ORV - SAGAR KANYA

CRUISE REPORT

Cruise No. SK - 333

(22nd August – 29th September, 2016)

Submitted by

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Hyderabad – 500 090

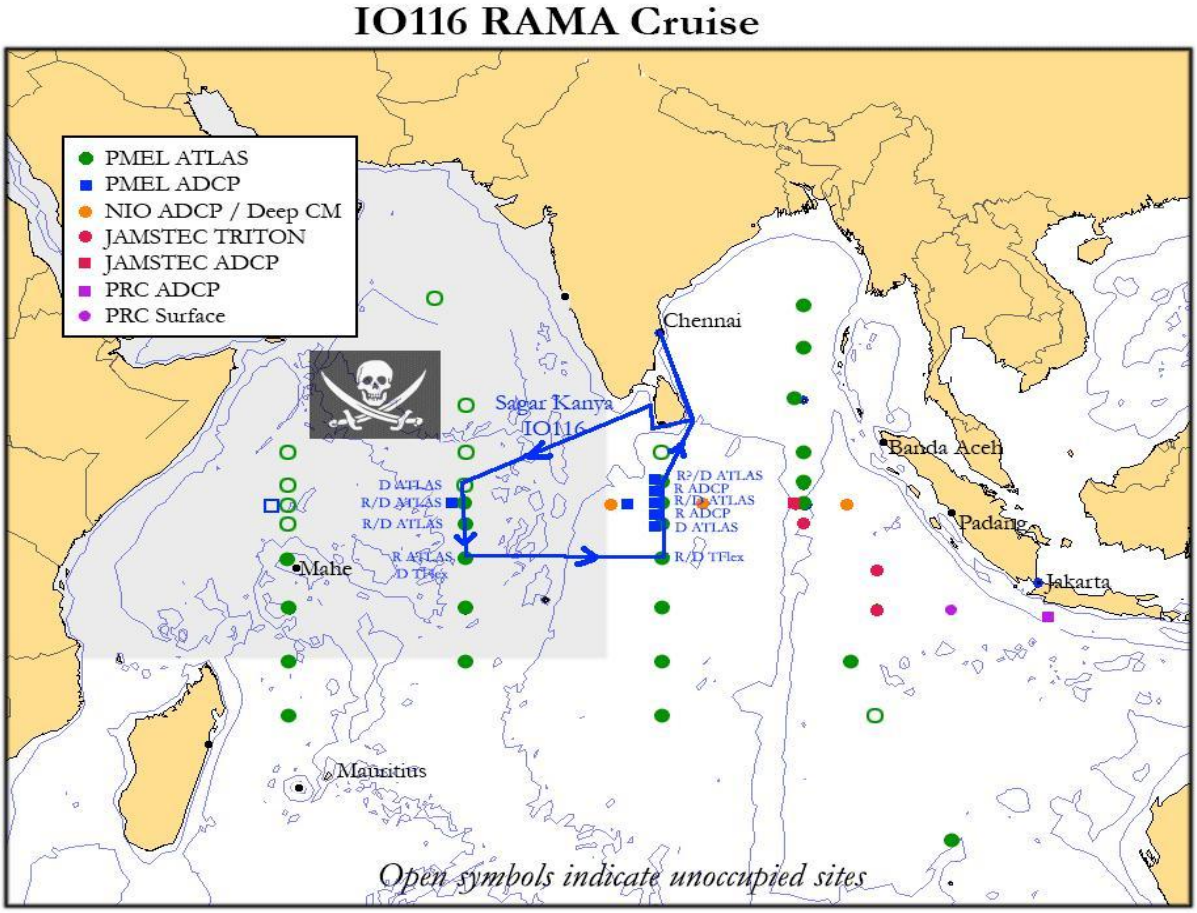
Objectives:

This cruise will be dedicated to the recovery of four and deployment of five deep ocean RAMA moorings, and the recovery of two deep ocean subsurface (Acoustic Doppler Current Profiler) ADCP moorings.

The moorings are a part of the Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA). This array is under development as part of a multi-national effort to provide data essential for monitoring, understanding, and predicting basin scale ocean-atmosphere variability such as the Asian monsoon, the Indian Ocean Dipole, and the Madden-Julian Oscillation.

(Conductivity, Temperature and Depth) CTD operations were conducted after every Mooring buoy deployment and retrieval locations.

Cruise Track:



Scientific Participants SK-333

Sr. No.	Name of Participants	Designation	Institute	Nationality
1.	Mr. Ashok Kumar	**Chief Scientist**	INCOIS	India
2.	Mr. John Michael Strick	**Dy. Scientist**	NOAA/PMEL	USA
3.	Mr. Ryan Christopher Wells	Scientist	NOAA/PMEL	USA
4.	Mr. Stephen Alan Smith	Scientist	NOAA/PMEL	USA
5.	Mr. Pavan Shirodkar	Onboard Asst.	NCAOR	India
6.	Mr. Alok Kumar Sinha	Jr. Research Fellow	NCAOR	India
7.	Mr. Bhaskar Kamble	Project Assistant-Technical	NCAOR	India
8.	Mr. Palanisawamy Boopathy	Senior Manager	NORINCO	India
9.	Mr. Rajak Mohamed Ismail	Assistant Manager	NORINCO	India
10.	Mr. Ganapathy Mahadevan	Service Engineer	NORINCO	India
11.	Mr. Madar Parshuram Durgappa	Service Engineer	NORINCO	India
12.	Mr. Venkatesan Selvaraj	Deployment Assistant	INCOIS	India
13.	Mr. Udhayakumar Raji	Deployment Assistant	INCOIS	India
14.	Mr. Subramanian Natesan	Deployment Assistant	INCOIS	India
15.	Mr. Nivas Niraimathi	Deployment Assistant	INCOIS	India

Recovery and Deployment of RAMA mooring Buoy:

The Research Moored Array for African Asian Australian Monsoon Analysis and Prediction (RAMA) moored buoy is an international program of Global Ocean Observation System (GOOS). RAMA & ADCP buoys were recovered and redeployed at assigned locations in Equatorial Indian Ocean and Bay of Bengal by MoES/INCOIS & NOAA/PMEL scientists during this cruise.

The recovery operations start with sighting the buoy on Radar or visually. Then the vessel moved close (up to 50-100 m) to the buoy float. Buoy is then released from the anchor weights by sending acoustic pulses to the Acoustic Release unit which connected between the Mooring line and Anchors. After that a small inflatable boat can be used to carry scientists and seaman's, lowered from the ship main deck midships Starboard from main deck. This boat approached to the buoy and all meteorological sensors (wind speed and direction, solar radiation, humidity and air temperature) taken off from the buoy tower. The buoy is then hooked with a rope (working Line ~300m) which is passed to the boat from ship. Finally the buoy was recovered on the main deck using A-frame and Win-tech Electric winch capstan and after recovery of the buoy float, the cable was pulled by winch and all sub-surface sensors were taken off from the mooring cable. Similar procedure followed for recovery of all RAMA buoys during the cruise.

Deployment of RAMA buoy was performed from midships of the ship using ATLAS Crane, before the deployment, the top tower, with all meteorological sensors clamped on it, was fixed on the Buoy. Then a cable Nilspin (Conductive Cable) was connected to the bottom tower of float and subsurface sensors were clamped at defined Depths on the mooring cable. The cable was laid along the Main Deck of the ship towards the ship aft. The RAMA buoy was deployed using the midships ATLAS crane deployed by A-frame from main deck and mooring cable passed over the Hanging Pulley Block connected in the deep sea winch and then by finally pass it Wintech Electrical Winch tech by entangle with 4-5 straps in winch of NOAA heaving capacity ~6 Ton . For Surface Buoy after completing Pay out ~ 600 m of Nilspin cable, the nylon rope was connected to the buoy mooring line for remaining length till up to sea-bed. At the end before connecting Anchors an Acoustic release was connected to the line, followed by the heavy anchor weight. The anchors were dropped from the ship aft by using A-frame and deep see winch capstan. Similar procedure followed for all RAMA buoy deployments.

Details of Buoy Retrievals/Deployments:

Sr. No.	Mooring Descriptions	Date	Mooring Locations	
			Latitude	Longitude
1	RAMA DEPLOYMENT – RA145	04-Sep-2016	01° 44.87' N	066° 43.68' E
2	RAMA RECOVERY – RA133	05-Sep-2016	00° 24.50' N	067° 00.77' E
3	RAMA DEPLOYMENT – RA146	06-Sep-2016	00° 23.36' N	067° 02.94' E
4	RAMA RECOVERY – RA132	07-Sep-2016	01° 37.35' S	066° 49.36' E
5	RAMA DEPLOYMENT – RA147	08-Sep-2016	01° 36.77' S	066° 47.87' E
6	RAMA RECOVERY - RA131	09-Sep-2016	04° 01.46' S	067° 13.68' E
7	RAMA DEPLOYMENT – RT009	10-Sep-2016	04° 01.29' S	067° 13.20' E
8	RAMA RECOVERY – RA130	16-Sep-2016	02° 38.27' S	081° 58.54' E
9	RAMA DEPLOYMENT – RA148	17-Sep-2016	01° 30.44' S	080° 29.40' E
10	ADCP RECOVERY - IO052	18-Sep-2016	00° 46.03' S	080° 30.12 'E
11	RAMA RECOVERY – RA126	19-Sep-2016	00° 05.24' N	080° 35.86' E
12	RAMA DEPLOYMENT – RA149	19-Sep-2016	00° 04.65' N	080° 33.99' E
13	ADCP RECOVERY - IO053	20-Sep-2016	00° 36.91' N	080° 27.21' E

CTD operations:

Conductivity, Temperature, and Depth (CTD) casts were made up to 700 meters depth at all the locations where RAMA buoys were deployed/recovered.

Sl.No	Latitude	Longitude	Date	start time (LT)	End time (LT)	Remarks
1	01° 67.57 N	066° 69.99 E	05-Sep-2016	03:10	05:12	CTD was lowered upto 700 Meters
2	00° 38.94 N	067° 04.91 E	06-Sep-2016	07:03	08:52	CTD was lowered upto 700 Meters
3	01° 61.23 S	066° 79.51 E	07-Sep-2016	21:40	22:45	CTD was lowered upto 700 Meters
4	04° 02.42 S	067° 22.79 E	09-Sep-2016	20:50	22:05	CTD was lowered upto 700 Meters
5	02° 63.77 S	081° 97.57 E	16-Sep-2016	11:25	12:18	CTD was lowered upto 500 Meters
6	01° 51.59 S	080° 47.90 E	17-Sep-2016	12:03	13:07	CTD was lowered upto 700 Meters
7	00° 79.93 S	080° 49.61 E	17-Sep-2016	19:48	20:44	CTD was lowered upto 700 Meters
8	00° 04.90 N	080° 58.01 E	19-Sep-2016	06:50	07:55	CTD was lowered upto 700 Meters
9	01° 51.84 N	080° 64.91 E	20-Sep-2016	21:26	22:03	CTD was lowered upto 500 Meters

Drifter:

Sl.No	Drifter ID	Latitude	Longitude	Date	Time (GMT)
1	145624	03 52.29 N	071° 03.19 E	02-Sep-2016	06:50
2	145637	01 37.08 N	068° 27.47 E	03-Sep-2016	05:00
3	145636	00 03.70 N	066° 58.71 E	06-Sep-2016	15:10
4	145614	03 00.55 S	067° 01.30 E	09-Sep-2016	19:55
5	145616	04 00.30 S	069° 02.40 E	10-Sep-2016	01:59
6	145608	03 54.65 S	072° 11.01 E	12-Sep-2016	05:52
7	145598	03 10.47 S	074° 44.15 E	13-Sep-2016	10:57
8	145548	02 40.95 S	080° 28.30 E	15-Sep-2016	13:25
9	145559	00 05.76 N	080° 34.31 E	18-Sep-2016	20:53
10	145550	03 00.60 N	080° 29.86 E	21-Sep-2016	12:17

Dairy of Events

22- Aug -2016, Day 1

- Scientific team signed on at 16:30 Hrs and accommodation allotted to all of them.
- All scientific equipments from NIOT were loaded prior onboard on 20-Aug- 2016 from 14 trucks.
- PMEL Electrical winch is successfully fitted in main deck with local workshop people.
- All scientific gears were inventoried and verified by PMEL team. All four seamen secure all the cruise material.
- Because of Bunkering and Provision issue sailing is not done.

23- Aug -2016, Day 2

- Bunkering & other provision was carried out aboard.
- @ 12:00 Hrs, we had meeting regarding sailing with ship captain.
- @ 17:30 Pilot onboard and 18:00 Hrs, Vessel sail out from JD3 Chennai port.
- @ 20:00 Hrs, we had meeting regarding email issue with radio officer, because ship email was not working.
- Vessel heading towards Colombo port, Sri Lanka.

24- Aug -2016, Day 3

- @ 20:00 Hrs, we had a small meeting regarding email issue with radio officer, because ship email was not working.
- NOAA scientist with help of seamen's set up the lab facility & instruments on deck and staged the mooring hardware and gears according to the order of operations.
- @ 16:15 Hrs, Safety drills were conducted onboard with scientific team and ship crew members.

25- Aug -2016, Day 4

- @ 11:00 Hrs, we had meeting regarding for operation and plan with ship captain, officers and few crew members and scientific team and Norinco Engineers.
- Assembled one RAMA buoy for our first deployment operation and fixed all met sensor near to first accommodation deck for testing.

- Email service is not working from first day Radio officer, Captain said because of some software issue email is not working, and after reached Colombo they will rectify this issue.

26- Aug -2016, Day 5

- @ 09:00 Hrs, a small discussion with Norinco engineers regarding bathymetry queries.
- Kept 2 no's RAMA tube to second accommodation deck for testing the met sensors.
- PMEL team and all seamen's are preparing for first RAMA buoy deployment like rope, pulley - A frame, winch power supply, etc.
- ETA to reach Colombo 10:00 Hrs.

27- Aug -2016, Day 6

- Seamen's are doing paint work on RAMA mooring, which we are going to deploy in this cruise.
- ETA to reach Colombo 10:30 Hrs.

28- Aug -2016, Day 7

- Assembled one more RAMA buoy for our deployment operation and fixed all met sensor near to first accommodation deck for testing.
- ETA to reach Colombo 09:30 Hrs.

29- Aug -2016, Day 8

- @ 09:12 Hrs, ship reached at near to Colombo port (60 miles distance from Colombo port to Sagar Kanya ship).
- SCI (Shipping Corporation of India) sent a CD to Colombo port agent, Agent came to ship and handover to captain.
- @ 14:30 Hrs, 2 no's PMEL team persons sign on, 16:00 Hrs Bunkering has done, starts 10:00 Hrs.
- Provisional work also completed at 15:30 Hrs.
- Vessel proceeds to first RAMA buoy deployment location.

30- Aug -2016, Day 9

- Ship email is not working at chief scientist room, but in radio officer room email is working so we are sending email from radio officer room.
- Current meter we tested/configure and kept to second deck for testing, it is working fine or not.

- Once again we cross check, all the buoy secure or not which we kept to transmission test.
- Approx. ETA is 04th Sep-2016, 05:30 Hrs, for first location.

31- Aug -2016, Day 10

- Sent an email to INCOIS OSF team regarding ocean forecast.
- A small meeting happened with NORINCO, PMEL team regarding Bathymetry survey, which we will do before our first RAMA buoy deployment.
- Approx. ETA is 04th Sep-2016, 05:30 Hrs, for first location.

01- Sep -2016, Day 11

- A small meeting happened with captain, PMEL team and chief officer regarding small boat trial.
- @ 09:35 Hrs, small boat lowered in the sea with tree persons (2-PMEL, 1-Seamen) for testing the small boat 09:50 Hrs, boat onboard.
- @ 16:00 Hrs, we had meeting regarding for operation and plan with ship captain, officers and few crew members and scientific team and Norinco Engineers.
- Approx. ETA is 04th Sep-2016, 05:00 Hrs, for first location.

02- Sep -2016, Day 12

- Testing of RAMA mooring sensors and doing data testing, checking coming right or not from sensors.
- Testing, checking of Acoustic release and deck unit before deployment of Acoustic release.
- Approx. ETA is 04th Sep-2016, 15:30 Hrs, for first location because of ship speed delay for reach location.

03- Sep -2016, Day 13

- RAMA buoy is ready for deployment with all met and ocean sensors.
- Tested all the sensors which we are going to deployed/fixed to the our first RAMA buoy deployment.
- Approx. ETA is 04th Sep-2016, 15:00 Hrs, for first location of RAMA deployment.

04- Sep -2016, Day 14

- @ 15:20 Hrs, Vessel arrived first RAMA buoy site in 1.5N|67E.

- @ 15:40 Hrs, we started the bathymetry survey and completed by 18:40 hrs.
- @ 21:00 Hrs, we started the new RAMA buoy (RA145) deployment.

05- Sep -2016, Day 15

- @ 00:30 anchors dropped in targeted site.
- @ 05:15 Hrs, CTD cast taken for 700 meter.
- Heading next operation site in equator region.
- PMEL Electrical winch is not working we and Electrical officer tried to repair the winch but not success.
- Ship deep sea winch we use for our retrieval operation and from now onward we will use deep sea winch for our all deployment/retrieval operation.
- @ 15:45 Hrs, RAMA buoy (RA133) signed.
- @ 16:10 Hrs, Transducer lower in the water from starboard side for release the buoy and we got release confirmation.
- @ 16:30 Hrs, small boat lowered in water and tied the buoy and around 17:00 Hrs, small boat onboard.
- @ 19:43 Hrs, RAMA Recovery operation started.

06- Sep -2016, Day 16

- @ 02:50 Hrs, RAMA Recovery operation completed.
- @ 09:15 Hrs, CTD cast taken for 700 meter.
- @ 12:05 Hrs, we started the new RAMA buoy (RA146) deployment.
- @ 15:30 Hrs, anchors dropped in targeted site.
- Vessel proceeds to next location.

07- Sep -2016, Day 17

- @ 10:00 Hrs, RAMA buoy (RA132) signed, now we are going to near (approx. 200m) the buoy for release.
- @ 10:30 Hrs, Transducer lower in the water from starboard side for release the buoy and we got release confirmation.

- @ 11:30 Hrs, small boat lowered in water and tied the buoy and around 11:55 Hrs, small boat onboard.
- @ 12:10 Hrs, RAMA Recovery operation started. 14:00 Hrs we recovered 700m wire rope with all oceanographic sensors.
- @ 18:10 Hrs, RAMA Recovery operation completed.
- @ 22:45 Hrs, CTD cast taken for 700 meter.

08- Sep -2016, Day 18

- @ 06:45 Hrs, we are ready for deploy the RAMA buoy, waiting for deployment position ETA 10 to 15 minutes.
- @ 07:00 Hrs, we started the RAMA buoy (RA147) deployment.
- @ 08:20 Hrs, we deployed 700m wire rope and fixed all the sensors on it according plan.
- @ 10:25 Hrs deployed all the nylon rope according the depth now we are waiting for Anchor deployment position.
- @ 10:45 Hrs, anchors dropped in targeted site.

09- Sep -2016, Day 19

- @ 12:15 Hrs, vessel reached the site to recover the RAMA buoy,
- Vessel in DP and well close to buoy the working line has connected to buoy before it would have to release, but unfortunately the bottom release and ship board Acoustic transducers couldn't make communication successfully.
- @ 13:05 Hrs, we lowered a small boat in water and this time three persons, for release the Acoustic because it not release while we tried from onboard. They couldn't able to do release the buoy because of some communication issued.
- Later by 04:00 Hrs, we tried to pull the working line and picked up the RAMA buoy on deck while heaving the buoy, the tag line which we connected between Buoy and A-Frame Railings got high tensed.
- @ 14:30 Hrs, RAMA buoy (RA131) on deck.
- @ 16:15 Hrs, recovered 700m wire rope with all oceanographic sensors.
- @ 20:40 Hrs, recovery operation was completed.
- @ 21:25 Hrs, CTD cast taken for 700 meter.

- Vessel proceeds to next RAMA buoy deployment site.

10- Sep -2016, Day 20

- @ 07:00 Hrs, deployment of RAMA buoy (RT009) were started.
- @ 11:30 Hrs, anchors dropped in targeted site.
- @ 12:25 Hrs, we lowered a small boat in water and this time four persons, for fixed the Wind sensor, which they forget to fix on RAMA buoy.
- @ 13:45 Hrs, small boat onboard and sensor is communicating.
- @ 14:00 Hrs, Vessel heading towards next location, Approx. ETA is 15th Sep-2016, 20:00 Hrs, ship speed is 6.2 knots.

11- Sep -2016, Day 21

- PMEL team with help of seamen's set up the RAMA buoy for next operations.
- Downloading of data is started from retrieval RAMA mooring.
- @ 10:00 Hrs, we had meeting regarding for next operation plan with PMEL team and Norinco Engineers.
- Approx. ETA is 15th Sep-2016, 17:30 Hrs, because ship speed is 6.7 knots for next location.

12- Sep -2016, Day 22

- @ 14:00 Hrs, we had meeting regarding for operation and plan with ship captain, officers.
- PMEL team plan to skip two operations because of time shortage this decision was taken PMEL office, from ship side everything is ok.
- Approx. ETA is 15th Sep-2016, 16:00 Hrs, because ship speed is 6.8 knots for next location.

13- Sep -2016, Day 23

- Prepared one RAMA buoy for our next deployment with connected all the sensors.
- @ 10:45 Hrs, One small meeting happened with third officer and PMEL team regarding new RAMA mooring retrieval, which we got information from PMEL office America.
- @ 22:45 Hrs, we came to know the news from PMEL office that 1S RAMA buoy (RA130) is drifted and now it near to 2S, which we deployed last year 28th Aug-2015, now we are going to recovering of this buoy.
- Approx. ETA is 16th Sep-2016, 01:00 Hrs, because ship speed is 6.5 knots for next location.

14- Sep-2016, Day 24

- A small meeting with chief officer, second officer, captain and PMEL team regarding ETA for Galle, after meeting we got ETA for Galle 23rd –September-2016.
- Approx. ETA is 16th Sep-2016, 04:00 Hrs, because ship speed is 6.2 knots for next location.

15- Sep-2016, Day 25

- A small meeting with PMEL team regarding sign off, PMEL team (03 persons) want to sign off Galle port. They also requested for transport from Galle to Colombo.
- A small meeting with NCAOR junior research fellow (Mr. Alok Kumar Sinha) regarding the extra CTD operation, he need around 500 meter CTD.
- Approx. ETA is 16th Sep-2016, 05:30 Hrs for our next RAMA buoy retrieval location.

16- Sep-2016, Day 26

- @ 07:00 Hrs, RAMA buoy (RA130) signed and vessel is going to near the buoy because we have to release the buoy/lower the small boat.
- @ 09:00 Hrs, small boat lowered in water and tied the buoy and around 09:30 Hrs, small boat onboard.
- @ 10:00 Hrs, RAMA Recovery operation started.
- @ 11:45 Hrs, RAMA Recovery operation completed.
- This RAMA buoy we lost all Nylon rope, only wire rope we recovered.
- @ 12:30 Hrs, CTD cast taken for 500 meter.
- Approx. ETA is 17th Sep-2016, 07:00 Hrs for our next RAMA buoy deployment location.

17- Sep-2016, Day 27

- @ 08:15 Hrs, deployment of RAMA buoy (RA148) were started.
- @ 10:00 Hrs, we deployed 700m wire rope with all the oceanographic sensors.
- @ 12:30 Hrs, anchors dropped in targeted site after deployment of anchor we went to little far for our CTD operation.
- @ 13:00 Hrs, from the buoy position we shifted 1.5 nm away and done the CTD cast for 700 meters.
- Vessel proceeds to our first ADCP buoy recovery site, approx. ETA is 17th Sep-2016, 20:00 Hrs.

- @ 21:15 Hrs, CTD cast taken for 700 meter.

18- Sep-2016, Day 28

- @ 06:15 Hrs, we reached ADCP recovery site.
- @ 06:30 Hrs, Transducer lower in the water from starboard side for release the ADCP buoy and we got release confirmation.
- @ 06:35 Hrs, ADCP buoy (IO052) signed.
- @ 06:50 Hrs, we lowered a small boat in water and tied the ADCP buoy.
- @ 07:10 Hrs, small boat onboard.
- @ 08:15 Hrs, ADCP buoy onboard and we started the recovery of ADCP mooring.
- @ 12:00 Hrs, we finished recovery of ADCP.
- Vessel heading towards next location (RAMA recovery), Approx. ETA is 18th Sep-2016, 18:00 Hrs, ship speed is 6.7 knots.
- Data downloaded from retrieve ADCP buoy.
- @ 17:10 Hrs, we reached RAMA buoy (RA126) position and RAMA buoy signed.
- @ 17:30 Hrs, Transducer lower in the water from starboard side for release the RAMA buoy and we got release confirmation.
- @ 18:00 Hrs, small boat lowered in water and tied the buoy and around 18:30 Hrs, small boat onboard.
- @ 18:50 Hrs, RAMA recovery operation started, RAMA buoy onboard.

19- Sep-2016, Day 29

- @ 02:20 Hrs, RAMA recovery operation completed.
- @ 08:15 Hrs, from the buoy position we shifted 1.5 nm away and done the CTD cast for 700 meters.
- @ 10:45 Hrs, deployment of RAMA buoy (RA149) were started.
- @ 12:00 Hrs, we deployed 700m rope with all the oceanographic sensors.
- @ 14:00 Hrs, anchors dropped in targeted site.
- All the sensors are giving good data, we checked from system.

- Vessel proceeds to our 2nd ADCP buoy recovery site, approx. ETA is 19th Sep-2016, 20:00 Hrs.

20- Sep-2016, Day 30

- @ 06:15 Hrs, we reached 200m far from ADCP recovery site.
- @ 06:30 Hrs, Transducer lower in the water from starboard side for release the ADCP buoy and we got release confirmation.
- @ 06:35 Hrs, ADCP buoy (IO053) signed.
- @ 06:50 Hrs, we lowered a small boat in water and tied the ADCP buoy.
- @ 07:10 Hrs, small boat onboard while recovery the weather picked up badly.
- @ 08:30 Hrs, ADCP buoy onboard and we started the recovery of ADCP mooring.
- @ 12:30 Hrs, we finished recovery of ADCP.
- Vessel heading towards next location (RAMA recovery), Approx. ETA is 20th Sep-2016, 19:00 Hrs, ship speed is 6.8 knots.
- @ 20:00 Hrs, vessel reached buoy location (RAMA recovery), but buoy was not there.
- We lost RAMA buoy with all underwater instruments and special high frequency sensors and plenty meters of Nylon rope with one Acoustic release. At last we got very bad and it's not our day.....
- Finally we come to a decision, skipped this location because someone taken our mooring from here and possibility to lost future also.
- @ 22:00 Hrs, CTD cast taken for 500 meter.
- Vessel heading towards Galle port, Approx. ETA is 23rd Sep-2016, 08:00 Hrs.

21- Sep-2016, Day 31

- @ 11:00 Hrs, we had meeting regarding for sign off for PMEL team with ship captain, chief officers, chief engineer.
- Packing of instruments started, making new material list according material which we have onboard.
- Finally we made list of material which have to offload from ORV Sagar Kanya ship, when ship will reach Chennai.

- Vessel heading towards Galle port, Approx. ETA is 23rd Sep-2016, 08:00 Hrs.

22- Sep-2016, Day 32

- All PMEL team are preparing for their sign-off.
- Labelled the entire material according list.
- Vessel heading towards Galle port, Approx. ETA is 23rd Sep-2016, 08:00 Hrs.

23- Sep-2016, Day 33

- @ 08:00 Hrs, Vessel reached near to Galle port, a small boat came for pickup PMEL team and around 08:20 Hrs all PMEL team went to small boat.
- Vessel heading towards Chennai port, Approx. ETA is 27th Sep-2016, 08:00 Hrs.

24- Sep-2016, Day 34

- Vessel heading towards Chennai port.

25- Sep-2016, Day 35

- Vessel heading towards Chennai port, Approx. ETA is 28th Sep-2016, 14:00 Hrs. ship speed is 4.2 knots.

26- Sep-2016, Day 36

- Vessel heading towards Chennai port, Approx. ETA is 27th Sep-2016, 18:00 Hrs. ship speed is 5.6 knots.

27- Sep-2016, Day 37

- Vessel reached near to Chennai port at 18:00 Hrs. and anchored, awaiting for berth.

28- Sep-2016, Day 38

- We did not get berth, Approx tomorrow morning 07:00 Hrs will get berth.

29- Sep-2016, Day 39

- Offloading works successfully completed and Sign off all the cruise participated.

Summary of the scientific works done during cruise SK-333:

1. 5-RAMA buoys were deployed and 6-RAMA & 2-ADCP buoys were recovered in Latitudes 1.5N, 0N along with 67 E longitude lines and Latitudes 1.5S, 4S along with 67E longitude of RAMA Moorings.
2. Conductivity-Temperature-Depth (CTD) profiles taken every RAMA and ADCP buoy locations.
3. Bathymetry survey was commenced for first RAMA buoy deployment locations.

Acknowledgements

I on behalf of the scientific team of RAMA cruise SK-333, would like to thank **Director, NCAOR** for providing the research vessel "ORV Sagar Kanya" and all the facilities onboard for our operations i sincerely thank to **Captain LELLWYN G.M. PINTO**, Chief Officer Mr. VISHANT V CHAVAN**,** Chief Engineer Mr. SUBHASH CHANDRA MISHRA and all Officers, Doctor, Electrical Engineers and Crew members onboard ORV-Sagar Kanya, for their excellent cooperation and good team work throughout the cruise in making this voyage a very successful, I am also thankful to Dr. M. Ravichandran, INCOIS for the kind support and valuable suggestions.

I am grateful to Dr. Anil Kumar and Mr. M. M. Subramaniam, NCAOR for all the administrative and logistic supports during the cruise. I sincerely thank agents M/s. Atlantic shipping Privet Limited (ASPL) and their team for make out all the paper works in-time during our Sign-On and Sign-Off process.

Thanks to M/s NORINCO Engineers onboard for their untiring works during RAMA, ADCP buoy and CTD operations. Finally I would like to thank all the members of scientific team of SK-333 to make this a completely successful and enjoyable cruise.

Date: 29-Sep-2016

(Ashok Kumar)
Chief Scientist, SK-333