

SAGAR KANYA CRUISE IN BAY OF BENGAL (SK 326)

23 January - 08 February, 2016



SUMMARY OF THE CRUISE REPORT

5th Research Cruise under
Ocean Mixing and Monsoon (OMM) Experiment

Cruise Summary Report Ship Name		ORV Sagar Kanya			
Cruise Start Date (dd/mm/yyyy)		23/01/2016			
Port of Departure		Chennai Port			
Name of Chief Scientist		B Praveen Kumar Scientist C, INCOIS, Hyderabad			
Objectives of the cruise		a) WHOI mooring recovery b) NIOT 3 mooring operations c) Lagrangian float deployment & recovery d) Argo floats & drifter proto type deployment e) Extensive uCTD & ADCP surveys in the northern Bay of Bengal f) CTD cast at selected locations & water sampling.			
Details of the Project					
Project Name Coupled Physical Processes in the Bay of Bengal and Monsoon Air-Sea Interaction		Sponsoring Agency Ministry of Earth Sciences, Govt. of India Coordinating Agency INCOIS, Hyderabad IISc, Bangalore		Principal Investigators Dr. M. Ravichandran, INCOIS, Hyderabad Prof. Debasis Sengupta, IISc, Bangalore.	
Details of Data collected					
Discipline	Instrument operated	Make and Model	Parameters measured	Number of Stations	Depths of observation
Physical Oceanography	a) uCTD b) ADCP c) CTD with DO	a) Ocean Science b) Teledyne RDI c) SeaBird	a) T, S, P b) Current velocity c) T,S,P and DO	a) Continuous b) Continuous c) Continuous	a) Upto 130m b) Upto 50m c) 100m & 800m
Meteorology	a) ASIMET b) INCOIS AWS	a) Star Engineering b) Swan Environmental Tech	a) Air T, Humidity, winds, shortwave and longwave radiation b) - do -	a) Continuous throughout cruise b) Continuous throughout cruise	a) Upto 20m above surface b) -do-

Deployments/Retrievals	a) Seven APEX Argo floats deployed b) One proto-type drifter from INCOIS deployed c) WHOI & BD11 retrieval d) BD11 deployment
Quality controlled / Post processing done onboard (Yes/No)	No
Any other information	

Sagar Kanya Cruise, SK 326
23 January - 08 February, 2015
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Sagar Kanya started sailing from Chennai port from 23rd January on a 17 day cruise. Total science crew in this cruise (SK 326) is 21 which include scientists and students from several Indian research labs and academic institutes. Mr. Jeff Lord and Mr. Emerson Hasbrouck of Woods Hole Oceanographic Institute (WHOI, USA) also participated in SK 326 for a WHOI mooring recovery which was deployed in November 2014 in a Sagar Nidhi cruise.

1. Objectives and Cruise Outline

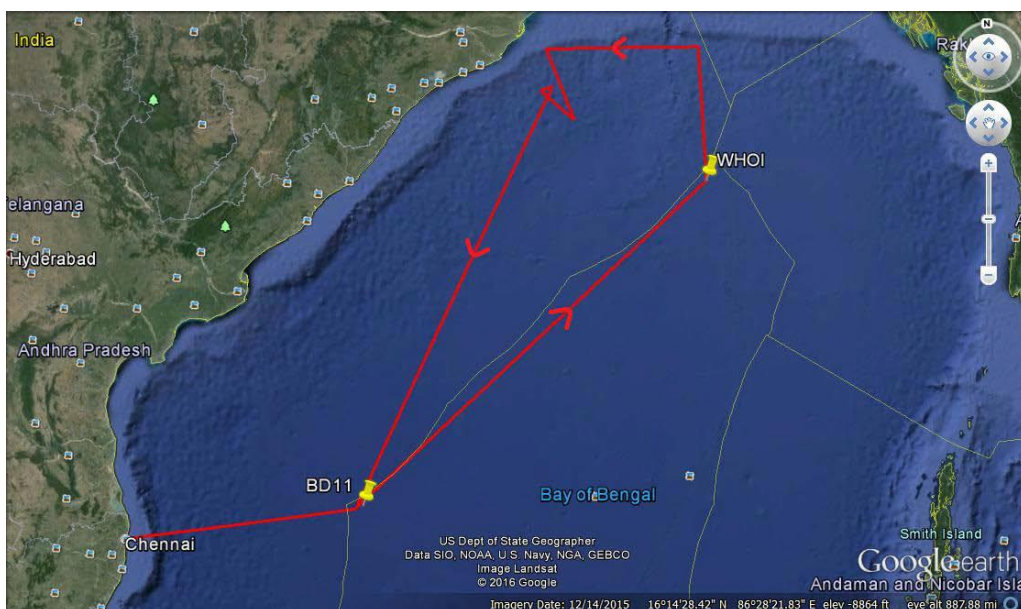
SK 326 is the 5th cruise under the Ocean Mixing and Monsoon (OMM) program, the other four were conducted onboard Sagar Nidhi (SN 82, SN88, SN 14/2014, and SN100). Main objectives of the 17 day cruise are

- a) Recovery of the Woods Hole Mooring
- b) Extensive upper ocean survey of the Northern Bay of Bengal
- c) Deployment & Recovery of Lagrangian float and deployment of argo floats
- d) NIOT's 3 mooring operations (Deployment & Recovery of BD11 and Recovery of ITBS).

2. Cruise track, Operations and Timeline

2.1 Cruise Track

Figure 1: Cruise track of SK 326



2.2 Schedule and Details of operations

No.	Date and Time	Operation
1	23/01/2016 15:30:00	Departure Chennai . Start of Cruise
2	24/01/2016	Planned float operations site; not done
3	25/01/2016 15:05:00	ARGO float (id 7497) deployment, CTD, water sampling
4	26/01/2016 00:57:00	ARGO float (id 7548) deployment, CTD, water sampling
5	26/01/2016 08:28:00	Bio ARGO deployment (id 7558) , CTD, water sampling
6	26/01/2016 16:00:00	ARGO float (id 7547) deployment, CTD, water sampling
7	27/01/2016 13:32:00	Bio ARGO (id 7557) deployment, CTD, water sampling
8	27/01/2016 12:56:00	Bio ARGO (id 7556) deployment, CTD, water sampling
9	28/01/2016 11:45:00	ARGO float (id 7545) deployment, CTD, water sampling
10	29/01/2016 12:30:00	Retrieval of WHOI mooring, CTD
11	31/01/16 11:00:00	CTD cast at 20°N: 87°55'E; water sampling
12	06/02/2016 13:10:00	BD11 mooring of NIOT
13	08/02/2016 15:30:00	Arrival Chennai; end of cruise

2.3 uCTD and ADCP survey in the northern Bay of Bengal

We collected temperature and salinity from Thermosalinograph throughout the cruise. Intense survey of the upper ocean structure north of 18°N started on 29th February evening after the WHOI mooring operation. This allowed us to make a direct comparison of Thermosalinograph T/S fields against the surface values from the uCTD. We found a warm bias of 0.25°C in the Thermosalinograph temperature. Salinity from both the instruments was matching well.

A total of 806 uCTD profiles were collected over 663 km length track. Mean sampling interval is 5 minutes and spatial resolution is 0.8 km. Real time satellite sea level anomalies suggest that along 20°N, we were moving from a strong downwelling eddy to a strong upwelling eddy. uCTD

observations suggest that in the subsurface layers of the downwelling eddy strong thermal inversions (also known as the barrier layers) of more than 2°C were prevailing. The thickness of these barrier layers were upto 40m between 30-70m layers.

We crossed over from the downwelling eddy to the upwelling eddy at around 87.5 longitude along 20°N latitude, which marked upsloping of the isopycnal contours. Over the upwelling eddy, the thermal inversions are very weak and confined more to the surface layers. Over the course of our upper ocean survey, we crossed many strong frontal structures with spatial density gradients ranging from 0.4kg/m³ to 1kg/m³ over distances of 4km to 15 km.



Figure 2: from top right: TR: WHOI mooring sighted, TL: deck operations in full swing to recover the yellow glass balls, BR: Establishing working line with the buoy for the recovery and BL: recovering the buoy.



Figure 3: NIOT engineers trying to establish a working line in the BD11 buoy (right panel) and the BD11 buoy onboard (left panel).