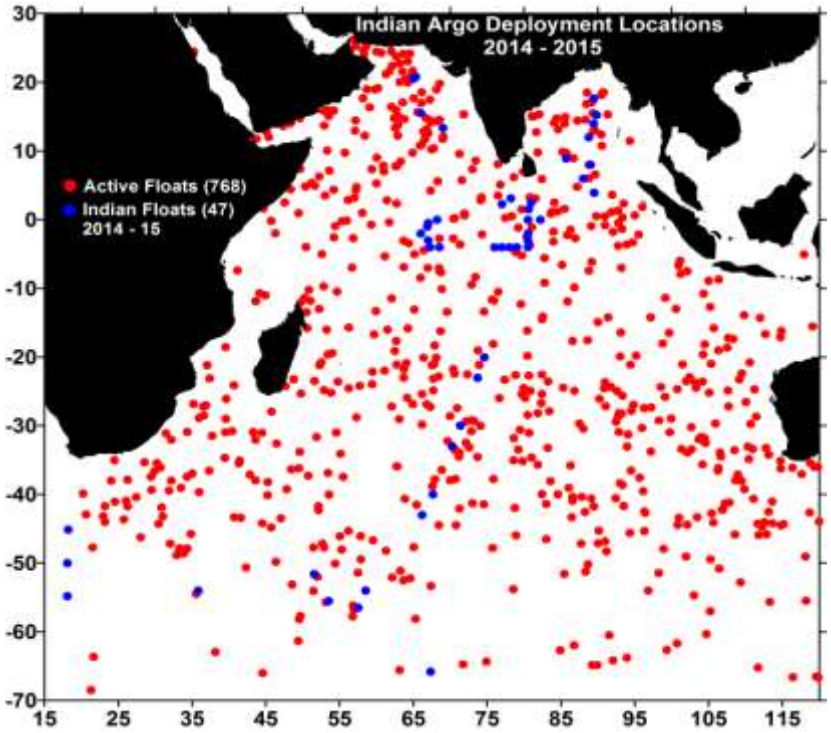
Argo Steering Team Meeting (AST-16)

National Report – India
(Submitted by M Ravichandran)

1. The status of implementation

1.1a Floats deployment

During the year 2014–15, 47 floats (Blue color in the below figure) were deployed in the Indian Ocean taking the total to 365. The new deployment includes 13 Bio-Argo floats with additional sensors like Doxy, FLBB, Chla and 2 floats with ice detection software.



1.1b performance Analysis of Floats deployed

Out of 365 floats deployed so far 117 floats are actively giving data. Out of these 117 active floats, 94 floats are less than 3 years old.

1.2 Technical problems encountered and solved

None

1.3 Status of contributions to Argo data management

- **Data acquired from floats**
  India had deployed 365 floats so far. Out of these 117 floats are active. All the active floats data are processed and sent to GDAC.
- **Data issued to GTS**
  TESAC format messages from these floats are being sent to GTS via New Delhi RTH. The issue wrt to the GTS messages not appearing in meteo France is still continuing.

- **Data issued to GDACs after real-time QC**
  All the active floats (117) 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	922	1052
Data downloads	1237	1476
Live Access Server	2,40,189	1,03,227
Argo products	1522	901

  - Argo data viewer developed at INCOIS and supplied to the users through DVDs is now also available from Argo UCSD web site. The link for viewing the same is: http://www.argo.ucsd.edu/incois_ADV.html
  - User interactions were conducted to bring about awareness about the Argo data among the researchers and students from various organizations and universities respectively.
  - INCOIS is also conducting University outreach program where in scientist visit various universities to bring about the awareness about the data with INCOIS. Students are encouraged to use Argo data for their MS thesis dissertations, thereby giving wide publicity to the Argo program. The publications and dissertations arising out of the Argo program are well documents with INCOIS.
  - INCOIS also started issuing projects to universities to utilize the Argo data. A visualization project using Argo data is sanctioned to IIIT, Bangalore.

1.4 Status of Delayed Mode Quality Control process

DMQC is done on all eligible floats on a routine basis.

- Around 190 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 60 % of FLOATS are DMQCed for INCOIS DAC.

1.5 Trajectory files status:

A total of 362 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 (April 2012 to March 2017) fully funded by Ministry of Earth Sciences, (MoES), Govt. of India. Funding is secured for deployment of 200 Argo floats (40 floats per year including 10 Bio-argo floats), Data management activities, Data analysis, etc. until 2017.

Three Permanent and three temporary scientific/technical personnel are working under Indian Argo project, which include personal for deployment of Argo floats, Data system, Analysis of Data, etc.

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 is committed to deploy floats in the Indian Ocean wherever gap exists. India has committed 40 floats per year until 2017 (10 floats in the Southern Ocean, 10 floats in the Bay of Bengal, 10 floats in the equatorial Indian Ocean and remaining 10 in the Arabian Sea). Out of 40 floats, 10 floats will be bio-argo floats. After ascertaining the gap region and cruise plan of MoES research vessels, these floats will be deployed. The existing data management resources will continue until 2017.

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

Operational: All Argo data are being routinely assimilated in Ocean Model for providing Global ocean analysis. This analysis is being used by MET department for initialization of coupled ocean-atmosphere forecast of the Monsoon. From the year 2011, India could provide seasonal forecast of monsoon using dynamical model wherein Ocean analysis (with assimilation of Argo) is an important contribution. The analysis products are being made available at INCOIS live access server (las.incois.gov.in)

Research: Argo data are being widely used for many applications to understand the Indian Ocean dynamics, cyclone and monsoon system in relation to heat content, thermosteric component of sea level and validation of OGCM by various Indian institutions and university students.

Argo Regional Centre (ARC) - Indian Ocean
(http://www.incois.gov.in/argo/ARDCenter.jsp)

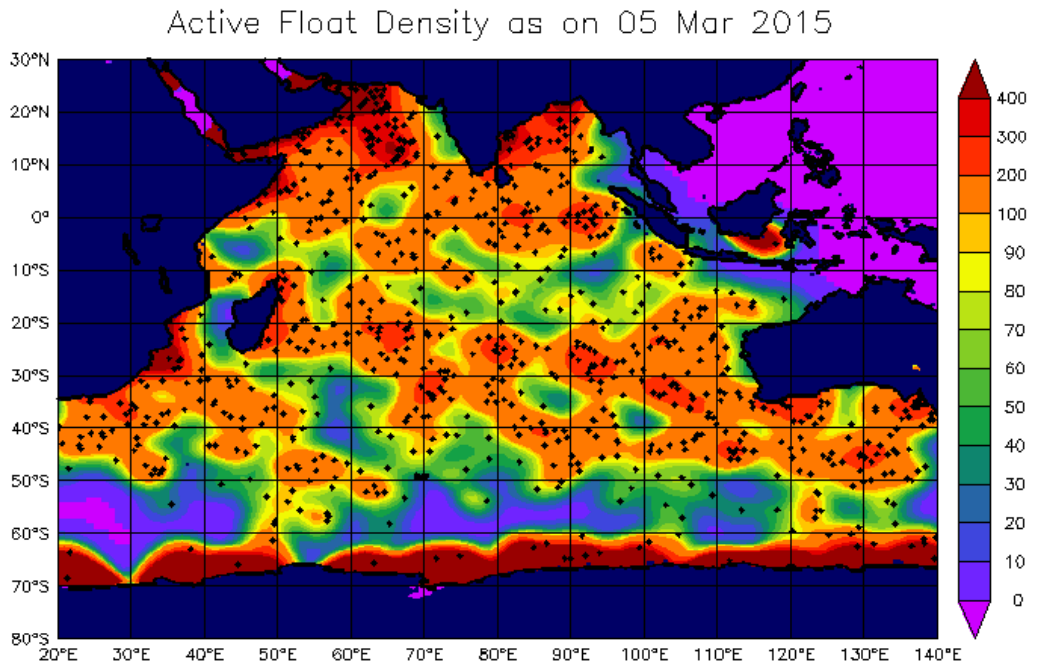
- Acquisition of Argo data from GDAC corresponding to floats other than deployed by India and made them available on INCOIS web site.
- Delayed Mode Quality Control
  (Refer 2.0 above)

- Data from the Indian Ocean regions are gridded into 1x1 box for monthly and 10 days and monthly intervals. These gridded data sets are made available through INCOIS Live Access Server (ILAS). Users can view and download data/images in their desired format.
- Data Sets (CTD, XBT, Subsurface Moorings) are being acquired from many principle investigators. These data are being utilized for quality control of Argo profiles.
- Value added products:

  Two types of products are currently being made available to various user from INCOIS web site. They are: (i) Time series plots corresponding to each float (only for Indian floats). This include Water fall plots, Surface pressure, Bottom most pressure, Surface temperature, Bottom most temperature, Surface salinity, Bottom most salinity, Trajectory of float, T/S plots. Also, Spatial plots using the objectively analysed from all the Argo floats data deployed in the Indian Ocean. This includes Temperature (at 0, 75, 100, 200, 500, 1000 meters), Salinity (at 0, 75, 100, 200, 500, 1000 meters), Geostrophic Currents (at 0, 75, 100, 200, 500, 1000 meters), Mixed Layer Depth, Isothermal Layer Depth, Heat Content up to 300 mts, Depth of 20 deg and 26 deg isotherms. These valued added products can be obtained from the above web site.

- Other statistics

- Regional Co-ordination for Argo floats deployment plan for Indian Ocean. The float density in the Indian Ocean as on 05 March 2015 is shown below.



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.

None

6. As part of an action item from AST-15 aimed to improve CTD cruise data being added to the reference database by Argo PIs, it is requested that you include the number and location of CTD cruise data uploaded by PIs within your country to the CCHDO website in the past year. These cruises could be used for Argo calibration purposes only or could be cruises that are open to the public as well.

None

7. Argo bibliography

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