

Argo Chinese National Report 2012

(Jianping Xu & Zenghong Liu, The Second Institute of Oceanography, SOA)

1. The status of implementation (major achievements and problems in 2012)

- floats deployed and their performance

In 2012 China deployed 20 floats in the northwestern Pacific Ocean through two cruises during June-September and December, respectively (Figure1). All of them were deployed by the Second Institute of Oceanography, SOA (CSIO), in which 9 floats were iridium APEX floats, and the remaining 11 were standard APEX floats. All the floats worked normally except one float (WMO number: 2901489) reported bad salinity data. Of them, 12 floats were installed lithium battery packs by the technicians from CSIO. China Argo has deployed 153 Argo floats since 2002, and 83 floats were still active as of 29 Jan, 2013.

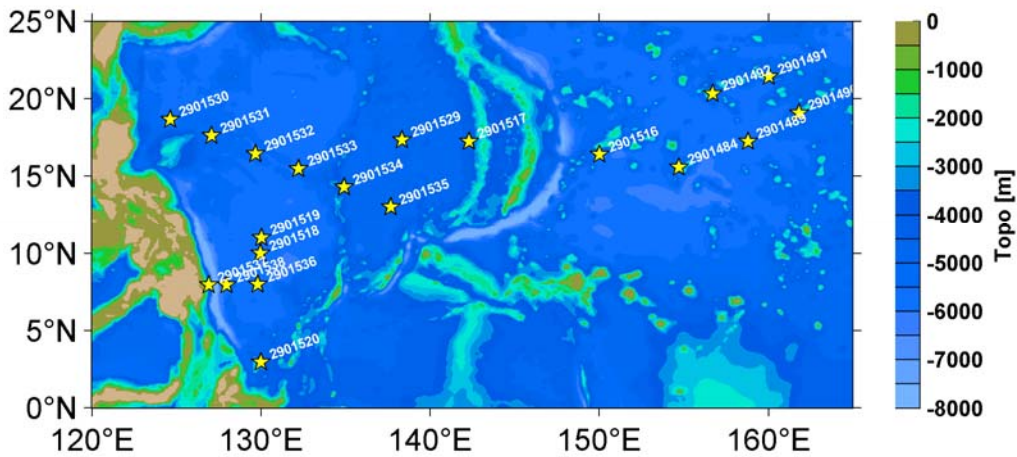


Fig.1 Launch positions of Chinese Argo floats in 2012.

In August 2012, AIC technical coordinator – Mr. Belbeoch Mathieu informed that two floats (WMO number: 2901515 and 2901617) were redeployed near Galle, Sri Lanka by National Aquatic Resources Research and Development Agency (NARA) after they were captured by fisherman of Sri Lanka. The float 2901515 belongs to CSIO and was recovered by local fisherman at the end of December 2011, whereas the float 2901617 belongs to the East China Sea Branch, SOA. After redeployment, the float 2901515 was allocated a new WMO number (2902365) and reported good data, while the another float didn't survive the redeployment. AIC then changed the ownership of this active float and put Sri Lanka in the list of Argo supporting countries. We are gratified that a new member state was added into International Argo. However, AIC should have notified its owner before changed the ownership of the float. We thank Dr. K. Arulanthan and Dr. R.M.R.M. Jayathilaka from NARA for their sincere help.

In September 2012, another Chinese float (ARVOR) which was deployed in the northwestern Pacific was notified drifting into the coastal waters of Hainan Island. CSIO immediately entrusted local fishery management agency to find this float in home of a fisherman. CSIO has recovered the float and notified the manufactory – NKE Instrumentation through the sales representative in China. NKE is willing to recall it and analyze the technical malfunction

(noted that this float always drifted at sea surface after deployment).

- technical problems encountered and solved

Currently two APF9a floats equipped with SBE41 CTD sensor (WMO number: 22901512 and 2901489) reported bad salinity measurements since their first profiles (Table 1 and 2). We have contacted with TWC for this issue, but they answered that Sea-Bird Electronics has finally looked through their internal test and calibration records and could not find any anomalies. So we can't find out what led to this technical problem.

Table 1. Comparison of salinity data between float 2901515 and nearby float

Cycle	Pressure (dbar)	Salinity	Nearby Salinity
1	1500.2	2.474	34.964
2	1500.4	11.538	34.983
48(LATEST)	1498.3	17.910	34.981

Table 2. Comparison of salinity data between float 2901489 and nearby float

Cycle	Pressure (dbar)	Salinity	Nearby Salinity
1	1999.7	14.085	34.603
2	1999.9	28.528	34.600
18(LATEST)	1900.1	29.710	34.600

-status of contributions to Argo data management (including status of pressure corrections, technical files, etc)

In 2012, China Argo submitted 3126 TS profiles (including 182 O2 profiles) to GDAC. Coriolis still helped us decode Argos messages from 8 active ARVOR floats. All data were distributed on GTS by CLS. We would thank Mr. Bernard from CLS for his selfless help.

Due to the lack of manpower, some actions of the ADMT haven't been done until now (e.g. resubmission of O2 profiles, update of a few technical files from PROVOR floats). It's a challenge for us to implement all the actions in a short time. We expect China Argo will be brought into national operational system in the near future, and change the situation of China Argo funded by research programs.

- status of delayed mode quality control process

CSIO submitted a total of 6888 D-files to GDAC in February and December 2012, respectively. We implemented surface pressure, CTM and OW salinity correction in DMQC. Until now, CSIO has submitted 7412 D-files which account for about 81% of the profiles. The main difficulties we encountered during DMQC are lack of historical CTD casts and difficult to carry out efficient DMQC in the Western Boundary Current region (Kuroshio) where exists larger salinity variations.

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

China Argo is mainly funded by research programs mostly from Ministry of Science and Technology (MOST), State Oceanic Administration (SOA) and National Natural Science Foundation of China (NSFC). In 2012, China Argo was funded by a special project of Science and Technology basic work from MOST, through which 35 floats will be deployed in the western Pacific in the following 5 years. Until now, China Argo hasn't been brought into operational ocean system, so the number of yearly deployment is unstable. At CSIO (Hangzhou), there is a group (about 5 persons) in charge of float deployment, Argo data processing (RT/DMQC), data exchange and Argo related products development. There are 3 persons in charge of Argo data processing, products development, and global Argo data collection and archives at NMDIS (Tianjin). SOA is considering bringing China Argo's operation into ocean observing and prediction system, and providing 50 floats every year.

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

In 2013 we estimate that China Argo will deploy about 40 floats, in which 20 are stocked. Because we haven't got any funding for float deployment cruise, so we have to look for appropriate cruises or opportunities to deploy these floats. Only one cruise has been confirmed until now, that is the South China Sea Institute of Oceanology, Chinese Academy of Sciences (SCSIO) will deploy two floats in Indian Ocean during March.

4. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centers. Please also include any links to national program Argo web pages to update links on the AST and AIC websites.

Argo data has been operationally used in ocean and atmosphere prediction and forecasting models in China. The agencies affiliated to SOA and Chinese Academy of Sciences developed some Argo products in order to prompt the application of Argo data. The products include:

CORA: a 23-year regional reanalysis product of temperature, salinity and currents for the China coastal waters and adjacent seas developed by NMDIS (www.argo.gov.cn).

BOA_Argo: a monthly ($1^{\circ} \times 1^{\circ}$) gridded temperature and salinity fields of global oceans based on Argo profiles from 2004 to 2011 which was developed by CSIO (www.argo.org.cn).

Surface Current: a dataset (Version 2) of global ocean surface currents for 1999-2010 derived from Argo float trajectories developed by Institute of Atmospheric Physics (IAP), Academy of Sciences (www.argo.org.cn).

The Argo data and its derived products are widely used in scientific areas of ocean and atmosphere basic research. According to incomplete statistics, 48 Argo related papers have been published on domestic and overseas journals (see the section of 'Keeping the Argo bibliography') in 2012. In 2003, CSIO and IAP once launched the first workshop of Chinese ocean data assimilation. From then on, seven workshops have been held. At least 1/3 conference papers were related to Argo in each meeting. During the 7th workshop of Chinese ocean data assimilation in 2012, 47 papers were submitted and 36 papers were related to Argo, which accounts for 76% of all the papers. Besides, CSIO once held the first Argo Science

Workshop at Hangzhou in 2006, under the support of MOST and SOA. There were 75 participants from 20 agencies attended the meeting, and 25 papers were submitted. One book named 'The collection of Argo Application papers' was published by Chinese Ocean press after the workshop. To further prompt the application of Argo data in the scientific area of ocean and atmosphere, CSIO plans to hold the 8th Chinese ocean data assimilation & the 2nd Argo Science workshop at Zhoushan, Zhejiang in the early of November 2013.

China Argo always concerns about the activities of Pacific Argo Regional Center (PARC), it will take up the activities of PARC and contribute more to international Argo with other countries around the Pacific, once China Argo gains the long-term operational funding. China Argo will contribute to the funding of the AIC as before.

There are two websites constructed by China, one is maintained by NMDIS (www.argo.gov.cn) at Tianjin (China Argo data center), and another is maintained by CSIO (www.argo.org.cn) at Hangzhou (China Argo Real-time data center). Through them, the implement status of China Argo, real-time data display including T/S/O₂ profiles, float trajectory, profile data, the derived products and status of global Argo are presented. Meanwhile, GDACs, related international organizations and member's Argo websites can be accessed through these two websites.

5. To continue improving the number of 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.

In the past year, we submitted 64 CTD casts to Coriolis. All CTD data were obtained from the cruise conducted by the Institute of Oceanology, Chinese Academy of Sciences from November to December 2012 in the northwestern Pacific. The contribution from the principal scientist of this cruise – Dr. Dongliang Yuan is appreciated. We will continue to collect and distribute recent CTD casts for Argo DMQC reference dataset.

6. Keeping the Argo bibliography

In 2012, China Argo published a special issue named 'Argo-China' in *Atmosphere-Ocean* (Volume 50, Guest Editor: Dake Chen). 10 papers related to Argo were published in this special issue. There are 48 papers related to Argo published in domestic and overseas journals this year.

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