

# **China Argo National Data Management Report**

## **The Operational Running and Service of**

### **China Argo Data Center**

China took part in the global Argo program in January 16<sup>th</sup>,2002. Until now 24 Argo floats have been deployed by China and 16 ~ 24 further floats will be deployed in north Pacific, west equatorial Pacific and east Indian Ocean. In order to implement the Argo data management and service, China Argo Data Center was authorized to set up in National Marine Data & Information Service in Nov. 2002 and began to run operationally in July 2003.

At present, the operational system of receiving, processing, managing Argo data has been established. China Argo Data Center processes the data of alive Argo floats deployed by China after the complete profile is received within 24 hours and authorize CLS and IFREMER to insert data to GTS. We have established the global Argo database, distribute Argo data through China Argo Data Center website and distribute Argo data to Chinese users regularly.

The real-time data QC procedure is based on AOML Argo real-time process system and IFREMER help us to issue the data to GDACs. Based on abundant historical data and empirical QC conclusions and oceanological characteristic,we established Argo Quality Control System for delayed-mode data, which includes four parts: preprocess, automatic QC, manual QC and data export.

#### **Preprocess Argo Data**

In order to preform QC conveniently, each Argo float data are ordered serially by observation time, at the same time blank location and time, duplicate profiles and duplicate levels are checked , we eliminate profiles whose time or location is missing and the ones that don't contain valid paramter values.

#### **Automatic Quality Control**

This procedure checks the observation time, location, speed and parameter values of each profile; checks increasing depth, constant profile, spike, gradient, density inversion; checks parameter with climatology and T-S relationship envelope.

## **Visual And Interactive Quality Control**

This part provides some figures to check the profile visually, also provide interface to browse data and edit QC flags. These figures include trajectory chart, profile map, figure for adjacent profiles, climatologic and T-S relationship envelope. In this procedure, data which failed to pass automatic QC will be checked again, and we can improve the reliability of the data, and optimize QC parameters according to the results.

## **Export Data And Generate Figures**

This part exports the data in ASCII format ,generates float and profile index files, generates temperature and salinity profile maps, waterfall maps and T-S relationship maps.

Based on the QC results of global Argo data, we find that the data is satisfying in general, but also has some problems:

1. The julian day or location of the profile is missing. We eliminate these profiles.
2. Abnormal drift speed: (we suggest that the speed limitation be no more than 1.0 m/s), set QC flag '4' for this profile.
3. The observation time of two or more profiles of the same float are very closed to each other. We reserve one profile, eliminate others.
4. Abnormal profile number "000", it is common in gts, we don't know why this happens ,so we reserve it temporarily.
5. Illogical profile sequence.Cycle numbers conflict with the "JULIAN DAY" values, we rearrange the profiles according to "JULIAN DAY".
6. The value of "STATION\_PARAMETERS" is empty, it's not consistent with the parameters in data files.We revise this item according to variables existing in data files.
7. Unrealistically high pressure values (greater than 2500dbar) or inverse pressure with pres\_qc '1'. We set pres\_qc '4' for the pressure.
8. Temperature or salinity values in a profile are constant or near constant. Set QC flag '4' for temperature or salinity profile.
9. Only a few of data in the profile are bad but the profile QC flag is '4'.We apply

a more reasonable profile QC flag according to QC flags of each data value.

Moreover, we suggest to add MD5 checksum into the index files on the FTP site of the global Argo data center. At present, the FTP site provides index files of the meta-data files, trajectory files and profile files, the index files contain the data file name, observation time, longitude, latitude and the last update time. Argo users can download the data files which meet the conditions conveniently.

But as a result of the huge downloading quantity, the unreliable network, and the software may have bugs, the data files downloaded maybe are not absolutely same as the ones on ftp site. The full name of MD5 is Message-Digest Algorithm 5 which came forth in the nineties of the twentieth century and evolved from MD2, MD3 and MD4. This algorithm can figure out a 128-bit message digest from plenty of information. Different information lead to different message digest. So that we can figure out the message digest of each file based on MD5 algorithm and put it into the index file on the global Argo data center's FTP site.

Therefore, users compare the MD5 checksum of the downloaded data files with the MD5 checksum in the index files to judge whether the downloaded data files are right or not. If not, users must download the data files again. At present, many web sites adopt this technique to validate downloaded data. Using this method, we can assure that users can download complete and right Argo data.

With the implementation of China Argo Project, many organizations and institutes take more attention to Argo and study the application of ARGO data. China Argo Data Center promotes using of ARGO data in China oceanography research, the main functions are:

1. Process the data of alive Argo floats deployed by China within 24 hours, authorize CLS and IFREMER to insert data to GTS. Copy Argos messages obtained from APEX floats and send it to IFREMER for data processing and distribution.
2. Download near real-time Argo data from global Argo data center.
3. Process and distribute near real-time Argo data.
4. Get, process and distribute Argo deployment information form AIC.
5. Perform quality control to delayed-mode Argo data and distribute them through

web.

6. Develop some products using Argo delayed-mode data.
7. Make Argo data CD
8. International Argo data cooperation and exchange.
9. Edit newsletter about Argo operational work.

China Argo Data Center will improve Argo data quality control method, improve the function of the Argo Data QC System, develop Argo data assimilation research, improve NCC-GODAS (National Climate Center-Global Ocean Data Assimilation System), study the decreasing of SSS by typhoon in the northwestern Pacific and analysis of water mass in the northwestern Pacific using Argo data, etc. China Argo Data Center will promote the use and generalization of Argo data in China and take part in global argo program more actively.