

Indian National Report (AST-11)

(Submitted by M Ravichandran)

Organization of Indian Argo Project

- a) The Indian Argo Project, fully funded by the Ministry of Earth Sciences (MoES), Government of India is implemented by the Indian National Center for Ocean Information Services (INCOIS) of MoES at Hyderabad.
- b) The Indian Argo Project for the year 2007-2012 envisages (a) Deployment of 200 Argo floats in the Indian Ocean, (b) Argo Data Management Activities, (c) Development of Ocean Data Assimilation System, (d) Analysis and utilization of Argo data and (e) Capacity Building at National level.
- c) Several R&D Institutions including the National Institute of Oceanography at Goa, NCAOR, Goa, Space Applications Centre, Ahmedabad, National Remote Sensing Centre, Hyderabad, Indian Institute of Tropical Meteorology, Pune, National Centre for Medium range Weather Forecasting (NCMRWF), New Delhi, Centre for Mathematical Modelling and Computer Simulation (C-MMACS), Bangalore participate in the utilization of Argo data. Efforts are underway to encourage and enable academic institutions in this endeavour.

1. The status of implementation

1.1a Floats deployment

16 floats have been deployed during the year 2009.

1.1b performance Analysis of Floats deployed

Out of 184 floats deployed so far, 79 floats are active. Out of these 79 active floats 48 floats are less than 3 years old.

1.1c Software support of CSIRO is continuing

CSIRO is extending full support with regards to the Real Time data processing software. We take this opportunity to thank the CSIRO team for sharing the software and continuing the 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 184 floats so far. Out of these 79 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. Upon 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 (79) data are subjected 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	Hits	Visitor
Argo Web-Gis	3210	1291
Data downloads	7487	421
Live Access Server	582	117
Argo products	811	267

1.4 Status of Delayed Mode Quality Control process

- 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. John Gilson's GUI is extensively used at different stages of DMQC. It is appreciated that he extended whole hearted support in setting up the GUI and slight modifications required due to platform change.
- Number of Real time profiles from INCOIS DAC : 22,763.
- Number of Delayed Mode profiles from INCOIS DAC: 12159.
- 53 % of FLOATS are DMQCied.

Major hurdles for DMQC are

- Lack of CTD profiles from 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 **180 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. 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 from April 2007 to March 2012 fully funded by MoES, Govt. of India. Funding is secured upto 2012 for deployment of 200 Argo floats (40 floats per year), Data management activities, Data analysis, 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 committed to deploy floats in North Indian Ocean wherever gap exists. Also plans to deploy few tens of floats in the Southern Indian Ocean. Received 15 floats with Iridium communication with standard CTD and these floats will be deployed in the equatorial Indian Ocean during July 2010. Another 30 floats are planned to procure and deploy where the gap exists in Indian Ocean (10 floats in Southern Ocean). After ascertaining the gap region and cruise plan of MoES research vessels, these floats will be deployed.

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.
- Efforts are underway to assimilate argo data in OGCM to realize operational forecast of ocean variables Indian Ocean region.
- 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. Summary of the number and location of CTD cruise data to the CCHDO website.

Nil

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*, in Press.
2. Udaya Bhaskar, T. V. S., Rahman, S. H., Pavan, I. D., Ravichandran, M. and Nayak, S.(2010), Comparison of AMSR-E and TMI sea surface temperature with Argo near-surface temperature over the Indian Ocean, *International Journal of Remote Sensing*, 30:10, 2669 — 2684.