Argo Steering Team Meeting (AST-12)

National Report – India

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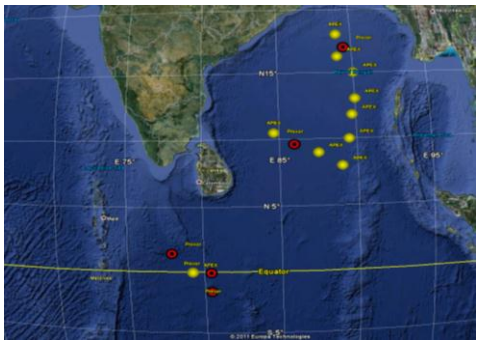
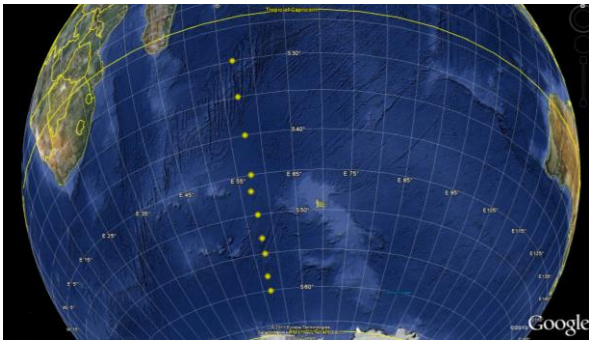
1. The status of implementation

1.1a Floats deployment

During the year 2010–11, India deployed 26 floats in the Indian Ocean taking the total to 206. The deployment location in the North Indian Ocean and Southern ocean are shown below.





1.1b performance Analysis of Floats deployed

Out of 206 floats deployed so far, 83 floats are active. Out of these 83 active floats, 39 floats are less than 3 years old.

1.1c Software support of CSIRO for DMQC

CSIRO extended whole hearted support by providing the Delayed Mode Quality Control processing software to INCOIS. One scientist from INCOIS visited CSIRO and had hands on experience with the DMQC s/w. Subsequently all the eligible floats were DMQCed and uploaded to GDAC. We take this opportunity to thanks the CSIRO team for sharing the software and support.

1.2 Technical problems encountered and solved

None

1.3 Status of contributions to Argo data management

- **Data acquired from floats**
  India had deployed 206 floats so far. Out of these 83 floats are active. All the active floats data are processed and sent to GDAC.
- **Data issued to GTS**
  Presently we do not have GTS access. Up on our request CLS ARGOS is continuing to send Indian floats data in TESAC format to GTS.
- **Data issued to GDACs after real-time QC**
  All the active floats (83) data are subject to real time quality control and are being sent to GDAC.

- **Web pages**
  INCOIS is maintaining Web-GIS based site for Indian Argo Program. It contains entire Indian Ocean floats data along with trajectories. Further details can be obtained by following the link:
  http://www.incois.gov.in/incois/argo/argo_home.jsp.
- **Statistics of Argo data usage**
  Argo data is widely put to use by various Organisations/ Universities/Departments. INCOIS Argo web page statistics (for the past one year) are as shown below

Page	Views	Visitor
Argo Web-Gis	827	395
Data downloads	784	1092
Live Access Server	1,62,034	74,091
Argo products	1169	444

1.4 Status of Delayed Mode Quality Control process

With the support from CSIRO, DMQC s/w developed at CSIRO is installed at INCOIS and majority of the problems are resolved.

- Using this s/w reprocessing of all the eligible floats data is done. Around 140 floats were passed through the DMQC s/w and the following problems are tackled
  - Pressure Sensor offsets.
  - Salinity drift.
  - Salinity Hooks.
  - TBTO problems.
  - TNPD problems. etc
- Around 81 % of FLOATS are DMQCied for INCOIS DAC.
  - Lack of CTD profiles in some of the region in North Indian Ocean is still a critical problem when decision is to be taken for the complicated cases.

1.5 Trajectory files status:

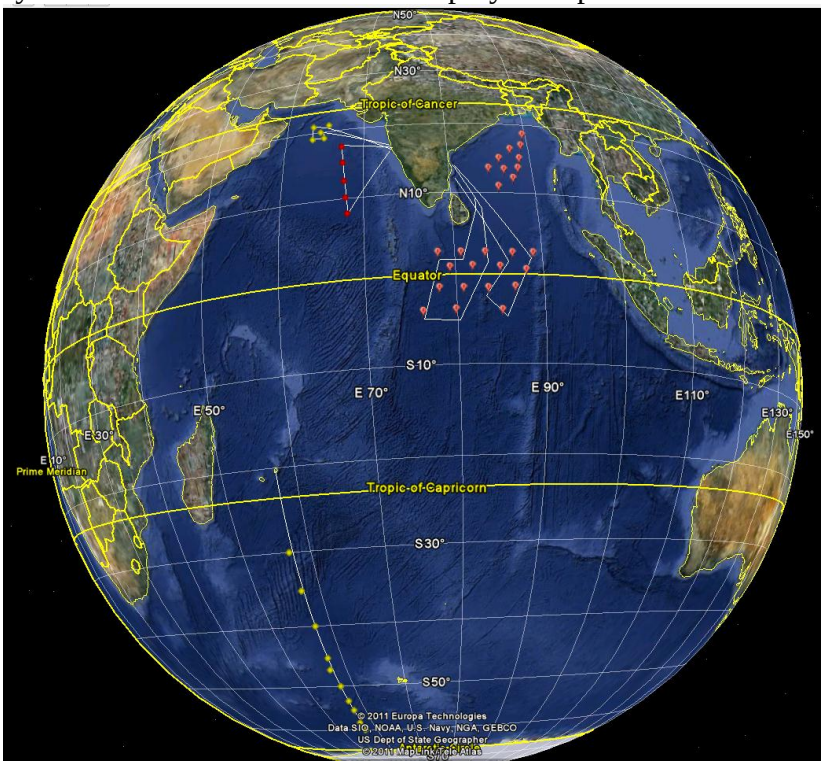
A total of 2**06 trajectory** netcdf files were processed and uploaded to the GDAC. The process of generation of trajectory netcdf files undergoes quality checks like position, time, cycle number, etc., and corresponding quality status is assigned to each parameter.

2. Present level of and future prospects for national funding for Argo including a summary of the level of human resources devoted to Argo.

Indian Argo Project is a 5 year Program started from April 2007 to March 2012 and it is fully funded by Ministry of Earth Sciences, Govt. of India. Funding is secured upto 2012 for deployment of 45 Argo floats, Data management activities, Data analysis, etc. Efforts are underway to secure funds for 200 floats during the years 2012-17.

3. Summary of deployment plans (level of commitment, areas of float deployment)and other commitments to Argo (data management) for the upcoming year and beyond where possible.

India committed to deploy floats in North Indian Ocean wherever gap exists. Also plans to deploy few tens of floats in the Southern Indian Ocean. During the year 2011-12, India plans to deploy 45 floats and the locations of deployment plan are shown below:



For the above 45 floats to be deployed, 25 floats are in hand and order has been placed for the remaining 20 floats. All these floats will be deployed using Indian research vessels.

4. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centers.

- Argo data has been widely utilized to understand the Indian Ocean dynamics, especially Dipole event, understanding the monsoon system in relation to heat content, buoyancy flux of the Indian Ocean and for validation of OGCM.
- In a major initiative, INCOIS started providing global ocean analysis products with assimilation of all *in situ* data (Argo, XBT and Moorings). These products are generated using OGCM (MOM) with GODAS assimilation system. These products are being made available at INCOIS Live Access Server (las.incois.gov.in).
- INCOIS is hosting Indian Ocean ARC, wherein all floats data from Indian Ocean region are archived and distributed apart from many products

5. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo. These might include tasks performed by the AIC, the coordination of activities at an international level and the performance of

the Argo data system. If you have specific comments, please include them in your national report.

Nil

6. Bibliography

Subrahmanyam, B., V. S. N. Murty, and D. M. Heffner, 2011: Sea surface salinity variability in the tropical Indian Ocean. *Remote Sensing of Environment*, 115, 944-956.

Bhaskar, T. V. S. U., D. Swain, and M. Ravichandran, 2010: Sonic Layer Depth variability in the Arabian Sea. *International Journal of Oceans and Oceanography*, 4, 17-28.

Bhaskaran, P. K., R. R. Kumar, R. Barman, and R. Muthalagu, 2010: A new approach for deriving temperature and salinity fields in the Indian Ocean using artificial neural networks. *Journal of Marine Science and Technology*, 15, 160-175.

Sharma, R., N. Agarwal, I. M. Momin, and V. K. Agarwal, 2010: Mixed Layer Depth and its Variability in the Eastern Equatorial Indian Ocean as Revealed by Observations and Model Simulations. *Marine Geodesy*, 33, 154-163.

Sharma, R., N. Agarwal, I. M. Momin, S. Basu, and V. K. Agarwal, 2010: Simulated Sea Surface Salinity Variability in the Tropical Indian Ocean. *Journal of Climate*, 23, 6542-6554.

7. CTD data base

Efforts are underway to archive all CTD acquired by different PIs.