CRUISE REPORT

DEPLOYMENT AND RETRIEVAL OF TSUNAMI/DATA BUOYS IN BAY OF BENGAL

Name of the cruise  Sagar Kanya  SK-288

Cruise Period  24\textsuperscript{th} August 2011 –
14\textsuperscript{th} September 2011

Place  Chennai to Chennai

OCEAN OBSERVATION SYSTEM
NATIONAL INSTITUTE OF OCEAN TECHNOLOGY
CHENNAI – 600 100
August-September 2011
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CHAPTER 1
OBJECTIVES OF THE CRUISE

The main objective of the SK-288 cruise is:

- Deployment of Tsunami buoys in TB08_A (near to the TB08 buoy), TB06 and Met buoy in BD06 location.
- Deployment of RAMA buoys and Cone buoy-INCOIS, Hyderabad.
- CTD operation in 10nm before the BD11, BD13, BD10 and BD08-NIOT OMNI buoys data validation.
- Multi-Plankton Net operation for National Institute of Oceanography, Goa.
- Thermosalinograph, Water sampling for International Centre for Radio Science, Jodhpur.
- Air sampling operation for Indian Institute of Science, Bangalore.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name</th>
<th>Organization</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. P. Murugesh</td>
<td>NIOT, Chennai.</td>
<td>Chief Scientist</td>
</tr>
<tr>
<td>2</td>
<td>Mr. N. Suresh Kumar</td>
<td>INCOIS, Hyderabad</td>
<td>Dy. Chief Scientist</td>
</tr>
<tr>
<td>3</td>
<td>Mr. R. Shamji</td>
<td>NIOT, Chennai.</td>
<td>Scientist</td>
</tr>
<tr>
<td>4</td>
<td>Mr. S. Sundar Jesuraj</td>
<td>NIOT, Chennai.</td>
<td>Scientific Assistant</td>
</tr>
<tr>
<td>5</td>
<td>Mr. P. Ramesh</td>
<td>NIOT, Chennai.</td>
<td>Skilled Assistant</td>
</tr>
<tr>
<td>6</td>
<td>Mr. M. Nareshkumar</td>
<td>Eurotech Pvt Ltd.</td>
<td>Mechanical Engineer</td>
</tr>
<tr>
<td>7</td>
<td>Mr. D. Balamurugan</td>
<td>Eurotech Pvt Ltd.</td>
<td>Deployment Engineer</td>
</tr>
<tr>
<td>8</td>
<td>Mr. William Lester Higley Jr</td>
<td>NOAA, USA</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mr. Douglas Ellis Macintyre</td>
<td>NOAA, USA</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mr. Amit Sarkar</td>
<td>NIO, Goa.</td>
<td>Scientist</td>
</tr>
<tr>
<td>11</td>
<td>Mr. Priya Brata Das</td>
<td>NIO, Goa</td>
<td>Scientist</td>
</tr>
<tr>
<td>12</td>
<td>Ms. Pratirupa Bardhan</td>
<td>NIO, Goa</td>
<td>Scientist</td>
</tr>
<tr>
<td>13</td>
<td>Ms. Kausar Fatima Mahamad Bepari</td>
<td>NIO, Goa</td>
<td>Scientist</td>
</tr>
<tr>
<td>14</td>
<td>Ms. Pooja Asopa</td>
<td>ICRS</td>
<td>Scientist</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Organization</td>
<td>Position</td>
</tr>
<tr>
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<td>------------------------</td>
</tr>
<tr>
<td>15</td>
<td>Ms. Shurti Singhal</td>
<td>ICRS</td>
<td>JRF</td>
</tr>
<tr>
<td>16</td>
<td>Mr. Prasanna Kannan Naidu</td>
<td>IISc, Bangalore</td>
<td>Scientist</td>
</tr>
<tr>
<td>17</td>
<td>Mr. Amey Hazare</td>
<td>NCAOR, Goa</td>
<td>Ship Representative</td>
</tr>
<tr>
<td>18</td>
<td>Mr. Bibin Abraham</td>
<td>NCAOR, Goa</td>
<td>Ship Representative</td>
</tr>
<tr>
<td>19</td>
<td>Mr. N. Subramanian</td>
<td>NIOT, Chennai</td>
<td>Deployment Assistant</td>
</tr>
<tr>
<td>20</td>
<td>Mr. D. Sakthivel</td>
<td>NIOT, Chennai</td>
<td>Deployment Assistant</td>
</tr>
<tr>
<td>21</td>
<td>Mr. S. Venkatesan</td>
<td>NIOT, Chennai</td>
<td>Deployment Assistant</td>
</tr>
<tr>
<td>22</td>
<td>Mr. V. Mohan</td>
<td>NIOT, Chennai</td>
<td>Deployment Assistant</td>
</tr>
<tr>
<td>23</td>
<td>Mr. J. Ilavendan</td>
<td>NIOT, Chennai</td>
<td>Deployment Assistant</td>
</tr>
<tr>
<td>24</td>
<td>Mr. M. Pari</td>
<td>NIOT, Chennai</td>
<td>Deployment Assistant</td>
</tr>
<tr>
<td>25</td>
<td>Mr. Biju Vickraman Nair</td>
<td>Norinco Pvt. Ltd</td>
<td>Field Engineer</td>
</tr>
<tr>
<td>26</td>
<td>Mr. Avertano Callistus Luis</td>
<td>Norinco Pvt Ltd</td>
<td>Field Engineer</td>
</tr>
<tr>
<td>27</td>
<td>Mr. Madar Parashuram Durgappa</td>
<td>Norinco Pvt Ltd</td>
<td>Field Engineer</td>
</tr>
<tr>
<td>28</td>
<td>Mr. R. Karthick Raja</td>
<td>Norinco Pvt Ltd</td>
<td>Field Engineer</td>
</tr>
<tr>
<td>29</td>
<td>Mr. Vinay Kumar Dubey</td>
<td>Pan India Pvt Ltd</td>
<td>Envirtech Representative</td>
</tr>
</tbody>
</table>
CRUISE ITINERARY

<table>
<thead>
<tr>
<th>Departure</th>
<th>Chennai --24\textsuperscript{th} August 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival</td>
<td>Chennai – 14\textsuperscript{th} September 2011</td>
</tr>
</tbody>
</table>
CHAPTER 3
CRUISE TRACK

Planned Cruise track
Actual Cruise track
List of Buoys deployment and retrieval:

<table>
<thead>
<tr>
<th>BuoyID /Type</th>
<th>Latitude(N)</th>
<th>Longitude</th>
<th>Depth(m)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIO-6</td>
<td>18° 15’ 36”</td>
<td>88° 16’ 22”</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TB06(D) - ENVIRTECH</td>
<td>15° 00’ 00”</td>
<td>90° 00’ 00”</td>
<td>2736</td>
<td>The location given is for TB08 buoy. While deploying TB08_A please verify that it is slightly away from the TB08 location.</td>
</tr>
<tr>
<td>TB08_A(D) - DP CPU With Sonardyne</td>
<td>12° 30’ 00”</td>
<td>85° 30’ 00”</td>
<td>3285</td>
<td></td>
</tr>
<tr>
<td>BD06(SWAP)-DP CPU</td>
<td>10° 00’ 00”</td>
<td>88° 30’ 00”</td>
<td>3523</td>
<td>Only swapping the BD06 Buoy</td>
</tr>
<tr>
<td><strong>BD11</strong></td>
<td>13° 30’ 00”</td>
<td>84° 00’ 00”</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BD13</strong></td>
<td>11° 00’ 00”</td>
<td>86° 30’ 00”</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BD10</strong></td>
<td>16° 30’ 00”</td>
<td>88° 00’ 00”</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BD08</strong></td>
<td>18° 10’ 00”</td>
<td>89° 40’ 00”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>313</td>
<td>18°00’ 00”</td>
<td>89° 30’ 00”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>315</td>
<td>15° 00’ 00”</td>
<td>90° 00’ 00”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>317</td>
<td>12° 00’ 00”</td>
<td>90° 00’ 00”</td>
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</tr>
</tbody>
</table>

**The CT sampling will be conduct on all OMNI buoy locations like BD11,BD13,BD10 and BD08. This testing time will covered in stipulated cruise duration**
## CHAPTER 4
### DETAILS OF DAY BY DAY ACTIVITIES

Dairy of Events

<table>
<thead>
<tr>
<th>Day &amp; Time</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>24/08/2011</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0900hrs - 1400hrs</td>
<td>Sign on process for all scientific team and Norinco staffs</td>
<td></td>
</tr>
<tr>
<td>1500hrs</td>
<td>All Buoys testing was started.</td>
<td></td>
</tr>
<tr>
<td>1500hrs - 0100hrs</td>
<td>Envirtech buoy testing was going on</td>
<td></td>
</tr>
<tr>
<td><strong>25/08/2011</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thursday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0900hrs - 1130hrs</td>
<td>Material segregation was done.</td>
<td></td>
</tr>
<tr>
<td>1330hrs</td>
<td>Envirtech testing was completed.</td>
<td></td>
</tr>
<tr>
<td><strong>26/08/2011</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Friday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1030hrs - 1115hrs</td>
<td>Meeting was held regarding the operations and introduction of the scientific participants.</td>
<td></td>
</tr>
<tr>
<td>1300hrs</td>
<td>Ship sailing was started.</td>
<td></td>
</tr>
<tr>
<td><strong>27/08/2011</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Saturday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0830-1030hrs</td>
<td>CTD operation was done upto the depth of 800m at 13°00'00&quot;N, 83°03'70&quot;E.</td>
<td></td>
</tr>
<tr>
<td>1225-1245hrs</td>
<td>ARGO float was deployed successfully at 13°04'41&quot;N, 83°13'71&quot;E.</td>
<td></td>
</tr>
<tr>
<td>1630-1730hrs</td>
<td>Safety drill was conducted by the Chief officer.</td>
<td></td>
</tr>
<tr>
<td>1745-1845hrs</td>
<td>CTD operation was done upto the depth of 2000m at 13°24'815&quot;N, 83°51'614&quot;E. Water sampling for surface water temperature study was taken for ICRS.</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Activity</td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>28/08/2011</td>
<td>0730hrs</td>
<td>Reached TB08_A location.</td>
</tr>
<tr>
<td></td>
<td>0748-0945hrs</td>
<td>Multibeam survey was conducted. Mechanical assembling for the buoy was done. Due to heavy rain and sea state was seven; we could not assemble and deploy the buoy. Before buoy deployment, the mooring line was checked using the mooring check list. Connecting link attachment between combination rope and nylon rope was also checked.</td>
</tr>
<tr>
<td></td>
<td>1425hrs</td>
<td>Buoy was deployed at 12°32.24’N, 085°28.0’E in the depth of 3256.</td>
</tr>
<tr>
<td></td>
<td>1640hrs</td>
<td>Anchor was deployed at 12°35.43’N, 085°31.42’E in the depth of 3256.</td>
</tr>
<tr>
<td>29/08/2011</td>
<td>0830-1145hrs</td>
<td>Assembly for BPR deployment was done. IXSEA Acoustic release releasing operation was tested with the connecting ring.</td>
</tr>
<tr>
<td></td>
<td>1200hrs</td>
<td>BPR with BPR float assembly started to deploy.</td>
</tr>
<tr>
<td></td>
<td>1610hrs</td>
<td>BPR with BPR float was released successfully at 3250m in 12°32.934’N, 085°31.38’E</td>
</tr>
<tr>
<td></td>
<td>1740hrs</td>
<td>Argo float was deployed successfully at 12°33.80’N, 085°31.26’E</td>
</tr>
<tr>
<td>30/08/2011</td>
<td>0440hrs</td>
<td>Argo float was deployed successfully at 11°45.47’N, 086°00.16’E</td>
</tr>
<tr>
<td></td>
<td>1045-1230hrs</td>
<td>We started the CTD operation up to the depth of 2000m at 11°11.61’N, 086°27.54’E.</td>
</tr>
<tr>
<td></td>
<td>0200-0500hrs</td>
<td>For NIO team, Multi-Plankton Net operation up to the depth of 1000m was done at 11°14.04’N, 086°33.77’E.</td>
</tr>
<tr>
<td></td>
<td>1045-0330hrs</td>
<td>Mechanical assembly for the buoy was done.</td>
</tr>
<tr>
<td></td>
<td>1740hrs</td>
<td>Argo float was deployed successfully at</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Activity</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>31/08/2011</td>
<td>0330hrs</td>
<td>Argo float was deployed successfully at 10°35.51'N, 087°36.81'E</td>
</tr>
<tr>
<td></td>
<td>1435hrs</td>
<td>BD06 buoy was deployed successfully at 09°57.64'N, 088°29.47'E in the depth of 3404m.</td>
</tr>
<tr>
<td></td>
<td>1620hrs</td>
<td>BD06 anchor was deployed successfully at 09°56.16'N, 088°28.75'E</td>
</tr>
<tr>
<td></td>
<td>1828hrs</td>
<td>Argo float was deployed successfully at 10°03.7'N, 088°24.3'E</td>
</tr>
<tr>
<td>01/09/2011</td>
<td>0830-1200hrs</td>
<td>Sensor fixing and searching of 317-RAMA buoy was done.</td>
</tr>
<tr>
<td></td>
<td>1342hrs</td>
<td>Retrieval of RAMA buoy was done at 11°55.77'N, 089°54.22'E.</td>
</tr>
<tr>
<td></td>
<td>2000hrs</td>
<td>RAMA buoy was deployed successfully at 11°59.264'N, 089°56.800'E.</td>
</tr>
<tr>
<td></td>
<td>2305hrs</td>
<td>RAMA buoy’s anchor was deployed successfully at 11°55.798'N, 089°54.324'E.</td>
</tr>
<tr>
<td>02/09/2011</td>
<td>0600hrs</td>
<td>CTD operation was done for the testing of RAMA buoy at 11°59.240'N, 089°55.596'E.</td>
</tr>
<tr>
<td></td>
<td>1230pm-1400hrs</td>
<td>Mechanical assembly for the TB06 Envirtech Tsunami buoy was done.</td>
</tr>
<tr>
<td></td>
<td>1730-2100hrs</td>
<td>Mechanical as well as electronics works was finished.</td>
</tr>
<tr>
<td>03/09/2011</td>
<td>0600hrs</td>
<td>Multi-beam survey starts</td>
</tr>
<tr>
<td></td>
<td>0630-0930hrs</td>
<td>TB06 Envirtech Tsunami Buoy was deployed at 14°55.880'N, 089°57.109'E at the depth of 2708m and mooring rope was paid out.</td>
</tr>
<tr>
<td></td>
<td>1020hrs</td>
<td>Anchor was deployed at 14°53.876'N, 089°56.493'E at the depth of 2708m.</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1145hrs</td>
<td>Envirtech BPR was deployed at 14°54.128'N, 089°56.568'E at the depth of 2711m.</td>
<td></td>
</tr>
<tr>
<td>1300hrs-2030hrs</td>
<td>Sailing towards 315-Rama buoy location. After siting the buoy, it was retrieved it was retrieved(1700hrs) at 15°00.69'N, 089°58.88'E. Mr.William was struck by Gel fish in his eyes.</td>
<td></td>
</tr>
<tr>
<td>04/09/2011 Sunday</td>
<td>CTD operation and Multi-beam survey was done in the location of the anchor drop position of RAMA buoy.</td>
<td></td>
</tr>
<tr>
<td>1030-1200hrs</td>
<td>RAMA buoy was deployed successfully at. 14°59.78'N, 089°57.16'E</td>
<td></td>
</tr>
<tr>
<td>1445hrs</td>
<td>RAMA buoy’s anchor was deployed successfully at 14°58.861'N, 089°55.291'E.</td>
<td></td>
</tr>
<tr>
<td>1648hrs</td>
<td>Buoy was sited in the location and data transmission was also checked. Sailing towards 10nm before the BD10 location for CTD operation.</td>
<td></td>
</tr>
<tr>
<td>1700hrs</td>
<td>Argo float was deployed at 15°13.1’N, 089°41.0’E</td>
<td></td>
</tr>
<tr>
<td>05/09/2011 Monday</td>
<td>CTD operation was done upto the depth of 500m at 16°24.95’N, 088°11.61’E .Because wind speed was 40knots and heavy rain also there.</td>
<td></td>
</tr>
<tr>
<td>0424hrs</td>
<td>Argo float was deployed at 15°45.125’N, 088°58.555’E</td>
<td></td>
</tr>
<tr>
<td>1345hrs</td>
<td>Reached 10nm before the BD11 location for CTD operation</td>
<td></td>
</tr>
<tr>
<td>1350-1415hrs</td>
<td>CTD operation was done with the fixing Sea-bird instruments to validate it upto the depth of 200m at 16°29.0’N, 088°16.3’E</td>
<td></td>
</tr>
<tr>
<td>1530-1615hrs</td>
<td>CTD operation was done in 16°30.678’N, 088°19.097’E</td>
<td></td>
</tr>
<tr>
<td>1820hrs</td>
<td>CTD operation was done in 16°48.446’N, 088°33.724’E</td>
<td></td>
</tr>
<tr>
<td>2148hrs</td>
<td>Argo float was deployed in 16°59.635’N, 088°41.617’E</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Activity</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>06/09/2011</td>
<td><strong>Tuesday</strong></td>
<td></td>
</tr>
<tr>
<td>0300hrs</td>
<td>Argo float was deployed at 17°23.74'N, 088°59.38'E</td>
<td></td>
</tr>
<tr>
<td>0700hrs -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500hrs</td>
<td>Since the weather condition is not good, the cone buoy deployment was</td>
<td></td>
</tr>
<tr>
<td></td>
<td>postponed to the next day. We moved to the CTD sampling and MPN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>operation for NIO.</td>
<td></td>
</tr>
<tr>
<td>2220hrs to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0100hrs</td>
<td>CTD operation sampling up to the depth of 2000m in rough weather</td>
<td></td>
</tr>
<tr>
<td></td>
<td>condition (wind speed is 30knots at 18°03.8'N, 088°57.0'E)</td>
<td></td>
</tr>
<tr>
<td>0240hrs -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0545hrs</td>
<td>MPN operation was done successfully at 18°08.47'N, 089°05.50'E</td>
<td></td>
</tr>
<tr>
<td>07/09/2011</td>
<td><strong>Wednesday</strong></td>
<td></td>
</tr>
<tr>
<td>1012 hrs</td>
<td>INCOIS cone buoy was deployed on 18°02.205'N, 089°32.336'E at at 25knots</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wind speed.</td>
<td></td>
</tr>
<tr>
<td>1418hrs</td>
<td>Anchor deployed on 17°59.793'N, 089°29.852'E.</td>
<td></td>
</tr>
<tr>
<td>1705 -1810hrs.</td>
<td>CTD operation was done to validate the sensors on 17°58.15'N, 089°31.47'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E.</td>
<td></td>
</tr>
<tr>
<td>1826hrs</td>
<td>Started the sailing towards BD06 drifting buoy location.</td>
<td></td>
</tr>
<tr>
<td>1835hrs</td>
<td>Argo float was deployed successfully on 17°59.033'N, 089°33.590'E.</td>
<td></td>
</tr>
<tr>
<td>1843hrs</td>
<td>Surface drifter buoy was deployed successfully on 17°58.700'N, 089°33.694'E.</td>
<td></td>
</tr>
<tr>
<td>1845hrs</td>
<td>Ship sailing towards the BD06 drifting location.</td>
<td></td>
</tr>
<tr>
<td>08/09/2011</td>
<td><strong>Thursday</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ship sailing towards the BD06 drifting</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>09/09/2011 Friday</td>
<td>Ship sailing towards the BD06 drifting location.</td>
<td></td>
</tr>
<tr>
<td>1026hrs</td>
<td>One surface drifter was deployed at 13°44.84′N, 089°08.045′E.</td>
<td></td>
</tr>
<tr>
<td>10/09/2011 Saturday</td>
<td>Ship sailing towards the BD06 drifting location.</td>
<td></td>
</tr>
<tr>
<td>11/09/2011 Sunday</td>
<td>Boat in water to hook in the buoy.</td>
<td></td>
</tr>
<tr>
<td>0945hrs</td>
<td>Boat capsized. (2 persons fall in water - Mr. Ramesh, NIOT and Mr. William, NOAA)</td>
<td></td>
</tr>
<tr>
<td>1041hrs</td>
<td>Alarm was raised.</td>
<td></td>
</tr>
<tr>
<td>1055hrs</td>
<td>Both of them rescued and the boat on deck.</td>
<td></td>
</tr>
<tr>
<td>1130hrs</td>
<td>BD06 MET buoy was retrieved at 09°11.01′N, 088°47.87′E.</td>
<td></td>
</tr>
<tr>
<td>1300hrs</td>
<td>Ship sailing towards to Chennai.</td>
<td></td>
</tr>
<tr>
<td>1728hrs</td>
<td>Surface drifter was deployed in 10°17.41′N, 086°09.29′E.</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>13/09/2011</td>
<td>Tuesday: Ship sailing towards Chennai.</td>
<td></td>
</tr>
<tr>
<td>14/09/2011</td>
<td>Wednesday: Ship sailing towards Chennai.</td>
<td></td>
</tr>
<tr>
<td>1030hrs</td>
<td>All scientists were signed off</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 5
TB08_A TSUNAMI BUOY DEPLOYMENT

Preparatory work:
TB08_A buoy was deployed with Conical hood. Inside the conical hood, the antenna was fitted with antenna flange at suitable height to avoid the transmission missing. Data pattern Tsunami CPU was fitted in the cylinder. Beacon lamp was fixed at one side of the (opposite to the lifting chain) with the Stainless steel plate. The plate bent like number seven. It was fitted very low to the antenna fixing point. Four stainless steel rods were used to fit the hood on the buoy. At bottom of the rod, PVC bush was used to lock the rod.

Deployment of TB08_A buoy:
In the cruise track, a location was given. That is the location of TB08 buoy. TB08_A buoy was deployed 2nm away (Northern side) from the TB08 buoy to avoid the entanglement of mooring ropes and 4nm before the anchoring point.

BPR deployment:
Sonardyne BPR was attached with IXSEA acoustic release and BPR dead weight. It was slowly lowered into the seawater by using Deep Sea Winch. Before 150m from the sea bottom, BPR was released with the release dunker unit.
CHAPTER 6
BD06 MET DEPLOYMENT

Preparatory work:
BD06 MET buoy was deployed with Surveillance and Underwater camera. The two camera was fitted with proper fixtures.
Data pattern CPU was fitted in the cylinder. The buoy had upper mast and Sensor arm. In the sensor arm, Sensors, Beacon lamp and antenna were fixed. The sensors are wind sensor, humidity sensor with air inlet arrangement. Radar reflector was also tied at the neck of the upper mast. Traditional FRP hood was used in the buoy and it was seated in the buoy groove for hood. Aluminum rod is used to fit the hood on the buoy. At bottom of the rod, Aluminum square nut with washer was used to lock the hood.

Deployment of BD06 MET buoy:
In the cruise track, a location was given. That is the location of BD06 buoy. First it was planned to swap the buoy. Due to rough weather condition, it did not happen. So it was decided to deploy the new buoy some distance away from the old BD06 buoy. BD06 MET buoy was deployed 2nm away (Southern side) from the BD06 buoy to avoid the entanglement of mooring ropes and 4nm before the anchoring point.
CHAPTER 7
TB06 TSUNAMI BUOY DEPLOYMENT

Preparatory work:
TB06 buoy was deployed with Envirtech surface modem with BPR. The buoy had upper mast and Sensor arm. In the sensor arm, Beacon lamp and antenna were fixed. Radar reflector was also tied at the neck of the upper mast. Traditional FRP hood was used in the buoy and it was seated in the buoy groove for hood. Aluminum rod is used to fit the hood on the buoy. At bottom of the rod, Aluminum square nut with washer was used to lock the hood.
Special fixture was fabricated for the fixing of buoy surface modem. It fixing should be done as per the figure no.7 in the chapter 8-Pictures. The surface modem should be as low as possible to avoid the interference of acoustic signals with the metal parts.

Deployment of TB06 buoy:
In the cruise track, a location was given. That is the location of RAMA buoy. TB08_A buoy was deployed 2nm away (Northern side) from the TB08 buoy to avoid the entanglement of mooring ropes and 4nm before the anchoring point.

BPR deployment:
Envirtech BPR was attached with Ballast weight. Weather condition was so bad during the buoy deployment time. So it was decided not to fit the IXSEA acoustic release with two Sonardyne BPR float with the mooring to find the position of buoy anchor. During the release of acoustic release after finding out the anchor position using the triangulation method described below, we could not find the release with the two BPR floats in the rough sea. So the anchor settling point was decided as the thumb rule “The anchor will settle 1/3rd of the total mooring length distance towards the buoy and the current direction at the location”. For the calculation of anchor settle point, first we waited for the settling of anchor for 30minutes. Then the settling distance was calculated from the anchor drop point as 957m (which is 1/3rd of the total mooring length).
For the BPR deployment, the surface current value and direction in the location from ADCP. The current value was 0.9m/s and the direction is 70°. So I made the heading
to $250^0 (70^0 + 180^0)$ as per the instruction of Dr. Daiele, Envirtech. The distance between the anchor settle point to BPR deployed location as 360m from the calculation. Before deploying the BPR, we checked the mechanical and electronics side.

**PROCEDURE TO DETECT BUOY ANCHOR POSITION**

**INITIAL CONDITIONS**

It is supposed that the BALLAST is already deployed at sea. Typically it takes 12-15 mins to reach the bottom of 4000mwd. The BALLAST has to be equipped with a recoverable transponder: an IXSEA release equipped with a suitable deep sea floating buoy is sufficient.

**STEP 1**

If P is the point where the BALLAST was launched at sea, move to the point P1, P2, P3 respectively at NORTH, SOUTH-EST and SOUTH-WEST with a distance from P of 1 NM. Define the coordinate of P1, P2, P3 in advance and sign them clearly in deg, min, sec on a paper.
STEP 2
Move to P1, and check with a portable GPS the position.
Prepare the deck unit with the transducer to be put at sea to interrogate the deep sea transponder.
Put the transducer at sea and send the command to get the range.
Check the position with the portable GPS (if it is not exactly P1, take note of the new position P1')
Take note of the range provided by the deck unit.
Ask the range two times and take note of both measurements that should be very similar (difference of maximum 10m). Calculate the average of the two measurements and write it close to the position P1'.

STEP 3
Move to P2 and repeat STEP 2 for P2.

STEP 4
Move to P3 and repeat STEP 2 for P3.

STEP 5
Insert also the water depth of P.
Insert the coordinate of P1 and P2 in the Excel sheet.
Insert the ranges measured in step 2 and step 3 respectively in R1 and R2
Take note of the coordinates calculates ate the rows 73-74.

STEP 6
Repeat step 5 for the couple of points

P1, P3
P2, P3
STEP 7
Sign the coordinates calculated in 73-74 in the map.
The intersection of the 3 circles is the position PB of the BUOY BALLAST

PROCEDURE TO DEPLOY THE BPR

STEP 1

When you are in the position PB detected with the triangulation, take note of the
surface current (in the first 400m of water from the surface) and of its direction.

If the current move forward the direction D [deg] with speed S [m/s], move the ship
back in the direction D + 180 [deg] at a distance of

$$\text{GAP} = \frac{400 \text{m}}{\text{Descending Speed [m/s]}} \times S$$

Considering the Descending speed about 1m/s, the relationship is

$$\text{GAP} = 400s \times S[\text{m/s}]$$

For example with a current of 0.2m/s toward the direction 85deg, move the ship at
80m in the direction 85+180 = 265deg.

In this point deploy the BPR in free fall without winch.
Deployment Details:
Buoy ID: TB08_A (Datapattern CPU and Sonardyne BPR):

Rope details:
1. Combination rope=550m
2. Nylon rope=320m
3. Polypropylene rope=2550m.

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Date &amp;Time</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TB08_A Buoy</td>
<td>12°32.24'N</td>
<td>085°28.0'E</td>
<td>28/08/2011, 1425hrs</td>
<td>3256</td>
</tr>
<tr>
<td>2.</td>
<td>Anchor</td>
<td>12°35.43'N</td>
<td>085°31.42'E</td>
<td>28/08/2011, 1640hrs</td>
<td>3256</td>
</tr>
<tr>
<td>3.</td>
<td>BPR</td>
<td>12°32.934'N</td>
<td>085°31.38'E</td>
<td>29/08/2011, 1610hrs</td>
<td>3250</td>
</tr>
</tbody>
</table>

BD06 MET buoy deployment locations:

Rope details:
Wire rope=550m
Nylon rope=320m
Polypropylene rope=3000m

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Date &amp;Time</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BD06 Buoy</td>
<td>09°57.64'N</td>
<td>088°29.47'E</td>
<td>31/08/2011, 1435hrs</td>
<td>3404m</td>
</tr>
<tr>
<td>2.</td>
<td>Anchor</td>
<td>09°56.16'N</td>
<td>088°28.75'E</td>
<td>31/08/2011, 1620hrs</td>
<td>3404m</td>
</tr>
</tbody>
</table>
TB06 Deployment locations:

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Date &amp;Time</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TB06 Buoy</td>
<td>14°55.880'N</td>
<td>089°57.109'E</td>
<td>03.09.2011,0930hrs</td>
<td>2708m</td>
</tr>
<tr>
<td>2.</td>
<td>Anchor</td>
<td>14°53.876'N</td>
<td>089°56.493'E</td>
<td>03.09.2011,1020hrs</td>
<td>2708m</td>
</tr>
<tr>
<td>3.</td>
<td>BPR</td>
<td>14°54.128'N</td>
<td>089°56.568'E</td>
<td>03.09.2011,1145hrs</td>
<td>2711m</td>
</tr>
</tbody>
</table>

Rope details:

1. Combination rope=550m
2. Nylon rope=320m
3. Polypropylene rope=2000m.
CHAPTER 8
DECISION & MAIL CORRESPONDENCE

INCOMING MAILS-27.08.2011

From: ssamc@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Saturday, August 27, 2011 12:20 PM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
Cc: venkat@niot.res.in <venkat@niot.res.in>; arul@niot.res.in <arul@niot.res.in>
    sundar@niot.res.in <sundar@niot.res.in>; rsundar@niot.res.in <rsundar@niot.res.in>
    vimala@niot.res.in <vimala@niot.res.in>
Subject: TB08_A Onboard Testing data receiving correctly

Dear Ft,

In TB08_A Tsunami buoy onboard testing data receiving correctly without any missed
are delayed from 26/08/11 10:00GMT( 15:30hrs IST) onwards.

Regards,
S.S Team,
NIOT Chennai.

OUTGOING MAILS-27.08.2011

Dear Sir,

We have reached the location at 5:00pm today(10nm away from the BD11 location) and doing
the CTD operation upto the depth of 2000m(for NIO).Please send the BD11 OMNI buoy
Conductivity and Temperature value at 12GMT.It will be very useful to compare the parameter
data.Tomorrow morning we will deploy the TB08_A Tsunami buoy.Today the testing with
conical hood was going on.From the Shore station confirmation,it works well.The mechanical
assembly will be started soon.I gave our "Report on mechanical processes in buoy assembly
and testing" to Mr.Doughlas andMR.William.I asked to give comments on the report.They get
the copy and they will give tomorrow.

Chief scientist,
Sagar Kanya.
INCOMING MAILS-28.08.2011

From: ssamc@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Sunday, August 28, 2011 3:59 PM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
Cc: arul@niot.res.in <arul@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>; rsundar@niot.res.in <rsundar@niot.res.in>; vimala@niot.res.in <vimala@niot.res.in>
Subject: Re: TB08_A 10:00GMT data

Dear Ft,

we have received data on 28/08/11 10:00GMT (15:30hrs IST) as shown below

2011.08.28,10:13:30, 12 32 49 N 85 28 09 E, TB08_A
NO RESPONSE AFTER 3 RETRIES

Regards,
S.S Team,
NIOT Chennai

Mail 2:

From: ssamc@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Sunday, August 28, 2011 7:53 PM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
Cc: rsundar@niot.res.in <rsundar@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>; vimala@niot.res.in <vimala@niot.res.in>; arul@niot.res.in <arul@niot.res.in>
Subject: TB08A tsunami buoy data

Dear Ft,

we got the tsunami buoy data format with the "error no response after 3 retries". I had attached the tsunami data for ur reference.

Regards,
S.S Team,
NIOT Chennai
Mail 1

Dear Sir,

We completed CTD operation at two positions and two Argo float deployments was done. Water sampling for surface water temperature study was taken for ICRS.

Positions:

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Operations</th>
<th>Latitude(N)</th>
<th>Longitude(E)</th>
<th>For the Institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CTD-1 (Depth upto 800m)</td>
<td>13°00'00&quot;</td>
<td>83°03'70&quot;</td>
<td>INCOIS</td>
</tr>
<tr>
<td>2.</td>
<td>Argo-1</td>
<td>13°04'41&quot;</td>
<td>83°13'71&quot;</td>
<td>INCOIS</td>
</tr>
<tr>
<td>3.</td>
<td>CTD-2 (Depth upto 2000m)</td>
<td>13°24'815&quot;</td>
<td>83°51'614&quot;</td>
<td>NIOT&amp;NIO</td>
</tr>
<tr>
<td>4.</td>
<td>Argo-2</td>
<td>13°26'64&quot;</td>
<td>83°54'13&quot;</td>
<td>INCOIS</td>
</tr>
</tbody>
</table>

We are going to use Sonardyne BPR for TB08_A tsunami buoy deployment. Mechanical Assembly for TB08_A is going on soon deployment will be done. Yesterday 4:30pm-5:30pm, Safety drill was conducted by the Chief officer.

We planned 6nm away from the anchor drop position from the TB08 buoy. BPR deployment will be done 350m away from the TB08_A anchor drop position. Buoy will be deployed after taking Multibeam survey of seabed (2nm before e and after TB08_A anchor drop position). We checked beacon lamp and fixed in hood. The anti-vandalism notice already fixed on conical hood. Buoy ID will be Pasted at last.

Chief scientist,
Sagar Kanya.

Mail 2:

Dear Sir,

Due to heavy rain and the sea state is seven. It is picking upto eight. Everything is ready for deployment. When the weather is ok, we will deploy the buoy with conical hood and BPR safely.

Chief scientist,
28/08/2011
Mail 3:

Dear sir,

We have deployed the TB08_A successfully. After taking Multibeam survey, we deploy the buoy. The sea state is 7 at the time of buoy deployment. The weather condition was very rough at the time of anchor deployment. Please send the buoy location till last transmission. This will be easy to site the buoy. We checked the mooring line using the check list. Connecting link attachment between combination rope and nylon rope was also checked. Tomorrow we will site the buoy and then we will deploy the BPR. Please send the positions of buoy from 5.30pm to last transmission position.

Deployment location:

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Time</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Buoy</td>
<td>12°32.24'N</td>
<td>085°28.0'E</td>
<td>1425hrs</td>
<td>3256</td>
</tr>
<tr>
<td>2.</td>
<td>Anchor</td>
<td>12°35.43'N</td>
<td>085°31.42'E</td>
<td>1640hrs</td>
<td>3256</td>
</tr>
</tbody>
</table>

Rope details:

1. Combination rope=550m
2. Nylon rope=320m
3. Polypropylene rope=2550m.

INCOMING MAIL-29.08.2011

From: Venkatesan <master@sagarkanyaamosconnect.com>
Date: Monday, August 29, 2011 1:17 PM
To: master@sagarkanyaamosconnect.com <master@sagarkanyaamosconnect.com>
Cc: rsundar@niot.res.in <rsundar@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>; vimala@niot.res.in <vimala@niot.res.in>; arul@niot.res.in <arul@niot.res.in>
Subject: Re: Sagar Kanya

Dear Mr Murugesh

Thanks Wish you all success

regards

Venkat
OUTGOING MAIL-29.08.2011

MAIL 1
Dear Sir,
Today morning we sited the buoy. The weather is rough. We discussed with captain, they agreed to put DP in the condition for BPR deployment operation. We are started the BPR deployment operation at 12.00 pm. If any weather became worst, we have to stop the operation. Now everything is going well. Thanks for giving the position of buoy.
Chief scientist,
29/08/2011

Mail-2:
Dear Sir,
We have deployed the TB08_A BPR successfully. The weather condition was very rough at the time of BPR deployment. Captain, Chief Officer and ship staffs gave wonderful cooperation to our team. Captain helped our team by putting in DP at the rough condition. NIOT staffs and deployment assistants also worked a lot to deploy the buoy with conical hood and BPR successfully.

BPR Deployment location:

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Time</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BPR</td>
<td>12°32.934'N</td>
<td>085°31.38'E</td>
<td>1610hrs</td>
<td>3250m</td>
</tr>
</tbody>
</table>

Chief scientist,
29/08/2011.

INCOMING MAIL-30.08.2011

Mail 1:
From: rsundar@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Tuesday, August 30, 2011 4:03 PM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
Cc: venkat@niot.res.in <venkat@niot.res.in>; arul@niot.res.in <arul@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>; vimala@niot.res.in <vimala@niot.res.in>
Subject: Fw: BD06 Location

Dear CS,

please find the existing BD06 Buoy deployment details.

Have you reached the location and what is time of deployment? Try to swap the buoy if the mooring is good because this buoy deployed more than one year. check the mooring condition before deployment.

<table>
<thead>
<tr>
<th>Deployed Position</th>
<th>10°00'42&quot;</th>
<th>88°30'09&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Transmission Position</td>
<td>10°00'18&quot;</td>
<td>88°31'37&quot;</td>
</tr>
<tr>
<td>Proposed Location</td>
<td>10°00'00&quot;</td>
<td>88°30'00&quot;</td>
</tr>
</tbody>
</table>

Regards,
R. Sundar
NIOT Chennai

OUTGOING MAIL-30.08.2011

Mail 1:

Dear Sir,

Yesterday we have deployed one Argo float and today early morning we have deployed one Argo float successfully. ICRS team fellows got sea sickness for the last three days. But they are taking surface water sample for study purpose. NIO team is working by doing experiments with the CTD data and samples. IISC fellow Mr. Prasanna is working with air collection process. Today we are sailing towards the BD13 location for CTD operation. NIO team wants the CTD data for the full depth of the location and ICRS team wants CTD sample at sea surface, 5m, 10m from the sea surface. We will stop the vessel at 10nm before the BD13 location. BD06 MET buoy assembly with camera is started at 09:00am. So the connection is disconnected from the buoy.

Thanks to Mr. Subramanian Sir, NCAOR to send the Satellite cloud image. Thanks to Ocean state forecast team for sending the forecast images and data to Sagar Kanya. Thanks to Shore station for sending the confirmation message to normal mode.

The weather is very rough.
**BPR Deployment location:**

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Date &amp;Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Argo -1</td>
<td>12°33.80'N</td>
<td>085°31.26'E</td>
<td>29/08/2011, 1740hrs</td>
</tr>
<tr>
<td>2.</td>
<td>Argo -2</td>
<td>11°45.47'N</td>
<td>086°00.16'E</td>
<td>30/09/2011, 0440hrs</td>
</tr>
</tbody>
</table>

Chief scientist,
ORV Sagar Kanya
30/08/2011.

**Mail 2:**

Dear Sir,

Today at 10.45am, we started the CTD operation up to the depth of 2000m. For NIO team, we are doing Multi-Plankton Net operation from 02:00pm onwards. I have asked the NIO, ICRS and IISc team members to give a report with images about their working during the cruises. We have planned some presentations sessions during the return sailing to Chennai.

**Kind Attn: Shore station**

Please send the BD06 buoy locations to site the buoy till last transmission. Please update the location till we sited the buoy. Mechanical assembly for the buoy is almost over. Today morning we will deploy the buoy. We will try to approach the buoy for swapping. If it is not possible, we will deploy the buoy with new mooring. The buoy will be deployed 10nm (North side) away from the anchor drop location of the old buoy. Please give the confirmation to do the operation. Thanks.

Chief scientist,
ORV Sagar Kanya.
30/08/2011.

**INCOMING MAIL-31.08.2011**

**Mail 1:**

From: ssamc@niot.res.in <master@sagarkanya.amosconnect.com>

Date: Wednesday, August 31, 2011 3:35 PM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>  
Cc: venkat@niot.res.in <venkat@niot.res.in>; arul@niot.res.in <arul@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>; vimala@niot.res.in <vimala@niot.res.in>  
Subject: GROUP HEAD Greetings  
Dear Sir,  
Group Head was very happy to inform greetings to all cruise team members regarding the BD06 deployment.  
Regards,  
S.S Team,  
NIOT Chennai

OUTGOING MAIL - 31.08.2011

Mail 1:
Dear Sir,
We will reach the BD06 location at 11.30am. We will site the buoy and then based on the weather condition, we will try to swap or deploy the buoy with new mooring. Now the wind speed is 26knots. Mechanical assembly with camera is tested and everything is ready on deck. Yesterday Mr. Suresh, INCOIS deployed one Argo float and he deployed one Argo float at early morning.

ARGO float Deployment locations:

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Date &amp; Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Argo -1</td>
<td>11°41'15.43&quot;N</td>
<td>086°33.07'E</td>
<td>30/08/2011, 1740hrs</td>
</tr>
</tbody>
</table>

Chief scientist,  
ORV Sagar Kanya  
31/08/2011.

Mail 2:
Dear Sir,
We deployed the BD06 MET buoy with Surveillance camera and Underwater camera successfully. Captain, Chief Officer and ship staffs gave wonderful co-operation to our team.
Out team members also worked hard for the deployment of the buoy safely. Everything was tested before they deployed. I had pain in stomach today morning. I took tablets from Medical officer from the ship and also I am taking my tablets also.

Thanks to Shore station team members for giving wonderful support for the deployment of BD06 buoy with camera.

**BD06 MET buoy deployment locations:**

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Depth</th>
<th>Date &amp; Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Buoy</td>
<td>09°57.64'N</td>
<td>088°29.47'E</td>
<td>3404m</td>
<td>31/08/2011,1435hrs</td>
</tr>
<tr>
<td>2.</td>
<td>Anchor</td>
<td>09°56.16'N</td>
<td>088°28.75'E</td>
<td>3404m</td>
<td>31/08/2011,1620hrs</td>
</tr>
</tbody>
</table>

**Rope details:**

- Wire rope=550m
- Nylon rope=320m
- Polypropylene rope=3000m

Chief scientist,
ORV Sagar Kanya
31/08/2011.

**Mail 3:**

Dear sir,

Good day, Here we are using Data pattern CPU and Sontek configured upper range as 6000. Herewith we integrate camera system. All are working well. Waiting for deployment.

Sundar jesuraj,
31.08.2011

**INCOMING MAIL-01.09.2011**

**Mail 1:**

From: Daniele Calore - Envirtech it <master@sagarkanya.amosconnect.com>
Date: Thursday, September 01, 2011 3:20 PM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
Subject: ENVIRTECH
Dear All please inform NIOT person to contact Daniele Calore to advice the status of installation tasks.

Mobile +393475398557
Best Regards

OUTGOING MAIL-01.09.2011

Mail 1:
Dear Sir,
Today we are sailing towards 317-Rama buoy retrieval and deployment operation. We will start the operation at 1:00pm. It includes three operations:
1. Siting the buoy
2. Retrieve the buoy
3. Deployment of buoy.
Chief scientist,
ORV Sagar Kanya
01/09/2011.

Mail 2:
Dear Daniele,
Good day. We may reach the deployment position on 4 or 5th September. Tomorrow morning, we will plan to switch on the buoy for testing. Thanks for sending the mail.
Chief scientist,
ORV Sagar Kanya
01/09/2011.

INCOMING MAIL-02.09.2011

Mail 1:
From: Venkatesan <master@sagarkanya.amosconnect.com>
Date: Friday, September 02, 2011 10:07 AM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
CC: ssamc@niot.res.in <ssamc@niot.res.in>; venkat@niot.res.in <venkat@niot.res.in>; NIOT Sundar <sundar@niot.res.in>; NCAOR SUBBU MM <mmsubbu@ncaor.org>

Subject: Re: ENVIRTECH

Dear Mr Murugesh

Greetings

Glad to know the progress and it was pleasure talking to you

Kindly inform anchor drop location of BD06 (urgent)

Please coordinate with Ramsundar on data

Tsunami buoy is working fine

Kindly update us on weather and working being done

regards

Venkatesan

Mail 2:

From: rsundar@niot.res.in <master@sagarkanya.amosconnect.com>

Date: Friday, September 02, 2011 10:47 AM

To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>

Cc: venkat@niot.res.in <venkat@niot.res.in>; arul@niot.res.in <arul@niot.res.in>;

sundar@niot.res.in <sundar@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>

Subject: Urgent Message to Cruise

Dear CS,

This is inform you that BD06 buoy drifting from the position. Presently 9

nm away from the Buoy first transmission position.

Please send me present ship position and discuss with captain regarding

retrieval/redeployment of BD06 plan.

Please call me /Sir(GH)

Regards

R.Sundar

Mail 3:

From: rsundar@niot.res.in <master@sagarkanya.amosconnect.com>

Date: Friday, September 02, 2011 10:47 AM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
Cc: venkat@niot.res.in <venkat@niot.res.in>; Dr Venkatesan NIOT GMAIL
<dr.r.venkatesan@gmail.com>; NIOT Sundar <sundar@niot.res.in>; arul@niot.res.in
<arul@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; NCAOR SUBBU MM
<mmsubbu@ncaor.org>; NCAOR SUBBU MM1 <mmsgoa@rediffmail.com>

Subject: Re: Sagar Kanya

Dear CS,
As per GH instruction, Please proceed and concentrate on successful deployment of TB06 Envirtech Tsunami System. Mean time we will observe the BD06 drifting position.

Regards
R. Sundar

Mail 4:

From: Venkatesan <master@sagarkanya.amosconnect.com>
Date: Friday, September 02, 2011 3:05 PM
To: master@sagarkanya.amosconnect.com <master@sagarkanya.amosconnect.com>
Cc: venkat@niot.res.in <venkat@niot.res.in>; NIOT Sundar <sundar@niot.res.in>; NIOT R. SUNDAR <rsundar@niot.res.in>; arul@niot.res.in <arul@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; NCAOR SUBBU MM <mmsubbu@ncaor.org>; NCAOR SUBBU MM1 <mmsgoa@rediffmail.com>

Subject: Re: Sagar Kanya

Dear Mr Murugesh
Greetings
Please continue work on deployment of TB06 with Envirtech BPR
Please keep us informed on developments
We are monitoring drifting of BD06 buoy
Please inform us on weather condition
regards
Venkatesan
Mail 5:
From: Daniele Calore - Envirtech it <master@sagarkanya.amosconnect.com>
Date: Friday, September 02, 2011 7:29 PM
To: rsundar@niot.res.in <rsundar@niot.res.in>
Cc: arul@niot.res.in <arul@niot.res.in>; venkat@niot.res.in <venkat@niot.res.in>;
sundar@niot.res.in <sundar@niot.res.in>; 'Sagar Kanya - MASTER'
<master@sagarkanya.amosconnect.com>
Subject: R: TB06 Deployment -Envirtech Tsunami System
Dear All, please tell me the INDIAN time you will start the installation
tomorrow morning so I will be ready to follow you.
I understood that due to the whether conditions it is difficult to use the
release for triangulation. The Risk is to lose the IXSEA release. I totally agree to skip this step.
Try your best to estimate position of buoy ballast after you put it at sea.
Good Job.
Regards
Daniele

OUTGOING MAIL-02.09.2011
Mail 1
Dear Sir,
Please send the webpage content (in word file format). It will be used to know the concept of triangulation. The webpage was recommended to read by Dr. Daniele, Envirtech.
Yesterday 317-Rama buoy was retrieved and deployed successfully. Next we are sailing towards TB06 Envirtech buoy deployment location. The mechanical assembly will start on 12.30pm. Because the deployment was finished at 11.30pm. The ETA may be 03/08/2011 at 06.00am.
Chief scientist,
ORV Sagar Kanya,
02.08.2011.
Mail 2:
Dear Sir,
I wrongly used the word as Captain refused to redeployment. He advised me that retrieval and going to the BD06 location will tough in that rough sea condition. He can do the process after getting the permission from NCAOR. But we have to skip the other process also. Tomorrow morning the deployment will be done from 6:00am onwards. I spoke with Dr. Daniele about the acoustic release and BPR float attachment. He told that you just skip the triangulation procedure and don’t attach the acoustic release and BPR float. He added that deploy the BPR as close as possible to the anchor settle point.
Today 0700pm condition:
Wind speed 17knots, Heavy swell and white horses also found on sea.
Chief scientist,
ORV Sagar Kanya
02/09/2011.

Mail 3:
Dear Sir,
I wrongly used the word as Captain refused to redeployment. He advised me that retrieval and going to the BD06 location will tough in that rough sea condition. If we are going to the location means we have to skip the other process also. Permission from NCAOR is needed for that.
Tomorrow morning the deployment will be done from 6:00am onwards. I spoke with Dr. Daniele about the acoustic release and BPR float attachment. He told that you just skip the triangulation procedure and don’t attach the acoustic release and BPR float. He added that deploy the BPR as close as possible to the anchor settle point.
BD06 watch circle radius was 0.81nm. Please fix the anchor drop point and finds the anchor settle point (which is approx. 1/3rd of the total mooring length). From the anchor settle point make a circle with a radius of 0.81nm. Fix all the lat, long positions as per the data come from buoy. If it lies within the circle, it is moored well. If it is lies outside the circle, it is drifted. Till now, we had confident that the buoy is moored well.
Today 07:00pm condition:
Wind speed 17knots, Heavy swell and white horses also found on sea.
Mail 4:
Dear Dr. Daniele,

Tomorrow morning the deployment will be done from **6:00am onwards**. As per our telephonic communication, we are going to skip the attachment of the acoustic release and BPR float attachment with the mooring line. We are skipping the triangulation procedures also as per your suggestion. We will deploy the BPR as close as possible to the anchor settle point.

We had a thumb rule that anchor will settle approx. 1/3rd of total mooring length towards the buoy position. We will check the current direction before we deploy the anchor and BPR. Then we will make the vessel counteract the current. We will come close to 200m near to the anchor settle point and then we will deploy the BPR as free fall.

If you have anymore suggestions, please send it immediately.

**Today 07:00pm condition:**
Wind speed 17 knots, Heavy swell and white horses also found on sea.

P. Muruges.

Chief scientist,
ORV Sagar Kanya
02/09/2011.

---

**INCOMING MAIL - 03.09.2011**

Mail 1:

From: Venkatesan <master@sagarkanya.amosconnect.com>
Date: Saturday, September 03, 2011 5:43 AM
To: Sagar Kanya - MASTER <master@sagarkanya.amosconnect.com>
Cc: venkat@niot.res.in <venkat@niot.res.in>; NIOT Sundar <sundar@niot.res.in>; NIOT R. SUNDAR <rsundar@niot.res.in>; arul@niot.res.in <arul@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; NCAOR SUBBU MM <mmsubbu@ncaor.org>; NCAOR SUBBU MM1 <mmsgoa@rediffmail.com>
Subject: Re: Sagar Kanya

Dear Mr Murugesh

Greetings

I have seen your correspondence with Dr Daniele and you may decide the deployment accordingly. Let us complete the deployment TB06 successfully. As far as BD06 we have informed Director and we shall inform you later.

Please record that BD06 old could not be sighted in that location of last transmission received. This is for our records and also record prevailing weather conditions with Master’s signature.

regards

Dr. R. Venkatesan

Scientist G & Programme Director

Ocean Observation Systems

*National Institute of Ocean Technology*

*Ministry of Earth Sciences*

Chennai 600100 India

Ph: +914466783532; +914466783535 +914422460678

Fax +914422460661

Mail 2:

From: Daniele Calore - Home <master@sagarkanya.amosconnect.com>

Date: Saturday, September 03, 2011 8:52 AM

To: Sagar Kanya - MASTER <master@sagarkanya.amosconnect.com>

Subject: FINAL CHECK OF BPR BEFORE TO PUT IT IN WATER

Dear All,

Now the BUOY is in water. It has sent the message at 02.30 am GMT. ALL OK

Current buoy position is

LAT 14deg 55.71min N

LON 089deg 57.26min E

The BPR has to be connected to the rope with the big yellow deepsea buoy
and fixed to its ballast and ready on the deck to be put in water.

STEP 1 - Connect the test cable (5 pins) to the BPR and the DB9 to the PC

STEP 2 - Connect the POWER SWITCH (Pay attention the connector orientation before insert it): you have to hear a short sound.

STEP 3 - Just see the message displayed on the screen by BPR and not editing anything: you should see a message on the screen every 15 sec. Messages are aligned with GMT time. The BPR switches automatically in ALARM mode and you will see it sends a message every 5 mins (2 times spaced of 1min). Thus you will hear acoustic sound every 5 mins (2 times).

STEP 4 - Is step 4 is OK disconnect test cable and put the dummy plug.

STEP 5 - Put BPR in water: before put the deepsea yellow buoy with rope and after the BPR suspended with pelican hook to be released.

NOTE. ONLY If in step 3 the BPR does not show the message every 15 sec, push space, ..UM>mode 1 UM>
UM>reset
and disconnect the cable.

Regards
Daniele

Mail 3:
From: Daniele Calore - Home <master@sagarkanya.amosconnect.com>
Date: Saturday, September 03, 2011 10:10 AM
To: Sagar Kanya - MASTER <master@sagarkanya.amosconnect.com>
Subject: BUOY POSITION

For your information.
BUOY POSITION AT 4.30 GMT (10.00 Indian Time)
LAT 14deg 54.83min N
LON 089deg 57.23min E
All Buoy parameters OK.
Begards

Mail 4:
From: Daniele Calore - Home <master@sagarkanya.amosconnect.com>
Date: Saturday, September 03, 2011 12:09 PM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: 'Dr Venkatesan NIOT GMAIL' <dr.r.venkatesan@gmail.com>; arul@niot.res.in
    <arul@niot.res.in>; 'NIOT R.SUNDAR' <rsundar@niot.res.in>; ssamc@niot.res.in
    <ssamc@niot.res.in>; 'venkat@niot.res.in' <venkat@niot.res.in>; 'NIOT Sundar'
    <sundar@niot.res.in>; 'NCAOR SUBBU MM' <mmsubbu@ncaor.org>; furio@envirtech.it
    <furio@envirtech.it>; 'Simone Falsetti' <simone.falsetti@envirtech.it>
Subject: BUOY AND BPR INSTALLATION

Dear All, with the present e-mail I inform you that we are receiving CORRECTLY BUOY and
BPR messages In the last message the BPR was at about 800mwd in the descending phase.Probably now it is at the bottom.
Best Regards and Congratulations for the good job
Daniele

Mail 5:
From: Daniele Calore - Home <master@sagarkanya.amosconnect.com>
Date: Saturday, September 03, 2011 12:39 PM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: 'Dr Venkatesan NIOT GMAIL' <dr.r.venkatesan@gmail.com>; arul@niot.res.in
    <arul@niot.res.in>; 'NIOT R.SUNDAR' <rsundar@niot.res.in>; ssamc@niot.res.in
    <ssamc@niot.res.in>; 'venkat@niot.res.in' <venkat@niot.res.in>; 'NIOT Sundar'
    <sundar@niot.res.in>; 'NCAOR SUBBU MM' <mmsubbu@ncaor.org>; furio@envirtech.it
    <furio@envirtech.it>; 'Simone Falsetti' <simone.falsetti@envirtech.it>
Subject: BUOY AND BPR INSTALLATION

At about 6.52:30 GMT of 3/09/2011 the BPR has touched the sea bottom.
System is working and sending messages.
Best Regards
Daniele

**Mail 6:**

**From:** rsundar@niot.res.in <master@sagarkanya.amosconnect.com>

**Date:** Saturday, September 03, 2011 1:04 PM

**To:** Sagar Kanya - MASTER master@sagarkanya.amosconnect.com

**Cc:** venkat@niot.res.in <venkat@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>

arul@niot.res.in <arul@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>

vimala@niot.res.in <vimala@niot.res.in>; daniele.calore@envirtech.it

<rsundar@niot.res.in|sundar.ranganathan@gmail.com>

**Subject:** TB06 Tsunami Buoy Data

Dear CS,

please find the attachment of TB06 Tsunami Buoy Data

congratulation FT for successful deployment of Envirtech Tsunami System

Note: Mr.Daniele,

During Tsunami Mode buoy not transmitting positions!!

Data format need to be changed

Regards

R.Sundar

Data Management Centre

Ocean Observation Systems,

National Institute of Ocean Technology,

Velachery-Tambaram Main Road, Pallikaranai, Chennai, India-600 100.

Phone : +91-44-66783537 | +91-9444041854 |

rsundar@niot.res.in|sundar.ranganathan@gmail.com |

**Mail 7**

**From:** Venkatesan <master@sagarkanya.amosconnect.com>

**Date:** Saturday, September 03, 2011 2:07 PM

**To:** Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Dear Mr Murugesh,

We congratulate The Master Officers Crew, NIOT team Eurotech and everyone on board for successfully deploying TB06 with Enviritech BPR in spite of bad weather prevailing at Site. It was possible only by coordinated team work

Special thanks to the Master for his support

Director joins me in congratulating you all

Shore station will monitor BUOY location to check mooring once BPR IS TURNED TO NORMAL MODE

Thanks to Dr Daniele Enviritech for perfect coordination

regards

Venkatesan

Mail 8:

From: Daniele Calore - Home <master@sagarkanya.amosconnect.com>
Date: Saturday, September 03, 2011 7:08 PM
To: 'Venkatesan' dr.r.venkatesan@gmail.com, Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: 'Daniele Calore - Envirtech it' <daniele.calore@envirtech.it>; arul@niot.res.in <arul@niot.res.in>; 'NIOT R.SUNDAR' <rsundar@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; venkat@niot.res.in <venkat@niot.res.in>; 'NIOT Sundar' <sundar@niot.res.in>; 'NCAOR SUBBU MM' <mmsubbu@ncaor.org>; furio@envirtech.it <furio@envirtech.it>; 'Simone Falsetti' <simone.falsetti@envirtech.it>

Subject: Re: ENVIRTECH

Dear All, BPR switched to normal mode autonomously at 12:53:30 GMT. Now it is in Normal Mode.

BPR is sending regular hourly tide data (at hh:15 Message<L>)

BUOY is sending regular hourly telemetry data (at hh:30 Message <K>)
Alarm messages stopped at 12:53:30 GMT.
All parameters are OK.
Thanks everybody for the synergic cooperation to get the target although the bad sea state.
Best Regards
Daniele

Mail 9
From: Venkatesan <master@sagarkanya.amosconnect.com>
Date: Saturday, September 03, 2011 7:16 PM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: venkat@niot.res.in <venkat@niot.res.in>; NIOT Sundar <sundar@niot.res.in>; NIOT R.SUNDAR <rsundar@niot.res.in>; arul@niot.res.in <arul@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; NCAOR SUBBU MM <mmsubbu@ncaor.org>; NCAOR SUBBU MM1 mmsgoa@rediffmail.com
Subject: Re: Sagar Kanya
Dear Mr Murugesh
Thanks for your mail
please send few photos
regards
Venkat.

OUTGOING MAIL-03.09.2011
Mail 1
Dear Sir,
We have deployed the TB06 buoy, anchor and BPR successfully. After taking Multibeam
survey, we deploy the buoy. Captain, Chief Officer and ship staffs worked a lot for the
deployment successfully. Captain's help is unforgettable.NIOT staffs and Eurotech team
members and deployment assistants also worked hard for the safe and successful
deployment of buoy, anchor and BPR. We checked the mooring line using the check list.
Connecting link attachment between combination rope and nylon rope was also checked.
For the calculation of anchor settle point, first we will wait for the settling of anchor for 30 minutes. Then I calculated the settling distance from the anchor drop point as 957 m (which is 1/3rd of the total mooring length).

For the BPR deployment, we took the current value and direction in the location. The current value was 0.9 m/s and the direction is 70°. So I made the heading to 250° (70° + 180°). The distance between the anchor settle point to BPR deployed location as 360 m from the calculation. Before deploying the BPR, we checked the mechanical and electronics side.

Thanks to Dr. Daniele for the support to cruise team.

Thanks to Shore station team members for the support to cruise team.

**Deployment location:**

<table>
<thead>
<tr>
<th>Sl.NO</th>
<th>Item description</th>
<th>Lat</th>
<th>Long</th>
<th>Date &amp;Time</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Buoy</td>
<td>14°55.880'N</td>
<td>089°57.109'E</td>
<td>03.09.2011, 0930hrs</td>
<td>2708m</td>
</tr>
<tr>
<td>2.</td>
<td>Anchor</td>
<td>14°53.876'N</td>
<td>089°56.493'E</td>
<td>03.09.2011, 1020hrs</td>
<td>2708m</td>
</tr>
<tr>
<td>3.</td>
<td>BPR</td>
<td>14°54.128'N</td>
<td>089°56.568'E</td>
<td>03.09.2011, 1145hrs</td>
<td>2711m</td>
</tr>
</tbody>
</table>

**Rope details:**
1. Combination rope = 550 m
2. Nylon rope = 320 m
3. Polypropylene rope = 2000 m.

P. Murugesh.

Chief Scientist,

ORV Sagar Kanya,

03.09.2011.

**Mail 2:**

Dear Dr. Daniele,

Thanks for your message. We will follow as per your instructions.

P. Murugesh.

Chief scientist,

ORV Sagar Kanya

03/09/2011.

**Mail 3:**
Dear Sir,
Thanks sir.
Now we are in Rama buoy location which is near (7nm) to our TB06 Envirtech tsunami buoy location. Retrieval of Rama buoy is going on. We are taking photos and videos of the TB06 buoy deployment. Tomorrow only the deployment of Rama buoy will be done.

**Weather conditions:**
Now wind speed is 18.8knots and raining also. Swell is high. Weather condition is going on as worst.

Chief Scientist,
ORV Sagar Kanya,
03.09.2011.

---

**INCOMING MAIL-04.09.2011**

Mail 1

**From:** Venkatesan <master@sagarkanya.amosconnect.com>
**Date:** Sunday, September 04, 2011 1:39 PM
**To:** Sagar Kanya - MASTER master@sagarkanya.amosconnect.com

**Cc:** venkat@niot.res.in; NIOT Sundar <sundar@niot.res.in>; NIOT R.SUNDAR <rsundar@niot.res.in>; arul@niot.res.in; ssamc@niot.res.in; NCAOR SUBBU MM <mmsubbu@ncaor.org>; NCAOR SUBBU MM1 mmsgoa@rediffmail.com

**Subject:** Re: Sagar Kanya

Dear Mr Murugesh
Thanks for your mailReceived report on TB06 deployment and Envirtech BPR is working fine 
regards
Venkatesan.

---

**OUTGOING MAIL-04.09.2011**

Mail 1

Dear Sir,
Rama buoy was retrieved successfully in heavy rain. Yesterday heavy rain with thunder also. Wind speed was 18knots. I have attached the photos of TB06 buoy deployment and BPR system. BPR deployment is in the video format. Today they are going to deploy the Rama buoy. They are doing the Multi-beam survey (1nm before and after the anchor drop position) and CTD operation in the anchor drop position.

Chief Scientist,
ORV Sagar Kanya,
04.09.2011.

Mail 2
Dear Sir,
Kind Attn: Mr. R.K. Muthumani
NIO team members (4 people) want to get accommodation in NIOT guest house from 10/09/2011 to 12/09/2011 evening. Please make arrangement for the people.
Chief Scientist,
ORV Sagar Kanya,
04.09.2011.

Mail 3
Dear Sir,
Today we deployed the 315-RAMA buoy successfully. We are waiting for the transmission checking and CTD operation if the foreigners wanted. Then they will cite the buoy. Afterwards we will move to the 10nm away from the BD10 location and then we will do CTD operation. One more 313-Cone buoy is to be deployed. We were waited 2nm away from the BD06 old buoy location. We could not find in the bad weather and visibility. We have attached the Buoy and BPR deployment sheets. SS team please check the sheets and send your comments.
Chief Scientist,
ORV Sagar Kanya,
04.09.2011.

INCOMING MAIL-05.09.2011
Mail 1
From: Venkatesan <master@sagarkanya.amosconnect.com>
Date: Sunday, September 04, 2011 8:16 PM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: venkat@niot.res.in <venkat@niot.res.in>; NIOT Sundar <sundar@niot.res.in>; NIOT R.SUNDAR <rsundar@niot.res.in>; arul@niot.res.in <arul@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; NCAOR SUBBU MM <mmsubbu@ncaor.org>; NCAOR SUBBU MM1 mmsgoa@rediffmail.com
Subject: Re: Sagar Kanya

Dear Mr Murugesh
Thanks
Good to hear that RAMA buoy is deployed
Shore station will check sheets and reply
regards
Venkatesan

Mail 2
From: snehal@ncaor.org <master@sagarkanya.amosconnect.com>
Date: Monday, September 05, 2011 11:21 AM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: mm subramaniam <mmsubbu@ncaor.org>
Subject: SK-288

TO:
Chief Scientist.
Dear Sir,
Kindly forward the list of equipments to be offloaded at Chennai on 10th September 2011.
Regards
Snehal
Sagar Kanya Cell
NCAOR

OUTGOING MAIL-05.09.2011
No mails sent from ship

INCOMING MAIL-06.09.2011
Mail 1
From: rsundar@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Tuesday, September 06, 2011 9:48 AM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: arul@niot.res.in <arul@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; venkat@niot.res.in <venkat@niot.res.in>
Subject: Important Message to CS

Dear CS,

As per Director and GH instruction, we have to retrieve the BD06 met buoy.
1. After successful operation of RAMA buoy directly proceed to NIO-6 operation skip the CTD operations in BD08 and BD10 location.
2. After completed NIO-6 operation directly proceed to BD06 location to retrieve the buoy.
3. After retrieval of BD06 buoy proceed to Chennai.
4. The Ship should be reached chennai on 14th Sep 2011.

Please discuss with Master and reply to us.

If necessary we will send the modified cruise track.

R. Sundar
Data Management Centre
Ocean Observation Systems,
National Institute of Ocean Technology,
Velachery-Tambaram Main Road, Pallikaranai, Chennai, India-600 100.
Phone : +91-44-66783537 | +91-9444041854 |
rsundar@niot.res.in|sundar.ranganathan@gmail.com |

Mail 2:
From: Venkatesan <master@sagarkanya.amosconnect.com>
Date: Tuesday, September 06, 2011 12:21 PM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: venkat@niot.res.in <venkat@niot.res.in>; NIOT Sundar <sundar@niot.res.in>; NIOT R. SUNDAR <rsundar@niot.res.in>; arul@niot.res.in <arul@niot.res.in>; ssamc@niot.res.in
Subject: Re: Sagar Kanya
Dear Mr Murugesh
Thanks we shall inform once we get reply from NCAOR
regards
Venkatesan

Mail 3:
From: mm subramaniam <master@sagarkanya.amosconnect.com>
Date: Tuesday, September 06, 2011 5:08 PM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: rasik@ncaor.org <rasik@ncaor.org>; Venkatesan <dr.r.venkatesan@gmail.com>; Anil Kumar Dr. NCAOR <anil@ncaor.org>; VSR <rajaraman@in.com>; snehal NCAOR <snehal@ncaor.org>; Gangopadhyay GM SCI <pk.gangopadhyay@sci.co.in>
Subject: SK-288 revised ETA
To Master Sagar Kanya
Dear Sir,
In continuation the request below, the extension of ensuing cruise SK-288 till 14th Sept. 2011 is approved. The revised ETA Chennai shall be 14th Sept. 2011. Accordingly the next cruise SK-289 is rescheduled as below:
Regards,
Subramaniam.
----- Original Message ----- 
From: Venkatesan
To: mmsubbu ; Atma ; Anil Kumar Dr. NCAOR
Sent: Tuesday, September 06, 2011 11:46 AM
Subject: Fwd: Important Message to CS
Dear Mr Subramanian
This has reference to discussion between our Director with Director NCAOR on our request to
extend cruise so that drifting BD06 buoy at 10 N could be retrieved. This is an emergency requirement to be undertaken in view of the prevailing condition.

Presently they are in the process of deploying last mooring and will execute one more CTD sampling. We are also cancelling some sampling to take this work. It is expected that the Ship can reach Chennai on 14th Sep 2011. Originally cruise was allotted for 20 days now with this revision it would be adjusted to 20 days.

If you can inform your decision to The Master they can change cruise plan accordingly. Awaiting for your reply please.

In fact we are glad to inform you that we have 6 tsunami buoy operational now which is an achievement and we have informed to Ministry. This is achieved due to the support of NCAOR and also due to The Master Officers and Crew. In spite poor weather conditions 2 tsunami buoys we deployed during this cruise. We thank you for your support.

regards
Dr. R. Venkatesan
Scientist G
Ocean Observation Systems
National Institute of Ocean Technology
Ministry of Earth Sciences
Chennai 600100 India
Ph: +914466783532; +914466783535 +914422460678
Fax +914422460661

OUTGOING MAIL - 06.09.2011

Mail 1:
Dear Sir,

Please send the corrected deployment sheet for TB08_A, BD06 and TB06. The Conical buoy mechanical assembly is going on. Multi-beam survey as well as CTD operation is also going on. Now the wind speed is 40knots.

Kind attn: Mr. Muthumani

Please arrange the accommodation for NIO people. I sent mail to you earlier.

Kind attn: Snehal madam, Mr. Muthumani
Mail 2:
Dear Sir,
Now the wind speed is 40knots and the sea state is 10. Heavy wind and heavy swell. Mr. Suresh Kumar discussed with Mr. Ravi, INCOIS and they postponed the deployment of cone buoy tomorrow. Now we are sailing towards NIO06 location and we will finish the CTD sampling. Tomorrow INCOIS will deploy the buoy. Afterwards, we will move to retrieve the drifting BD06 MET buoy. Please send the location of drifting buoy frequently.
Kind attn: Mr. Muthumani
Please arrange the accommodation for one day to Mr. Vinay, Pan India.
Chief scientist,
ORV Sagar Kanya,
06.09.2011.

Mail 3:
Dear Sir,
Now the wind speed is 40knots and the sea state is 10. Heavy wind and heavy swell. The ETA after the retrieval of BD06 is 13th sep2011 night or 14th sep2011 morning. Please send the location of drifting buoy frequently.
Kind attn: Mr. Muthumani
Please arrange the accommodation for one day to Mr. Vinay, Pan India.
Chief scientist,
ORV Sagar Kanya,
06.09.2011.

INCOMING MAIL-07.09.2011
Mail 1
Dear CS,

We can understand the difficulty you undergo at sea and appreciate all your efforts in completing the tasks in spite of rough weather. We, shore station do have a request. While you send your daily status note please do mention your current position (lat & long) too. If you send twice a day morning and evening it will be of great use.

Thanks,

With Kind Regards,
S. Ramasundaram,
Project Scientist - Ocean Observation Systems (OOS),
National Institute of Ocean Technology,
MOES, Govt. of India.
Velachery-Tambaram Road, Pallikaranai, Chennai, India-600 100.
Phone: +91 44 6678 3536 | 6678 3434 | +91 94443 78898 | sundar@niot.res.in |

OUTGOING MAIL - 07.09.2011

Mail 1

Dear Sir,

We are going to deploy the Cone buoy soon. Now the wind speed is 22knots. Heavy wind and heavy swell.

06/09/2011:

Yesterday morning Argo float was deployed at 17°23.74’N, 088°59.38’E. At night (06/08/2011, 0300hrs) we did the CTD operation sampling up to the depth of 2000m in rough weather condition (wind speed is 30knots) from 2220hrs to 0100hrs at 18°03.8’N, 088°57.0’E. We have waited for the suitable condition for the deployment of CTD. Then from 0240hrs – 0545hrs at 18°08.47’N, 089°05.50’E, we did MPN operation was done successfully.
05/09/2011:
At 1820hrs, CTD operation was done in 16°30.678'N, 088°19.097'E.
At 2148hrs, Argo float was deployed in 16°48.446'N, 088°33.724'E.
At 2400hrs, Argo float was deployed in 16°59.635'N, 088°41.617'E.
Chief scientist,
ORV Sagar Kanya,
07.09.2011.

Mail 2
Dear Sir,
We deployed the Cone buoy successfully. The buoy was deployed on 18°02.205'N, 089°32.336'E at 1012 hrs at 25 knots wind speed. Anchor deployed on 17°59.793'N, 089°29.852'E at 1418hrs.
Then CTD operation was done to validate the sensors on 17°58.15'N, 089°31.47'E at 1705 - 1810hrs.
At 1826hrs, we started the sailing towards BD06 drifting buoy location.
At 1835hrs, Argo float was deployed successfully on 17°59.033'N, 089°33.590'E.
At 1843hrs, Surface drifter buoy was deployed successfully on 17°58.700'N, 089°33.694'E.

Kind attn: Mr. Ramsundar sir.
Thanks for your mail. I will update the position in morning and evening. As on 07/09/2011, 1910hrs, the ship position is 17°58.030'N, 089°33.134'E.
Chief scientist,
ORV Sagar Kanya,
07.09.2011.

INCOMING MAIL - 08.09.2011
Mail 1
From: tamilselvi@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Thursday, September 08, 2011 10:39 AM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: venkat@niot.res.in <venkat@niot.res.in>; cmuthu@niot.res.in <cmuthu@niot.res.in>; rkmuthu@niot.res.in <rkmuthu@niot.res.in>
Subject: Mail from Tamilselvi, NIOT

Dear Cruise Team,

Have a Good day & Good Morning.

kind Attn.: Mr. P. Murugesh. Chief Scientist

As discussed with Group Head, Kindly send the confirmation mail of one current meter frame was taken for Sagar Kanya Cruise before SRIV due to urgent basis.

Thanks & regards,
T Tamilselvi

OUTGOING MAIL-08.09.2011

Mail 1

Dear Sir,

The ship position is as on 08/09/2011, 1145hrs is 16°12.9'N, 089°23.7'E.

Kind attn: Tamilselvi madam, Mr.Muthukumar and Mr.Muhumani.

Yes, one current meter frame was taken before the SRIV clears.

Chief scientist,
ORV Sagar Kanya,
08.09.2011.

INCOMING MAIL-09.09.2011

Mail 1

From: rkmuthu@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Friday, September 09, 2011 6:25 AM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: arul@niot.res.in <arul@niot.res.in>; cmuthu@niot.res.in <cmuthu@niot.res.in>; dr.r.venkatesan@gmail.com <dr.r.venkatesan@gmail.com>; mmsgoa@rediffmail.com <mmsgoa@rediffmail.com>; mmsubbu@ncaor.org <mmsubbu@ncaor.org>; rsundar@niot.res.in <rsundar@niot.res.in>; ssamc@niot.res.in <ssamc@niot.res.in>; sundar@niot.res.in <sundar@niot.res.in>; tamilselvi@niot.res.in <tamilselvi@niot.res.in>; venkat@niot.res.in <venkat@niot.res.in>
Subject: Re: Sagar Kanya

Dear Cruise team,

Good day and Good morning
We have already arranged accommodation for NIO, Goa participants (Students room). Today we will arrange ICRS people (Students room). Not possible for PAN India. because of our NIOT main guest house is already fully reserved some other meeting purpose.
please send the offloading material list (NIOT, INCOIS, NIO, IISc, ICRS). we will arrange for wharfage fee based on material list.

with regards

MUTHUMANI RK
Project Junior Assistant
Stores / Cruise / Logistics Cell
OCEAN OBSERVATION SYSTEMS,
NATIONAL INSTITUTE OF OCEAN TECHNOLOGY
CHENNAI - 600 100, INDIA
Ph: +91 44 66783532,
Fax: +91 44 66783400, 22460661
Mobile: +91 9443764284

OUTGOING MAIL-09.09.2011

Mail 1

Dear Sir,
The ship position is as on 09/09/2011, 1020hrs is 13°46.0’N, 089°08.0’E. We may at the drifted buoy location on 10th mid-night.
INCOIS wanted to retrieve the drifted buoy which was deployed at 1.5S, 80.5E. Now it crosses 08°17.340’N, 087°40.380’E and IISc wants gravity core operation in any location. Please send your suggestion.

Happy Onam wishes to all. Here Mr. William celebrates his birthday.

Kind attn: SS team

Please send the position details of BD06 drifted buoy in table format.

Kind attn: Mr. Muthumani.
I have already sent NIOT materials to be offloaded. I will sent the offloaded equipments for NIO, IISc, and ICRS soon. Thanks for the info regarding the accommodation for scientists.

Chief scientist,
ORV Sagar Kanya,
09.09.2011.

INCOMING MAIL-10.09.2011
No mail was got from NIOT

OUTGOING MAIL-10.09.2011
Mail 1
Dear Sir,
The ship position is as on 10/09/2011, 1010hrs is 10°54.580'N, 088°51.811'E. Tomorrow morning we will start the retrieval operation. So please keep on sending the position of the buoy.I has attached the Report on work done by the NIO scientists. I have attached the Diary of events from 24/08/2011 to 10/09/2011.
09/09/2011:
One surface drifter was deployed at 13°44.84'N, 089°08.045'E on 1026hrs.

Kind attn: Snehal madam, Mr.Muthumani
I have attached the offloaded equipments of NIO scientists. Others are making the list.ICRS scientist have no offloaded equipments except the samples in small plastic bottles.

Chief scientist,
ORV Sagar Kanya,

INCOMING MAIL -11.09.2011
Mail 1:
From: ssamc@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Sunday, September 11, 2011 12:35 PM
To:Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Subject: Congratulations from GROUP HEAD
Dear Murugesh,

Group Head congratulating to u & all cruise team members for successfully completed the cruise operation & for BD06 retrieval operation.

Regards,
S.S Team,

NIOT Chennai

Mail 2:

From: Venkatesan <master@sagarkanya.amosconnect.com>
Date: Sunday, September 11, 2011 9:00 PM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: venkat@niot.res.in <venkat@niot.res.in>; rkmuthu@niot.res.in <rkmuthu@niot.res.in>
Subject: Re: Sagar Kanya

Dear Mr Murugesh

We once again appreciate your coordination and efforts and thank The Master, Crew everyone board for successfully completion of cruise Muthumani will do the needful best

Venkatesan

---

Mail 1:

Dear Sir,

Thanks to the shore-station team for giving wonderful support regarding the updation of BD06 location.BD06 MET buoy was retrieved at 1130hrs at 09°01'N,088°47.87'E.Our ETA will be 15th Sep2011FN.I will send the cruise report soon.

Kind attn: Mr.Muthumani

I have attached the offloaded equipments of NIOT, NIO, and IISc scientists. ICRS scientist has no offloaded equipments except the samples in small plastic bottles. I am not well now. Please make it as a single list and it should be in-line with the equipments loaded to the cruise. Please send the list as early as possible to MM.Subbu sir and Snehal madam.

Chief scientist,

ORV Sagar Kanya,

INCOMING MAIL -12.09.2011
No mails

OUTGOING MAIL-12.09.2011
Mail 1:
Dear Sir,
We are sailing towards Chennai. ETA will be 15th sep2011 at 0600hrs. Due to the damage in the boat during the retrieval of BD06 buoy, we are skipping the retrieval of ATLAS buoy. I have attached the report of work done by ICRS scientists.

Kind attn: Mr.Muthumani
Please arrange a car from NIOT to Airport at 04:00am on 16/09/2011 for the ICRS scientists.

Kind attn: Shore station
Please send the corrected buoy and BPR deployment sheets that I have sent earlier. I will send Buoy retrieval and buoy search sheet at the earliest.

Chief scientist,
ORV Sagar Kanya,

INCOMING MAIL -13.09.2011
Mail 1:

From: venkat@niot.res.in <master@sagarkanya.amosconnect.com>
Date: Tuesday, September 13, 2011 10:22 AM
To: Sagar Kanya - MASTER master@sagarkanya.amosconnect.com
Cc: arul@niot.res.in <arul@niot.res.in>; NIOT C MUTHU <cmuthu@niot.res.in>; Dr Venkatesan NIOT GMAIL <dr.r.venkatesan@gmail.com>; NCAOR SUBBU MM1 <mmsgoa@rediffmail.com>; NCAOR SUBBU MM <mmsubbu@ncaor.org>; rkmuthu@niot.res.in <rkmuthu@niot.res.in>; NIO R.SUNDA R <rsundar@niot.res.in>;
Subject: Re: Sagar Kanya

Dear Mr Murugesh

We have made arrangements for unloading Kalyaperumal Muthumani will take care of Port related work

Please ensure no item is left behind on board

Please prepare report on BD06 old which could not be found/lost signed by The Master

regards

Venkat

OUTGOING MAIL - 13.09.2011

Mail 1:

Dear Sir,

ETA may be 14th September 2011 at 1400hrs. I finished the cruise report 95%.

Kind attn: Snehal madam and Mr. Muthumani

Mr. Sureshkumar told that he included some items which was used in previous cruise. Now the items are in ship. He already spoke with Mr. Muthumani, NIOT.

Thanks for your great help. Two 9 ton vehicles enough for NIOT materials. Please arrange two quails for NIOT staffs and Eurotech team.

Kind attn: Shore station

Thanks to SS team for correcting the Buoy deployment, search and retrieval sheets.

Thanks Sundar sir.

Chief scientist,
ORV Sagar Kanya,

Mail 2:

Dear Sir,

Today I got sign from Master in all deployment, retrieval and search sheet.

Kind attn: Mr. Ramesh
I got Equator crossing certificate with Master signature for you and Mr. Muthukumar also.
Chief scientist,
ORV Sagar Kanya,
CHAPTER 9-PICTURES

TB08_A BUOY DEPLOYMENT WITH CONICAL HOOD:

Fig.1: Assembly Conical hood with TB08_A buoy

Fig.2: Conical hood assembled with TB08_A buoy
Fig. 3: After deployment of Conical hood assembled with TB08_A buoy

TB08_A SONARDYNE BPR DEPLOYMENT:

Fig. 4: Deployment of TB08_A BPR
BD06 DEPLOYMENT:

Fig. 5: Deployment of BD06 MET buoy

Fig. 6: After Deployment of BD06 MET buoy
TB06 ENVIRTECH BUOY DEPLOYMENT:

Fig. 7: Assembly of Surface modem with the Tsunami pipe in TB06 buoy
Fig. 8: Deployment of TB06 buoy with surface modem
Fig.9: Deployment of TB06 Envirtech BPR with surface modem

RAMA BUOY DEPLOYMENT:

Fig.10: Deployment of RAMA buoy
Fig. 11: Retrieval of RAMA buoy

INCOIS CONE BUOY DEPLOYMENT:

Fig. 12: Deployment of Cone buoy

CTD OPERATION:

Fig. 13: Deployment of CTD
Fig. 14: After retrieval of CTD

Fig. 15: Data analysis of CTD values at various depths
MULTI-PLANKTON NET OPERATION:

Fig. 16: Multi-Plankton Net preparation work

Fig. 17: Deployment of Multi-Plankton Net
Fig.18: Multi-Plankton Net in sea water

WATER SAMPLING:

Fig.19: Water samples at various depths collected from CTD
Fig. 20: Water samples at various depths collected from CTD

**RETRIEVED BD06 BUOY:**

Fig. 21: Retrieval of drifted BD06 buoy
CHAPTER 10. REPORTS OF WORK DONE BY INCOIS, NIO, ICRS AND IISC SCIENTISTS

ORV SAGAR KANYA

CRUISE REPORT
Cruise No. SK-288

Submitted by

Mr. Suresh Kumar
Deputy Scientist, SK-288
Indian National Centre for Ocean Information Services
Hyderabad – 500055
Objectives of the Cruise

The cruise (SK-288) was a multidisciplinary cruise embarked on from Chennai – Bay of Bengal – Chennai, during Aug 24 – Sep 14, 2010 onboard research vessel “ORV Sagar Kanya”.

Followings are the planned scientific objectives of the cruise during SK-288

1. In connection with the set-up of Bay of Bengal Observatory, deployment of a INCOIS-Mooring Buoy (Cone-Head) at location 18N, 89.5E.
2. Retrieval and Deployment operations of RAMA Moorings (INCOIS-PMEL) in the Bay of Bengal at two locations (12N, 90E; 15N, 90E).
3. Deployment of INCOIS-ARGO floats (Autonomous Temperature and Salinity Profiling Floats) along the cruise track at different locations. In total 14 Argo floats planned to deploy during the cruise.
4. Collecting marine meteorological parameters along the ship routes and CTD operation after every Buoy deployment.
5. Deployment of Three Pacific Gyre Surface drifters buoy during the cruise.
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). ATLAS RAMA buoys were recovered and redeployed at assigned locations 12N|90E, 15N|90E and 18N|89.5E. in the Bay of Bengal region by INCOIS-PMEL scientists during this cruise.

The recovery operations start with citing the buoy on Radar and visually. The vessel then moved close (up to 50-100 m) to the buoy float. Buoy is then released from the anchor weight by sending acoustic pulses to the ‘Acoustic Release’ unit which connected between the Mooring line and Anchors. After that a small zodiac boat, carrying scientists, lowered from the ship main deck either Starboard or Port side. 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) 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, 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-Cone & ATLAS buoy float was performed from the centre of the stern of the ship using A-Frame or midships-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 buoy was deployed using the ATLAS crane from Midships and mooring cable passed over the Hanging Pulley Block connected in center of A-Frame and then by finally pass it Wintech Electrical Winch tech by entangle with 4-5 straps in winch of NOAA. 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 a Acoustic release was connected to the line, followed by the heavy anchor weight. The anchor was dropped using Deep Sea Winch Cable and A-frame from the ship aft. Similar procedure followed for all RAMA buoy deployments.

Details of RAMA buoy retrievals/deployments are as below,

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Date</th>
<th>Time in GMT Hrs</th>
<th>Deployment Location</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latitude</td>
<td>Longitude</td>
</tr>
<tr>
<td>1</td>
<td>01-Sep-2011</td>
<td>08:07-12:13, 14:34-17:35</td>
<td>11°55.77 N</td>
<td>089°54.22 E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11°55.79 N</td>
<td>089°54.76 E</td>
</tr>
<tr>
<td>2</td>
<td>03-Sep-2011, 04-Sep-2011</td>
<td>10:46-14:50, 09:16-11:19</td>
<td>15°01.00 N</td>
<td>089°58.40 E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14°58.86 N</td>
<td>089°55.29 E</td>
</tr>
<tr>
<td>3</td>
<td>07-Sep-2011</td>
<td>04:42-10:20</td>
<td>17°59.95 N</td>
<td>089°30.34 E</td>
</tr>
</tbody>
</table>

Drifter deployments:

To determine Sea Surface Temperature & Currents and collection of met-ocean data in Bay of Bengal INCOIS, deployed Pacific Gyre Surface drifter buoys during the cruise at following locations.
Drifter Deployment Details:

<table>
<thead>
<tr>
<th>Station No.</th>
<th>Date</th>
<th>Time (GMT)</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Argos ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>07-Sep-2011</td>
<td>13:13</td>
<td>17°58.70 N</td>
<td>089°33.69 E</td>
<td>42652</td>
</tr>
<tr>
<td>2</td>
<td>09-Sep-2011</td>
<td>04:56</td>
<td>13°44.84 N</td>
<td>089°08.05 E</td>
<td>42658</td>
</tr>
<tr>
<td>3</td>
<td>12-Sep-2011</td>
<td>11:58</td>
<td>10°17.41 N</td>
<td>089°09.29 E</td>
<td>42708</td>
</tr>
</tbody>
</table>

Argo Floats deployments:

The Autonomous Salinity and Temperature Profiling Floats (ARGO) were deployed at 14 locations during the cruise by Mr. Suresh Kumar, Scientist INCOIS. These floats first sink in to 2000 m depth and then adjust their buoyancy to rise up to sea surface accordingly the no. of Cycle days programmed in it. While ascending in the water column, it records (PTS) the temperature and salinity profile with respect to Pressure and depth table, this recorded information is transmitted to the ARGOS/Iridium satellite by the Antennas fixed on the float. This cycle is repeated at every 10/5 days. Details of Argo floats deployed during SK-288 are listed below.

ARGOS-Float DEPLOYMENT DETAILS

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Float Serial #</th>
<th>Dep. #</th>
<th>LAT</th>
<th>LONG</th>
<th>Area of Deployment</th>
<th>Time (GMT-Hrs)</th>
<th>Vessel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5776</td>
<td>6</td>
<td>10°35.51 N</td>
<td>087°36.81 E</td>
<td>Bay of Bengal</td>
<td>30-Aug-11, 22:17</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>2</td>
<td>5777</td>
<td>4</td>
<td>11°45.47 N</td>
<td>086°00.16 E</td>
<td>Bay of Bengal</td>
<td>29-Aug-11, 23:10</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>3</td>
<td>5778</td>
<td>7</td>
<td>10°22.09 N</td>
<td>088°47.09 E</td>
<td>Bay of Bengal</td>
<td>31-Aug-11, 17:16</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>4</td>
<td>5779</td>
<td>5</td>
<td>11°15.43 N</td>
<td>086°33.07 E</td>
<td>Bay of Bengal</td>
<td>30-Aug-11, 12:10</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>5</td>
<td>5780</td>
<td>1</td>
<td>13°04.41 N</td>
<td>083°13.71 E</td>
<td>Bay of Bengal</td>
<td>27-Aug-11, 06:55</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>6</td>
<td>5781</td>
<td>2</td>
<td>13°26.64 N</td>
<td>083°54.13 E</td>
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</tr>
<tr>
<td>7</td>
<td>5782</td>
<td>8</td>
<td>15°45.12 N</td>
<td>088°58.55 E</td>
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<td>04-Sep-11, 22:54</td>
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</tr>
<tr>
<td>8</td>
<td>5783</td>
<td>9</td>
<td>16°48.44 N</td>
<td>088°33.72 E</td>
<td>Bay of Bengal</td>
<td>05-Sep-11, 16:18</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>9</td>
<td>5784</td>
<td>10</td>
<td>16°59.63 N</td>
<td>088°41.61 E</td>
<td>Bay of Bengal</td>
<td>05-Sep-11, 18:30</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>10</td>
<td>5785</td>
<td>11</td>
<td>17°59.03 N</td>
<td>089°33.59 E</td>
<td>Bay of Bengal</td>
<td>07-Sep-11, 13:05</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>11</td>
<td>5298</td>
<td>3</td>
<td>12°33.80 N</td>
<td>085°31.26 E</td>
<td>Bay of Bengal</td>
<td>09-Aug-11, 12:10</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>12</td>
<td>6920</td>
<td>1.1</td>
<td>10°03.07 N</td>
<td>088°24.03 E</td>
<td>Bay of Bengal</td>
<td>31-Aug-11, 12:50</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>13</td>
<td>6922</td>
<td>1.2</td>
<td>14°58.80 N</td>
<td>089°56.43 E</td>
<td>Bay of Bengal</td>
<td>04-Sep-11, 15:35</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
<tr>
<td>14</td>
<td>6924</td>
<td>1.3</td>
<td>17°23.74 N</td>
<td>088°59.38 E</td>
<td>Bay of Bengal</td>
<td>05-Sep-11, 21:30</td>
<td>ORV-Sagar Kanya SK-</td>
</tr>
</tbody>
</table>
Summary of the scientific works done during cruise SK-288:

1. Totally 2-ATLAS Buoys were recovered and 3-ATLAS & Cone type buoys were deployed @ 12N, 15N, 18N | 90E.

2. Total 14 ARGO floats (autonomous temperature and salinity profiling floats) deployed at different locations along the Ship cruise track. (SK-288)

3. Conductivity-Temperature-Depth (CTD) profiles taken every buoy locations

4. 3- Surface Drifter buoys were deployed during the cruise

Acknowledgements:

I, on behalf of the scientific team of RAMA cruise SK-288, would like to thank Mr. Murgesh Chief of the expedition SK-288, Scientist-NIOT for providing the facility aboard ‘ORV Sagar Kanya for our operations in the Bay of Bengal region. I sincerely thank Master- Sagar kanya for his support during cruise. I acknowledge Chief Officer, Chief Engineer and all Officers, Doctor, Electrical Engineers and crew members onboard for their cooperation and good work throughout the cruise. I am grateful to Mr. Subramaniyum, NCOAR for all the administrative and logistic support during the cruise. I sincerely thank agents Mr. Venkatesh, Mr. Nagoor and their team for doing all the paper works in-time during Sign-On and Sign-Off process. Thanks are also due to the NORINCO (AMC) engineers for their untiring works during buoy and CTD operations. Finally I would like to thank all the members of scientific team of SK-288 to make this cruise successful.

Date: 14-Sep-2011

(N Suresh Kumar)
Deputy Scientist, SK-288

==================================***=====================================
National Institute of Oceanography

Work Report

Ship: ORV Sagar Kanya
Cruise Number: SK288

Participants:
1. Amit Sarkar (CSIR - Senior Research Fellow)
2. Priyabrata Das (Project Assistant)
3. Pratirupa Bardhan (Project Assistant)
4. Kausar Fatima Bepari (Project Assistant)
Studies on long term changes in physicochemical and biological characteristics of Bay of Bengal, based on time series observations

Amit Sarkar, Priyabrata Das, Pratirupa Bardhan, K F Bepari and S.W.A. Naqvi
National Institute of Oceanography, Goa, India

Objectives:
The present work investigates the long term changes in biogeochemical aspects of dissolve gases, nutrients, stable isotopes signature of suspended particulate matter and planktons in Bay of Bengal based on an open ocean time series studies.

The station coordinated at 18°N and 89°E in Bay of Bengal is considered as prime location for time series study as a part of project SIBER (Sustainable Indian Ocean Biogeochemistry and Ecological Research). During the scientific voyage of ORV Sagar Kanya (Cruise Number: SK288) we had visited the spot and collected samples for scientific research.

Work at Sea:
During ORV Sagar Kanya cruise, SK288, samples for dissolve gases, nutrients, stable isotopes and plankton were collected at 18°4.993’N and 88°59.090’E. A brief of work carried out onboard is the following-

Dissolve Gases:
Dissolve Oxygen (DO) and two climatically important dissolve gases, Nitrous Oxide (N₂O) and Methane (CH₄) samples, were collected at location using CTD-Rosette along with other parameter. The samples were collected from 14 standard depths from surface to bottom till 2000m deep.
DO in water samples was fixed immediately using Winkler-A and Winkler-B and analyzed within a few hours of collection at a high precision using automated titration system.

Dissolve Nitrous oxide and Methane gas samples were collected from same cast and depths. The samples were preserved instantly by adding mercury chloride in order to cease any kind of microbial activities. Samples are kept preserved and will be analysed in shore lab (NIO) using Gas Chromatography.

**Macro Nutrients:**

Nutrient samples were collected from standard depths to 2000 m at the station. The samples were stored frozen and as well as preserved poisoned in plastic bottles to analyse in duplicate. Macro nutrients Nitrate (NO₃), Nitrite (NO₂), Ammonia (NH₄), silicate (SiO₄), Phosphate (PO₄), Total Nitrogen and Phosphorus in samples will be analysed at NIO Laboratory using a SKALAR segmented flow and Braun Lurbe autoanalyzer using standard procedures.

**POC, PON, **¹³C, **¹⁵N:**

Stable carbon and nitrogen isotopic composition of organic matter (δ₁³C, δ₁⁵N) in water provide valuable insights into the environmental condition under which the organic matter formed. It also helps to interpret ratios measured in sediments where they are used as paleoproductivity proxies. During this cruise water samples were collected from CTD sampling cast. 2L of samples were collected and filtered immediately through pre-combusted GF/F filters (25mm in diameter and 0.7µm porosity) using vacuum pump at very low pressure (≈ 100mmHg). The filters were preserved frozen (-20°C) until isotope ratio mass spectrometric (IRMS) analysis.

**Chlorophyll a and Plankton:**

Fluorometric chlorophyll a data provides information about concentrations of plant biomass. In order to investigate vertical distribution of chl-a along with phytoplankton and heterotrophic nano flagellate (HNF), water samples were collected at the
locations up to surface 200m deep, filtered and preserved for further studies at shore laboratory.

**Operation of Multi plankton Net/Sampler (MPN/MPS); Zoo plankton vertical distribution:**

To study zoo plankton vertical distribution and species composition in Bay of Bengal MPN were operated at two stations 13°25.058’N/ 83°51.979’E and 18°4.993’N/88°59.090’E. Nets samples were collected from four compartment of water column, surface mixed layer depth (0-60m), top to bottom of thermocline (60-150m), two bottom depths 150-500m and 500-1000m.

**Acknowledgement:**
We express our sincere gratitude to all scientists, Engineers, Captain and Crew on board ORV Sagar Kanya (SK288) for bringing in our participation and work plan a generative success.
A Report on the Project Trip On ORV SAGAR KANYA

*International Centre for Radio Science (ICRS)
Jodhpur, Rajasthan
September, 2011

Submitted to:
Mr. P. Murugesh
Chief Scientist

Submitted by:
Pooja Asopa
Shruti Singhal
Objective

ICRS is working on a project entitled “Simulation of SMOS Brightness Temperature (BT) using Radiative Transfer Model and Retrieval of Salinity from SMOS BT in Open Seas” provided to us by INCOIS.

One of the major objectives of this project is to simulate the values of Brightness Temperature (BT) using Radiative Transfer Model. In order to achieve our objective we need to have the in-situ values of Sea Surface Salinity (SSS), Sea Surface Temperature (SST) and Wind Speed (WS). Thus, one of the major objectives of the ship cruise is to obtain the in-situ data (for this we require AWS and Thermosalinograph data starting from 26/8/11 to the last day of the trip). Another objective of the cruise is to collect the surface water samples for the locations where SMOS track is coinciding with the ship track.

Data Acquisition

1. Water Samples

Ten water samples have been collected. These are as listed in the table below.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Date</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Sampling Details</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27.8.11</td>
<td>13°24.926’</td>
<td>83°51.088’</td>
<td>CTD Station; Surface sample taken</td>
<td>1715 Hrs</td>
</tr>
<tr>
<td>2</td>
<td>29.8.11</td>
<td>12°35.681’</td>
<td>85°31.578’</td>
<td>Surface sample taken</td>
<td>1005 Hrs</td>
</tr>
<tr>
<td>3</td>
<td>30.8.11</td>
<td>11°08.416’</td>
<td>86°24.146’</td>
<td>CTD Station; Surface, 5m and 10m samples taken</td>
<td>1055 Hrs</td>
</tr>
<tr>
<td>4</td>
<td>1.9.11</td>
<td>11°55.386’</td>
<td>89°53.984’</td>
<td>Surface sample taken</td>
<td>1605 Hrs</td>
</tr>
<tr>
<td>5</td>
<td>3.9.11</td>
<td>14°54.120’</td>
<td>89°56.544’</td>
<td>Surface sample taken</td>
<td>1145 Hrs</td>
</tr>
<tr>
<td>6</td>
<td>4.9.11</td>
<td>14°58.865’</td>
<td>89°55.183’</td>
<td>Surface sample taken</td>
<td>1650 Hrs</td>
</tr>
<tr>
<td>7</td>
<td>5.9.11</td>
<td>16°27.138’</td>
<td>88°11.912’</td>
<td>CTD Station; Surface, 5m and 10m samples taken</td>
<td>1420 Hrs</td>
</tr>
</tbody>
</table>
2. **Automatic weather station**
   AWS data of ORV Sagar Kanya is taken from date 26.8.11 to 14.9.11.

3. **Thermosalinograph**
   Thermosalinograph data of ORV Sagar Kanya is taken from date 26.8.11 to 14.9.11.

**Acknowledgement**

The Scientists working on this Project acknowledge with thanks the support given by Dr. S.S.C. Shenoi, Director INCOIS and Dr. Ravi Chandran, Senior Scientist INCOIS, for providing ICRS Scientists this opportunity to work on this Project entitled “Simulation of SMOS Brightness Temperature (BT) using Radiative Transfer Model and Retrieval of Salinity from SMOS BT in Open Seas”.

We also thankfully acknowledge NCAOR for providing us this opportunity to piggy ride on ORV Sagar Kanya for our project.

We extend our warm gratitude to Capt. Prashant Lokhande, Chief Officer Nisar Ahmed Matroji, Chief Scientist Mr. Murugesh and Deputy Chief Scientist Suresh Kumar Neelakandhan.

We would also like to thank all the crew members and participants of the ship for their support and corporation.
Report on scientific activities by participant of IISc in SK-288

Prasanna K
Research Scholar, Center for Earth Sciences.
Indian Institute of Science, Bangalore

Objective:
To study air CO$_2$ interaction in Bay of Bengal during the same time of a normal monsoon year and compare it with previous data collected during an El Nino year.

Air Samples:
The air sampler consists of two flasks for collection of air simultaneously and bourdon tube gauge pressure gauge to monitor the pressure in the sample cylinders. The cylinders are of ~3 liters in capacity with two Teflon stoppers at the ends. The motor and battery is kept as a peripheral attachment for the sampler.

Initially both the flasks are flushed with ambient air for 10 minutes with gargling and before the actual air samples collection. A total of 15 air samples were collected singly at various latitudes except for air sample AS1, AS8 and AS12 which are in replicates. Samples were collected at high pressure at 1 Kg/cm$^2$. Care was taken to ensure no breath or engine exhaust contamination occurred to the samples during collection.

Locations of sample collection:

<table>
<thead>
<tr>
<th>Sample number</th>
<th>Air samples</th>
<th>Latitude (S)</th>
<th>Longitude (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Deg</td>
<td>Mins</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>11</td>
<td>12.379</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>03</td>
<td>88</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>55.386</td>
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</tr>
<tr>
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<td>88</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>57.563</td>
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</tr>
<tr>
<td>9</td>
<td>12</td>
<td>55.952</td>
<td>89</td>
</tr>
</tbody>
</table>
Water samples:
Sea surface samples were collected by conventional method of bucket sampling. The samples were collected using a bucket it was reassured that the bucket was devoid of any other water contaminations. The buckets were flung into the surface ocean and let rinse for at least 10 minutes with the in-situ water before the actual sample was brought up. The water was immediately transferred to air tight containers and tinted glass vials. ≈ 0.25 μl of saturated HgCl2 Solution was added to poison the water in tinted glass vials to avoid biological activity the water thus stored shall be used for the analysis of Dissolved Inorganic Carbon (DIC).