work carried out Inductive cable uncoiled and all subsurface sensors fixed on the respective depth marking ADCP and DVS fixed on the frames Buoy shifted to Aft end for ease of deployment Readiness informed to bridge and vessel poisoned in buoy drop location with respect to the wind Final buoy attached with deep sea winch cable for lifting

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
06-11-2018 Tuesday	1330 1520 1600 1650 1800	<p>AD08Buoy lifted and dropped in water at Lat : 11°44.98' N / Long : 068° 34.60 E and mooring cable load were shifted to capstan winch.</p> <p>Full mooring paid out and sinker dropped at Lat : 11°47.42' N / Long : 068° 36.22 E</p> <p>Buoy deployed and waited for confirmation from shore station.</p> <p>Preparation of CB02 buoy sagar bhoomi buoy work carried out</p> <p>CTD casting done</p> <p>No data received from deployed AD 08 buoy and waited full night for confirmation from shore station.</p>
07-11-2018 Wednesday	0750 0930 1000 1830 1730	<p>Boat lowered and approached the AD 08 buoy and changed the antenna</p> <p>By noon data confirmation from shore station received.</p> <p>Carried out the Buoy readiness work of next location.</p> <p>CT sensor field calibration done and analysed the drift</p> <p>By evening sailing started to next location.</p> <p>Vessel started sailing towards next location</p> <p>DEEPAVALI celebrated by all ship crews and super numerals and attended party on 19:30 hrs.</p>
08-11-2018 Thursday	0850 0930 1000 1430	<p>IXSEA release prepared for AD 10 retrieval.</p> <p>Sagar bhoomi buoy work carried out and dead weight added with release</p> <p>Assembled the AD 10 buoy with all metrological sensors</p> <p>CB 02 buoy assembled with sontek current meter and carried out the final checking.</p>
09-11-2018 Friday	0800 0930 1030 1120 1140 1200	<p>Involved in sensor fitment for AD 10</p> <p>Reached AD 10 location and given release command using IXSEA releaser at Lat : 10° 19.73' N / Long : 072° 33.34 E</p> <p>Boat lowered to establish the lifting and tag line with buoy</p> <p>Buoy lifting line given to ship by boat and started pulling the buoy to vessel</p> <p>Buoy lifted to main deck and secured</p> <p>Mooring load transferred to capstan and started mooring recovery along with sub surface sensors. Found a cut in SBE modem cable</p>

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
09-11-2018 Friday	1320	Green float on board at the end of the nylon rope
	1335	Full mooring recovered , yellow float and releaser on board at Lat : 10°19.06' N / Long : 072° 32.10 E
	1600	All sensors found in good condition
	1730	Sagar bhoomi BPR painted
	1950	conducted CTD, water sampling using MPN
	2230	Horizontal trawling of bongo net started to collect the surface samples completed by 2250 hrs.
10-11-2018 Saturday	0800	CB 02 final Buoy work carried out on deck
	0930	Vessel was stopped at 200 m depth and Agatti boat with diver reached vessel
	1000	CB02 buoy with mooring lowered from vessel and given to boat for towing to the deployment location
	1030	MPN lowered for vertical hauling
	1130	Buoy swapped with new Buoy with help of hired boat and divers
	1145	Retrieved CB02 buoy towed to vessel by Agatti boat and lifting line given to vessel.
	1200	Buoy lifted to main deck along with mooring and subsurface
	1140	sensors. CT sensor cable and humidity sensor shield found damaged
	1220	CTD carried out
	1320	Horizontal Hauling carried out by bongo net for surface sample collection.
	1335	Involved in buoy cleaning work
	1545	Vessel reached CALVAL location
	1600	Boat lowered for buoy retrieval and lifting line and tag line established and give to vessel
	1630	Buoy lifted to main deck and secured at Lat : 10°36.83' N / Long : 072° 17.48 E
	1650	Boat lifted to main deck
1950	Field calibration carried out for CT sensor of retrieved AD 10.	
2030	HADAMS Buoy assembly work carried out	
2115	Multi-beam survey carried out	

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
11-11-2018 Sunday	0930	Morning ship reached the CAL VAL location and made vessel in DP for deployment
	1030	Buoy final assembly prepared and deck cleaning work carried out
	1400	Vessel positioned to the deployment location and buoy dropped at at Lat : 10°35.585' N / Long : 072° 16.807 E
	1500	Full mooring paid out and final sinker weight dropped at Lat : 10°36.565' N / Long : 072° 17.796 E
	1600	AD 10 Buoy final work carried out
	1630	Sagar bhoomi BPR made with external power source for on
	1730	board testing.
	1800	CTD, MNP and bongo net done at location.
	2000	Data down loaded from retrieved CB 02 and CAL VAL BUOY
12-11-2018 Monday	0930	Final AD10 buoy assembly was completed for deployment and received data confirmed from shore station
	1000	Inductive cable uncoiled and sensors fixed at respective depth marking
	1350	Vessel reached the deployment location
	1436	Buoy drop in water at Lat : 10° 18.247' N Long : 072°35.403' E
		Mooring paid out along with sub surface sensors successfully
	1555	Anchor dropped at Lat : 10° 19.099' N Long : 072°35.249' E
	1620	Vessel positioned in DP 500 meter away from the anchor drop point for CTD casting and data reception confirmed from mission control centre.
	1730	CTD casting and Buoy CT validation casting was carried out and completed by 2400 hrs.

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
13-11-2018 Tuesday	0930	Vessel reached AD09 location and established the communication with releaser.
	1100	Deck cleaning and preparatory work for buoy recovery carried out
	1350	Vessel positioned near the buoy and release command executed
	1420	Boat lowered in water
	1510	Buoy lifted to main deck and secured at Lat: 08° 12.74' N / Long: 073°18.28' E
	1520	Boat lifted to main deck
	1700	Full mooring recovered along with the sensors
	1730	Retrieved buoy and sensor cleaning work carried out.
	1805	All sensors found physically good except wind sensor with stuck at its cup
	1810	Multibeam survey started and finished by 2000 hrs
14-11-2018 Wednesday	0930	HADAMS buoy keel frame and mast fixed. Vessel reached ADCP sub surface mooring location
	1010	Surface modem lowered to communicate with release, after confirmation release command executed.
	1024	Sub surface ADCP buoy sighted near the port aft side of the vessel
	1030	Boat lowered and reached the float and towed to vessel
	1110	ADCP buoy lifted to main deck and started heaving up all the mooring.
	1310	CTD casting carried out
	1330	HADAMS surface buoy final assembly carried out and mooring prepared
	1630	Vessel reached buoy drop location and informed the readiness
	1650	HADAMS Tsunami buoy dropped in water at Lat: 08° 13.132' N / Long: 073°16.912' E
	1750	After paid out all the mooring sinker weight dropped at Lat: 08° 16.07' N / Long: 073°16.81' E
	1920	dummy data received at shore station from the deployed buoy CTD and MPN lowered to 100m for vertical micro plastic sample collection
	2030	Dummy data received at shore station from the deployed buoy Bongo net trawling started and finished by 2050.

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
15-11-2018 Thursday	0930 1150 1425 1730 1920	BPR mooring prepared and it was attached with BPR assembly Vessel reached near Sagarbhoomi and started the lowering work of BPR at Lat: 08° 16.25' N / Long: 073°16.81' E BPR started lowering using Deep sea winch On lowering one transmission was checked each 50 meter The Buoy got transmission issue and hold the BPR at 1300 m and started retrieval of same waited at same location for the confirmation from shore station
16-11-2018 Friday	0630 1010 1030 1200 1310 1340 1400 1550 1620 1720	Vessel reached AD 09 location and made in DP for deployment of AD 09. Buoy shifted to aft most point of the deck for the ease of deployment. Induction cable uncoiled and all subsurface sensors attached with the mooring and surface buoy. Buoy lifted from deck and lowered in water at Lat: 08° 08.93' N / Long: 073°17.04' E The top mooring with sub surface sensors lowered in water safely and paid out all the ropes till the sinker weight. Sinker weight dropped in water at Lat: 08°10.209' N / Long: 073°19.123' E Deployment of AD 09 completed with all its sensors and ship moved to Sagar bhoomi location Vessel reached Sagar bhoomi Buoy location, boat lowered to pick the buoy. Buoy picked to main deck and mooring attached with dummy Buoy and lowered in water. The Tsunami buoy took back to deck for troubleshooting changed the antenna and downloaded the data from CPU
17-11-2018 Saturday	0630 1010 1130 1200	<ul style="list-style-type: none"> • Started the pack up of materials • Sagarbhoomi trouble shoot carried out • Involved in deployment and retrieval sheet preparation and report editing work • vessel moved towards south to avoid the cyclone prone area

Date & Day (DD/MM/YYYY)	Time (XX:XX hrs)	Events Description
18-11-2018 Sunday		Vessel started sailing towards Tuticorin Cruise documentation work carried out Attended on-board drill Involved in material packing
19-11-2018 Monday		Cruise documentation work carried out Involved in material packing work Involved in deck cleaning work
20-11-2018 Tuesday		Cruise documentation work carried out Involved in material packing work Micro plastic studies like CTD, Bongo, MNP carried out Vessel reached Tuticorin port, Pilot on boarded the vessel and berth allotted
21-11-2018 Wednesday		offloading of materials to lorry capstan winch removed from deck by cutting out the welding Sign granted on all certificates from ship master and chief scientist. Collected data CD from Norinco- ship AMC on CTD and MNP
22-11-2018 Thursday		All participant Signoff and immigration clearance completed sign off and immigration formalities were completed by 1100 hrs and returned to NIOT