4Th Argo Data Management Meeting Report

Monterey, California, USA

5-7th November 2003

1. Introduction

Mike Clancy from Fleet Numerical Meteorology and Oceanography Center welcomed the participants to Monterey and to the meeting. He remarked that Argo was an important program to them and as such they were pleased to be hosting the meeting. He wished the meeting success.

The agenda for the meeting was reorganized to meet some participants travel schedules. The revised agenda and timetable appears in Annex 1. The list of participants appears in Annex 2.

2. Review of the Actions from previous meeting.

At the Ottawa meeting 26 actions were issued and most of them have been completed. The exact status can be found in the Annex 3.

The points that were not achieved have been taken up for discussion at this meeting, during discussions on the GDACs (subscription system), on formats (ASCII formats), on delayed mode QC and the GADR (role and CD). New actions, as appropriate, were formulated and are recorded as actions of this meeting. This action list appears in Annex 4.

The mechanism for integrating a correction for a significant drift or offset detected by the delayed mode QC process, into the real-time data processing stream has been postponed and needs further consideration by the AST before something is decided at ADMT level.

3. Review of National system development and milestone updates

Before the meeting, national reports were received from a number of countries. Oral presentations of these reports were not made. Instead participants were invited to add remarks to supplement their reports. These reports are included in annex 6.

The countries were also asked to update the milestones application on AIC WWW site. This was not all done before meeting and DACs/GDACs were requested to do it before 30th November. The table below records the status at the time of the meeting.

RT Operations % complete

	Australia	Canada	China	Coriolis	Japan	Korea	UK	USA
Data acquired from floats	100	100	100	100	100	100	100	100
TESACs issued to GTS	100	100	0	100	100	100	100	100
BUFR issued to GTS	0	0	0	0	0	0	0	0
Metadata sent to GDACs	100	100		100	100	0	100	100
Profiles sent to GDACs	100	100		100	100	0	100	100
Trajectories sent to GDACs	100	100		100	90	0	50	100
Technical sent to GDACs	?	?		0	?	0	?	100
Data sent to PI	100	100		100	100	100	100	100
Web pages for data	100	100		100	100	50	100	100
Web pages for information	100	100		100	50	0	100	100

From these figures we can see that the real-time data stream is in place in most of the countries. For the countries that have not yet set up a national DAC, the data are sent to the

GDAC either through GTS (9% of the data), or through collaboration with another DAC. The next step is to move to BUFR and this is addressed later in this report.

There was the suggestion to modify the list of operations recorded for the real time mode to include the transfer of technical files as well. This was accepted.

DM Operations % complete

	Australia	Canada	China	Coriolis	Japan	Korea	UK	USA
Data sent to PI	100	100		100	0	0	100	0
Data received from PI	0	70		0	0	0	0	0
Profiles sent to GDACs	0	90		0	0	0	0	0
Trajectories sent to GDACs	0	90		0	0	0	0	0
Web pages for data	0	0		0	0	0	0	0
Web pages for information	0	100		0	0	0	0	0

The next step is to set up the delayed mode data stream and a few countries are ready to send some of their quality controlled delayed mode data to the GDACs. They were mainly waiting for the new version of the format to be endorsed by the committee and agreement on the delayed mode process and criteria (see delayed mode topic later in report).

4. Regional Centres

We first dealt with the definitions of the Regional Centres activities and agreed on a set of core and optional functions that had to be implemented.

4.1. Definition of the Functionalities

At the outset, each regional centre will define a geographical ocean area of prime interest. Its activities, then, will support Argo requirements for that region.

Required Functions

1. Compare all of the Argo data in their region of interest with each other and with the best available recent CTD/hydrographic data. The regional centres will acquire the Argo data from one of the GDACs. To acquire the recent CTD data they may find it worthwhile to let some other organization(s) assemble the data from the various sources and then forward them all together
2. Establish a mechanism, in concert with other regional centres and DACs, for sending feedback to the PIs to alert them to apparent problems in their data. It is important that all regional centres use the same mechanism to alert PIs of problems. It is suggested that the Regional Centres contact the appropriate DAC which will then contact the PI. This serves the purpose of alerting the DAC to potential changes and also funnels queries from multiple Regional Centres to a PI.
3. Develop climatologies in concert with other regional centres. It is expected that Regional Centres will need to improve the climatologies that they are working with and make them available to the rest of Argo community.

4. Prepare and distribute Argo data products and services on a regular schedule. The endorsement of the variety of products that may be produced is something to be determined by the AST.
5. Provide documentation of their procedures. Each Regional Centre should describe their data handling and product generation procedures. These descriptions should be available through web access so that users will know what has been done.

The Regional Centres will not serve Argo data and will have to point to GDACs as the official source for ARGO.

Optional activities:

1. Provide scientific QC as a service to national programs without such capabilities. Since some countries contributing to Argo may be without sufficient resources to undertake the scientific QC, the Regional Centres are a logical place for this to occur. This means they will need to identify those profiles not having undergone scientific QC and use the same procedures for this as the PIs are using.
2. Coordinate Argo float deployment plans for the region. Providing advice/guidance on regional deployment needs. At the moment, deployment plans are handled by individual AST members in ocean areas of interest to them. Since the Regional Centres will be looking at the data collected in their region of interest, they will be in a good position to determine where deployments are needed to fill gaps or to be ready when floats reach their operating limits.
3. Develop new quality control tests for real-time or delayed mode if appropriate for the particular region. It may be expected that new procedures will be developed to check data quality and that can be implemented earlier on in the data system. Where possible, this should be implemented at the DACs so that users of the real-time data benefit. Equally, procedures developed that improve the scientific data quality assessment should be passed to PIs when possible.
4. Compare Argo data with model output and with assimilated fields to understand why specific data are rejected by assimilations (e.g. model inconsistencies, systematic data errors). Each Regional Centre will need to make contact with the appropriate modelling centre(s) and arrange for standard or non-standard products to be exchanged.

In addition to these activities, regional centres may wish to compare their products and procedures with those carried out by other centres.

All potential Regional Centres actors agreed to implement at least the required functions and some of the optional ones.

4.2. Status of the regional activities

Argo national programs (and institutions) interested in forming or participating in regional data centres are listed below. The first one listed for each ocean accepted to coordinate the activities of these centres and to work with the others in developing a regional data centre.

- Atlantic Ocean – France (IFREMER/Coriolis) [60N,20S] U.S.A. (AOML) [20N, 40S]

- Pacific Ocean – Japan (JAMSTEC), U.S.A.(IPRC)
- Southern Ocean – U.K.(BODC) [40S,90S], Australia (CSIRO/BOM) [(100E,40S) , (180E,90S]
- Indian Ocean – India (INCOIS), Australia (CSIRO/BOM)) [(100E,0) , (180E,40S], U.S.A. (IPRC)

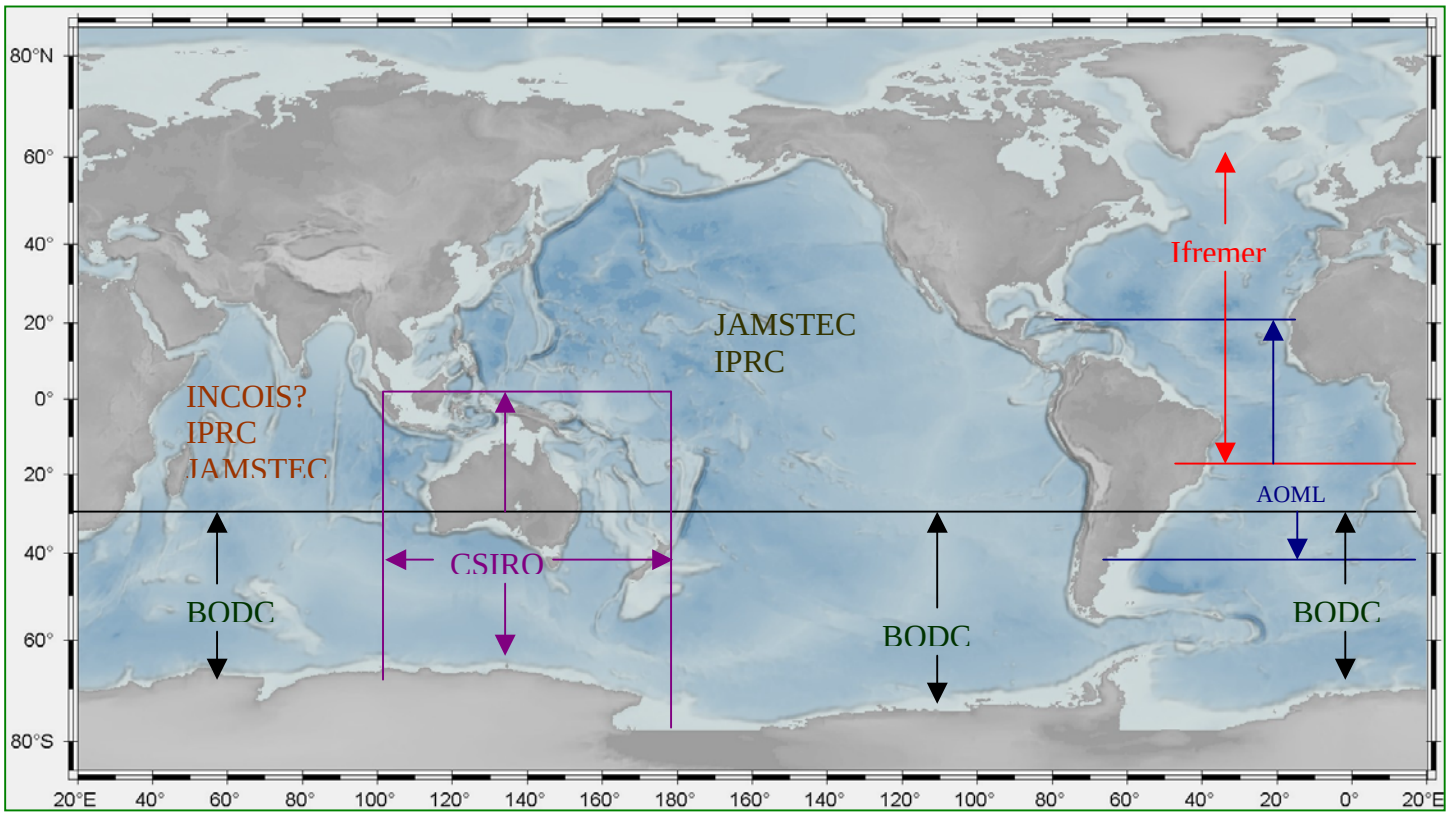


Figure 1 Area of interest of the institutes participating in Regional DACs implementation

More information on detailed plans for each RDAC can be found in annex 5.

The discussion on RDACs included an instruction to the AIC to separate the description of regional coordination from the descriptions of regional centres.

5. Real Time data stream

5.1. Report

B. Keeley reviewed characteristics of the real-time data stream. He noted that

1. the number of floats and volume of data being reported on the GTS was steadily growing.
2. it was not completely clear whose floats were still being inserted on the GTS with no automatic QC but the number did seem to be substantially lower than at the last meeting. He had taken all TESAC data from 2003 and passed them through the automated QC procedures. The failure rate (indicating that QC had not been done) was fairly consistent by month at about 3%.

3. data inserted onto the GTS through LFPW (Toulouse) were still consistently missing the 24 hour target though in August and September some improvements were seen. He noted that about 70% of floats were now getting to the GTS within the 24 hour target.
4. there was the occurrence of exact duplicates on the GTS with a particularly bad record occurring in mid June
5. there were also near duplicates appearing on the GTS where partial profiles were appearing both before and after full profiles. Although the number of occurrences is not large, we should make an effort to suppress these.
6. since Feb, 2003, the fraction of Argo profiles appearing at the GDACs that only derived from the GTS had dropped from about 30% to under 10%.

Subsequent discussions added information on this topic

- Coriolis has recently modified its transfer of TESACs to Meteo-France for insertion on the GTS and this is the reason for the improvements noted in item 3 above.
- The meeting was informed by M. Belbeoch that CLS had very recently implemented real-time QC procedures and that this likely would take care of the floats without QC noted in item 2 above. He cautioned, however, that there was limited flexibility in the software to adjust to format changes in messages sent by the floats.

Actions to address some of these issues are recorded in annex 4.

5.2. New RT Procedures

Thierry Carval proposed a new test to detect jumps and offsets in profiles. There was general agreement on the desirability of this, with some discussion surrounding how to refine the procedures that he proposed. He was asked to rewrite the proposal taking into account the discussion and to distribute this by email for acceptance.

He also proposed that each DAC should make available the list of floats for which it is believed that profile information is bad. There was much discussion about what was called the "grey list". The meeting agreed that such a list was a good idea and that DACs would implement this and send copies of their grey lists routinely to the GDACs. Thierry was asked to rewrite the proposal again for clarity and to add a stop date to the information to be kept in the list.

Claudia Schmid remarked that she had observed profiles that had what seemed to be an unrealistic lack of variation from one profile to the next. She remarked that these "frozen profiles" should also be tested for. Participants remarked that it was not clear how to find these profiles without good profiles being caught by the test. She was asked to prepare a proposal for such a test to be considered at the next DMT meeting.

5.3. Standardized RT Handling

Bob Molinari noted that the US DAC seemed to be handling profiles that failed the automatic QC tests differently than other DACs. He suggested that this should be clarified. The DMT chairs requested each DAC to provide a description of precisely what actions are taken when profiles fail the procedures. They will compile this information and resolve any differences by email.

6. Delayed mode data stream

A modified delayed mode salinity QC approach developed at IfM Kiel was presented by U. Send. It had become necessary since the WJO method did not work well in the N. Atlantic with deep water mass formation, with both homogeneous and multivalued temperature profiles, and complex basin geometry/bathymetry. The main novel features include usage of uninterpolated historical profiles, selection of only a few isotherms fulfilling special criteria, vertical windowing of the reference data base, reference profile selection and covariance mapping scales weighted by f/H, and shorter timescales derived from mooring and CTD data. These changes resulted in significantly improved agreement of float data with mapped reference data, and also reduced the uncertainty in the mapped fields. For each single float profile a salinity offset to the mapped reference field is obtained by applying a weighted vertical least squares fit between float profile and mapped field.

The improved performance of this method may allow a more objective, reproducible and automatable decision process for accepting a float as good or for correcting a drift or offset. A proposition was to

1) work with the hypothesis that a float is good unless the opposite is shown with high statistical confidence
2) work with the hypothesis that a float salinity will only have an offset or a (piecewise) linear drift.

In that case, a linear fit (offset and slope) should be applied to the estimated profile-by-profile salinity offsets. The uncertainty of the offset and slope of this linear fit can be given. If the offset or the slope are different from zero with high confidence (2 standard errors), a correction should be applied, otherwise the float accepted as good. This approach was endorsed. Uncertainty remained in the discussion as to whether the linear fits should be re-done at regular intervals for the entire period since float deployment, or whether piecewise (e.g. 6 monthly) fits should be used and the past fits never changed. **The AST needs to study this issue and advise the ADMT on the procedure to implement: whether QC can be performed up to the current time or only until 6 months before, or whether QC will be re-done and updated as longer time series become available**.

A step-by-step flowchart has been set up to provide guidelines for delayed-mode operators to assign values to the relevant parameters in the Argo netCDF format Version 2. The relevant qc flag definitions have also been agreed on. **It was agreed that while more refined reference databases and statistical methods are being developed, delayed-mode operators start issuing delayed-mode data in Argo netCDF format Version 2, for floats that are obviously statistically consistent (no drift or offset detected within 2 standard errors) or where the proposed correction is beyond doubt.**

Before issuing delayed mode data, the statistical calibration results for each float should be visually inspected. For this, a small number of diagnostic plots should be proposed by the Science Team, e.g. time series output from the mapping/statistical calibration algorithm, and depth-time contour plots of both the salinity anomalies relative to a float or climatological mean profile and of the anomalies relative to climatology divided by the standard deviation of the climatology (everything larger than 2 standard errors could appear in colour). With such plots, a float where the decision is obvious should only take a few minutes of visual inspection.

It was emphasised that the delayed mode procedures presently approved are statistical methods that ensure that "good" profiles are consistent with reference profiles. They are not calibrated in the sense of comparing with some standard via in-situ or post-calibrations. These

delayed-mode profiles may therefore not be accurate enough for some scientific purposes that involve detecting real ocean change. For these purposes, further expert evaluation, for example by PIs or regional analyses, may be needed.

7. Data Format issues

7.1. History Section

The meeting was informed that there was some discussion still to be resolved on clarifying the document prepared by B. Keeley describing how the history section of the format should be filled. This chiefly centred around how to record the information about delayed mode QC operations. A. Wong and the co-chairs offered to resolve the differences during the meeting and to provide revised text to be included in the User Guide. The meeting agreed.

7.2. Version 2

Participants were asked to make comments on the content revised version of the Users Guide and format version 2 that it contains. A number of comments were received that T. Carval was asked to take note of. Many of these were of an editorial nature and would have no impact on any software development.

A comment was received from Canada concerning a variable assigned a dimension 0. There was some question that this would be interpreted by netCDF software as indicating a second unlimited dimension, something that is not allowed. T. Carval said he would look into this and make the appropriate corrections.

B. King noted that in using technical files, there were no conventions being used to name variables and consequently upper and lower case characters appeared, some used spaces between parts of the variable name, some used underscore characters and so on. He suggested that a minimum convention be adopted and one that would ease software development. He suggested and participants approved restricting technical names to upper case characters only with words joined by an underscore.

He also noted that the units quoted for oxygen were not consistent with the units used by WOCE, micromoles/kg, and that this would be desirable in comparing oxygen data reported form floats with data collected during WOCE. The meeting agreed.

With these decisions, the new format was accepted which cleared the way for DACs to modify their software to conform to the new specifications and then start to send delayed mode data to the GDACs.

7.3. Change Control

The conversion from version 1 to version 2 of the format requires that all DACs convert all of their data holdings and resend them to the GDACs. To avoid problems for both GDACs and users, it would be necessary to closely coordinate this activity. M. Ignazsewski proposed a procedure for managing the changeover. The general thrust of he proposal met with approval, with some discussion on details of how to do it. He was asked to revise the document based on the discussions and this would then provide future guidance. Issues to take note of in the revision would be

- adequate notification to users of a change in the format. It was suggested that notice be immediately placed on the GDAC web pages as well as a pointer to the version to be implemented.
- a broad notice being sent by email to known users at the GDAC.

An aggressive timetable was suggested and agreed to by the DACs and GDACs. It is as follows.

- The revised form of the format version 2 be posted on the internet by mid November. It would include all of the editorial changes noted, inclusion of the text describing how to use the history section and resolution of the possible second unlimited dimension in the trajectory structure.
- As soon as the new version is available, notice be posted at both GDAC web sites informing users of imminent changes and this timetable.
- Notice be sent by email to known users of the GDAC to inform them of changes coming.
- DACs prepare software and write a sample file by 1 Dec.
- GDACs prepare format checking software that will be used to verify DACs are meeting the version 2 format specifications. This to be completed by 1 Dec.
- DACs to inform GDACs when they have sample files ready and to send these to GDACs at the earliest possible date for verification.
- GDACs to build new directories into which the version 2 files will be transferred.
- DACs to begin conversion of any delayed mode data they might have, and real-time data that they hold. On receiving notification from the GDACs, DACs will transfer existing files and begin sending newly received real-time files in version 2.
- Target for complete conversion of GDAC holdings is 31 Dec.

7.4. ASCII Files

A number of participants have received requests for an ASCII form of the netCDF files. The main reasons are that reading netCDF requires the installation of appropriate libraries, and the netCDF is not the most user friendly format to those with no experience in their use. The meeting was informed that both GDACs currently offer ASCII forms now that transcribe information from the netCDF file into ASCII (some of the metadata + all profile data). The Monterey GDAC offers this through their LAS interface and it is a very simple flat file structure. The Coriolis GDAC offers the MEDATLAS format from its GDAC pages.

The meeting agreed that there is no one ASCII form that will meet all needs, but that having two different forms that contained all of the information in the netCDF files also available from the GDACs was a workable solution. Users could examine either one and choose the form that they like the best.

It was also noted that other software tools exist to convert to ASCII such as those using Matlab (offered by Coriolis) and one using software written at IOS in Canada. It was agreed

that these tools, and any others offered by the community, should be referenced at the AIC and on the GDAC sites so that users can have a wider choice.

7.5. BUFR

The meeting reviewed the document submitted by J. Turton describing both the requirement for conversion to BUFR for GTS distribution and a proposed way forward. M. Belbeoch noted that E. Charpentier had worked on this some time back and had a template that may well be what was required. The meeting agreed that it was important to move forward on this issue and therefore decided to form a working group to carry out the following tasks

- decide what information should be included in BUFR for distribution on the GTS so that both profiles and trajectories could be distributed.
- examine the template proposed by E. Charpentier and make modifications as required to ensure the complete information desired was included.
- prepare and submit documentation for the Expert Team on Data Representation and Codes who are responsible for the maintaining BUFR for WMO
- devise a strategy for ensuring that all DACs can easily and uniformly write BUFR.

Members of the subgroup are Reyna Sabina, Kyle Rushing, Ann Thresher, Mathieu Belbeoch, Thierry Carval. They were asked to prepare an interim report in time for the next AST meeting in March, 2004 to report progress.

8. Review of GDAC operations

At this meeting the status of the two GDACs was reviewed and improvements needed were discussed.. Presently 6 DACs are sending their data to the 2 GDACS at the same time as to GTS: AOML/USA, MEDS/Canada, JMA/Japan, CSIRO/Australia, BODC/UK, Coriolis/France. 2500 new profiles are arriving each month and the database contains more than 50,000 profiles from more than 1500 floats.

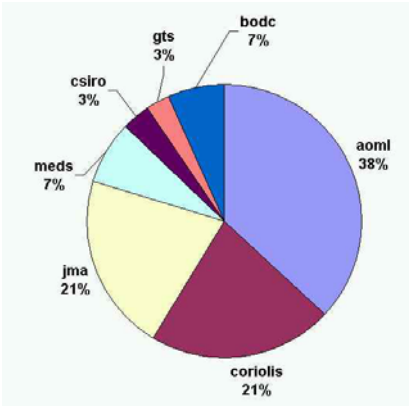


Figure 2 : Where are the data coming from

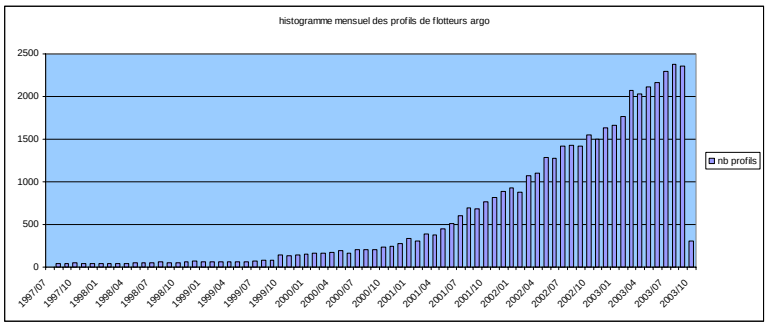


Figure 3 Amount of data available at GDACS

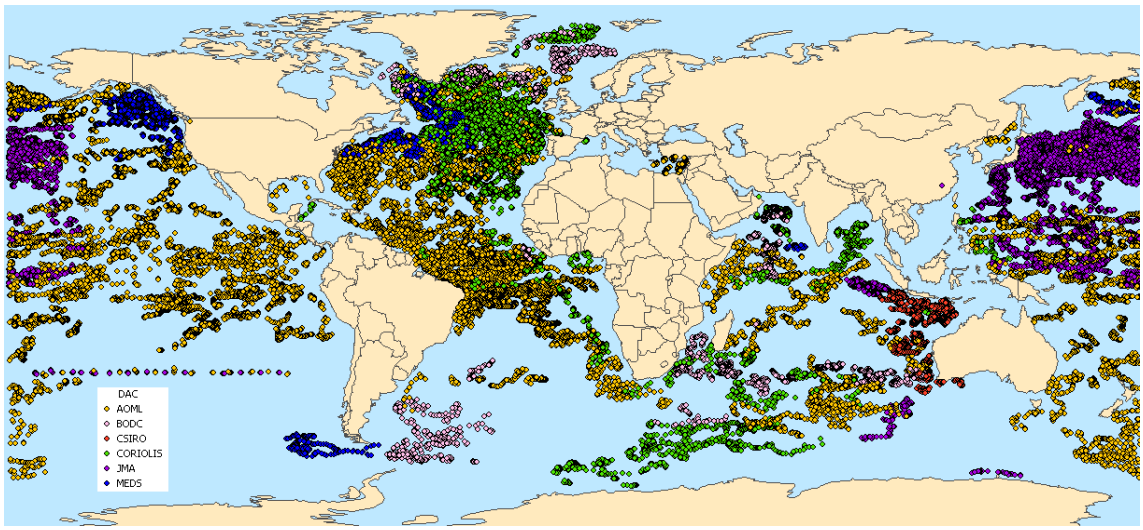


Figure 4 Localization of the Argo data acquired in 2003 colored by DAC provider

Although the amount of data coming to the GDACs only through GTS has decreased a lot during the past year, the total volume of the Argo database at the GDACs that came from the GTS still represents 30% of the total amount of data. Therefore, the US GDAC was asked to also provide access to these GTS data by copying daily the Coriolis GTS directory. It was also decided that in collaboration with the DACs, the GDACs will work to reduce this amount of data by:

- Notifying the DACs where there is historical data that only arrived by GTS and work with them to recover these and write netCDF files to go to GDACs
- Verifying that when a float started to come through a DAC all the previous data were sent
- Recovering historical data that countries want to label as Argo equivalent.

The floats that are not referenced at AIC will be clearly identified at the GDACs.

The index file provided on the ftp site is useful and should be implemented on both GDACs. However, the xml format is not valuable at this time and so they will be transformed to comma separated fields and a zip version will be available at the same time as the unzipped version.

It was agreed that statistics on timeliness, quality, and usage of the data will be implemented and reported by GDACs.

A problem reporting system has been implemented at Ifremer but it is clumsy and not well used. The problem has to be addressed another way, perhaps through the cookbook, a FAQ section on the WWW site to provide to users answers to the most frequently ask questions, information on problem discovered and how/when was solved or how to get round it, or shortcuts to deal rapidly with Argo data.

There are users who want to retrieve periodically Argo data on an area of interest. A specification was discussed and we agreed to start on serving real-time data that way, with extension to delayed mode data as soon as possible. The following criteria will be available:

- Geographical area: North East Lat/Lon and South/West Lat/Lon

- Time frame: daily, weekly or monthly
- Good data only (qc=1) or all data ?
- Type of data: profile or trajectory
- Format: ASCII or netCDF
- Email address
- A comment on the usage of the subscription system.

After subscription, a compressed file will be regularly generated on the GDAC ftp site, an email notification containing the ftp address of the file will be sent to the user; the data file will be kept one week on the server. The subscription will end automatically if the user doesn't retrieve the files on the ftp site more than 2 times, or after one year if there is no answer to the end-of-subscription notification email.

9. Products

John Gunn from the Earth and Space Research Laboratory provided a short presentation on progress in the SMOS and Aquarius satellite missions. The SMOS satellite, being developed by ESA, is optimized for detecting soil moisture, but it also effective at measuring sea surface salinity. The Aquarius satellite, under development by NASA, has its primary intention to measure surface salinity. The two satellite teams are working in close cooperation. The observation modes are different but will complement each other. Both missions will rely on measurements from other satellites to measure all of the variables required in extracting a salinity signal from space.

Bob Molinari presented the results of his survey of products that his DAC and a few others prepare. All of these fall into the category of products that either monitor the data or data flow, not scientific products. There was some discussion of the various products, and in earlier parts of the meeting others were presented. The meeting agreed that there should be a "core" set of products that each DAC would routinely generate, although they were free to generate others as they wished. It was also agreed that some products were required that demonstrated the performance of the data system as a whole. Some of these currently are generated by the AIC, but there are others that various DACs could also contribute.

There was agreement that B. Molinari and B. Keeley would contact DACs, GDACs, and the AIC with a suggested list of core products and seek their response to

- whether they now produce such a product
- whether they would be willing to produce it
- what other products they think should be considered part of the core set
- what other products they would offer that measure performance of the data system as a whole.

All agreed to respond within 2 months at which time a preliminary core set of products will be proposed for implementation. At that time as well, the AIC will be asked to insert appropriate links to the data system products offered by DACs

It was noted that there was still a lack of products that demonstrated scientific value of the emerging Argo data. The DMT meeting felt that the generation of such products and the selection of which ones would be broadly used was something more appropriate for the AST

to resolve. The co-chairs were instructed to raise this with the AST and suggest they solicit AST members to bring their suggestions to the next AST meeting.

10. AIC WWW Site

The Argo technical coordinator presented the functionalities of the new WWW site which has been under development since last meeting. It has been agreed that this WWW site will be reviewed by the AST and the ADMT chairs before being opened to the public. This WWW site has to be machine independent i.e. work properly on Macintosh, PC, Unix and Linux operating systems.

The Argo monitoring tool developed at AIC is widely used by the PIs and the ADMT asked the TC to add more queries possibilities to the search engine provided, such as " what are all the floats equipped with this version of that sensor". This should be possible if AIC updates his database with the metadata available at GDACs.

The AIC TC was asked to maintain additional mailing lists at AIC for the AST, ADMT, the Argo PIs.

A new section on tools will be implemented (see the section on formats) with links to the tools made available either to read the netCDF files, or to convert netCDF files to other formats used by software such as Ocean Data View, JOA or IOS.

Links to interesting products (see the products section) generated from Argo data will also be set up to advertise the use of Argo. The AST will tell AIC what are the links to implement at the next AST meeting.

Steve Piotrowicz raised the question of the funding for AIC which will run out in 2 years. at least for using 100% of the technical coordinator's time. A document defining the role, the functionalities and the support expected from the technical coordinator has to be written and an evaluation of the man power needed for this function. The TC was asked to prepare the portion discussing roles and responsibilities, and DACs and GDACs asked to contribute their evaluation of appropriate resources. This document will be provided to the AST at next meeting in March, 2004 in Brest .

11. Long term archive

C. Sun presented a review of the present operations of the Global Argo Data Repository and some future plans. A discussion ensued about the relative roles of the GADR compared to the GDACs. B. Keeley presented a summary that he and S. Pouliquen had made in the hope that it would guide the discussion. B. King raised the point that we wanted the **GADR to safe guard the delayed mode Argo data** and really to issue this as part of their products. The meeting agreed with this, but acknowledged that US NODC purposes extended beyond these functions and that was partly what C. Sun had described. The agreed objectives and relative roles are as follows.

GDAC Objectives

1. Provide access to Argo data including profiles, trajectories, metadata and technical information
2. Function as the primary data source for the Project

NODC Long Term Archive (GADR) Objectives

1. To safeguard Argo Project data and information beyond the life of the Project.

2. To provide complementary data and information access to those services provided by Argo GDACs.

Comparison of Activities

GDAC	**NODC**
Acquire float metadata from DACs prior to first profile reporting	Archive metadata from GDAC on a regular schedule.
Acquire real-time profile, trajectory, and technical information from DACs within 24 hours of float reporting.	Archive delayed profile, trajectory and technical information from GDAC on a regular schedule.
Acquire delayed mode profile, trajectory, and technical information from DACs within 5 months of float reporting.	
Refresh delayed mode profile, trajectory, and technical information from DACs as corrections come from PIs resulting from QC or data analysis activities.	
Provide ftp access to data and information on a basin, float or receipt time basis.	
Provide www access to data and information based on a variety of selection criteria including area, time range, float identifiers.	Provide www data integration tools to allow clients to get Argo float data combined with data collected with other instruments.
Provide use statistics, data system monitoring information and problem reporting facility	Provide use statistics, data system monitoring information and problem reporting facility
	Provide tools to allow transformation of Argo and other profile data into other forms such as would be suitable for display software such as ODV or OceanAtlas.
	Provide hardcopy data sets for distribution to users.
	"Register" the Argo data in international data inventories such as FGDC.
	Offsite storage of data.

C. Sun then proceeded to show some aspects of the draft form of the CD/DVD that he had been developing. He noted that reproducing the exact structure of the GDACs meant including both mono profile and multi-profile files. Doing so made it necessary to use a DVD as the medium. The meeting expressed its strong desire to distribute the data and information on a CD and suggested that removal of the multi-profile files should make this possible. It was also noted that it was important to include trajectory files and some graphics illustrating these data. The meeting agreed to form a working group to review the CD and develop the final form by March of 2004. The working group consists of S. Pouliquen, C. Sun, A. Thresher, G. Dawson, L. Petit de la Villeon and B. King

J. Gould asked about the projected distribution list for the CD and also remarked that it would be valuable to develop a document name for the CD. B. King suggested this should

extend to the various of documents being produced by Argo. The DMT asked J. Gould to take this task on.

The mailing list would be derived from the lists of PIs and National Contacts maintained by the AIC. The CD was intended for individuals with limited access to the internet and so it was expected that the number of CDs to be produced would be on the order of a few hundred. The DMT sought help from the AIC and Argo Director to decide the mailing list.

12. Review of documents

As a result of the discussions at the meeting a number of documents will need revision. The co-chairs assumed responsibility to coordinate this and at the earliest possible date. In particular, the Users Guide Version 2 is to be finalized and published (see the section on formats) on the web as soon as possible.

13. Other business

B. Keeley informed the meeting that he is stepping down as co-chair. He thanked the participants for their support and their work over the past 3 years. He especially thanked S. Pouliquen as the other co-chair. Her dedication and cooperation made his job much easier since it worked very well as a shared responsibility. He noted that he would work with the DMT and AST to find a replacement and expressed his confidence that work would continue to progress at the same or faster a rate than we experienced in the few years he was co-chair.

B. King offered to host the next meeting of the DMT in the September or October time frame of 2004 in South Hampton. The meeting accepted his kind offer. He will work with the co-chairs to finalize a date as soon as possible.

14. Review of the actions of the meeting

See annex 4 for the list of actions generated from this meeting.

15. Annex 1 Agenda

Wednesday morning

1. Introductions
   a) Welcome
   b) Local Arrangements

2. Review of Actions from Ottawa and AST meeting

3. Review of National system development and milestone updates

4. Regional Centres

Wednesday afternoon

5. Real-time Data Stream - Keeley
   The meeting will be informed of issues concerning the distribution of the data in real-time.
   a) Review of implementation of QC
   b) Review of effectiveness of QC
   c) Timeliness to GTS
   d) Determine sources of duplication on GTS
   e) Status of auto QC at CLS – Belbeoch

6. Delayed Mode Data Stream
   The meeting will be informed of the issues regarding the distribution of the data in delayed mode
   a) Review of implementation of QC
   b) Review of effectiveness of QC
   c) Country documentation

Thursday morning

6 Delayed mode Data Stream Wrap up

7. Data format issues
   The meeting will be informed and take appropriate action on the following issues.
   a) ASCII version for groups who cannot use netCDF - Carval
   b) BUFR - Belbeoch
   c) Change development and change control – Ignaszewski
   d) Identification of netCDF tools or other available tools

Thursday afternoon

8. Review of GDAC operations - Carval, Ignaszewski
   A review will be presented of the operations at both GDACs and will include the following topics. Participants will be asked to provide comments and advice.
   a) WWW / ftp implementation
   b) Synchronization
   c) Timeliness and receipt of real-time and delayed mode data
   d) Status of problem reporting system
   e) Implementation of ocean boundaries
   f) Use statistics

9. Products
   The meeting will review the products submitted to Bob Molinari, and will decide on what additional products are desirable, and how the products will be presented.
   a) Status of products - Molinari
   b) Data CDs for groups with poor internet access – Belbeoch / Sun / Pouliquen

Friday morning

10. AIC web site – Belbeoch
    The meeting will review the operations of the AIC including
    a) List of national contact points
    b) List of Data Management Team members
    c) Revised web site

11. Long term archive plan – Sun
    The meeting will discuss the GADR, its functions, and review its progress.
    a) Role of GADR
    b) Implementation plan and actions taken

12. Review of documents
    a) Handbook - Pouliquen
    b) Users manual for formats - Carval
    c) GDAC operations - Pouliquen
    d) Real-time QC – Keeley
    e) Cookbook – Ignaszewski
    f) Delayed mode QC – Wong

13. Other business
    Participants will have the opportunity to raise other issues of importance to them. We should also set the time and location of the next meeting.

14. Review of Actions of this meeting
    A brief review will be made of actions generated by this meeting to confirm the actions, who will undertake them, and completion dates.

16. Annex 2 Attendees

Name	Country	Organization
Beeck, Thomas	USA	FNMOC
Belbeoch, Mathieu	France	Argo Information Center
Blaha, John	USA	Naval Oceanographic Office
CARVAL, Thierry	France	IFREMER
COATANOAN, Christine	France	IFREMER
Danchenkov, Mihail	Russia	FERHRI
Dawson, Garry	UK	UK Hydrographic Office
DeWitt, Lynn	USA	Pacific Fisheries Env. Lab
Domenico, Ben	USA	Unidata
Hacker,Peter	USA	Univ of Hawaii
Gould, John	USA	Scripps Institute of Oceanography
Gunn, John	USA	Earth and Space Research
Hall, Norman	USA	NODC
HEO, Seung	Korea	KODC
Ignaszewski, Mark	USA	FNMOC
Johnson, Greg	USA	Pacific Marine Environmental Lab
Keeley, Robert	Canada	MEDS
King, Brian	UK	SOC
Kobayashi, Taiyo	Japan	Frontier Observational Research System for Global Change
Linguanti, Joseph	Canada	Institute of Ocean Sciences
McCreadie, Rebecca	UK	BODC
MINATO, Shinya	Japan	JAMSTEC
Molinari, Robert	USA	AOML
Owens, Breck	USA	WHOI
Perkin, Ron	Canada	Institute of Ocean Sciences
PETIT de la VILLEON, Loic	France	IFREMER
Piotrowicz, Steve	USA	NOAA
Polito, Paulo S.	Brazil	University of São Paulo
POULIQUEN, Sylvie	France	IFREMER
Reed, Greg	France	IOC
Rickards, Lesley	UK	BODC
Roemmich, Dean	USA	UCSD
Rushing, Kyle	USA	NAVO

Sabina, Reyna	USA	AOML
Schmid, Claudia	USA	AOML
Send, Uwe	Germany	Institut fuer Meereskunde
SEO, Jangwon	Korea	Marine Meteorology Research Lab
Sharfstein, Phil	USA	FNMOC
Soviero, Alexandre	Brazil	Centro de Hidrographia da Marinha
Sun, Charles	USA	NODC
Thresher, Ann	Australia	CSIRO
Vélez-Belchí, Pedro	Spain	Instituto Español de Oceanografia
Waseda, Takuji	USA	University of Hawaii
Wong, Annie	USA	PMEL
YANG, Jin-Gwan	Korea	Meteorological Research Institute
Yoshida, Takashi	Japan	JMA

17. Annex 3 Summary of the status of the action of the 3rd meeting

	Action	Target Date	Responsibility	Status
1	GDACs to create a new subdirectory in the "geo" directory for Antarctic data. The definition of Antarctic needs to be agreed between them and appropriate documentation written to let clients know. (agenda 2a)	ASAP	Carval, Ignasewski	Cancelled Southern Ocean to be removed from US GDAC in November
2	GDACs to ensure the geographic limits for the "geo" directory is properly documented both on their ftp site and in the GDAC documentation (agenda 2a)	ASAP	Pouliquen/Carval, Ignasewski	Readme on FTP site in Geo directory Update GDAC done in 2.4 version
3	GDACs to remove versions of profile data derived from the GTS when the data are received directly from the DACs. (agenda 2a)	March, 2003	Carval, Ignasewski	Fully operational since Sep 2003
4	GDACs to remove any built in delays between receiving data from DACs and posting those data to the servers. (agenda 2a)	ASAP	Carval, Ignasewski	OK
5	DACs to ensure profile data are presented ordered from surface to bottom. (agenda 2a).	ASAP	DACs	Not Ok for CSIRO and BODC new files will be provided rapidly
6	DACs and others sending profile data to the GTS as TESACs must convert pressures to depths using the standard UNESCO algorithm. (agenda 2a)	ASAP	DACs	CORIOLIS : will be done in November Ok for Meds, JMA, AOML, CSIRO and CLS
7	GDAC to design an ASCII format for the metadata. (agenda 4b)	End 2002	Carval/ Ignasewski	Use existing ascii at two Gdac. Provide visibility on others existing tools at AIC
8	GDACs to consider if a data subscription service is feasible and how it might be implemented. (agenda 2b)	March, 2003	Pouliquen, Ignasewski	Specification presented at the meeting
9	Co-chairs to provide AST with their Team's list of priorities for validation and list of questions needing AST advice.	March, 2003	Pouliquen, Keeley	OK
10	All DACs to remove use of the Q designator in float identifiers. (agenda 2c)	Nov 2002	DACs	OK
11	MEDS to remove the Q from float identifiers when GTS data sent to GDACs. (agenda 2c)	ASAP	Keeley	OK
12	Co-chairs to ensure changes are made in GDAC and DAC documentation to reflect no use of Q. (agenda 2c)	ASAP	Keeley, Pouliquen	OK

	Action	Target Date	Responsibility	Status
13	Products working group to evaluate present data and network related products from all DACs and GDACs. (agenda 3a)	March, 2003	Molinari	See proposal on Meeting WWW site
14	Working group to draft and circulate the CD for countries lacking good access to the Internet. (agenda 3b)	Dec, 2002	Sun and others	A draft circulated in February
15	Complete version 1 of CD (agenda 3b)	Sep, 2003	Sun and others	Draft received and will be reviewed by a small group
16	Provide CD WG with experiences from meeting with groups with poor internet access (agenda 3b)	ASAP	Belbeoch, Keeley	Provided as part of comments on draft CD
17	RTQC WG to look how to modify the top and bottom test to stop overflagging of good data (agenda 5a).	ASAP	Keeley and others	DACs were to remove this test. No other work has been done.
18	RTQC WG to propose tests that are better matched to the working characteristics of profiling floats (agenda 5a).	March, 2003	Keeley and others	Thierry to propose two new tests: -Grey list -Jump detection
19	BUFR WG to report on progress (agenda 4c).	Sep, 2003	Keeley and others	Document written by J Turton and B Keeley posted on meeting WWW site
20	GADR WG to refine specifications and report on progress (agenda 8).	March, 2003	Sun and others	To be discussed
21	Editors of documentation to make required updates (agenda 9).	ASAP	Pouliquen, Carval, Keeley	Gdac OK Version 2.4 User Manual V2 to be endorsed by committee Handbook: OK RealTimeQC: New QC proposal to be addedy Delayed mode QC : :proposal made by Annie on WWW site CookBook: Proposal made by Mark on WWW site
22	Comments on formats to be provided to the Formats WG for consideration (agenda 4b)	ASAP	All	User Manual V2
23	Investigate how to get Argo documentation translated into other languages (agenda 9).	Sep, 2003	Pouliquen, Keeley	Not done Cancelled at meeting because of lack of man power to do it
24	Investigate the feasibility of detecting a drift in salinity or temperature and providing correction factors to DACs to modify data before insertion on the GTS (agenda 5b)	Sep, 2003	Wong, Johnson	To be discussed
25	Draft a proposal on how use could be made of the DBCP Buoy QC facility to notify users of suspect data in floats (agenda 5b)	Sep, 2003	Keeley, Pouliquen	Not done
26	Clarify how the results of the QC process will be properly recorded in the Argo data structure (agenda 6)	Sep, 2003	Schmid and others	To be discussed

18. Annex 4 Actions of the 4th meeting

	Action	Target Date	Responsibility	Status
1	Monterey GDAC to remove Southern Ocean Directory as soon as possible	Dec 1, 2003	Ignaszewski	
2	Modify the milestones for the real time stream to include technical data transfers.	Dec, 2003	Belbeoch	
3	AIC to separate the description of regional coordination from the descriptions of regional centres	ASAP	Belbeoch	
4	AIC to seek documentation describing CLS RTQC procedures and place it on the AIC web site	Mar, 2004	Belbeoch	
5	GDACs and AIC to determine the number of floats that are operating but not reporting data either to the GTS or GDACs.	Mar, 2004	GDACs, Belbeoch	
6	MEDS to begin routine distribution of information on near duplicates detected on the GTS	Mar, 2004	Keeley	
7	Carval to rewrite RT QC "jump test"to rflect the discussion at the meeting and to distribute the new proposal by email	Jan, 2004	Carval	
8	Carval to rewrite the "grey list" proposal, circulate it by email for final comment. DACs and GDACs to implement	Jan, 2004	Carval, DACs, GDACs	
9	Schmid to propose a "frozen profile" test	Sep, 2004	Schmid.	
10	Standardize the handling procedures when profiles fail the automatic RTQC	Mar, 2004	chairs, DACs.	
11	Make final changes to version 2 of the format based on the discussions and make the revised document available on the web as soon as possible.	30 Nov, 2003	T. Carval	
12	AIC to acquire references to software tools that helping the manipulation of netCDF files and make these pointers available on the AIC web site	Mar, 2004	M. Belbeoch, DACs, Others	
13	WG to prepare transition to BUFR	Sep, 2004	R. Sabina, T Carval, M. Belbeoch, A. Thresher, K. Rushing	
14	US GDAC to copy daily the GTS directory at the Coriolis GDAC	1 Jan, 2004	M. Ignazsewski	

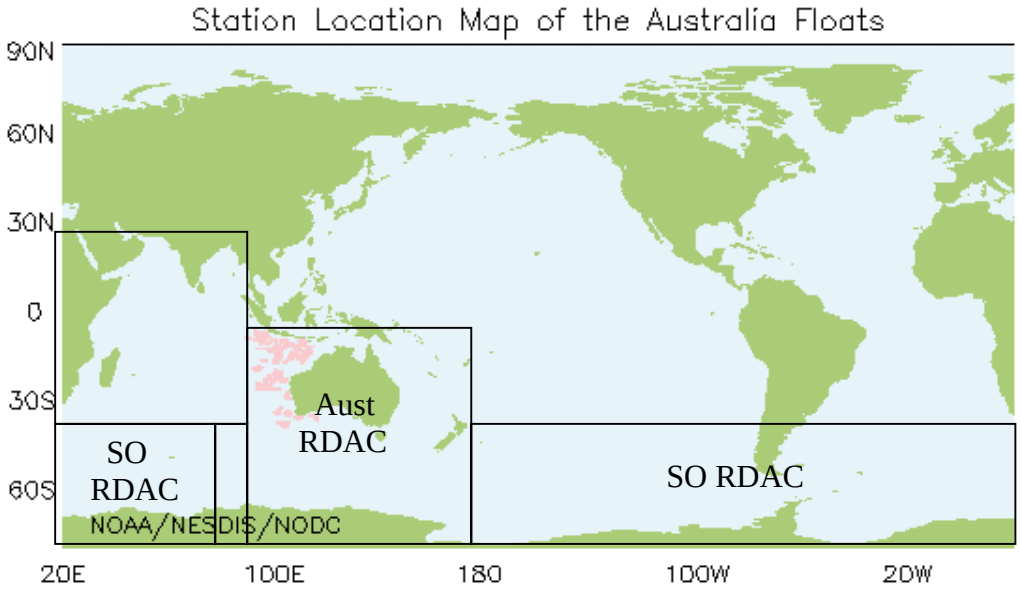
15	Build netCDF files for data on GDACs only having come through the GTS	Mar, 2004	DACs, GDACs	
16	Convert format of index files to comma separated values	1 Jan, 2004	GDACs	
17	Report statistics on timeliness, quality , usage of data	Mar, 2004	GDACs	
18	Implement an improved problem reporting system	Sep, 2004	GDACs	
19	Remove Southern Ocean directory	1 Dec, 2004	US GDAC	
20	Implement a data subscription service	Sep, 2004	GDACs	
21	Develop set of core and data system products	Sep, 2004	DACs, GDACs, AIC	
22	Ask AST to resolve what scientific products are desirable	Mar, 2004	co-chairs	
23	Review content of the new AIC web site before release	Mar, 2004	chairs AST, DMT, Argo Director	
24	Maintain mailing lists of AST, DMT Argo PIs	Mar, 2004	AIC TC	
25	Document the roles, responsibilities and necessary resources of the TC	Mar, 2004	DACs, GDACs, AIC TC	
26	Finalize content of Argo CD	Mar, 2004	S. Pouliquen, C. Sun, A.Thresher, G. Dawson, L. Petit de la Villeon, B. King	
27	Develop a document naming convention for Argo	Mar, 2004	J. Gould	
28	Establish the mailing list for the Argo CD	Jun, 2004	J. Gould, AIC TC	

19. Annex 5 Regional Dacs reports and plans

19.1. Regional DAC activities at CSIRO/BOM Australia (Ann Gronell)

CSIRO/BOM proposes to act as a Regional DAC for the area 100E to 180E and 0 to 90S. We are currently funded with a half-time position to implement the Delayed mode QC process for all floats in our region. This will include the required functions of an RDAC such as float to float comparisons, development of high quality climatologies and comparisons to altimeter data for floats in this region. Susan Wijffels will be the point of contact for this RDAC.

We are also, within our RDAC boundaries, participating in the Southern Ocean RDAC in which the UK is taking the lead. For this activity, we will extend our southern boundary to 90E (northern boundary 40S) to provide for overlap so we can compare our products and results to make sure we have no major incompatibilities.



We are currently also acting as deployment coordinator for Indian Ocean deployments but, at the moment, we are overcommitted and cannot undertake responsibility for the entire Indian Ocean. This leaves the area bounded by approx. 30N, 40S, 20E, 100E without a responsible RDAC. It is possible that another Indian Ocean RDAC partner will take up this region as their area of primary responsibility.

Regional DAC activities at IFREMER/CORIOLIS/France and AOML/USA (Sylvie Pouliquen –Bob Molinari)

Ifremer and AOML propose to act as a Regional DAC for the Atlantic Ocean from 60N to 20S for Ifremer and From 20N to 40S for AOML. Ifremer is presently funded for a position full time and AOML is writing a proposal to obtain funding.

We plan to implement the required functions of an RDAC such as float to float comparisons, development of high quality climatologies . Sylvie Pouliquen and Bob Molinari will be the points of contacts for this RDAC. Ifremer accepted to do the coordination between the two institutes.

Ifremer is currently also acting as deployment coordinator for Atlantic deployments and plans to continue in the near future.

19.2. Pacific and Indian Rdac

Pacific Ocean
Interim-Chair: Minato
JAMSTEC/FORSGC – Minato & Kobayashi
IPRC-APDRC, U. Hawaii – Hacker & Waseda
PMEL – Johnson & Wong

Indian Ocean
Interim-Chair: Ravichandran (?)
INCOIS – Ravichandran (?)
CSIRO – Wijffels & Thresher
IPRC-APDRC, U. Hawaii – Hacker & Waseda

Progress to date:
INCOIS
There was no participant from India this time. However, contact after the meeting provided the following information.
India is willing to host the Regional Data center for the Indian Ocean region. INCOIS is now developing North Indian Ocean Hydrology using the data sets available from the Indian Research Cruises conducted from 1965 to present, apart from WOA2001. This will enhance our capability for delayed mode quality control. Also, we have received the PMEL DMQC algorithm for doing the same in the Indian Ocean region.
We would like to have training from other DMQC center. In this regard, we are approaching POGO for some fellowship. However, we would like to know the procedure and responsibility of such regional data center.

CSIRO
See paragraph 19.1
Coordination with IPRC is expected in the Indian Ocean.

JAMSTEC/FORSGC
1. Develop climatologies
   - Pacific climatologies SeHyD 1.0 (Selected Hydrographic Dataset Version 1.0) available for DM-QC, from JAMSTEC web site; in matlab format, with utility scripts. Improvement of SeHyD will be continued.
   - Created an Indian Ocean HydroBase (profile dataset in HydroBase-format): it is available for Argo, if you request.
2. Delayed mode QC
   - We have experiences about salinity adjustment in the DM-QC of the Japanese floats deployed by June 2003 in the Pacific and the Indian Ocean. So we are ready to complement for other PIs to do DM-QC.
   - We expect improvements of A Wong's salinity adjustment software totally on someone to achieve regional QC, that is, target float data be adjusted to the sea truth salinity data such as nearby shipboard CTDs especially at the deployment and recovery, post-calibration of recovery floats.
3. Coordination and Plan
   - For the regional QC using nearby CTD data and mapping of anomalies, JAMSTEC/FORSGC collects nearby CTD data for the floats deployed by Japan and

IPRC/APDRC collects those by U.S. We desire helps from all institutes/organizations in Canada, U.S. (NODC?), and other countries.

IPRC/APDRC

1. Develop climatologies
   - Subcontract to WHOI to complete the global Hydrobase
   - Subcontract to CSIRO for the XBT QC of the 20th century in the Indian Ocean
2. Delayed mode QC
   - Getting familiar with the Wong DM-QC software (1 professional and 1 student)
3. Prepare and distribute Argo data products
   - Format conversion from Argo-netCDF to EPIC-netCDF
   - Delivery of Argo profiles using EPIC web browser (see recommendation below)
4. Model-data inter-comparison
   - Develop server capability (subcontract to PMEL; LAS & EPIC)
   - Serve real-time GODAE model output (NLOM)
   - Serve other GODAE model outputs (ECCO, GFDL)

Recommendations from the DM team:

- Prepare and distribute Argo data products
  - IPRC/APDRC: They agreed to state clearly on the web, what data format changes were made and point to the GDACs as the distribution centres for the master copy of Argo data.

Coordination

- Develop climatologies
  - Through WHOI, Hydrobase activity will be coordinated
  - Synchronize the climatology database
- Delayed mode QC
  - IPRC personnel intend to visit JAMSTEC/FORSGC, CSIRO to learn their QC method

Plans

- Define short-term and long-term goals
  - What are the required capabilities for a regional center?
  - What are the desired capabilities?
- Define geographical region of interest
  - e.g. IPRC has scientific interest in the Indian Ocean, the Western Pacific and possibly the Subtropical Pacific.
- Establish mechanism of communication
- Commitment (0-100%)

20. Annex 6 National Reports

ARGO National Report – Australia – 2003

The Australian National Argo program has had a successful year, deploying 20 floats in waters of the SE Indian Ocean. Floats were deployed by a mix of commercial, research and Royal Australian Navy vessels.

All of the new floats reported successfully though we have since lost two floats after approx. 4 months. We surmise that these floats hit soft, shallow bottom and probably picked up detritus or sediment, thereby changing their ballast load and preventing them from reaching the surface. Fourteen of our floats deployed last year are potentially affected by the pressure sensor problem but have not shown signs of failure.

We plan to deploy a further 32 floats in the next year, though deployment might be delayed by the Druck pressure sensor recall. Our major area of deployment will be the Southern Ocean with the Antarctic Cooperative Research Centre providing up to 14 of the new floats, all Apex. The Australian Bureau of Meteorology is providing another 8 floats – 6 Apex and 2 Provor, and CSIRO will buy the final 10 floats, also Apex. We also plan to deploy 5 Korean floats if the CTDs can be replaced in time to meet the ship's schedule. Up to two floats will be deployed in the tropics to replace older floats reaching the end of their lives.

We have trialed a clever method of deployment from moving ships using a sling arrangement. This is a very gentle method of getting the floats into the water. We have had no failures to date. We plan to produce a training video of the entire deployment procedure that can be given to the ships along with the deployment kit and instructions we currently provide. The video will probably be ready in the new year and can be made available to the Argo community on request.

1. Status:
    - Data has been acquired from all floats – we have had no immediate failures. Data is processed approximately 4 hours after the float is expected to submerge, giving ARGOS time to acquire all the satellite reports before we download the profiles. If we process the data earlier, we lose position and trajectory data.
    - The data is sent to the Australian Bureau of Meteorology who perform an automatic format check and then insert the data onto the GTS. This is usually completed between 12 and 24 hours after the profile. One float, the only Provor we have deployed to date, spends approximately 24 hours on the surface and so the data is not sent to the GTS as soon as we would like. It is usually inserted onto the GTS within 48 hours of the profile.
    - Data is sent to the GDACs at the same time it is sent to the Australian Bureau of Meteorology for insertion onto the GTS. Both GDACs are contacted via ftp and the data delivered automatically each time a float reports.
    - Data is immediately available to the PIs for delayed QC, though we have not fully implemented these procedures yet.
    - The delayed mode data is not yet sent to the GDACs but we should be able to start sending it by the end of 2003.

- Web pages are under construction and will be released as soon as they are approved for external access. We have a site for deployment opportunities in the Indian Ocean as well as a data navigator for floats in our area of interest.

2. Delayed Mode QC:

- The Wong and Johnson (2003) delayed mode QC procedure has been obtained for evaluation of its performance in the Australian region. There are indications that this will be more difficult than elsewhere because there is little historical CTD data in this region.
- We are assembling an historical database using local datasets, the Orsi et al. Southern Ocean data set, and the Indian Ocean hydrobase data set assembled by Suga and colleagues.
- Helen Phillips, CSIRO Marine Research, and Rick Smith, the Antarctic Climate and Ecosystem Cooperative Research Center will be exercising the WJ2003 scheme in the region and examining ways to improve it.
- We aim to implement routine delayed mode QC for the region described below within about 6 months. Some clarity on what is to be done with the information obtained (suggested recalibrations) would be useful from the Argo Data Team.
- There is no formal documentation yet. This will follow after we refine the delayed mode QC procedures.

4. Regional Centre Functions:

- We aim to undertake the functions of a regional centre for the area bounded by longitude 100 – 180E, latitude 0 – 90S. With the current low float numbers this may be possible with the manpower at hand. As float numbers increase, it is likely more manpower will be required and we continue with efforts to increase our resources for this work.

Argo National Data Management Report for Canada - 2003

1. Status

Data acquired from floats. We are presently tracking 70 active floats. Of these, 5 may be in trouble or may have failed.

- Data issued to GTS: All data are issued to the GTS. Although there are variations, more than 85% of the reports are issued to the GTS within 24 hours. Longer delays are usually caused by incomplete messages received from the floats. There also seems to be problems with the CRC verification. We are keeping statistics and failure information.

- Data issued to GDACs after real-time QC: We are routinely sending files to the GDACs on the same schedule as they are issued to the GTS.

- Data issued for delayed QC: MEDS is routinely issuing data to the PI on a regular basis.

- Delayed data sent to GDACs: The PI is routinely using the Wong et al software and returning data which pass with no problems. This constitutes about 70% of the data. We have software that transforms the data into the latest draft version of netCDF. On GDAC advice we are waiting for acceptance of the format before starting to send the data.

- Web pages: MEDS maintains pages that show float tracks, and some aspects of the data collected for all of the Canadian floats, active or dead. Data are available for Canadian floats as well, but we alert viewers that the official version resides at the GDACs. Pages are updated daily.

  We also show some simple information about the global programme including the positions of float reports each month, the success rate of meeting the 24 hour target for getting data to the GTS, number of floats reporting, and some statistics on how long floats report continuously.

  Readers may go to
  http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/argo/ArgoHome_e.html
  to see the pages.

2. Delayed Mode QC

Howard Freeland has implemented the agreed delayed mode QC at his institute. His institute will be handling the delayed mode quality control processing for all of the Canadian floats. Every month he downloads any new files from MEDS. He brings the data into Annie's "source" matrices and graphically views the profiles from each float to flag any additional outliers before they get into the fitting process. Annie's routine takes about 6 hours to run on his PC. He applies the criterion that each float is working well until its data exceeds 3 standard deviations from the mapped climatological data and it passes to Delayed Mode unchanged as, presumably, the highest quality data. Once it fails that criterion, it is changed i.e. salinity corrected to climatology for the rest of its natural days. He checks the diagnostic plots to see how things are going and then puts the data on his ftp site and notifies MEDS of updates.. As long as nothing goes wrong, half a day is plenty of time.

There are plans to develop quality control procedures for the temperature profiles, but nothing is ready at present. There are no plans at present to deal with trajectory data.

At present, MEDS has in hand all Canadian floats passed through delayed QC up to data collected to the end of September, 2003. The software to write these data into the latest format is ready to use. We are waiting for the format to be confirmed.

3. GDAC Functions
Canada has no GDAC functions

4. Regional Centre Functions

Canada has no regional centre functions. However, Canada provides a view of the state of the Argo array in the Gulf of Alaska, and some appreciation of changing conditions there as seen by Argo. These are available at the web page:
http://www.pac.dfo-mpo.gc.ca/sci/osap/projects/argo/Gak_e.htm.

China National Argo Data Center's Construction and Operational Running

National Report of China
Oct.22, 2003

In September of 2001, a foral entry into International Argo Cooperative Program was approved by Chinese government. So far, China has deployed 19 Argo buoys in the tropical western Pacific Ocean and eastern Indian Ocean. China National Argo Data Center was established by the National Marine Data and Information Service (NMDIS) in November, 2002, and put into trial operation in January of 2003.

China National Argo Data Center plans to set up an effective data management mechanism in charge of Chinese management of Argo buoy data. In addition, a global long-term operational running system responsible for Argo buoy data's collection, processing, management and distribution is to be established. The center's responsibilities fall mainly in the following fields:

- As a national node, it participates in international cooperation and exchange of data collected in the global Argo program, fulfilling its responsibilities and tasks as a member state;

- Track, collect, manage and periodically release the information on Argo buoy deployment and operation, as well as the information concerning implementation of the global Argo program, so as to serve the Chinese end users;

- Receive, process and distribute timely the data collected by the Argo buoys deployed by China, and supply services on Argo data's real-time and non-real-time data collecting, processing and distribution for sharing;

- Participate in developing and stipulating criteria and technical specifications for Argo buoy data's processing and application;

- Carry out study on methodologies for Argo buoy data's quality control, including study on methodologies for Argo data's real-time/delayed-time processing and quality control;

- Set up and maintain the Argo metadatabase and the database system;

- In light of the marine historical data and other marine monitoring data carry out study on data assimilation method and the related statistics and analysis method, and make Argo data products;

- Construct China National Argo Data Center's website and issue Argo data and products as well as other data obtained by international cooperative programs timely, and moreover, supply sharing services and conduct long-term operational running and maintenance.

NMDIS pays much attention to the performance of China National Argo Data Center. A special group in charge of its operational construction and operation has been founded in the center in a bid to guarantee effective studies on methodology and technology's development

in Argo data receiving, processing, service supply, and on Argo data's assimilation methods and data products.

Remarkable achievements have been made in the China National Argo Data Center's construction and operational running in the following aspects:

1. Connections with all Argo data centers worldwide have been established to facilitate Argo data's receiving operation and relevant information's processing;
2. A total of 1598 Argo buoys' data all over the world have been collected and processed;
3. Effective Argo data services have been supplied to all the relevant Chinese departments, entities, experts and the public, in particular, for the work of Chinese climate and marine forecasting as well as marine scientific research;
4. Notable phasic progress has been made in the operational running system's development for Argo data's receiving, processing, management and service;
5. Study on the quality control methods and development of the quasi-real-time quality control system for Argo data system and visible delayed-time quality control system have been carried out;
6. Study on the construction of Argo database and Argo metadatabase is being under way;
7. The China National Argo Data Center's website has been established, and the network issuing system for relevant information has been put into operational running.

The State Oceanic Administration (SOA) has formally approved that the China National Argo Data Center's performance be brought into NMDIS's operational work as of July, 2003, and agreed to give financial support to the center's long-term operation.

Japan Argo National Data Management Report, November 2003

1. Status

Data acquired from floats. The Japan NDAC, the Japan Meteorological Agency (JMA), is presently acquiring ARGOS messages from 156 active floats operated by five Japanese organizations: Japan Marine Science and Technology Center (JAMSTEC), JMA, Meteorological Research Institute (MRI), National Polar Research Institute (NPRI), and Tohoku University, as of October 16, 2003.

Data issued to GTS. All profiles are issued to the GTS in TESAC form with the GTS bulletin header SOVX02 RJTD. The header will be switched to SOFX01 RJTD from November 4, 2003. TESAC message is issued after real-time QC when a profile is completed and at least two possible positions are determined within 36 hours after surfacing. When 36 hours passed, TESAC message is issued even if the profile is incomplete or single position. More than 90% of TESAC messages are issued within 24 hours. Longer delays are due to initial preparation for newly deployed floats.

Data issued to GDACs after real-time QC. All profiles are issued to the GDACs on the same schedule as they are issued to the GTS. Trajectory files are updated and issued to the GDACs 96 hours after surfacing.

Data issued for delayed QC. JAMSTEC, which is in charge of delayed mode QC, is acquiring ARGOS messages directly via CLS from the floats operated by JAMSTC, NPRI and Tohoku Univ. in the same way as the NDAC. It acquires netCDF files of all Japanese floats from GDACs.

Delayed data sent to GDACs. This has not yet happened. Delayed data will be sent to the GDACs from the NDAC.

Web pages. JMA maintains web pages that show the global network, float tracks, TS profiles, and TESAC messages based on the GTS data distributed in the last 6 months. It stopped providing Japanese float data on October 3, 2003 so that users can get all Argo data from a single GDAC server. JAMSTEC's web pages show various data products including float tracks, TS profiles and TS diagrams of Japanese floats and some scientific and network products. JAMSTEC operates mirrors of GDAC ftp sites.

2. Delayed Mode QC

Pressure correction is done automatically after 10 days from getting real-time QCed data. Salinity correction and subsequent visual QC have been done for floats deployed earlier. These are published in our own ASCII format on our Web site (documents are not yet prepared). Submission of delayed QCed netCDF files will start after the next-version of Argo profile file format (2.1) is carried.

4. Regional Centre Functions

High quality historical data set named as SeHyD1.0 (Selected Hydrographic Data Set Version 1.0) is completed for the Pacific. It will be published soon on our Web site.

National data Center India

India has deployed 31 floats in the North Indian Ocean with both APEX and PROVOR floats. These floats data are received at INCOIS and made available at INCOIS website (www.incois.gov.in/Incois/argo/argo_webGIS_intro.jsp) after real-time quality control. Another 25 floats will be deployed in the North Indian Ocean during April, 2004. We have not send the data either to GTS or Global data center, since we don't have GTS accessibility. However, Indian argo floats data are made available to Coriolis data center for Provor floats and CLS ARGOS for APEX floats. Both Coriolis Data center and CLS ARGOS are sending the data to GTS.

From February/March 2004, we would like to send the real-time data after QC to Global data centers. In this regard, we would like to know the format for sending the same.

Regional Data Center (Indian Ocean)

India is willing to host the Regional Data center for the Indian Ocean region. INCOIS is now developing North Indian Ocean Hydrology using the data sets available from the Indian Research Cruises conducted from 1965 to present, apart from WOA2001. This will enhance our capability for delayed mode quality control. Also, we have received the PMEL DMQC algorithm for doing the same in the Indian Ocean region.
We would like to have training from other DMQC center. In this regard, we are approaching POGO for some fellowship. However, we would like to know the procedure and responsibility of such regional data center.

Argo National Data Management Report for Korea

1. Status

Data acquired from floats

Year	Organization	Number of deployed Argo floats in each area			TOL
		East/Japan Sea	Northwest Pacific	Antarctic Ocean & Others	
2001	KMA	3	7		18
	MOMAF	5	1	2	
2002	KMA	5	10		25
	MOMAF	6		4	
2003	KMA	5	10		33
	MOMAF	8		10	
2004 (Plan)	KMA	5	10		30
	MOMAF	5		10	

Data is currently acquired from 59 active floats.

Data issued to GTS

Within 24 hours of data collection, the profile data are broadcasted on the GTS by CLS in France.

Data issued to GDACs after real-time QC

Data from Argo METRI/KMA are issuing by CLS after a general quality control, such as limits defined for each kind of sensors. For example, limits are tested for salinity values, but the filters are applied the same way on any geographic area.

Received help from AOML and JMA, KMA are developing real-time QC system, which will be developed due in the end of 2003, and operated after early of 2004.

Data issued for delayed QC

The National Oceanographic Research Institute (NORI) will carry out CTD observation at the Sea deployed the floats for DMQC. The KODC had the serial oceanographic observations which were carried out bimonthly on 69 fixed stations from 8 lines in East Sea(Japan Sea), since 1961, in February, April, June, August, October, and December.

Delayed data sent to GDACs

In the future, the KODC will send delayed data to GDACs after carrying out a higher level of DMQC using a program and manual QC by the specialists.

Web pages

The KODC already has opened a Korea Argo web page (http://kodis.nfrdi.re.kr/argo/) in English. It is upgrading continuously. Korea Argo webpage have menus for DM data and RT data. Argo DM data is controlled by KODC. Web pages for RT data is operated by KMA and linked Korea Argo web page. Web page on Argo METRI/KMA in KMA is http://argo.metri.re.kr.

The professor Kuh Kim of Seoul National University operates Argo homepage (http://eastsea.snu.ac.kr/pfloat.html) for Profiling Floats in the East/Japan Sea.

2. Delayed Mode QC

The KODC carrying out DM center in Korea.

The KODC is responsible for the Argo DMDB and has developed a program in order to control Argo DMDB and data QC in Korea. The KODC carrying out a higher level of DMDB QC using this program and manual QC by the specialists.

ARGO National Report for Russia (2003)

2003 was unproductive for the deployment of Russian ARGO floats. Government didn't give financial support to ARGO project in 2003. As the result the plan of floats deployment was failed and no one Russian float has added to ARGO net.

By our R/V "Shokalsky" some University of Washington' floats were deployed in the South ocean.

Two our floats near Kamchatka (deployed in October of 2002) worked properly.

STATUS:

1. DATA ACQUIRED FROM FLOATS

Data has been delivered from two floats. Data is processed approximately 4 hours after the receiving. We use the help of CLS and University of Washington for the processing of data as well.

2. DATA ISSUED TO GTS

Data to GTS is delivering by CLS only. Separately in national ARGO Data Center all profiles automatically are primary controlled (10 steps) and transformed in TESAC.
But profiles don't issue to GTS by National ARGO Data Center yet. Reason is Basic Russian Radiometeorological Center (Moscow) does not give the GTS Bulletin header.
Problem is discussed now.

3. DATA ISSUED FOR DELAYED QC

Automatic transformation in NetCDF and in ARGO Data Bas is carried out.
Automatic delayed QC (Wong-Johnson procedure) is under test. For it historical North Pacific Data Set and data from every FERHRI R/V are used.

4. DELAYED DATA SENT TO GDACs

In the present data after delayed QC doesn't send to GDAC.

5. WEB-PAGE

Russian ARGO web page (http://rus.hydromet.com/~argo/) in English with data (in text and NetCDF formats) and products is opened. Mirror of GDAC ftp site is operated as well.

6. GDAC FUNCTIONS

No.

7. REGIONAL CENTER FUNCTIONS

No.

ARGO National Report – Spain – 2003

This year have begun the direct contribution of Spain (which also contributes through the European project Gyroscope) to the international project Argo. It started in September this year with the deployment of one profiler in the Iberian Basin and five in the area between the Canary and Cape Verde islands. The floats, all of them APEX; were deployed by Spanish research vessels.

A further deployment of seven floats, one APEX and six PROVOR; is planned for the next year. The main area of interest is the Mediterranean outflow area and the Mediterranean sea, although the mayor part of these floats will be offered to the Argo international community to be deployed according to the Argo requirements in some other part of the globe.

The Spanish Argo contribution has been funded (REN2001-4022-E), by the Spanish Department of Science and Technology (*Ministerio de Ciencia y Tecnología*) and it is led by the Instituto Español de Oceanografía: other partners are Instituto de Ciencias del Mar, Puertos del Estado, I. Hidrográfico de la Marina, I. Nacional de Meteorología, Universities from Málaga, Castilla-La Mancha, Cádiz y Las Palmas de G. C. and AICO-InterOCEAN.

1. Status

- Data has been acquired from all floats, although some problems have been found with the last profile of two floats, more profiles will be need in order to find the reason of the problem.
- The data is send directly to the Coriolis (Ifremer) center, who is doing all the near real time processing, including near-real time QC, issue to GTS and public web page maintenance.
- Data is available in the following web page: http://www.coriolis.eu.org/cdc/projects/argo-spain.htm, where information about the Spanish ARGO contribution can also be found.
- Actually there is not national center for ARGO (DAC) is Spain, although it is planed to begin it at the Instituto Español de Oceanografía in the near future.

2. Delayed Mode QC

- As the Spanish Argo program have just started two months ago, there is not delayed mode working by now. Presently the Coriolis center (Ifremer) is also in charge of the delayed mode QC, close feedback with Coriolis will be done for a correct delayed mode QC.

UK Report to the Argo Data Management Meeting

Introduction/Background

The aim of the UK Argo project is to establish an operational system with the capacity to deploy about 50 floats each year (maintaining about 100-150 floats in the water at any one time), and to capture all Argo data in real time in support of operational ocean forecasting, as well as processing UK float data in delayed mode for climatological and hydrographic purposes. Funding is being provided by the Department for Environment, Food and Rural Affairs (DEFRA), the Ministry of Defence (MoD) and the Natural Environment Research Council (NERC). Participating organisations include the Met. Office (Ocean Applications with technical assistance from Observations Supply branch on procurement and deployment of floats), the Southampton Oceanography Centre (SOC), the British Oceanographic Data Centre (BODC) and the UK Hydrographic Office (UKHO). Following completion of the pilot project it is hoped that there will be a joint long-term commitment from DEFRA and MoD for the continued operational funding of Argo floats.

1) Status

- *Data Acquired From Floats*
  A total of 89 floats have been deployed since the beginning of the Argo project from VOS, research ships, Royal Navy vessels and aircraft (23 since the last Data Management Meeting). The UK have now deployed 22 in the North Atlantic (8 active; 14 failed/overdue), 5 in the tropical Atlantic (west coast of Africa: 1 active; 4 failed/overdue), 41 in the Indian Ocean (23 active, 19 failed/overdue), 5 in the South Atlantic (0^o to 40^oS: 4 active; 1 failed/overdue) and 15 in the Southern Ocean (9 active; 6 failed/overdue).
  Of these floats, 1 is owned by Mauritius.
  All full resolution data is received daily from CLS in the form of hexadecimal ftp messages.
  A total of 3123 profiles (correct on 11th September 2003) have been transmitted by floats in the UK Program since the beginning of Argo.

- *Data issued to the GTS*
  For the UK float data, CLS are creating GTS bulletins containing TESAC messages and forwarding these to Meteo-France for quality control and insertion onto the GTS. The UK Met. Office retrieves these data from the GTS for use with their Forecasting Ocean-Atmosphere Model (FOAM).

- *Data issued to GDACs after real-time QC*
  BODC have been routinely issuing full resolution profile data (after real-time QC) since 3rd July 2003. All profiles prior to this date have also been issued to the GDACs. All metadata files have been issued and BODC hope to be issuing technical and trajectory data by the beginning of 2004.

- *Data issued for delayed QC*
  All UK profile data present at the GDACs have been through real-time QC and can be subjected to delayed QC.

- *Delayed data sent to GDACs*
  Currently no UK data have been quality controlled in delayed mode.

- *Web pages*

UK Argo web pages are hosted by SOC, UK Met. Office and BODC. Those hosted by BODC are the data management pages (www.bodc.ac.uk). These give an overview of UK Argo, include links to the data and other Argo sites. An interactive map will also be available (updated daily) from the end of 2003 along with links to plots of the last temperature and salinity profiles and battery voltage timeseries.

2) Delayed-mode QC

BODC are working in conjunction with the UK Hydrographic Office (UKHO) with regard to delayed mode QC. Data is visually checked once a quarter before being sent to the UKHO. The UKHO will perform climatological envelope checks against their own climatology and send back to BODC any recommended changes. BODC will check these recommendations before sending the new data onto the GDACs. BODC will then undertake inter-float comparisons and comparisons with other nearby (e.g. CTD, XBT and SOOP) data as well and run the float data through the Wong software.

We envisage sending the first delayed quality controlled data to the GDACs by the middle of 2004.

3) Southern Ocean Regional Data Centre

BODC is operating as the regional Southern Ocean Argo Data Centre and will collaborate with the international Argo community in the management, exchange and dissemination of data; including the development and adoption of common protocols and procedures and the operation of the Southern Ocean regional data centre. Scientific guidance will be provided by SOC.

Currently work has concentrated on working with the Wong software on 2 long timeseries floats in the Drake Passage. The subsurface temperature inversion has led to problems in using this software. We have found that by working up from the bottom of the profiles to the 1st inversion and truncating the profile there improves the results considerably. Annie Wong is now working on further improving her software south of the Polar Front.

We have also begun to collate data from south of 30°S to improve the historical dataset used in any checks made against float data. This has involved removing some points from the supplied dataset which are of suspect quality.

Argo National Data Management Report of United States

September 1st 2002 - October 16th 2003

1. Status

- **Data acquired from floats:**

September 2002 to October 2003

Floats deployed:	298
Floats failed on launch:	5
Profiles quality controled:	9,900
Floats reporting:	381
No reports last 30 days:	9

1997 to October 2003

Floats deployed:	556
Floats failed on launch:	16
No reports more than 30 days considered inactive:	150

- **Data issued to GTS:**

During the reporting period, Service Argos and AOML put 9,111 Qc'ed profiles on GTS, 8,561 of them are recorded as having been transmitted. The discrepancy is under investigation (the missing 450 passed the QC tests).

- **Data issued to GDACs after real-time QC:**

During the reporting period, 9,900 netcdf profiles, technical and trajectories netcdf files and about 450 meta netcdf files have been issued to both GDACs.
Total numbers of netcdf files issused: 30,150

- **Data issued for delayed QC:**

Data is provided to the Pis and the delayed mode QC center daily on:
ftp://ftp.aoml.noaa.gov/phod/pub/ARGO_FTP/argo/nc

- **Web pages:**

The URL for the US Argo Data Assembly Center is:
http://www.aoml.noaa.gov/phod/ARGO/HomePage/

It provides links to:
- Documentation.
- Operations.
- FTP Services.
- On-demand Web Access profiles.
- Links to Related Sites.

A test side for Argo Productos is at:
http://www.aoml.noaa.gov/phod/ARGO/Products.

2. Delayed Mode QC

A system for verification and distribution has been designed and software has been developed, but not yet fully tested.

Argo National Data Management Report of France for DAC and GDAC activities

September 1st 2002 - October 27th 2003

1. Status of the DAC

- Data acquired from floats
  September 2002 to October 2003
  Floats deployed 106
  Profiles controlled 6687
  Floats reporting 176

  October 1999 to October 2003
  Floats deployed 286
  Profiles controlled 10965
  Inactive floats 110

Coriolis data center is the French data assembly center (DAC). We process data from Provor and Apex floats. These floats are deployed by national programs from 7 countries and 11 scientific projects.
See figures 1 & 2.

Country	Active floats	Total floats
China	3	8
Denmark	2	5
European union	65	82
France	51	117
Germany	38	53
India	11	15
Spain	6	6
Total	176	286

Scientific project	Active floats	Total floats
Argo-Greenland	1	5
Argo-España	6	6
BSH (Germany)	22	22
Coriolis (Shom, Ifremer)	35	98
Flostral	13	15
Gyroscope	65	82
Indian Argo project	11	15
China Argo project	3	8
MFSTEP	4	4
SFB460 (Germany)	9	13
Weccon (Germany)	7	18
Total	176	286

- Data issued to GTS

All data processed by Coriolis are distributed on the GTS by way of Meteo-France. This operation is performed by an operator. Therefore, during week-ends float data are not distributed on GTS within 24 hours of measurement. An automated distribution will solve that problem from November 2003.

- Data issued to GDACs after real-time QC

All meta-data, profiles and trajectory data are sent to Coriolis and US-Godae GDACs. This distribution is automated.
Technical data are not yet issued to GADCs.

- Data issued for delayed QC

All profile files are sent to PIs for delayed QC. Most of the Atlantic data handled by Coriolis are checked by the European project Gyroscope.

- Delayed data sent to GDACs

Scientific projects did not yet return delayed mode data to Coriolis data center. Gyroscope will probably produce delayed mode data by the end of 2003.

- Web pages

The web site of the French DAC is available at : http://www.coriolis.eu.org/cdc/

It provides :

- Individual float description and status (meta-data, geographic map, graphics : section, overlayed, waterfall, t/s charts)
- Individual float data (profiles, trajectories)
- FTP access ;
- Data selection tool ;
- Global geographic maps ;
- Weekly North Atlantic analyses (combines Argo data and other measurements from xbt, ctd, moorings, buoys) ;
- Some animations.

2. Delayed Mode QC

Annie Wong et al method has been adapted to North Atlantic environment to produce the delayed mode data for Gyroscope project. The method adapted by Lars Boehm from IFM-Kiel should be applied by the end of 2003 .

3. GDAC functions

Coriolis data center operates a Global DAC since 2001.
National centres reporting to Coriolis GDAC

- AOML (USA)
- MEDS (Canada)
- JMA (Japan)
- Coriolis (France)
- BODC (UK)
- CSIRO (Australia)

DAC	Stations	Platforms	Active platforms
aoml	19599	558	392
bodc	3822	84	49
coriolis	10955	286	176
csiro	1618	30	20
jma	11103	255	156
meds	3741	92	76
Total	50838	1305	869

See figures 3, 4 & 5.

- Operations of the ftp server

GDAC FTP data are available from :
ftp://ftp.ifremer.fr/ifremer/argo/

Documentation on the GDAC FTP site is available from :
http://www.coriolis.eu.org/coriolis/cdc/argo_ftp_site.htm

- Operations of the www server

An individual description of all Argo floats is available at
http://www.coriolis.eu.org/coriolis/cdc/floats/cdcFloats.asp

A global map of Argo floats is available at
http://www.coriolis.eu.org/coriolis/cdc/floats/cdcFloatsMaps.asp

A data selection tool for Argo is available at
http://www.coriolis.eu.org/coriolis/cdc/DataSelection/cdcDataSelections.asp

- Data synchronization

  Every day, Coriolis-data center checks all profile files from US-Godae. All missing or obsolete profiles are collected from US-Godae.
  The synchronization of meta-data, trajectory and technical data is not yet performed. These additional synchronizations should start by the end of 2003.

- Use statistics
  The following table displays the number of files downloaded from the GDAC ftp site. The figure of January 2003 is not complete, most of the statistics were not recorded this month.

month-year	nb. of dowloaded files
sept-02	211381
oct-02	131223
nov-02	73469
déc-02	87942
janv-03	4182
févr-03	183146
mars-03	298440
avr-03	276265
mai-03	675199
juin-03	380078
juil-03	464836
août-03	291588
sept-03	186915

  See figure 6.

4. Regional Centre Functions

The regional center for North Atlantic is not yet operational.

Figure 1 : countries of floats managed by Coriolis DAC, 28 October, 2003

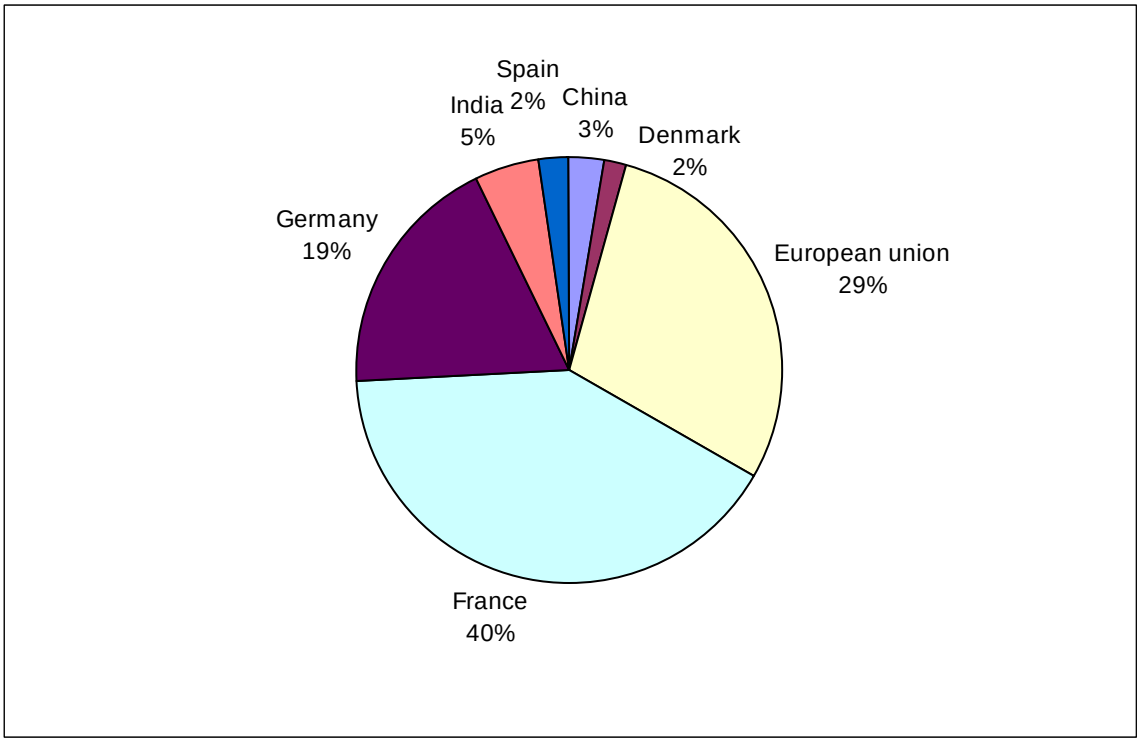


Figure 2 : type of floats managed by Coriolis DAC, 28 October, 2003

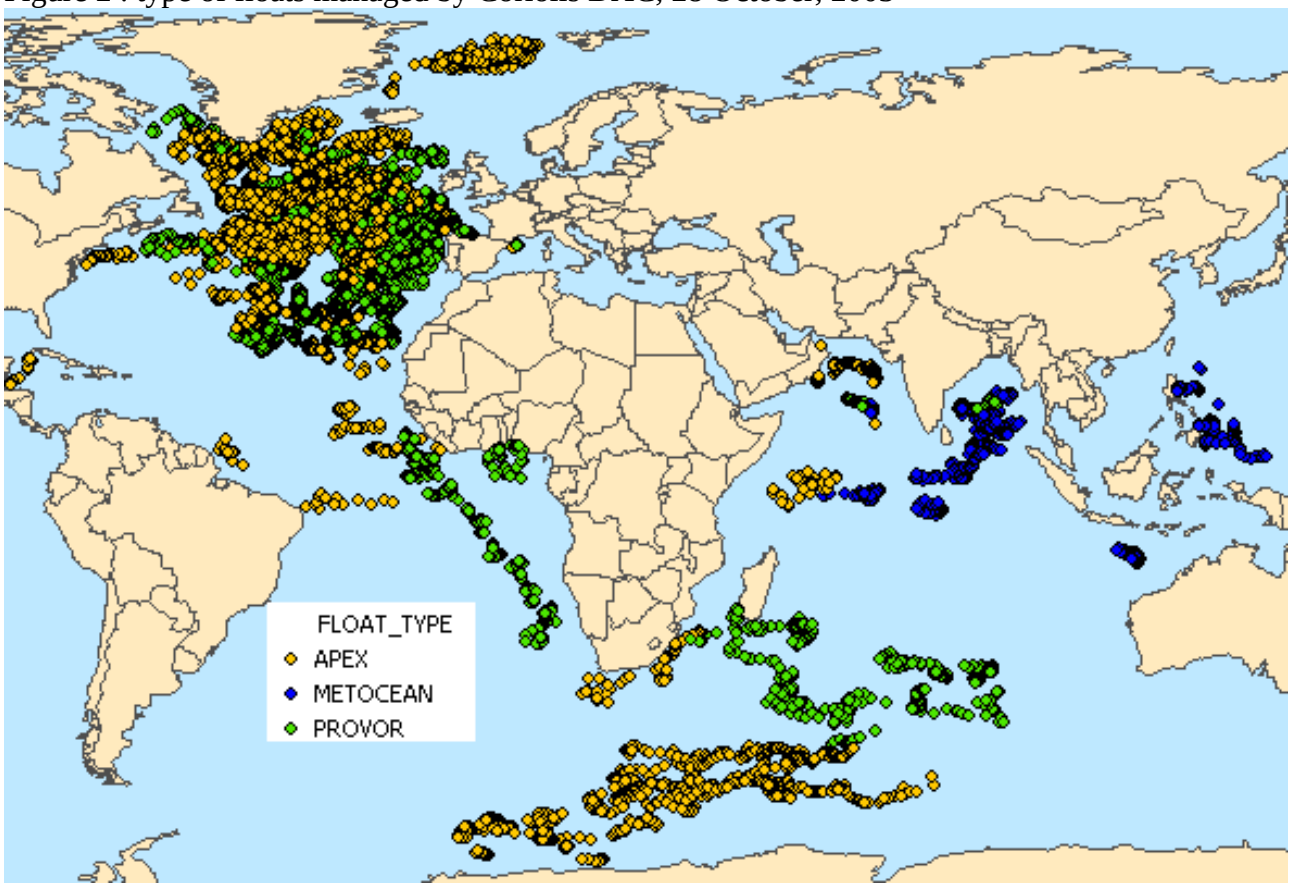
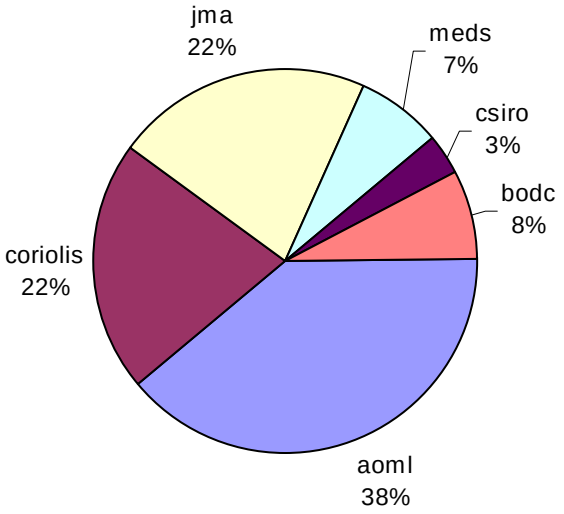
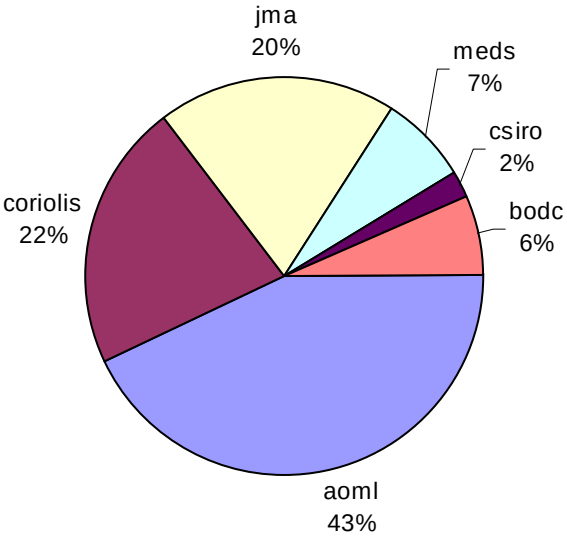


Figure 3 : Argo profiles and platforms available from GDAC



Argo GDAC Profiles, 27/10/2003



Argo GDAC Platforms, 27/10/2003

Figure 4 : monthly distribution of profiles available on GDAC

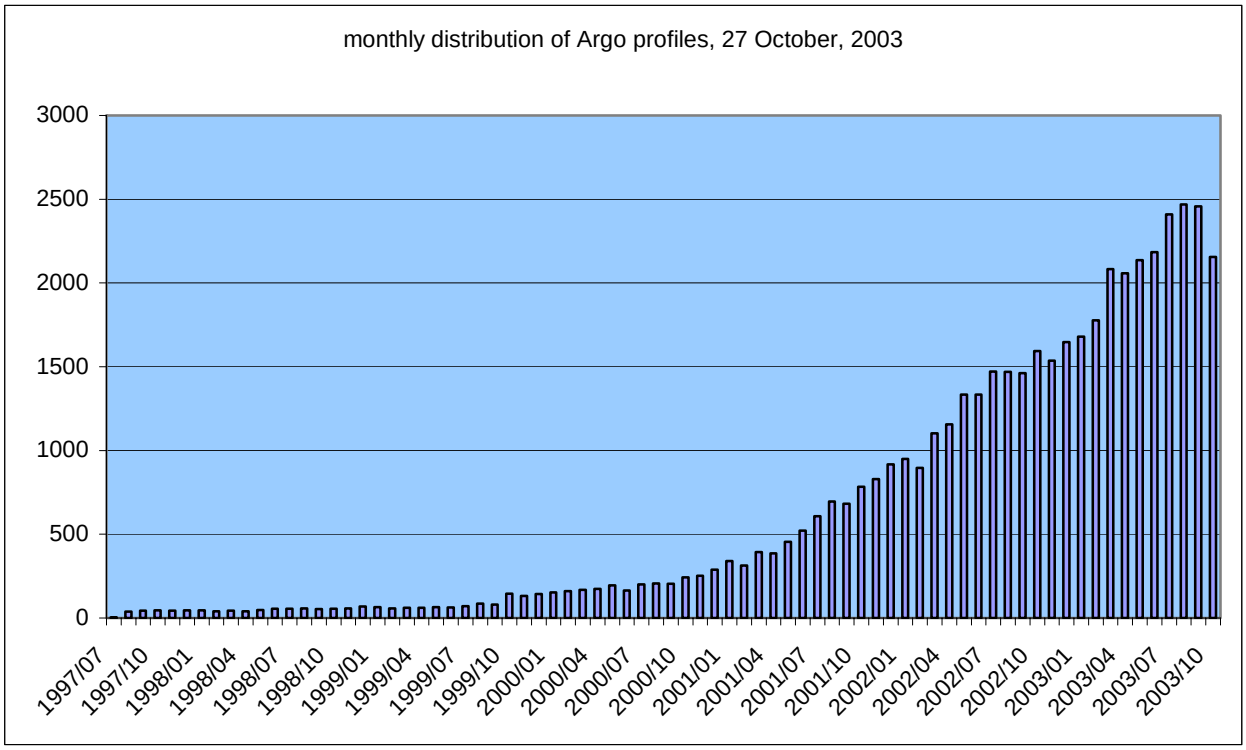


Figure 5 : geographic distribution of profiles available on GDAC, 28 October 2003

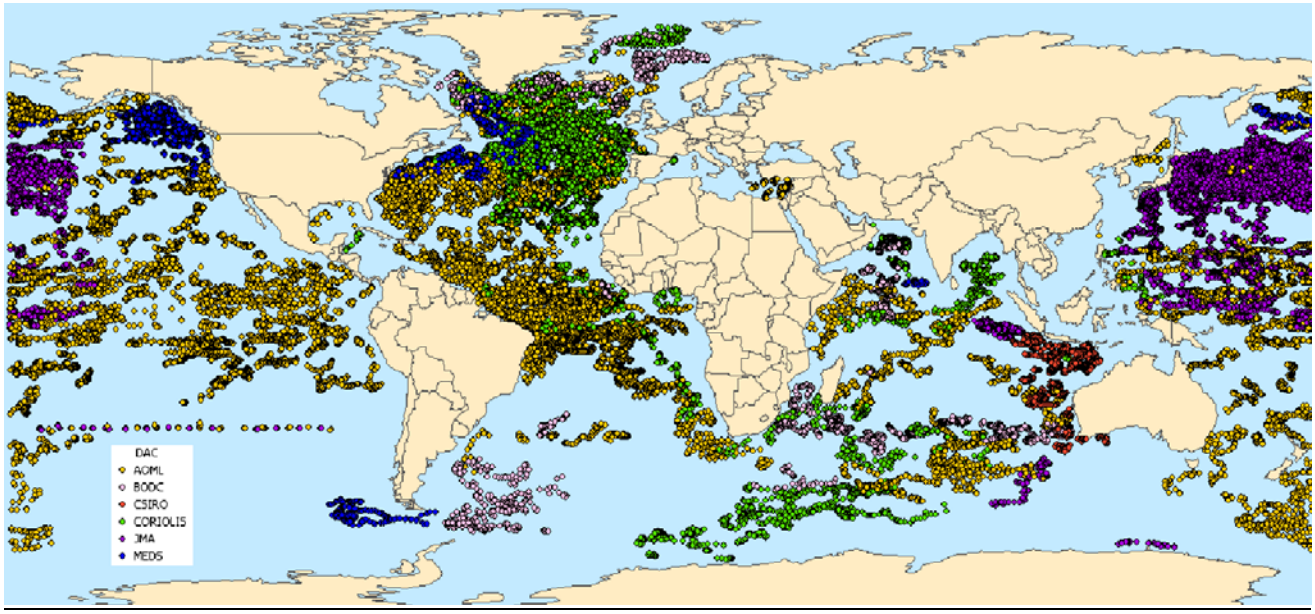
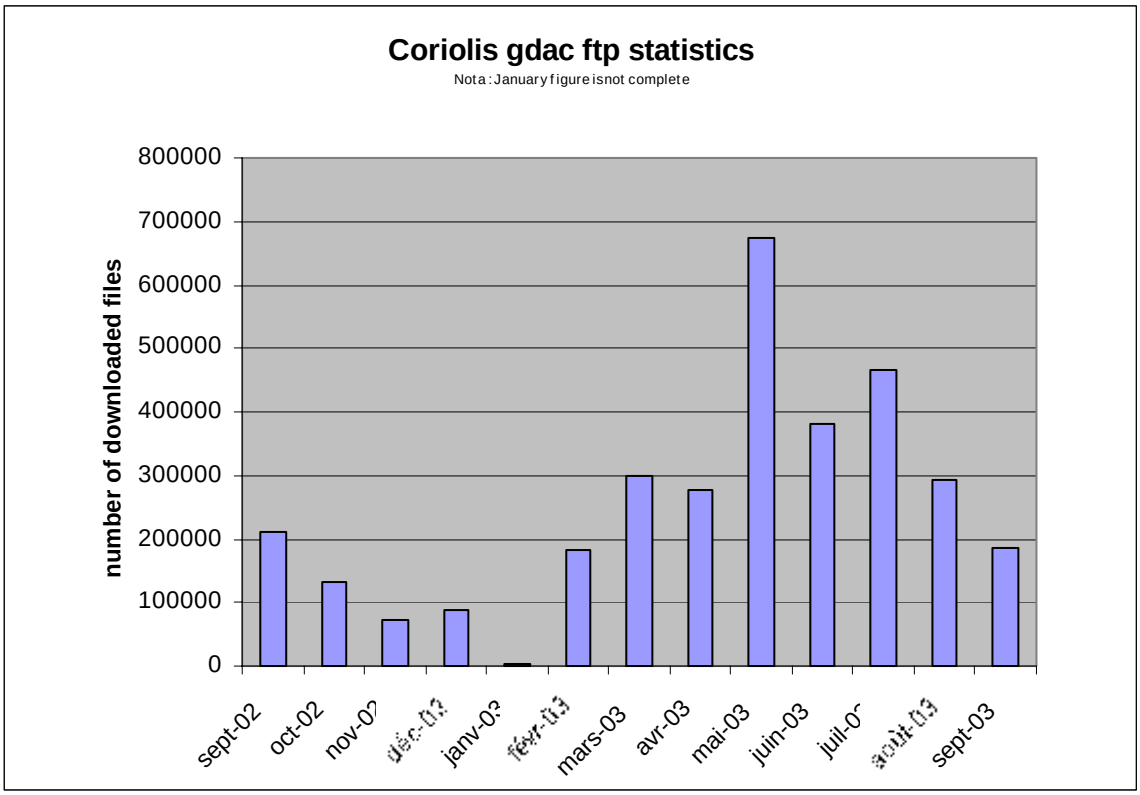


Figure 6 : number of argo data files downloaded from Coriolis GDAC.



Status of the US GDAC

October, 2003

DACs reporting

Austalia (CSIRO)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 30 Floats reporting
- 1610 profile files

Canada (MEDS)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 92 Floats reporting
- 3680 profile files

France (IFREMER)
- Reporting: Meta-data, Trajectory, and Profile data
- 283 Floats reporting
- 10500 profile files

Japan (JMA)
- Reporting: Meta-data, Trajectory, and Profile data
- 255 Floats reporting
- 10830 profile files

UK (BODC)
- Reporting: Meta-data and Profile data
- 84 Floats reporting
- 3330 profile files

USA (AOML)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 558 Floats reporting
- 18420 profile files

FTP Server

Address: ftp://www.usgodae.org/outgoing/argo

Synchronization:
- Profile files being synchronized with the French GDAC once per day at 0000 GMT.
- Other file types will be synchronized when the respective file index files are implemented. (See Open Issues below.)

Open Issues:
- Index files for meta-data, technical, and trajectory files not implemented. Expect to implement all by the end of 2003.
- Missing latitudes and longitudes in profile files are set to (0, 0) in the index files - will be completed by 19 November 2003.
- Southern Ocean basin needs to be removed and the index files re-generated - will be completed by 19 November 2003.

WWW Server

Address: www.usgodae.org/argo/argo.html

The Argo Web interface consists of:
- HTTP and FTP direct access to all GDAC data and metadata files
- OPeNDAP access to all GDAC NetCDF data and metadata files
- A custom Web Application:
    - Allows selection of profiles by region, time, DAC, and Float ID
    - Generates an optional location plot for selected profiles
    - Provides quick preview plots of salinity and temperature profiles, and float track
    - Provides download of profile, trajectory or technical data for all, or a selected subset of matching profiles/floats

- Live Access Server
    - Allows selection of profiles by region, time, DAC, and Float ID
    - Allows selection of profiles by region, time, DAC, and Float ID
    - Generates plots for property/depth (waterfall), property/propery, pie (surface expression of profile data), gaussian filled, or metadata (time/location)
    - Generates ASCII tab delimited table output for selected profiles
    - Generates Ferret/COARDS compatible NetCDF output for selected profiles
    - Generates Float Operations plots: Float Track, and Waterfall Plots

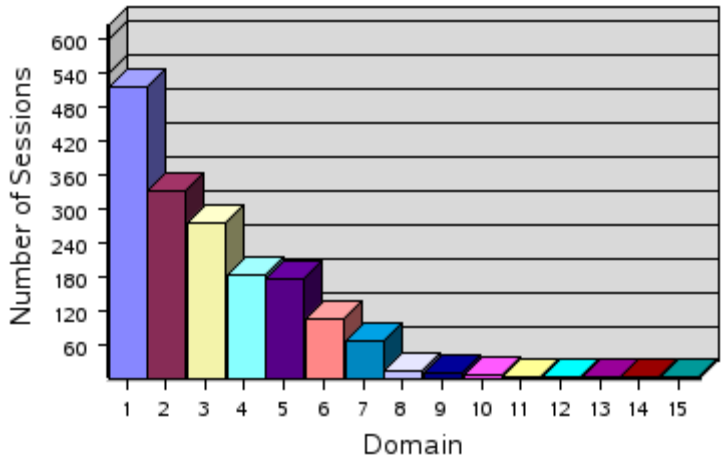
    - Future plans include:
        - Overlay of float track on any x-y data hosted by the USGODAE LAS
        - Comparison of profile data with gridded model or climate data hosted by the USGODAE LAS
        - Comparison of different profiles
        - Operations on individual profiles

Usage Statistics

USGODAE 2003 FTP: Argo Downloads January 1, 2003 - September 17, 2003

Filters Applied: Directories that contain /argo/

Domain Breakdown



Legend:
1. United States Government
2. United States Educational
3. Japan
4. France
5. Unresolved
6. United Kingdom
7. Canada
8. United States Military
9. Network (.net)
10. Italy
11. Germany
12. Australia
13. Organization (.org)
14. Commercial (.com)
15. India

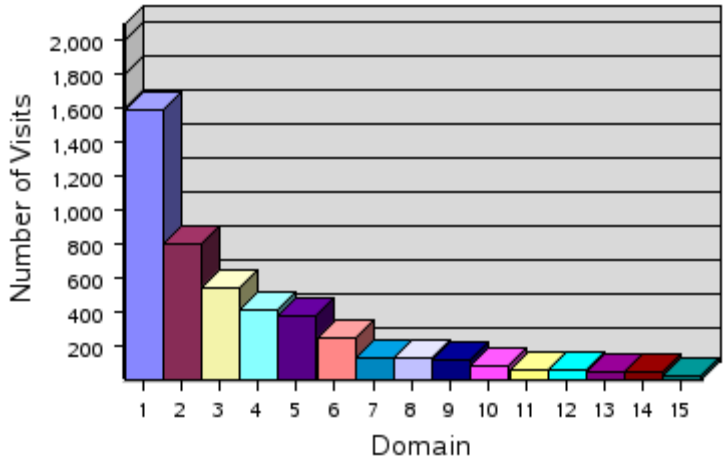
	Domain	Last Session	Downloads	Sessions
1.	United States Government	Sept. 15, 2003 at 11:55 p.m.	282,627 (6.2%)	515 (3.9%)
2.	United States Educational	Sept. 15, 2003 at 11:09 p.m.	256,632 (5.6%)	330 (2.5%)
3.	Japan	Sept. 15, 2003 at 8:20 p.m.	1,185,446 (26.1%)	273 (2.1%)
4.	France	Sept. 15, 2003 at 8:52 p.m.	82,639 (1.8%)	181 (1.4%)
5.	Unresolved	Sept. 12, 2003 at 6:13 p.m.	320,700 (7.1%)	174 (1.3%)
6.	United Kingdom	Sept. 15, 2003 at 6:44 a.m.	3,567 (0.1%)	103 (0.8%)
7.	Canada	Sept. 15, 2003 at 7:59 p.m.	96,400 (2.1%)	66 (0.5%)
8.	United States Military	June 18, 2003 at 4:16 p.m.	111,944 (2.5%)	11 (0.1%)
9.	Network (.net)	Aug. 11, 2003 at 2:30 a.m.	13 (0.0%)	8 (0.1%)
10.	Italy	June 24, 2003 at 6:48 a.m.	5 (0.0%)	4 (0.0%)
11.	Germany	April 17, 2003 at 1:47 p.m.	19 (0.0%)	3 (0.0%)
12.	Australia	July 18, 2003 at 1:50 a.m.	31 (0.0%)	2 (0.0%)
13.	Organization (.org)	July 14, 2003 at 7:44 p.m.	2 (0.0%)	2 (0.0%)
14.	Commercial (.com)	June 25, 2003 at 6:05 a.m.	4 (0.0%)	2 (0.0%)
15.	India	April 16, 2003 at 9:06 a.m.	3 (0.0%)	2 (0.0%)

Domains represented: 15 out of 42 (35.7%)
Domains matching filters: 17
Downloads represented: 2,340,032 out of 4,543,862 (51.5%)
Sessions represented: 1,676 out of 13,280 (0.1%)

USGODAE 2003 Web: Argo Downloads January 1, 2003 - September 17, 2003

Filters Applied: Directories that contain /argo/

Domain Breakdown



Legend:

1. Japan
2. Unresolved
3. Network (.net)
4. United States Educational
5. Commercial (.com)
6. United States Government
7. United States Military
8. United Kingdom
9. Canada
10. France
11. Online Services
12. Australia
13. Germany
14. Organization (.org)
15. Russia

	Domain	Last Visit	Views	Visits
1.	Japan	Sept. 11, 2003 at 1:55 p.m.	5,910 (1.3%)	1,583 (2.3%)
2.	Unresolved	Sept. 17, 2003 at 10:52 p.m.	5,302 (1.2%)	790 (1.2%)
3.	Network (.net)	Sept. 17, 2003 at 8:46 p.m.	1,029 (0.2%)	538 (0.8%)
4.	United States Educational	Sept. 17, 2003 at 6:17 p.m.	1,254 (0.3%)	404 (0.6%)
5.	Commercial (.com)	Sept. 17, 2003 at 10:17 p.m.	721 (0.2%)	369 (0.5%)
6.	United States Government	Sept. 17, 2003 at 7:43 p.m.	813 (0.2%)	236 (0.3%)
7.	United States Military	Sept. 17, 2003 at 7:34 p.m.	726 (0.2%)	128 (0.2%)
8.	United Kingdom	Sept. 15, 2003 at 2:53 p.m.	823 (0.2%)	124 (0.2%)
9.	Canada	Sept. 17, 2003 at 8:33 p.m.	215 (0.0%)	116 (0.2%)
10.	France	Sept. 8, 2003 at 12:53 p.m.	244 (0.1%)	72 (0.1%)
11.	Online Services	Sept. 17, 2003 at 1:17 p.m.	82 (0.0%)	57 (0.1%)
12.	Australia	Aug. 26, 2003 at 12:47 a.m.	91 (0.0%)	55 (0.1%)
13.	Germany	Sept. 8, 2003 at 2:27 p.m.	78 (0.0%)	44 (0.1%)
14.	Organization (.org)	Sept. 15, 2003 at 8:56 p.m.	105 (0.0%)	39 (0.1%)
15.	Russia	Sept. 11, 2003 at 12:48 p.m.	67 (0.0%)	18 (0.0%)

Domains represented: 15 out of 125 (12.0%)
Domains matching filters: 55
Views represented: 17,460 out of 459,739 (3.8%)
Visits represented: 4,573 out of 68,482 (6.7%)

Global Argo Data Repository

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The purposes of this report are:

- to review the U.S. National Oceanographic Data Center's involvements in the Argo project and
- to describe basic procedures by which the U.S. National Oceanographic Data Center acquires, processes, quality controls, archives, and serves Argo data.

The NODC operates the long-term archive, also known as the Global Argo Data Repository (GADR), for Argo data. The objectives of the GADR are:

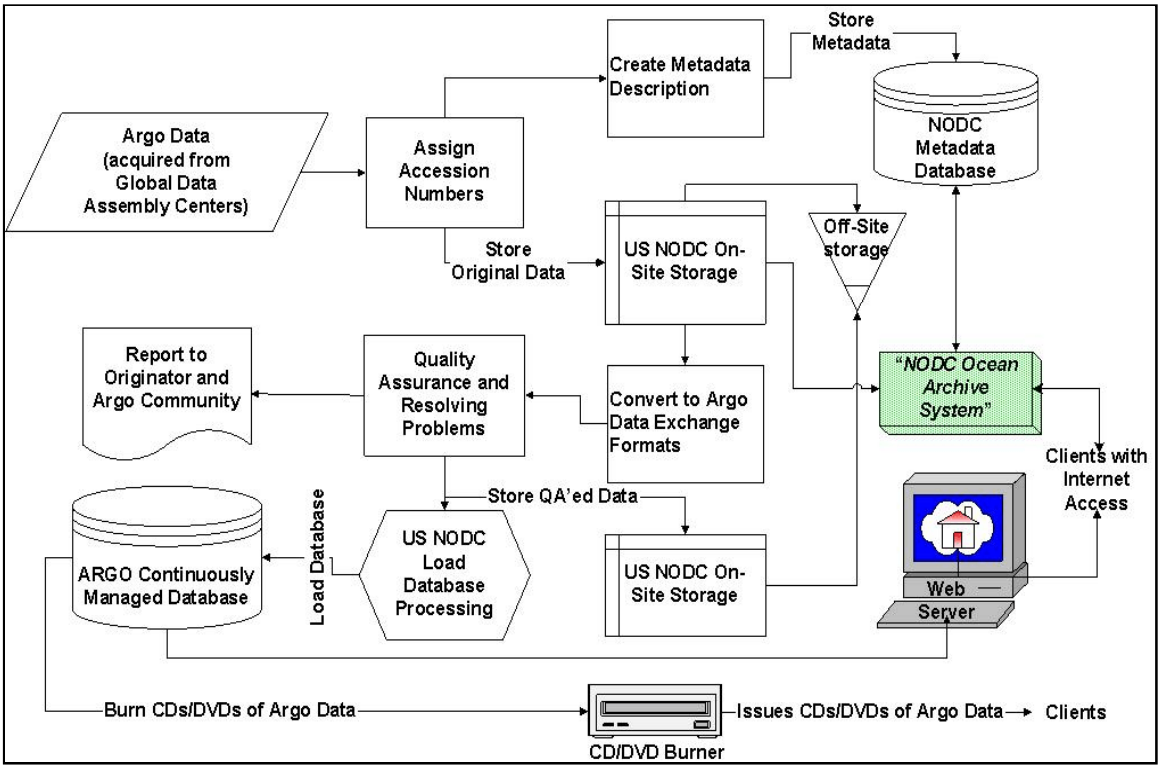
- to safeguard versions of the Argo data and information and
- to provide high quality Argo data to a wide variety of users in a timely and useful manner.

Currently, the NODC acts as a backup to the two GDAC servers each acting as a mirror of the other and has developed standard operating procedures (SOP) for processing Argo data. The SOP can be divided into four basic steps: data acquisition/accession, data ingestion, data quality control, and data distribution. The following figure is a schematic diagram which depicts the conceptual design of Argo data flow after arriving at the NODC. The following sections briefly describe the data processing procedures at the NODC.

1. Data Acquisition/Accession

The first phase in a series of procedures of processing Argo data at the NODC begins with downloading Argo data from the U.S. GODAE (Global Ocean Data Assimilation Experiment) Argo server in Monterey, California. This phase of data acquisition is automatically invokes `ArgoDataAgent` at 00:15 UTC every day. A UNIX script, known as "`ArgoDataAgent`", logins into the server as an anonymous and looks for an Argo daily data file, named as "`yyyymmdd_prof.nc`" in the "`latest_data/yyyy/mm/`" subdirectory of the sever's "`pub/outgoing/argo`" directory, where "`yyyy`" is the four-digit year, "`mm`" is the two-digit month of the year in the range `01` to `12`, and "`dd`" is the two-digit day of the month in the range 01 to 31. If the Argo daily file is not available at the login time, the `ArgoDataAgent` automatically generates an e-mail message and sends it to the Argo data manager at the NODC. The manager then investigates the cause(s) of the failure and take actions accordingly. The `ArgoDataAgent` also updates (replaces) Argo float's metadata, trajectory, and technical data residing in the "`dac`" directory and its subdirectories, if the data files are newer at the server than those residing in the GADR. Argo daily data files are "tarred" and "zipped" (compressed) into a single archive every week. An accession number is assigned to each weekly archive. Argo data in the "`dac`" directory and its subdirectories are automatically "zipped" and "accessioned" into a single monthly archive.

An accession number is also assigned to such monthly archive. Both weekly and monthly archives are stored in the NODC mass storage device.



2. Data Ingestion

Argo data acquired from the US GDAC are in the netCDF format as specified in the Argo User's Manual (http://www.ifremer.fr/coriolis/cdc/argo/argo-dm-user-manual.pdf). Argo users may have difficulty working with the netCDF format of files on the global Argo data servers. Great care is taken to reconstruct the US GDAC netCDF format into the Argo GADR (NODC) netCDF format. The reconstructed netCDF format preserves all original metadata information and measured parameters as well as conforms with the netCDF conventions commonly used by Cooperative Ocean/Atmosphere Research Data Service (COARDS) (See the Web site at http://ferret.wrc.noaa.gov/noaa_coop/coop_cdf_profile.html) and WOCE (See the Web site at http://woce.nodc.noaa.gov/woce_v3/wocedata_1/utils/netcdf/woce_conventions/woce_netcdf_format.htm). To avoid any future confusion with the netCDF files on the global Argo data servers, we name the reconstructed netCDF format as the "GADR (or NODC) netCDF format". The GADR netCDF format is fully compatible with `ncBrowse`&a Java application that provides flexible, interactive graphical displays of data and attributes from a wide range of netCDF data file conventions. The NODC version of Argo GDAC netCDF format is under review by the format-working group of the Argo Data Management Team.

To encourage wider use of Argo data we have developed a utility program that extracts the values of observation location, time, measured parameters, and the associated quality-control flags from the original netCDF files and saved them in the tab-delimited spreadsheet text format (compatible with `Java OceanAtlas` and `Ocean Data View`).

3. Data Quality Control

The NODC does not perform any quality control (QC) procedure on Argo data downloaded from the US GDAC. All data has been passed the standard automated real-time QC procedure performed by each Argo data center. All QC flags are preserved in their original forms at the NODC.

4. Data Distribution

The NODC, in cooperation with the Argo Data Management Team, has produced a compact disc containing Argo global data and resource. This disc, labeled as "GDAC_DVD", contains data collected under the Argo Science Team auspices, documents, resources, and software programs for analysis, display, and synthesis of Argo data. Updates and amendments to the contents of the disc will be available online at http://www.nodc.noaa.gov/argo/updates. The original Argo GDAC netCDF files are available both on the Argo DVD and off-line when users request. Currently, the NODC also serves Argo daily data in the NODC version of Argo netCDF and tab-delimited spreadsheet text formats to the public through the NODC Web site at http://www.nodc.noaa.gov/argo/latest_data.html.