Argo National Data Management Report (2010) – India

1. Status

- **Data acquired from floats**
  India has deployed 9 new floats (9-APF9A with near surface temperature mission) in 2010 in the Indian Ocean taking its tally to184 floats so far. Out of these 68 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 and hence we are not able to send Indian floats data to GTS. Up on our request CLS ARGOS is still continuing to send Indian floats data in TESAC format to GTS.

- **Data issued to GDACs after real-time QC**
  All the active floats (68) data are subject to real time quality control and are being successfully uploaded to GDAC. RT s/w obtained in collaboration with CSIRO is extensively used for the same. The support of CSIRO in term of the Real Time S/W is highly acknowledged.

- **Data issued for delayed QC**
  In total 73% of the eligible profiles for DMQC are generated and uploaded to GDAC. Lack of manpower is hindering rapid progress in generating DMQC profiles.

- **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. Apart from the floats deployed by India, data from floats deployed by other nations in the Indian Ocean are received from the Argo Mirror and made available in the INCOIS website. User can download the data based on his requirement.
  - Statistics of Indian and Indian Ocean floats are generated and maintained in INCOIS web site. The density maps for aiding people for new deployments are made available on a monthly basis. For full details visit http://www.incois.gov.in/Incois/argo/argostats_index.jsp.

- **Trajectory**
  1. A total of **167 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. Finally a visual check is performed to verify that there are no missing cycles without cycle numbers and to check the surface time intervals.
  2. **17 (PROVOR) floats** are not eligible for the processing of the trajectory data files in current processing procedure and a new method has to be adopted.

- **Statistics of Argo data usage**
  Argo data is widely put to use by various Organisations/ Universities/ Departments. Indian Meteorological Department (IMD) is using Argo data for their operational purpose. Scientists, Students and Researchers from INCOIS, NIO, SAC, C-MMACS, NRSA, IITM, NCMRWF, IISc etc are using Argo data in various analysis. Many paper based on Argo data were also published in reputed journals. See the references below.

  INCOIS Argo web page statistics (for the past one year) are as shown below

Page	Hits	Visitors
Argo Web-GIS	2137	1017
Data download	8252	417
Live Access Server	1027	519
Argo products	812	302

- **Products generated from Argo data**
  1. Value added products obtained from Argo data are continued. Many products are generated using Argo temperature and salinity data. The Argo T/S data are first objectively analysed and this gridded output is used in deriving value added products. More on this can be see in the RDAC functions.
  2. Version 2.0 of DVD on "Argo data and products for the Indian Ocean" is released to public for use. This DVD consists of ~ 1,25,000 profiles and products based on the Argo T/S. A GUI is provided for user to have easy access to the data.
  3. Updation to Mixed Layer Climatology based purely on Argo observation is in progress. All the profiles from 2009 – 2010 will be used for this. This is being done on a special request from Indian Navy.
  4. To cater to many users of INCOIS LAS, it is enhanced in term of capacity. New Server is procured and new products will be made available in near future. For further details visit http://las.incois.gov.in.

2. Delayed Mode QC

- INCOIS started generating and uploading D files to GDAC form July 2006, and as of today, profiles belonging to all eligible floats have been subjected to DMQC.
- Advanced Delayed Mode Quality Control s/w developed by CSIRO is successfully transferred to INCOIS. Using this s/w all the eligible floats are reprocessed to tackle pressure sensor offset problems, salinity hooks, thermal lag corrections, salinity drifts.
- Lack of enough historical background data is hindering the DMQC processing. But majority of the Indian floats are found not to have big drifts in the salinity sensors.
- About 73% of the eligible profiles are subjected to DMQC and the delayed mode profiles are uploaded on to GDAC.

3. GDAC Functions

INCOIS is not operating as a GDAC.

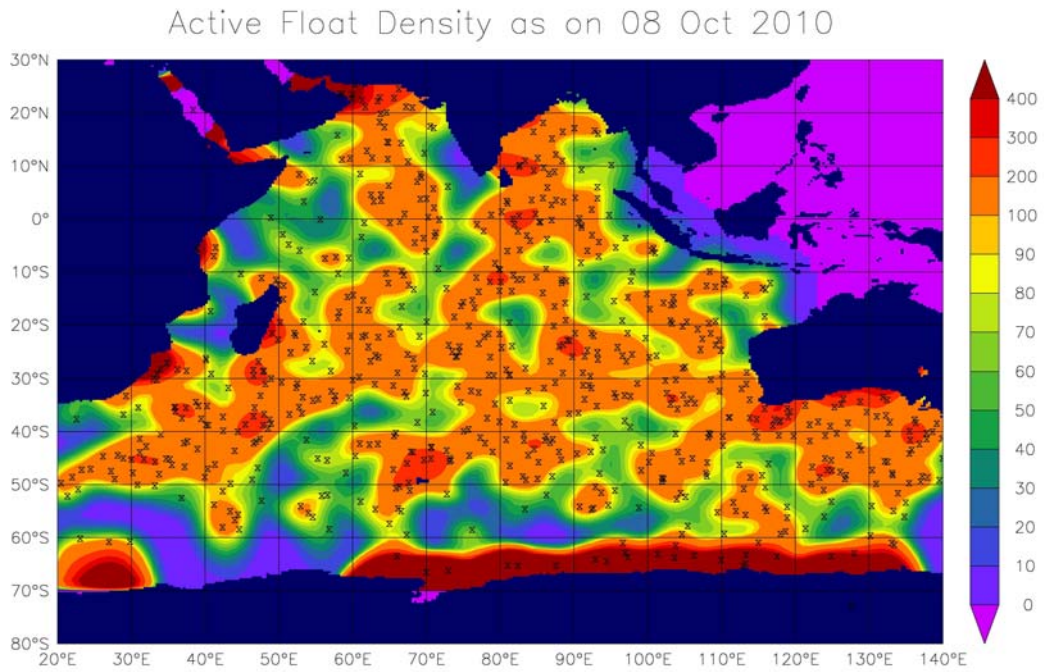
4. Regional Centre Functions

- 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.
- Additionally SST from TMI and Wind from Quickscat, Chla from MODIS and OCM are also made available on daily and monthly basis.
- Data Sets (CTD, XBT) 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 the following plots:
    - Water fall plots
    - Surface pressure
    - Bottom most pressure
    - Surface temperature
    - Bottom most temperature
    - Surface salinity
    - Bottom most salinity
    - Trajectory of float
    - T/S plots.

  (ii) 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 following link http://www.incois.gov.in/Incois/argo/products/argo_frames.html
- Regional Co-ordination for Argo floats deployment plan for Indian Ocean. The float density in Indian Ocean as on 08 Oct, 2010 is shown below.



Publications:

1. Sindu Raj Parampil, Anitha Gera, **M. Ravichandran**, and Debasis Sengupta, (2010). Intraseasonal response of mixed layer temperature and salinity in the Bay of Bengal to heat and freshwater flux, *Journal of Geophys. Research*, Vol 115, C05002, pp 17.
2. V.V. Gopalakrishna, F.Durand, K.Nisha, M.Lengaigne, T.P.Boyer, J.Costa, R.R.Rao, **M. Ravichandran**, S.Amrithash, L.John, K.Girish, C.Ravichandran, V.Suneel,(2010). Observed intra-seasonal to inter annual variability of the upper ocean thermal structure in the south eastern Arabian Seaduring 2002–2008. DSR-Part 1, Vol 57 (6), pp 739 – 754.
3. Prasad Kumar Bhaskaran, Ravindran Rajesh Kumar, Rahul Barman, **Ravichandran 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, Vol 15 (2), pp 160 -175.
4. **Udaya Bhaskar, T.V.S**, Debadatta Swain, **M. Ravichandran,** (2010). Sonic Layer Depth variability in Arabian Sea. International Journal of Ocean and Oeanography, Vol 4 (1), 17 - 28.