5th ARGO DATA MANAGEMENT MEETING

Southampton
29th September – 1st October 2004

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1. Objectives of the meeting

The 5th Argo Data Management meeting was hosted by SOC and BODC and B King welcomed the participants to Southampton.

S. Pouliquen presented the objectives of the meeting, elaborated in coordination with Argo project office that are the following:

- Identify, and take steps to implement, actions needed to improve Real-Time data flow (considering all aspects of the system from transmission from the float to arrival at GDAC)
- Review status of Delayed-Mode quality control
- Identify, and take steps to implement, actions needed to increase the volume of Delayed Mode Q-C'd data and to get these data to the GDACs.
- Identify a set of robust metrics for documenting future (and if possible past) growth and performance of:
  - The Argo array
  - The Argo data system
  - The uses being made of Argo RT and DM data
- Review and take steps to put in place appropriate Argo data archive functions including the detailed specification of possible distribution of Argo data and analysis tools via CD-ROM.
- Assess the ability of present Argo data formats and processing mechanisms to handle data from profiling floats with new sampling schemes (e.g. sampling during drift phase), with novel sensors or using new data communication and position-fixing systems.
- Give clear guidance to the planned Regional Data Centres on their responsibilities, their relationships with GDACs and their role in regional Delayed Mode QC.

Two presentations have been added to the proposed agenda: "Cls Argos real time processing" was added to the Real Time point and "Salinity from satellites" to the Product point. The point on "evolution of the array" was moved to the Product point under the discussion addressed by B Keeley. The revised agenda and timetable appears in Annex 1. The list of participants appears in Annex 2.

S Pouliquen also presented the status of the actions that were raised last meeting: 12 actions were closed, 12 were underway and status was addressed in the relevant agenda points and 4 were not started (2 were cancelled and 2 reported on the action list issued at the end of the 5th meeting). The exact status is provided in Annex 3 and the 5th meeting action list in Annex 4.

2. Status of Argo program

2.1. Status of the project and new features at AIC (M Belbeoch)

The Argo Technical Coordinator, M. Belbeoch, presented the status of the program emphasizing the implementation aspects (e.g. network growth, remote areas access) and the challenges that Argo faces. He noted that there were 1450 active floats with 98% reporting in real-time; 50 were waiting for GTS distribution and 50 were waiting for GDAC distribution.

The Argo TC recalled the importance of properly labelling the instruments before launching, even if the actual sticker was not a universal solution, and if possible to write the WMO Id on it.

He reported on the status of cooperation developed with South American countries (Chile, Costa Rica, Mexico), encouraged by the AIC, and stimulated via float donations (from Canada and Spain).

He stressed the fact that the Argo funding should be sustained long enough to fill and maintain the global array and recalled the need for continuous cooperation between operational and research communities.

The TC introduced the AIC information system, recalling it's website was the visible part of the iceberg. Then he presented basic web sections ("news", "contacts", "meetings", "documents", "links", and "help" with search features) and operations oriented products (see annex) available at the AIC. He recalled that developments have been rather ambitious (one person 30% of working time) and thus ergonomics could be improved as noticed by the AST (March 2004). The TC took steps and worked with a student specialized in graphical design to highlight JCOMMOPS / AIC services and realize the new Argo portal www.argo.net. First feedback on the portal was given by the ADMT.

He presented the latest developments concerning the AIC's data management section:

- Reporting interface for DACs was upgraded to be used by GDACs and for the delayed mode.
- The AIC now monitors on a daily basis the data distribution set up (for the 2 channels): (e.g.) as long as the float has not been noticed on the GTS/GDACs, operator is notified to set it up. (see http://w3.jcommops.org/cgi-bin/WebObjects/Argo.woa/wa/dataStats)

Future AIC developments were introduced, particularly concerning float lifetime statistics, GIS upgrade (projections), and the new Notification interface. The application, being developed, should rationalize long term deployment planning, save time for those in charge of it and store more metadata concerning deployment condition (e.g. sea state, ship speed, dep. method, etc) for better network monitoring.

2.2. How to better know Argo user community? (John Gould)

Argo's objective is not just to build an array but also to deliver data that meet user needs. While initially there were many data management issues to be resolved within Argo, we now need to take a broader view to ensure that we are meeting the needs of the rapidly growing and diversifying community of users in:

- Operational forecast and analysis centres
- Research groups doing regional and global data assimilation
- Oceanography and climate research
- Commercial users

So a first step has to be to learn who these users are, and then to be aware of their uses of the data and to implement an effect means of responding to user needs in terms of:

- Data quantity
- Data access
- Data quality
- Data timeliness
- Response to queries

There is a relatively small (order 20) group of operational centres using Argo data. For each of these we already have a point of contact. A dual approach to compiling a list of other Argo data users is suggested.

1) National members of ASAT and ADMT should be used to identify users in their own countries and regions.
2) Users will download data from GDACs and should be asked to perform a simple registration process when they access data.

A suggested questionnaire is shown below.

Introductory text
In order to tailor the data service to user needs we ask you to identify who you are and what use you will make of Argo data.

- Please enter your name and e-mail address

Check as many boxes as are relevant
Data use
I work in a
- Government research lab
- Data centre
- University
- Commercial company
- Operational centre
- Other

I plan to use the data for
- Oceanographic research
- Climate research
- Environment/ocean analysis/products
- Technology issues
- Other

My area of interest is
- N Atlantic
- S Atlantic
- Equatorial Atlantic
- N Pacific
- S Pacific
- Equatorial Pacific
- Indian Ocean
- S Ocean
- Mediterranean
- Global

After establishing a database of Argo users we will need an effective mechanism to communicate with them.

Prior to ADMT-5, Argo Director contacted a number of Argo data users who did not have easy access in their lab to information on Argo (i.e. they were not in the same lab as an AST or ADMT member). Feedback came from UK, USA, Canada, and South Africa.

A common confusion was between the RT and DM data streams. All users were downloading data from the GDACs and regarded this as DM even though it had not been subjected to DM QC. Users were also confused about what level of correction had been applied to the data. (They did not know what to expect of the data).

For this reason there is and urgent need to prepare a simple Argo data guide that explains the various data streams and what a user should expect of the data at each stage. A guiding principle at all stages of Argo data delivery should be that

"The data should not contain errors that we know about and know how to fix (subject to the level of available resources)"

3. Real Time Data Management

The purpose of this item was to review the Argo real time data stream highlight the residual problems to identify new actions needed to improve the volume, timeliness of delivery and quality of Argo RT data. .

3.1. Milestones (S Pouliquen)

On AIC WWW site a system of milestones has been set up to monitor the DAC implementation status both for realtime and delayed mode data streams. 3 new DACs (China, India, Korea) have been set up during 2004 and started to implement the realtime data stream.

Realtime data management Operations % complete

	Australia	Canada	China	Coriolis	Japan	India	Korea	UK	USA
Data acquired from floats	100	100		100	100		100	100	100
Data issued to GTS in Tessac	100	100		100	100		100	100	100
Data issued to GTS in BUFR	0	0	0	0	0	0	0	0	0
Data sent to PI	100	100		100	100		100	100	100
Metadata sent to GDACs	100	100		100	100		100	100	100
Profiles sent to GDACs	100	100		100	100		100	100	100
Trajectories sent to GDACs	100	100		100	100		100	100	100
Technical Files sent to GDACs	100	100		100	100		100	0	100
Web pages for data	100	100		100	100		50	100	100
Web pages for reporting DAC activities	100	100		100	50		50	100	100

The conclusion is that for the DACs that have started at the beginning of ARGO most of the functionalities are in place.

Delayed mode data management Operations % complete

	Australia	Canada	China	Coriolis	Japan	India	Korea	UK	USA
Data processed at PI level	100	50		50	84		50	1	30
Profiles sent to GDACs	0	95		50	1		0	66	100
Trajectories sent to GDACs	0	0		0	0		0	0	30
Web pages for data	0	50		50	100		0	100	0
Web pages for reporting Dac activities	0	0		0	0		0	100	0

The delayed mode process has started especially at DAC level but the operations at DAC level is not obvious (see Delayed mode item in this report)

Realtime and Delayed mode GDACs data management Operations % complete

	CORIOLIS	Us Godae
Data received from DACs Metadata	100	100
Data received from DACs Profiles	100	100
Data received from DACs Trajectories	100	100
Data received from DACs Technical	100	80
Data Issued to Users FTP	100	100
Data Issued to Users WWW	100	75
GDAC Synchronization	50	75
WWW pages for GDAC activities	100	50
Delayed mode Data received from DACs Profiles	100	60
Delayed mode Data received from DACs Trajectories	0	10
Delayed mode Data Issued to Users FTP	100	100
Delayed mode Data Issued to Users WWW	100	75
WWW pages for GDAC activities	0	50

I wonder how some items can have different percentages? Claudia

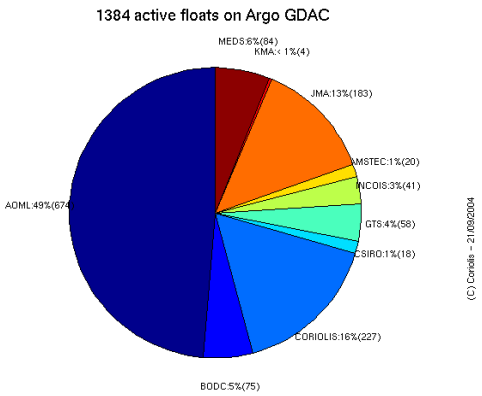
3.2. GDAC data from GTS only (S Pouliquen)

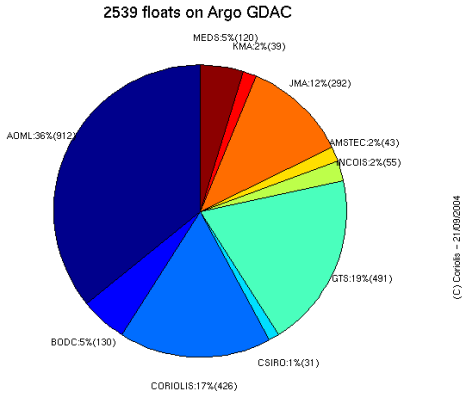
AIC has implemented a monitoring tool to identify the floats that are:

1. Transferring data that are not sent to GTS
2. Transferring the data that are not sent to GDACs
3. Transferring data that are only sent to GTS (often via CLS) and not to GDACs

These lists, updated daily, are very useful and should be regularly checked by the DAC managers.

At the 5th AST meeting, it has been decided that the goal was to arrive to less than 5% of the realtime data in the 3rd list. This goal is achieved which is great. If one checks this 3rd list, he can see that a lot of the floats cited are part of the Argo-Navoceano program. So the ADMT recommend to USA to find a solution to help Navoceano to transmit their data to GDACs.





However on historical dataset available at GDACs they are still 20% of floats that have only been sent though GTS. AIC and GDAC should provide the list of floats to the DACs for them to provide the historical data to the G(?)DAC. The goal should be again to reduce this backlog to less than 5%.

3.3. Status of Argo data on GTS (B Keeley)

Keeley presented a summary of issues and results from real-time delivery of the Argo data on the GTS. He noted the following points

- That approximately 85% of floats are making the target of being distributed within 24 hours of collection. Even if improved the situation at Toulouse node is still not satisfactory and action has to be raised at French level (CLS and Coriolis)
- MEDS produces monthly statistics of timeliness and volumes coming from the different GTS insertion points. These are useful in catching distribution problems that still arise.
- MEDS has been issuing a monthly report of duplicate TESACs since January of 2004. Numbers vary from none to many 10s of occurrences with no steady decline noted.
- He showed a sample where 3 separate TESACs were received in the space of 1 hour from a single float. The three profiles all were separate pieces of the complete profile with identical values of T and S at common pressures. Christian Ortega remarked that he was surprised by this and wanted more information to follow up.
- Keeley showed examples of errors that get through the automated real-time QC procedures and that show up in the TESAC. It is expected these also appear in the real-time NETCDF files sent to the GDACs. Errors include smaller spikes, salinity offsets over parts of profiles, and unrealistic deep pressures.
- MEDS visually checks every TESAC and the rate of error is approximately 4% of messages have one or more problems.

3.4. CLS Argos (C Ortega)

C. Ortega presented the CLS/Service Argos enhancements being implemented in their processing centres to better serve the Argo data management requirements. These mainly concern the real-time DAC capabilities.

Duplicates: In some circumstances, the Argos GTS time tagging process generated duplicated observations. This impacted some BUOY and TESAC bulletins. A routine has been developed to suppress these duplicates. It has been implemented this September.

APEX 28-bit format: Within this new format, some Salinity-Temperature-Depth data samples of a given level are split over two Argos messages. A routine has been developed to reassemble these data before the processing and the QC of the profiles. Each APEX message includes a header containing the message number. Prior processing individual messages, the routine picks-up the 40 last bits of the previous message and concatenates them with this message data. These 40 bits contain the data missing to complete the S-T-D sample. This routine can be used for any data format presenting same characteristics. The implementation of this routine is scheduled for end Y2004 – beginning Y2005. CLS/Service Argos strongly recommends that float users and manufacturers discuss new Argos formats with them so that work at the level of the DACs can be minimized and best technical solutions retained. We will be pleased to help in this process with our existing simulations tools.

AOML "box" redundancy: All the US Argo profiles are processed by Service Argos Inc, for GTS dissemination, with the dedicated software developed by AOML. It has been decided, with AOML agreement, to implement this software in a dedicated computer at CLS to provide redundancy and increase the overall reliability of the operation. This software may also be used, when needed, to process some formats the GTS sub-system is not addressing currently. This implementation will be completed at the end of this year.

Speeding-up the data distribution: Currently, the CLS GTS-sub-system waits for a pre-set duration (typically 18 hours) before starting to process the messages of a given float. The GTS dissemination is hence delayed by approximately the same time. The new routine picks up the total number of data samples transmitted coded in the first message and sums up the number of data samples received. As soon as all the data samples are received, the profile starts being processed. In case a message is missing, the profile is calculated, using all messages available, after the pre-set duration is met. The implementation of this routine is scheduled for this September.

Meta data dissemination to Ifremer GDAC and/or others: Coriolis has asked to receive all the Argo data sets processed by CLS GTS-subsystem directly on an Ftp site. These include list of float locations, T/S profile data (including rejected ones), and float technological meta-data which are encoded in the Argos messages. An extraction of the GTS data in ASCII format was developed. The implementation of the "ASCII" data Ftp delivery is scheduled for this September. However, development for technological meta-data was delayed and is planned for early 2005. Netcdf coding is also envisioned.

Enhancing the quality of the Service: The user office team is being trained to know more about the floats and other hardware in order to better answer to the user needs, provide accurate end-to-end (from float to user processing software) advice and ideally anticipate on useful actions to get best results out of the Argos system.

DAC capability: Over the past years, CLS/Service Argos have developed the real-time DAC capabilities in accordance with the ADM requirements, and are willing to offer this service to the users or countries who haven't developed this capabilities. The ADM acknowledged this capability and invite users with such concern to make contact with CLS/Service Argos to set-up the related data processing and dissemination.

CTD profiles collected by marine mammals DAC capability: As a conclusion, CLS/Service presented preliminary results from a cooperative program between UK, France and Australia were 24 seals were equipped with Argos transmitters fitted with CTD sensors. Interesting profiles were shown for depths of 500 to 800 m in ice-covered regions around Antarctica. Though the primary goal of the biologists is to study the animal behaviour in their habitat, these animals provide CTDs from regions were floats are difficult to

operate (ice-covered) and the ADM may approach this community to check the quality of the data with the perspective, should they be proven to be valuable, to add these profiles to the global data bases.

3.5. What happen when Data arrive at CORIOLIS GDAC (C Coatanoan)

Because CORIOLIS has experienced problems while providing the Argo dataset to the Mercator model for assimilation, CORIOLIS GDAC has decided to implement an alert system based on the analysis of the residuals calculated statistical objective analysis over the Atlantic Ocean. This alert system will be extended to global ocean beginning of 2005. C Coatanoan, who is performing this check at CORIOLIS warns the DAC managers when an error is detected, the DAC has then to send back the corrected data to GDAC.

Within the past 2 months 6500 profiles have been submitted and 150 anomalies detected. This represents 2% of the data which sounds small but which can cause problem when one knows that a single erroneous measurement can corrupt a complete forecast; this has been experienced both by FOAM/UK who gets his data from GTS and MERCATOR/France who gets them from CORIOLIS GDAC. That's why it is important that each DAC takes actions to correct most of the anomalies and prevent them to happen again in future.

Some anomalies are detected on a float dataset or metadata:

- Missing metadata: if this file is missing the transmission is blocked as it is mandatory
- Missing trajectory or technical files: this should disappear with time
- No complete set of cycles: « historical » data are missing for some floats, specially for the recent DACs; a list will be sent to those DACs to help them to update their dataset.
- Missing information or unknown value for some parameters

Some anomalies are detected on the profiles:

- Some measurements have QC flags set to 0, which means "no QC applied". This should not happen.
- Data with spike not flagged
- Data with bad flag on the neighbouring measurements of an anomaly
- Data with flag at 1 or 2 when it's clear that should be 3 or 4.
- Data with should be in the DAC grey list
- Bad quality indicator on pressure level: we need to homogenize P measurement flagging. (See Realtime test issue later in this report)

All DACs agreed that the feedback from GDAC was valuable and that they were correcting their processing to prevent the errors from happening again. GDAC have seen improvement with time. Some DACs have to correct their implementation (erroneous spike flagging, Grey list float should be flagged at 3-4).

It was not clear to decide if P/T/S should be flagged independently; normally if P is wrong T/S should failed density test. Christine Coatanoan will check if these cases continue to happen. DACs involved in RT QC should looked offline on their own system if this assumption is correct.

The 40637108 cycle 35that has been sent to GDAC was flagged in a strange way. This cycle will be send to different DACs to see if it is not an implementation problem (like the order of the tests) that lead to this strange flagging.

It is not easy to communicate problem detection to realtime users. Chairs were advised to look at the problem reporting system put in place by DBCP for the drifter program.

3.6. Revue of Real Time tests (T Carval)

T Carval has made a review of the new tests that where decided at the last ADMT meeting:

- Test 15- Grey List: 3 DACs (Coriolis, JMA, AOML) have transmitted their list at GDAC but only Coriolis and JMA have implemented this test as specified. Nevertheless Meds, BODC, CSIRO will provide their Grey list soon and are using internal files to prevent data from going to GTS. In real time, data from floats that have been put in grey list will have their QC flag set to 3. A Delayed mode examination can set the flag to 4 if the PI thinks it's unrecoverable. DAC will ftp data through submit directory (greylist_<dac>.csv) and GDAC will produce a consolidated grey list file greylist_argo.csv that will be made available at the root of the Ftp site. The grey list flag will not override a flag of 4 assigned by another test.
- Test 16- Jump: this test is only implemented at CORIOLIS because it's the only DAC that have active FSI sensors that are more likely to be affected by salinity jumps.

At this meeting it was decided to implement additional tests on profile:

- Test 17- Frozen test: the purpose is to detect a float that has profiles that don't change from one cycle to another. The specification will be provided by AOML to be put in RealTimeQC manual. This test is used to warn operator to eventually put this float on a grey list. Feedback on this test from DACs will be revisited next year. The exact specification of this test can be found in the Argo QC manual.
- Test 18- Max depth test: If the pressure is higher than DEEPEST_PRESSURE + x db (x to be defined by realtime working group) the pressure and all related parameters should be flagged at 3, P/T/S should not be sent on GTS.

It was also proposed to implement some simple test on trajectory files as we often see at GDAC erroneous positions. These tests are derived from the first realtime profile QC: Platform ID/ Impossible date/ Impossible Date/ Position on Land/ Impossible Speed/ Global Range test/ Regional Global parameter test. T Carval will provide a complete description in the realtime QC manual.

Moreover when time is not monotonic in trajectory file, it often highlights a problem in the cycle numbering. GDAC and DAC managers will define a check at GDACs when a DAC submits a new trajectory file.

3.7. BUFR format (M Ignaszewski)

Argo program will have to distribute Argo data in BUFR format soon. Both profile and trajectories should be transmitted on GTS.

It was decided that this format should:

- Include full resolution profile + Qc flags
- Include both bad and good data.
- That Pressure will be the transmitted parameter unless there is a strong requirement for depth from operational users. Contact to be made feedback through DAC contacts.
- Include basic metadata

The question of how much metadata should be put in this BUFR format was discussed. A consensus was achieved that it should be as close to the present Netcdf format as possible and that all measured parameters should be included. It was also agreed that the format should define mandatory and optional parameters. DACs will be encouraged to fill the optional parameters whenever possible.

The draft BUFR template for profile data has to be ready before the end of January 2005 for discussion within ADMT and AST. It has to be ready for the next WMO meeting of the ET/DRC. The next step is to develop a plan to switch to BUFR. In order to minimize the work induced at DAC level, a tool to generate BuFR from NETCDF should be developed in one place and provided to all DACs

for implementation. Takashi Yoshida (JMA) has developed an early version of this tool already; volunteers to help complete this when the BUFR template is finalized will be welcome.

4. Delayed mode data management

The purpose of this item was to review the implementation of the delayed mode QC as defined at the 6th AST meeting in March and identify the difficulties encountered by the teams.

During the presentations, there was much discussion of the following important issues to ensure the consistency of the Argo data set:

- Standard reference data sets. An important function of the RDACs should be the development of reference data sets for their region. Making contact with all projects collecting data, both large and small, in an area will be critical.
- Homogenisation of the delayed-mode method. Many cases were discussed where changes to the method and subjective decisions were required to supplement the accepted method. The Delayed-Mode workshop that has been discussed should be a high-priority to further refine and standardize the method.
- Feedback of delayed-mode QC results to the real-time data so that the best quality real-time data can be achieved.

The need for a delayed-mode workshop to address these issues was stressed by several of the attendees. It is very important that this workshop be held as soon as possible.

4.1. CORIOLIS/France (C Coatanoan)

Annie Wong et al method has been adapted to the North Atlantic environment by Lars Böhme from IFM-Kiel, to produce the delayed mode data for the Gyroscope project and installed at the Coriolis Data Center.

Within the European project Gyroscope, each float has been scrutinized for the delayed QC following the steps defined by Argo; a lot of collaborative work between the PI and the data center has been necessary to study the results provide by the method and take the appropriate decisions.

To calculate correction for each float, a sliding window has been applied for a period of 12 months on both sides of the profile. The recommended correction and appropriate diagnostic plots (standard Wong one plus additional plots requested by the Pi) are provided to the PIs through a dedicated WWW site as the Coriolis Pis are distributed throughout France.

From this first experience, we would like to highlight some problems we experienced applying the delayed mode QC.

- Firstly concerning the sliding window:
  - for the inactive floats, the sliding window is applied to all the float life (the default length must be 12 months).
  - for the active floats, the sliding window is applied up to the profile 6 months younger than the last submitted profile at the time when the delayed mode is applied.Secondly some floats do not have enough reference data to apply the delayed mode, a work must be done to collect recent CTD.
- The proposed correction sometimes has a shape that differs from a drift and an offset. The PIs have asked for additional plots to help them understand the proposed corrections even in what we called simple cases at last AST meeting.
- When a drift is observed in the life time of the floats, the proposed correction is not correct if calculated simultaneously on the both sides of that drift: so we have to reprocess the float by splitting its life before and after the start of the drift.

Among the 84 Gyroscope floats, 63 floats have gone through the delayed mode QC: 26 didn't need correction, 37 needed minor corrections often offset coherent with Ifremer tank tests results, 11 need additional work.

At the Coriolis Data Center, the delayed mode data have been implemented in the database; the generation of the corresponding files is on the way and should be delivered to GDAC before the end of October.

4.2. CSIRO/Australia (R Smith)

Rick Smith reported CSIRO issues regarding delayed-mode calibration, covering topics such as resources, complexity of each Argo float, lack of a workable methodology, the existing climatology of Southern Ocean, and technical anomalies.

One of the issues with Australian delayed-mode QC is lack of resources in the form of manpower. Currently, there is only one half-position tackling delayed-mode calibration. Each Argo float can be idiosyncratic and the data complex, calibration is time consuming and requires a broad spectrum of expertise. This includes knowledge of physical oceanography, regional water masses, programming skills, knowledge of several software tools notwithstanding a technical understanding of Argo floats. Although there are many documents to aid an operator with DM calibration there appears to be a lack of a singular structured methodology - in short, a standard master worksheet.

In the Southern Ocean region there are several technical anomalies that we are currently working with at the moment. These include,

- Linear salinity-sensor drift
- Over-correction of real-Time data in Australian region
- Real-time data generally good
- Climatology

The linear salinity-sensor drift is particularly obvious amongst our older floats. We are currently contacting the manufacturers about this. Another of our technical anomalies appears to be that the Wong et al software appears to suggest an over-correction of the real-time when run on certain floats. This is an ongoing investigation. However, so far the real-time data for the region is generally good, particularly amongst later floats - these requiring little or no calibration. Another anomaly is how the historical climatology is selected from the WMO boxes for objective mapping. We have recently found that inappropriate historical data can be selected, e.g. particularly in North West Australia where historical data is selected from the regional waters as well as the other side of the Indonesian archipelago for the objective mapping process.

To address of these DM implementation issues several possible solutions are being offered.

- New position starting ~June 2005
- Collaboration with BODC
- Closer ties with other agencies
- Investigation of a standard Climatology for Southern Ocean
- Central place to report problems and solutions
- Compile a standard methodology

To increase submission of DM data to the GDACS, a new position will be starting in June 2005 to work on delayed-mode. We are hoping to develop closer ties with BODC and other agencies in exchanging ideas, shared software and tools. We would like to investigate the use of a standard climatology for Southern Ocean to avoid duplication.

Lastly a compilation of a master work sheet for DM calibration would be a useful for DM operators. This would standardize procedures and methodology. Another useful tool to aid DM calibration would be a

website to log technical problems and anomalies. They could be listed along with solutions for other operators seeking direction.

4.3. DFO/Canada (R Perkins)

Canadian Delayed-Mode Argo float profiles are generated using the method described in the "Argo Delayed-Mode Manual", ver. 1.0 by Annie Wong with some minor adjustments described below.

In Canada, delayed mode processing begins with MEDS Real-Time profiles in NETCDF format, ftp'd and kept in a queue until a run is scheduled. Data are put through a coarse filter then manually de-spiked to prevent the incorporation of bad data into the fitting of the salinity to climatology. Flags from this despiking process are carried through to the Delayed -Mode PSAL_ADJUSTED_QC.

The criterion for a good profile is that it must be within 2*(standard deviation of the fit) but the standard deviation is not allowed to fall below .008 in areas with sparse data or unrealistically stable climatology. Using this automatic criterion, we find that about 5% of files are judged to be wrongly classified when passed through the "PI Evaluation" step. These re-classified profiles are then re-run with the appropriate criteria.

Floats that are judged to have been biologically fouled are corrected to climatology for the remainder of their lifetimes.

Some re-analysis and modification of Delayed-Mode files is expected as more data comes into the reference database and we are going to feed calibration information back into the Real-Time files to improve the PSAL_ADJUSTED variable for real time users.

4.4. Jamstec/Japan (S Minato)

JAMSTEC's corrections to realtime profiles are as follows:

- Adding data repaired by manual 'Bit Error Repair',
- Correction of the position (Lat, Lon) and time (Juld, Juld_Location),
- Change of a number of layers using delayed or repaired messages,
- Manual change of flag of each layer by Visual QC,
- Pressure correction using SSP and subsequent salinity recalculation,
- Salinity correction using WJO.

Grey floats are judged by the following criteria:

- Abnormal salinity drift and offset is given by the salinity increase or decrease of 0.03 psu at around 2000db from the deployment.
- Abnormal pressure is judged by 2200db.

Japan proposes flags 1/2/3/4 for each segment of profile with doubtful pressure in delayed-mode QC. They have done validation of salinity corrections based on WJO method using shipboard CTD. The percentage of correct answers by automatic 2σ choice exceeds 90%. Visual QC exceeds 95%.

4.5. BODC/UK (R McCreadie)

Delayed mode quality control in the UK is a collaboration between the United Kingdom Hydrographic Office (UKHO), who compare the data against their climatology, and the British Oceanographic Data Centre (BODC) who use statistical methods such as WJO to scrutinize the data. Currently BODC has solely used the WJO method although the Boehme method is soon to be tested. The software by John Gilson has also been tried and was found to be a powerful tool for data visualization and manipulation. For the majority of

UK floats BODC is acting as the PI as well as the data centre. In cases where there is a PI then the PI is consulted and has the final say in any corrections.

Three floats, deployed at 32°S in the eastern Indian Ocean during 2002, have been through the full delayed mode process. Of these three floats one salinity sensor was found to be stable and reporting data within 2 standard deviations of climatology, one was found to be stable but suffering from a constant offset of 0.03 with an error of 0.002 and the third salinity sensor has been shown to be drifting salty. The delayed mode files from the two stable floats have been sent to the GDACs.

The UK's limited experience has shown the delayed mode process to be slow if you are to have confidence in your results. We welcome the idea of a delayed mode quality control workshop where we hope that the question of how to deal with more complicated cases will be addressed. This will, along with the delayed mode email group, hopefully encourage communication and exchange between groups performing delayed mode quality control.

4.6. AOML/USA

After the data went through the delayed-mode QC they are tested for consistency at the US DAC. Tests are applied to profile and trajectory files. This test proved valuable in a small number of cases (about 99% of the files passed the tests without problems). After discussing the outcome of the test with the PI the remaining about 1% were also found to be OK (small problems like differences in the DATE_CREATION field can be ignored if the data are identical; once a PRES_FLAG was changed by the PI from 1 to 4, which was accepted).

After the tests the delayed-mode trajectory file is merged with the real-time trajectory file. This ensures that the delayed-mode QC is not lost during the real-time processing. This merging has to be repeated whenever a new profile comes in.

More information can be found at http://www.aoml.noaa.gov/phod/ARGO//HomePage/home.html (follow the link to 'Documentation', then 'Delayed-mode ...').

AOML is willing to share our software with other DACs.

4.7. NMDIS/CHINA

L Shaohua presented the work they have performed on Argo dataset by applying Argo real time Qc procedure, followed by visual inspection and a climatology test. As a result of this work NMDIS has issued a CD. Additional information should be provided to NMDIS team, before they start the delayed mode process according to AST proposed method.

4.8. Summary of the discussion (A Wong)

During the 6th AST meeting in March, two basic criteria were agreed on for salinity drift delayed-mode quality control:

1. The basic criterion for float salinity delayed-mode qc is to not adjust float salinity that are within ± 2 × max [statistical uncertainty, instrument resolution/precision] of climatological recommendations, provided statistical uncertainty is realistic.
2. In the absence of expert intervention, delayed-mode drift evaluation shall involve a time series over a window of 12 months (i.e. 6 months before and after the profile).

In the 6 months since the March AST-6, these two basic criteria have mostly helped to separate the good profiles from the problematic profiles in the stable ocean basins with good reference data sets, i.e. The Pacific. Hence most of the currently available delayed-mode data are in the Pacific Ocean. The other ocean basins have experienced difficulties either because of poor reference data sets or unsuitable separation

criteria. So, in order for delayed-mode data from other ocean basins to become available, two pressing issues need to be resolved:

- Mechanisms and actions to improve the reference data sets;
- More refined separation criteria for the variable regions.
- The 12 month sliding window is producing correction that doesn't have the shape of "offset + drift" being too much affected by the different water masses where the float evolve

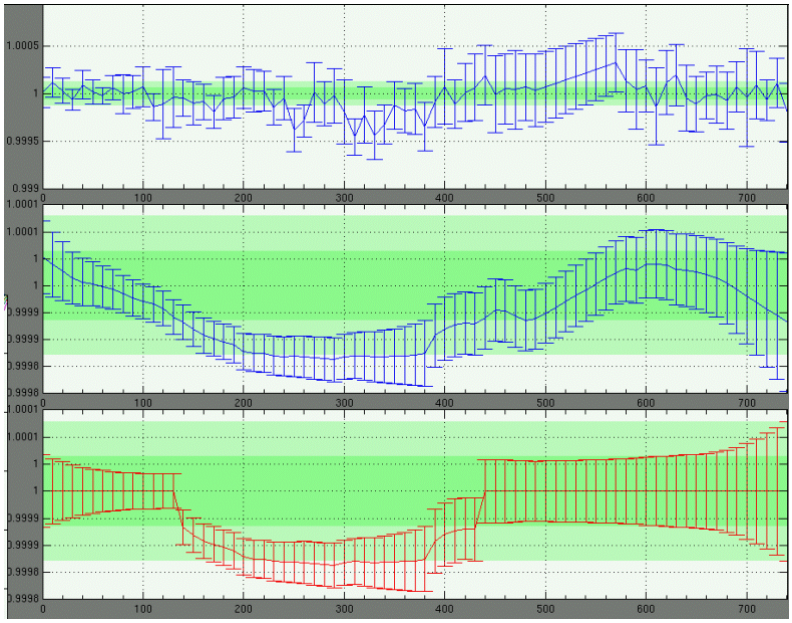


Figure shown by U send summarizing the sliding window issue
Upper panel the individual correction,
Middle panel the proposed correction calculated with the sliding window,
Lower panel: correction to be applied according to AST 6 criteria: no correction for 150 days /correction for 300 days / no more correction until the end of float life .

Other issues:

I. No one has ventured beyond QC-ing the simple cases of good profiles and the profiles that need only simple adjustments. There are many complex cases that await further QC guidelines. Even with the cases that only require simple adjustments, the data team is not sure at which point of the float series the adjustments should be applied to.

II. Our collective experience is that subjective PI decisions are often needed in addition to the basic separation criteria. So the speed of delivery of delayed-mode data often rests with the PIs, and consistency between PI decisions is therefore important.

III. Everyone wants to see salinity adjustment to happen in real-time, but the data team needs the PIs to inform the DACs of what adjustments to use. This cannot happen when similar issues have not been sorted out for the delayed-mode stream.

IV. Most people feel it's very important to fold good Argo data back into the reference data sets.

- Finally, the good news from those who have issued delayed-mode data is that the current NETCDF format has been found to be adequate so far. Everyone echoed a need for better information exchange between delayed-mode operators. All agreed to use the delayed-mode email list as a starting point for a discussion forum: argo-delayed-mode@ifremer.fr

5. Monitoring the Argo Data Management System and Additional Products

5.1. Monitoring the Argo Data Management (B Keeley)

At the 4th ADTM meeting a group was established to define a set of products that will help to monitor both the Argo data management system and the Argo array. Action was also taken for labelling some scientific products as Argo ones.

B Keeley presented a summary of products that can be found on various web sites for DACs.

He divided the types of products seen into classes agreed to at the Ottawa ADMT meeting - data related, network related and science related. He remarked that it was his view that the products should demonstrate how well Argo was meeting its objectives. In touring web sites he found a wide selection of presentations of similar information. At the end he recommended the following

1. DACs prepare a table of float statistics with common columns, AIC to provide a compilation of statistics
2. DACs prepare a display summarizing the operation of each float.
3. DACs show profile and track data of their floats.
4. AST prepare the sampling density plot
5. MEDS or JMA prepare timeliness stats to GTS
6. GDACs prepare histograms of float distributions
7. AIC prepare map of global float distributions, development of the network and projection date of a complete network
8. AST, GDACs, DACs to provide links to science related products of local or international interest.

All DACs can provide additional information and displays as suits their national needs.

Point 1 is important and should be done rapidly. AIC proposed to implement the following table at Argo program level:

- WMO ID (without "Q")
- Float manufacturer
- Sensor type
- Deployment date (as mm/dd/yyyy)
- Deployment location (as lat N, long E)
- Active or Inactive (A or I)
- Last reported profile (as mm/dd/yyyy)
- Number of cycles reported
- Number of cycles expected (based on deployment and present date)
- Number of profiles with failed QC

AIC has also provided after the meeting a list of URLs showing monitoring tools already available at AIC. This list is provided in Annex 5

5.2. Deep currents estimated from Argo floats (JongJin Park)

In order to estimate the subsurface trajectory of an Argo float, we require knowledge of the ascent and descent positions. These can be calculated by extrapolation from surface position times and fixes, so long as JULD_ASCENT_END and JULD_DESCENT_START are available. Wherever possible, DACs should include these quantities in traj.nc files. If they are not known, then in principle these times can be estimated for some float types. For the example of APEX floats, missing times can be estimated from the time of the first descent, which we refer to as the reference time, or the START_DATE. If this is not available, then it too can be estimated from the envelope of surface fix times. However, proper and complete filling of the traj.nc files is preferred over requiring the user to make estimates. If the internal clock of an APEX float malfunctions, JULD_DESCENT_START can be irregular, but we can identify and correct that kind of problem by examining groups of cycles (Delayed Mode QC for trajectory files).

Under the assumption that adding a rectilinear and inertial velocity can reproduce a float surface trajectory, a method has been developed which determines each component from the satellite fixes. Extrapolation to surface arrival and departure times allows us to predict the location where a float arrives at the surface and dives to the park depth. The errors by extrapolation and velocity shear during ascending and descending have been examined, and are estimated to be less than 2km, or 0.2 cm/s of deep velocity over 10 days. J.J. Park (Korea) and B. King (UK) are preparing a prototype code based on Matlab to calculate velocity at parking depth. After further testing it could be made available to DACs for routine application. We propose to work with DACs to improve the completeness of filling of variables in traj.nc files for all types of floats.

5.3. Need from future Salinity Satellite missions (J Gunn)

John Gunn has presented an updated status of the Aquarius/SAC-D and SMOS satellite missions, to be launched in 2008 and 2007 respectively, and their surface validation plans. Near surface salinity measurements provided by the Argo and GOSUD networks will be critical resources for satellite instrument calibration and data validation. A surface salinity uncertainty <0.1 psu will be sufficient for satellite validation. Remotely sensed salinity measurements are done in the microwave band at ~1.4 GHz, where the surface optical depth is ~1-2 cm in seawater. From this perspective, it is desirable to validate the satellite data with *in situ* measurements made as close as possible to the surface. However, little is known about the statistics of the difference between surface salinity and the values at ~5m depth which is typically the shallowest observed by Argo floats and GOSUD ships. We present a preliminary assessment (histograms) of salinity differences between 5 or 6 m and the near-surface based on a subset of WOCE Pacific CTD transects. The vast majority of the differences are much less than 0.1 psu, and the number of outliers >0.1 psu generally is less than 6%. The preliminary conclusion is that the present minimum Argo and GOSUD salinity measurement depths will be satisfactory for satellite validation. These preliminary conclusions will be validated next with a complete global analysis of the World Ocean Atlas CTD archive data.

6. Data format Issues

While format is pretty well standardized for measurements and qc flags, experience at GDACs shows that there are discrepancies both at metadata and technical and history levels that ought to be resolved to the benefit of the community.

For the 5th meeting it has been decided to first start with the metadata information that are really critical when Argo GDACs will to be connected to distributed data system such as OpenDap network that are emerging nowadays. T Carval presented the status at GDACs. Because of the format check at metadata file submission, all floats have a metadata file that contains 52 fields but some (many) metadata fields are empty. It has been decided that from these 52 defined fields, some fields needed to be identified as compulsory and should be checked by the file format checker. A warning will be issued to the DAC manager in the case of an anomaly in these compulsory fields but the file will be accepted by the GDAC. Regular reports of the anomalies will be made by the GDACs to the DAC managers in order to improve the present status. Argo-DM members should inform T Carval if some additional metadata fields are needed. The argodm-format mailing list will define the compulsory metadata fields.

The salinity measurements in the trajectory files (at drift or at surface) must be corrected after delayed mode QC has been performed. The correction has to be made in the Psal-adjusted parameter each time a new trajectory is issued and history should provide tracking of the changes. AOML started to correct the trajectory files and discovered that the way the history section is defined it significantly inflates the size of the file. C Schmid provided a revision of the format to T Carval and that will make a proposal to the argo-dm-Format mailing list.

JJ Park, while developing the velocity product from trajectory files has also found discrepancies that made these files difficult to use operationally. B King made a summary of the problems encountered: each DAC had some deficiencies in the trajectory files they were generating and they have received a summary by email. Very sensitive parameters are those related to the estimation of start/stop time for descending and ascending profiles. They all have to be filled in and correctly ordered in time space. B King advised DAC to calculate this information and not estimate it from metadata. Another problem is related to cycle numbering that lead to non-monotonic times of the trajectory and error induced by missing cycles. This point has been addressed by an addition real-time test on trajectory. DACs were requested to study the error report generated by B King and to take appropriate action to improve the file quality.

Another point that was addressed during this item was the new parameter naming convention. The problem was raised by the arrival of first Argo floats measuring oxygen. The decision is that the parameter name will be DOXY and the unit field will specify the unit to users. The DAC will have to make the conversion to the agreed units. It is believed that the small salinity corrections during delayed-mode processing will not affect the conversion significantly, but this must be verified with the chemists. It was also decided that when different sensors measure the same parameter, the additional parameters will be named <measured parameter>_<sensor name > or <measured parameter>_<range> (for example, TEMP and TEMP_DOXY, DOXY and DOXY_B). The present variable names stay the same. The new names will be documented in User manual. This requires that the parameter name be lengthened from 4 to 16 characters. This will have an impact on variables in profile, trajectory, and metadata files. All of the consolidated files at GDACs have to be changed to handle long parameter names before the first DAC starts to provide data. It was decided that when all DACs are ready to write this new format, the GDACs will patch the FTP DAC directory to change the length of parameter name in the existing files. A plan has to be issued by GDAC managers in agreement with DAC managers.

Finally, it was decided to change the "Profile_<Param>_QC" implementation because the present definition is misleading. There was a consensus to adopt a letter scale that will classify the profile by the percentage of good values. The definition of the scale will be finalized through the argo_dm mailing list. The GDACs will patch the existing files at the same time as the parameter name patch.

7. GDACS

7.1. US GDAC (M Ignaszewski)

M Ignaszewski briefly summarized the changes to the US GDAC during the previous year that included: 1) format change (at both GDACs), 2) addition of two new DACs (INCOIS and KMA), 3) mirroring of French GDAC GTS data, and 4) implementing synchronization on all file types except technical files.

He noted that there were 15 float Ids duplicated between the INCOIS and GTS dac directories and that one float ID was identified as an INCOIS float at the US GDAC and as a GTS-only float at the French GDAC. Also, there are still 1200 profile files on the French GDAC whose vertical parameter is depth (variable: DEPH) that are not accepted on the US GDAC. These situations will need to be resolved by the GDACs and DACs.

He then gave a brief overview of the two web access options available at the US GDAC. The Argo Data Browser (usgodae2.fnmoc.navy.mil/cgi-bin/argo_select.pl) allows data selection based on position, time, dac, float ID, and delayed-mode-only data. The results can be viewed as text lists, position plots, and profile plots and the data can be downloaded in the standard Argo file formats. A request to provide the consolidated float files for any float that has a profile that satisfies the selection will be studied.

The other web access option is the LAS server (usgodae2.usgodae.org/las/servlets/ datasets). While the data selection options are similar, the options for viewing and downloading the results are very different.

7.2. French GDAC (T Carval)

T. Carval reported on the new features available from Ifremer GDAC.

- Argo data are available from a DODS/Opendap server.(see http://www.ifremer.fr/cgi-bin/nph-dods/data/in-situ/argo)
- Statistics on GDAC content are updated once a week. (see http://www.coriolis.eu.org/coriolis/cdc/argo_gdac_monitoring.htm)
- The web data selection displays and distribute Argo trajectories. (see http://www.coriolis.eu.org/coriolis/cdc/trajectorySelection/cdcTrajectorySelections.asp)
- A data subscription service is now available. This service is dedicated to customers who want to receive regularly new data according to some criteria (area, periodicity, level of processing…). Regularly, a compressed data file is generated on the ftp server and a notice email is sent to the subscriber. For the moment, the service is limited to vertical profiles but will be extended to trajectories in 2005.

8. RDACs: provide an information on what done and what is planned

8.1. Atlantic (S Pouliquen & C Schmid)

At the last ADMT meeting AOML and CORIOLIS agreed to set up the Atlantic RDAC. Up to now no coordination meeting has been organised but discussions have started by email between the two institutes. An RDAC meeting is planned for Spring 2005. AOML is organising a South Atlantic RDAC meeting with countries from Southern America and Africa in Brazil mid November.

At CORIOLIS some North Atlantic activities have started related to:

- Product generation: Weekly Temperature and Salinity fields are generated and available through an FTP and a LAS server at CORIOLIS. A higher resolution product over North Atlantis is under preparation
- New CTD collection over Northern Atlantic has started but better coordination with AOML and other partners has to be set up. These data are used for delayed mode quality control at the CORIOLIS data center and will be used in 2005 to check coherence of Argo data set among the basin.
- A new climatology for Northern Atlantic based on the Reynaud Climatology and Argo floats that have gone through delayed mode QC is under preparation. First statistics were presented at meeting. First release should be available in 2005.

New CTD data collection is really a big issue for Argo and is clearly a project within the project. We don't have the man power to chase after these data and collaboration with other international programs such as Clivar and Pogo or national programs involved in Argo should be set up to achieve this challenge.

8.2. Indian (M Ravichandran)

As part of Regional data centre, the major activities of INCOIS, India are as follows: Improvement of Indian ocean climatology, downloading of all the Indian Ocean floats data from GDAC and made available from Regional Data center web site, generating data products for the Indian ocean region, and co-ordination of Argo deployment plan for the Indian Ocean.

A major effort has been mounted to improve the Indian Ocean Climatology for use in the DMQC process. PMEL software for DMQC has been configured at INCOIS. One Scientist from INCOIS is being deputed to IOS, Canada under POGO fellowship immediately after this meeting to get familiarized with DMQC. Delayed mode QC data will be done from January, 2005 and made available to GDAC.

All the data from the Indian Ocean are made available at Regional data center web site, which is a web-GIS based website, wherein user can download ASCII data by selecting a group of floats, parameters, date and time and depth, etc,. The trajectories of the floats are also seen from this site for the Indian Ocean region.

Data quality and health monitoring systems are under development and will be made available through the web during the coming year.

Argo value added products such as sea surface temperature, Mixed layer depth, Isothermal layer depth, relative geostrophic currents, mass and volume transport, heat content of upper ocean, core depth of different water masses, etc are generated.

The list of future activities is included in the Indian Ocean RDAC report in the Annex.

8.3. Pacific (A Thresher)

In late June 2004, a meeting was arranged to call together all the groups with an interest in the establishment of a Pacific RDAC for the Argo program. The main participants were JAMSTEC and IPRC with attendance by CSIRO, NODC and the GODAE GDAC. Ruth Curry from WHOI also attended to give an overview of her new HydrobaseII, which is due to go on-line shortly. After declaring our areas of interest and discussing how we would handle areas of overlap, we assigned some tasks to individual organizations. IPRC will host a web page for the RDAC and will act as a coordinator for cooperation between the participants. JAMSTEC will help with QC software development, while CSIRO and IPRC will provide feedback between the RDAC and modellers. IPRC will also work on CTD dataset assembly and gather new data as it becomes available. We will meet twice a year, in conjunction with other international meetings, if possible, to make sure that we are all on track and our results are both reproducible and comparable.

8.4. Southern Ocean (R McCready)

R McCready presented the status of the Southern Ocean Regional Data Centre (SORDAC) which is a collaborative effort between BODC and CSIRO. Present responsibilities for the Southern Ocean sectors are:

- Atlantic Ocean sector: BODC 70°W – 90°E
- Indian Ocean sector: CSIRO 90°E – 180°E, to 60°S; BODC remainder
- Pacific Ocean sector: Not yet determined

The SORDAC will operate south of 35°S therefore incorporating a 5° overlap with all other RDACs at the northern boundary (assuming that they extend to 40°S). BODC and CSIRO have agreed to carry out RDAC activities as defined by the Argo Data Management Team (ADMT), collaborating in several areas such as:

- Developing a standard climatology: The World Ocean Database 2001 (WOD2001) will be used as the basis of the climatology. Initial work will involve “cleaning up” this dataset. CSIRO and BODC will each concentrate on their own regions to carry out this work, combining their results to produce an improved historical dataset. The Pacific sector data will have little or no work performed on it resulting in the final product being very similar to the WOD2001 in this sector. Other data will be added to this dataset.
- Evaluating Argo data: Each partner will evaluate all Argo data within their region of responsibility using methods agreed by the ADMT and Argo Steering Team (AST)
- Developing tools and shared software.

- Joint website for Southern Ocean.

Efforts will be made to ensure that duplication does not occur as well as to make navigation between the two partner's websites as smooth and seamless as possible.

BODC and CSIRO have agreed that initial efforts should be directed at improving the historical dataset for the region as this is vital for the national DACs with floats in the region. BODC have already developed a website which will be going live by November 2004 and will continue to improve this as the RDAC activities become more intense. BODC and CSIRO have also agreed in principle to an exchange program. Rick Smith from CSIRO has visited BODC during September 2004 and it is hoped that this will be reciprocated by someone from BODC in 2005. It is felt that such an exchange will ensure that exchange of information and ideas between institutes will be enhanced and that duplication of effort does not occur.

9. GADR (C Sun)

The US National Oceanographic Data Center (NODC) continued to operate the Global Argo Data Repository during the past year. The primary functions of the NODC were:

- Archive delayed-mode profiles, metadata, trajectory and technical information received from the GDAC on a monthly basis.
- Provide tools to allow transformation of Argo and other profile data into other forms.
- Provide use statistics, data system monitoring information and problem reporting facility.
- Register the Argo data in international data inventories
- Subscripted and provided metadata to NASA's Global Change Master Directory: http://gcmd.nasa.gov/getdif.htm?Global_Argo_Data_Repository
- Provide WWW data integration tools to allow client to get Argo float data combined with data collected with other instruments.
- Provide hardcopy data sets for distribution to users.
- Provide offsite storage of data.

The NODC extended its primary functions and performed additional tasks as follows:

- Archive latest ("daily') profiles received from the GDAC on a weekly basis.
- Provide WWW and OPeNDAP accesses to the NODC version of profiles received from the GDAC.
  WWW URL: http://www.nodc.noaa.gov/argo
  OPeNDAP/DODS: http://data.nodc.noaa.gov/cgi-bin/nph-dods/argo

Major Accomplishments during the past years are:

- Completed a draft version of Argo Data Explorer (ADE) ─ A Java application that allows transformation of the Argo NETCDF format to the ASCII text format.
- Completed a draft version of Argo NdEdit ─ A Java application that allows to search/sub-set an Argo inventory file on Argo CD.

The question of issuing the Argo CD was discussed and J Gould mentioned that the first idea was to provide access to people without Internet access. These users are now connecting the Internet and the needs seem to have changed. This CD should be seen as more as advertising material for Argo containing basic information about Argo program, plus sample datasets, information on dataflow, some interesting results. The Argo executive committee was worried to send a confusing message to the users by sending them large amount of data not fully qualified in delayed mode. It was decide that the first of the two CDs that were prepared by NODC would be modified to take into account these new requirements. NODC will collaborate with J Gould on this issue.

10. Other Topics

JMA has accepted to host the 6th Argo data management meeting in Tokyo next year.

ANNEXES

Annex 1 - Agenda of 5th Argo Data Management Meeting

Objectives of the meeting

- *Identify, and take steps to implement, actions needed to improve Real-Time data flow (considering all aspects of the system from transmission from the float to arrival at GDAC)*
- *Review status of Delayed-Mode quality control*
- *Identify, and take steps to implement, actions needed to increase the volume of Delayed Mode Q-C'd data and to get these data to the GDACs.*
- *Identify a set of robust metrics for documenting future (and if possible past) growth and performance of:-*
  - *the Argo array*
  - *the Argo data system*
  - *the uses being made of Argo RT and DM data*
- *Review and take steps to put in place appropriate Argo data archive functions including the detailed specification of possible distribution of Argo data and analysis tools via CD-ROM.*
- *Assess the ability of present Argo data formats and processing mechanisms to handle data from profiling floats with new sampling schemes (e.g sampling during drift phase), with novel sensors or using new data communication and position-fixing systems.*
- *Give clear guidance to the planned Regional Data Centres on their responsibilities, their relationships with GDACs and their role in regional Delayed Mode QC.*

Schedule: *Meeting will start at 9am and finish around 1730 on Wednesday and Thursday. We plan to finish around 1400 on Friday to allow people to catch plane more easily.*

1. **Status of Argo program**

   What's new at AIC, status on the Actions. Improvement needed?

   4th meeting actions: 2-3-4-12-23-24
   - Status of Argo program (M Belbéoch)
   - Monitoring the performance of the Float array (M Belbéoch)
   - What's new at AIC? (M Belbéoch)
   - How to better know Argo user community? (J Gould)

2. **Real Time Data Management**

Review the Argo real time data stream, the status of actions from ADMT-4 and identify new actions needed to improve the volume, timeliness of delivery and quality of Argo RT data. .

4th meeting Actions : 5-6-7-8-9-10-11-13-15

Specific issues

- GTS status
  - Assess the progress made in reduce the number of floats coming only through GTS (action 5). Identify new actions needed. (S Pouliquen)
  - Timeliness of data delivery: Review evidence provided by the MEDS statistics on the timeliness of data delivery via GTS. (B Keeley)
- Distribution to GDAC (C Coatanoan)
  - Are there problems in the delivery of data and metadata to GDACs?
- Are Argo RT data meeting user needs? (J Gould)
- RT data quality tests (are they adequate and uniformly applied?) (T Carval)
  - Implementation of Jump and Grey List tests
  - Do we need additional tests : Frozen test, other deficiencies?
- Standardized handling procedures for floats that fail RTQC tests (M Ignaszewski)
- Formats for data delivery (BUFR Format) (M Ignaszewski)

3. Delayed mode data management

Review of the implementation of the delayed mode QC as defined at the 6th AST meeting in March. Identify the difficulties encountered. What lessons have been learned about the need for communication between PIs and DM-DACs? What actions are needed either at ADMT or AST levels or by the Argo Project Office?

6th AST actions 18-26

- Feedback from the different DACs on the Delayed Mode implementation and the problems encountered: USA, CSIRO, MEDS, Japan, CORIOLIS, others

Each country having started Delayed mode QC should prepare a 15mn presentation to summarize their experiences. Please send to Co-Chairs the name of the person that will make presentation

France : C. Coatanoan	***Canada: R Perkin***	***USA: C Schmid***
CSIRO: R. Smith	**Japan : S. Minato**	**UK : R McCready**
China: L Shaohua		

- Discussion to define actions needed (A Wong)

4. Monitoring the Argo Data Management System

At the 4th ADTM meeting a group was established to define a set of products that will help to monitor both the Argo data management system and the Argo array. Action was also taken for labelling some scientific products as Argo ones

4th meeting actions: 21-22

- Agree a set of metrics needed to monitor the performance of the data system and take steps to construct and distribute these metrics in a routine manner (B Keeley)
- calculation of trajectories from position fix data (JJ Park)
- Other products (including metrics of Argo data use)
- Link with salinity satellites (J Gunn)

5. Data format Issues

While format is pretty well standardized for measurements and qc flags, experience at GDACS shows that there are discrepancies both at metadata and technical and history levels that ought to be resolved to the benefit of the community.

Moreover new parameters are coming and we need a strategy to handle them more efficiently than the energy it took for the oxygen data

- Harmonisation of filling metadata fields (T Carval)
- History section usage (C Schmid)
- how to fill the trajectory files (B King)
- Do we need some upgrades? (T Carval)
- How to handle new parameters (M Ignaszewski)
- Format change control process (M Ignaszewski)

6. GDACS

What's new at GDACs, status on the Actions. Improvement needed?

4th meeting actions: 1-14-16-17-18-19-20

- CORIOLIS(T Carval)
- US GODAE (M Ignaszewski)
- Identification of any significant inconsistencies between holdings, procedures and access to data by the two GDACs (M Ignaszewski)

7. RDACs: provide an information on what done and what is planned

Each RDAC is invited to provide information on the progress made during the past year especially to start implementing the mandatory activities

- Atlantic (S Pouliquen)
- Indian (M Ravichandran)
- Pacific (A Tresher)
- Southern Ocean (R McCready)

8. GADR

Status on the Argo CD, plans for regional versions. GADR progress to comply with Argo requirements.

4th meeting actions: 26-28

- The Argo CD, issue of regional versions (C Sun)
- Status of the Archiving centre (C Sun)

9. Other topics

4th meeting actions: 25-27

Annex 2 - List of participants

	Name1	Name2	Email	Address	Country
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Annex 3 - Status of the 4th meeting actions

	Action	Target Date	Responsibility	Status
1	Monterey GDAC to remove Southern Ocean Directory as soon as possible	Dec 1, 2003	Ignaszewski	Completed
2	Modify the milestones for the real time stream to include technical data transfers.	Dec, 2003	Belbeoch	Completed
3	AIC to separate the description of regional coordination from the descriptions of regional centres	ASAP	Belbeoch	Completed
4	AIC to seek documentation describing CLS RTQC procedures and place it on the AIC web site	Mar, 2004	Belbeoch	Cancelled because CLS implemented Argo QC
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	*List produced by Aic* *PI and DACs solicited*
6	MEDS to begin routine distribution of information on near duplicates detected on the GTS	Mar, 2004	Keeley	In place since March
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	Completed
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	Completed A consolidated Argo "Grey List" file must be made available through GDACs
9	Schmid to propose a "frozen profile" test	Sep, 2004	Schmid.	Definition Done. To be approved at next ADTM meeting
10	Standardize the handling procedures when profiles fail the automatic RTQC	Mar, 2004	chairs, DACs.	Mark: will contact

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	Completed
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	Mark: will start discussions
13	WG to prepare transition to BUFR	Sep, 2004	R. Sabina, T Carval, M. Belbeoch, A. Thresher, K. Rushing	Mark: will start discussions – 06/14/04
14	US GDAC to copy daily the GTS directory at the Coriolis GDAC	1 Jan, 2004	M. Ignazsewski	Completed
15	Build NETCDF files for data on GDACs only having come through the GTS	Mar, 2004	DACs, GDACs	The list is available. Pis and DACs have been solicited to improve the situation
16	Convert format of index files to comma separated values	1 Jan, 2004	GDACs	Completed
17	Report statistics on timeliness, quality , usage of data	Mar, 2004	GDACs	Not started at US GDAC and Coriolis
18	Implement an improved problem reporting system	Sep, 2004	GDACs	Mark: Looking into options
19	Remove Southern Ocean directory	1 Dec, 2004	US GDAC	Completed
20	Implement a data subscription service	Sep, 2004	GDACs	Under dev at Coriolis Not started yet at FNMOC
21	Develop set of core and data system products	Sep, 2004	DACs, GDACs, AIC	Discussion started by Bob M and Bob K
22	Ask AST to resolve what scientific products are desirable	Mar, 2004	co-chairs	Definition provided by J Gould to AST
23	Review content of the new AIC web site before release	Mar, 2004	chairs AST, DMT, Argo Director	ADMT part has been reviewed by Sylvie

24	Maintain mailing lists of AST, DMT Argo PIs	Mar, 2004	AIC TC	List are at AIC but not mailing list yet
25	Document the roles, responsibilities and necessary resources of the TC	Mar, 2004	DACs, GDACs, AIC TC	Resolved at AST
26	Finalize content of Argo CD	Mar, 2004	S. Pouliquen, C. Sun, A.Thresher, G. Dawson, L. Petit de la Villeon, B. King	Under review by AST. Sylvie contact J Gould to speed up the process
27	Develop a document naming convention for Argo	Mar, 2004	J. Gould	Cancelled
28	Establish the mailing list for the Argo CD	Jun, 2004	J. Gould, AIC TC	On going

Annex 4 - 5th meeting action list

	Action	Target Date	Responsibility	Status
1	AIC to implement official email list for Argo-DM, Argo-Delayed mode from mailing list presently available at Ifremer	Nov 2004	AIC	
2	Milestones DACs and US GDAC to update AIC status within 2 weeks	Mid Oct 2004	DAC GDAC managers	
3	www. Argo.net have to be accessible on all browser and a non-flash version should be made available	Before being released	AIC	
4	GDAC to implement register form when user try to download data (Model provided by J Gould) and propose a statistic from these forms and log information	GDAC managers	March 2005	
5	Argo DM overview document to be written by Project Director and published on Argo new letter and GDAC WWW sites	J Gould +GDAC managers	Dec 2004	
6	Update Argo DM documentation to provide 3 documents: User handbook, Argo QC, Format User manual	S Pouliquen and M Ignaszewki to coordinate	March 2005	
7	USA are encourage to find a way to get Navocean to send their data to GDACs as it's the last significant Pi not included in this data stream	Project Office or USA DAC manager ?	As soon as possible	
8	Inventory of historical floats for which data have only been received by GTS to be issued and sent to DACs managers to take appropriate actions	AIC+ T Carval and than DAC managers	November 2005	
9	Toulouse GTS Node is generating most of the duplicates detected on GTS. CLS and/or Coriolis have to find the reason and take appropriate actions.	CLS and T Carval	December 2004	
10	Toulouse GTS node is still the one who is providing only half of the profiles within 24h. CLS and/or Coriolis have to find the reason and take appropriate actions.	CLS and T Carval	December 2004	
11	a report summarizing the problems encountered while checking data at Coriolis GDAC should be sent biannually to DACs for actions	C Coatanoan DAC to correct their RT QC process if necessary	March 2005	
13	DAC to provide their grey list and GDAC to provide a consolidated argo grey list on FTP and WWW GDACS	DAC + GDAC managers	December 2004	

14	Update the RT qc manual with the additional tests on profile and trajectory – Define the test ordering and document interaction between tests	T Carval + volunteers	December 2004	
15	Detection of bad cycle naming from trajectory files	T Carval + volunteers		
16	Finalize draft proposal for BUFR format …	M Igneszewski+ Bufr group	Next WMO meeting	
17	Define a strategy to improve reference data set for Delayed Mode users by connecting to other international programs and improving data sharing among Argo network.DAC and RDAC activities regarding reference data base for DM to be coordinated. A proposal to be issued	Project Office together with RDAC coordinators		
18	To summarize the delayed mode experience and questions raised by ADMT to AST for the 2005 delayed mode workshop	ADMT Cochairs	February 2005	
19	Float statistics table to be generated according to report guidelines	AIC+ T Carval + B Keeley + J Gould	February 2005	
20	AST www site to point to the relevant Argo scientific products that are available at Nation level	J Gould	December 2004	
21	Velocity fields from trajectory should address all the type floats with the help of AST designated working group . Provide to DAC guidance to fill properly the trajectory files	JJ Park	October 2005	
22	Metadata: update the format with additional parameters if necessary and define the mandatory fields	Argo-Dm group	December 2004	
23	Implement warning mechanism on mandatory fields checking for metadata as well as a periodical check of the GDAC ftp site	GDAC managers + DAC manager for corrections	March 2005	
24	Update the format of history section for trajectory file	C Schmid + Argo-dm	December 2004	
25	Implement an improved problem reporting system	M Ignaszweski	December 2004	
26	Standardize the handling procedures when profiles fail the automatic tests	M Ignaszweski	March 2005	
27	DAC to implement the format changes for parameter name an parameter_profile _qc . GDAC to patch the existing FTP sites according to schedule to be agreed by DAC	DAC and GDAC managers	From Mid November till March 2005	

	and to modify file checker			
28	GDAC to study the possibility to ask for all profiles of a float that has ever been in an area for a period of time	GDAC manager	October 2005	
29	Found a volunteer to Pacific area of the Southern Rdac	Project Office L esley R	As soon as possible	
30	Summarize the Delayed mode problems encountered by the DACs applying AST recommended method	Project Office and ADMT co-chairs	Delayed Mode workshop	

Annex 5 - AIC key URLs

Following services/tools/statistics/products are available on-line, amongst others, and improved gradually:

- Official Argo Active Float list with last locations and basic metadata (updated bi-daily)
  - ftp://ftp.jcommops.org/Argo/Status /status.txt
- All Argo Deployments (bi-daily)
  - ftp://ftp.jcommops.org/Argo/Status /deployment.txt
- All float trajectories (active & inactive)
  - ftp://ftp.jcommops.org/Argo/Status /loc.txt
- Deployment Notification Interface:
  - http://w3.jcommops.org/cgi-bin/WebObjects/Notification
  - Implementation of IOC Resolution XX-6
- Interactive Map (GIS):
  - http://w3.jcommops.org/website/Argomap
  - zoom in/out, query, display maps
  - many layers available (trajectories, EEZs, etc)
- National/Regional program status
  - http://w3.jcommops.org/cgi-bin/WebObjects/Argo.woa/wa/prog
- Float Search Engine
  - http://w3.jcommops.org/cgi-bin/WebObjects/Argo.woa/ptfSearch .
  - Find floats crossing up to 20 criteria.
- Argo Global Program Status
  - http://w3.jcommops.org/cgi-bin/WebObjects/Argo.woa/wa/status
  - History, yearly deployments
- Monthly/Yearly Status Maps
  - http://w3.jcommops.org/cgi-bin/WebObjects/Argo.woa/wa/maps
  - Argo maps (low/high definition, browse the archive)
- Float Detail Page
  - http://w3.jcommops.org/cgi-bin/WebObjects/Argo.woa/wa/ptf?wmo=A9nnnnn
  - replace A9nnnnn by a WMO Id
  - Access all regional/national products for a given platform
- Search Engine
  - http://w3.jcommops.org/cgi-bin/WebObjects/Argo.woa/wa/search?string=keyword
  - replace keyword by any keyword or platform ID
  - Obtain any Argonaut phone number, some platform details, document or news, acronym definition, stored in the JCOMMOPS DB.

Annex 6 - RDAC reports

Indian Ocean RDAC Report

As part of Regional data centre, the major activities of INCOIS, India are as follows:

1. Improvement of Indian ocean climatology.
2. Downloading all the Indian Ocean floats data from GDAC and made available from Regional Data center web site.
3. Generating data products for the Indian ocean region
4. Co-ordination of Argo deployment plan for the Indian Ocean.

PMEL software for DMQC has been configured at INCOIS. Test calibrations for limited number of floats have been carried out. However, the WOA 2001 climatology used by the software is inadequate to make a meaningful calibration in the North Indian Ocean. In order to improve Indian Ocean Climatology, a major effort has been mounted to collect CTD data from different oceanographic cruises. India is already collecting number CTD profiles during deployment of Argo floats and other oceanographic cruises, which will be used for improving climatology of this region.

Further, one Scientist from INCOIS is being deputed to IOS, Canada under POGO fellowship immediately after this meeting to get familiarized with DMQC. Delayed mode QC data will be done from January, 2005 and made available to GDAC.

The floats deployed by India are processed at INCOIS and made available to GDAC. However, data from the floats deployed by other countries in Indian Ocean are achieved from GDAC and made some visual QC. All the data from the Indian Ocean are made available at Regional data center web site, which is a web-GIS based website, wherein user can download ASCII data by selecting a group of floats, parameters, date and time and depth, etc,. The trajectories of the floats are also seen from this site for the Indian Ocean region.

Float to float comparisons, float-nearby CTD comparison, and development of high quality climatologies for the Indian Ocean are in progress and these results will be made available from Feb 2005.

A health monitoring system software have been developed to monitor technical information about the floats, the pop up date for the particular floats, current location and trajectory of Argo floats, surface current using drift information, Float ascent and decent time, etc. This software is presently in offline mode and soon it will be made available via web.

In order to evaluate float performance, the products such as waterfall plots, composite T-S curves, time series of surface pressure and maximum pressure by float type, battery voltage, etc are generated.

Argo value added products such as sea surface temperature, Mixed layer depth, Isothermal layer depth, relative geostrophic currents, mass and volume transport, heat content of upper ocean, core depth of different water masses, etc are generated.

The following are the some of the future activities are planned

- Real-time data reception & processing
- Delayed mode Quality control
- Float to float, CTD-float comparison
- Publish value added products on Web
- Analysis of Argo data with other data sets for monsoon applications
- OGCM and Altimeter validation
- Assimilation of Argo data in OGCM
- Capacity building (IOGOOS)

Southern Ocean Report
The Southern Ocean Regional Data Centre (SORDAC) is currently a collaborative effort between BODC and CSIRO. Present responsibilities for the Southern Ocean sectors are as follows and are also shown in Figure 1:

Atlantic Ocean sector:	BODC 70°W – 90°E
Indian Ocean sector:	CSIRO 90°E – 180°E, to 60S; BODC remainder
Pacific Ocean sector:	Not yet determined

The SORDAC will operate south of 35°S therefore incorporating a 5° overlap with all other RDACs at the northern boundary (assuming that they extend to 40°S). BODC and CSIRO have agreed to carry out RDAC activities as defined by the Argo Data Management Team (ADMT), collaborating in several areas such as:

1) **Developing a standard climatology**
The World Ocean Database 2001 (WOD2001) will be used as the basis of the climatology. Initial work will involve "cleaning up" this dataset by removing duplicates and near duplicates, assessing the quality of all bottle data as early indications show that some of this data is of suspect quality, assessing the quality of all CTD data as some data maybe of poor quality, and visually examining all data considered good for the removal of any spikes that have not been flagged.

CSIRO and BODC will each concentrate on their own regions to carry out this work, combining their results to produce an improved historical dataset. The Pacific sector data will have little or no work performed on it resulting in the final product being very similar to the WOD2001 in this sector.

Other data will be added to this dataset. An incomplete list of additional data sources includes:

- BODC holdings
- CSIRO holdings
- Alex Orsi (Department of Oceanography, Texas A+M University)
- CLIVAR
- Contact other relevant agencies
- CTDs from deployment cruises
- Incorporating good float data?

To ensure standard format, dataset integrity, version control and reducing the risk of multiple copies of the historical dataset BODC will act as custodians. The partners will deliver data to BODC (with any supporting documentation) in the agreed format. BODC will apply the changes to the historical dataset. They will not perform checks on the quality of the data supplied, only checking against the existing historical dataset for duplicates and ensuring appliance with the agreed format. BODC will make all versions available on the web along with all documentation.

2) **Evaluating Argo data**
Each partner will evaluate all Argo data within their region of responsibility using methods agreed by the ADMT and Argo Steering Team (AST). The float data will be obtained from the GDACs. All methods requiring comparison against a historical dataset will use the historical dataset compiled and made available by the SORDAC.

If either partner recommends changes to any Argo data they will alert the PIs to problems *via* the national DAC for that float. The PI will have the final say on any corrections to be applied and the national DAC will be asked by the RDAC to reissue the corrected data to the GDACs.

3) Developing tools and shared software

BODC and CSIRO will:

- Jointly evaluate relevant software used by the Argo community for suitability in the Southern Ocean.
- Jointly develop new tools and methods for evaluating Argo data in the Southern Ocean.
- Exchange working scripts/software.

4) Joint website for Southern Ocean

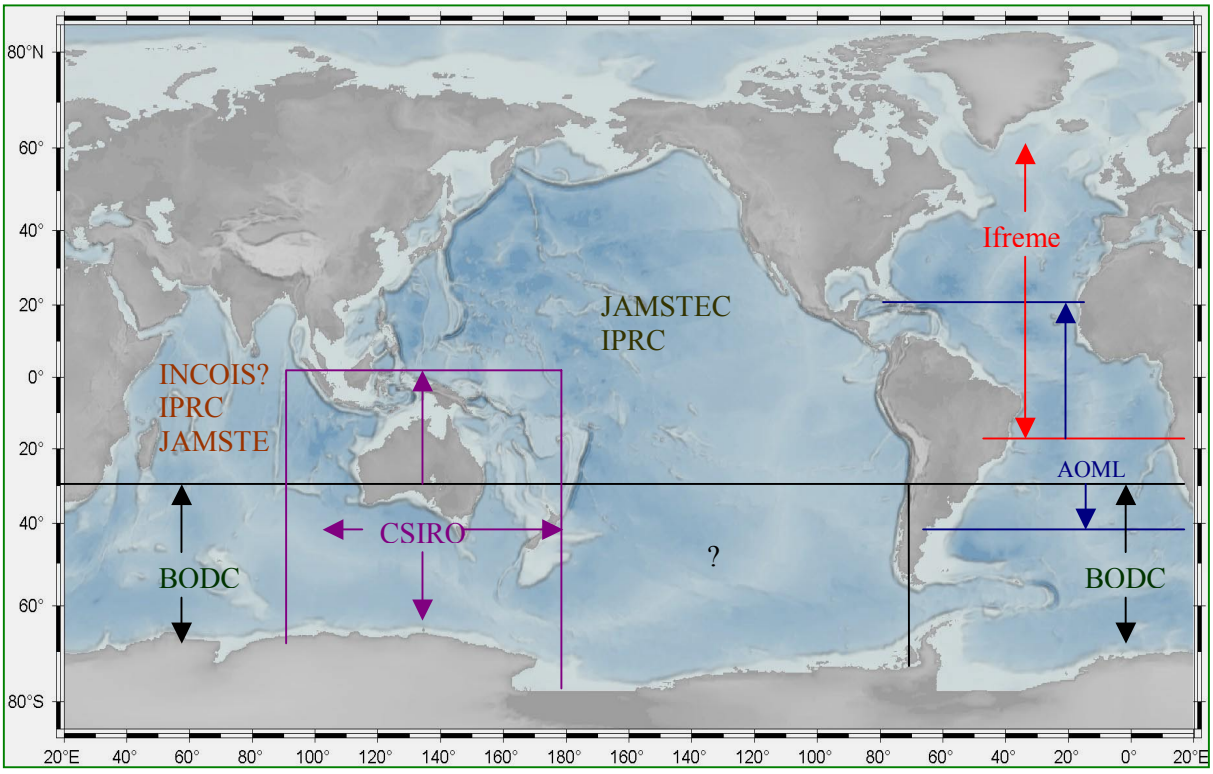
BODC will host the main website for the SORDAC providing:

- information on the Argo project
- information on the role of the RDAC
- documentation of the regional centre procedures
- download facility of the historical dataset developed jointly by the partners
- the current network status of Argo floats
- display and link to Argo related products
- link to CSIRO pages that display the work carried out by them

Efforts will be made to ensure that duplication does not occur as well as to make navigation between the two partner's websites as smooth and seamless as possible.

BODC and CSIRO have agreed that initial efforts should be directed at improving the historical dataset for the region as this is vital for the national DACs with floats in the region. BODC have already developed a website which will be going live by November 2004 and will continue to improve this as the RDAC activities become more intense. BODC and CSIRO have also agreed in principle to an exchange program. Rick Smith from CSIRO has visited BODC during September 2004 and it is hoped that this will be reciprocated by someone from BODC in 2005. It is felt that such an exchange will ensure that exchange of information and ideas between institutes will be enhanced and that duplication of effort does not occur.

Figure 1. Institute responsibility of RDAC activities (Modified from the ADM 2003 meeting minutes).
r in Ifremer is missing.
Comparing this map with the map below (Australia Nat. Rep.): Southern Ocean goes to 30S here and to 40S in the other map.



Annex 7 - National DAC and GDAC reports

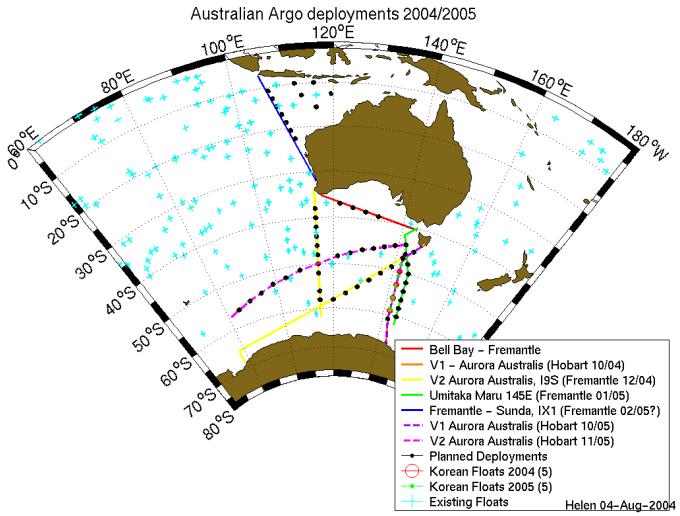
Argo National Data Management Report
Argo Australia
A cooperative project between CSIRO Marine Research (CMR)
and the Australian Bureau of Meteorology

The past year has been productive. Though the time-frame was tight, we were ready to deliver V2 Argo format NETCDF files before the 31st December and had minimal format changes required after testing. Delivery is now automated and, subject to the vagaries of ftp, works well.

The Australian Bureau of Meteorology now processes all real time reports from Argo floats in our program. They then have a direct pipeline onto the GTS; float data generally arrives on the GTS well within 12 hours of collection. They are in the process of taking over the NETCDF file generation and delivery as well and will shortly become the primary portal for Australian Argo data. More details can be found below.

We have hired a half-time scientist, Rick Smith, to begin delayed mode QC. We are still testing the available tools on the floats in our region.

In the past year, we deployed 2 floats in the Great Australian Bight. This small number was due to the general recall of the float sensors, limiting the number of unaffected floats we had on hand. Within the next year, we plan to start making up for this lean year by deploying 41 floats as detailed on the map below. In addition, we are deploying 5 Korean floats, bringing the total number to 46 floats. Later next year, we are already planning to deploy a further 20 floats (including another 5 Korean floats), two of which will carry O_2 sensors.



1. Status

- Argo float data is currently acquired from all active floats through automated ftp to Service Argos. It is then subjected to real-time calibration and QC, and then sent to the GTS. This is being done at the Bureau by JAFOOS – the Joint Australian Facility for Ocean Observing Systems.
- CMR runs a parallel process as a backup and generates the V2 NETCDF files which are then submitted daily to the two GDACs.
- Real-time mode data is immediately available for delayed mode QC, both directly from the CMR processing site and through a mirror of the GODAE GDAC site which is updated weekly. Daily files (which are updated hourly by GODAE) are downloaded twice a day as well, giving real-time access to all available profiles.

- Operational Delayed mode QC has not yet begun. We believe we need to adapt the WJO routines to our areas of interest and are assembling the appropriate climatologies. We anticipate that delayed mode QC will begin mid-November 2004 and delayed mode NETCDF files from profiles that require correction will be submitted to the GDACs within 5 months. However our float salinities are corrected for drift in realtime, and thus the current GDAC copies have reasonably accurate salinities. Thermal lag spikes and a better drift correction remain to be applied in delayed-mode fashion.
- Web pages are automatically updated when each float reports. The latest plots of temperature, salinity and positions are available at:
  http://www.per.marine.csiro.au/argo/index.html
- Argo data will be an important in situ data source in our new Blue Link project to predict ocean circulation in real-time. More details of this project can be found at
  http://www.marine.csiro.au/bluelink/index.htm

  Helen Phillips is using Argo data in regional analyses of the oceanic freshwater budget.

  Widodo Prabawano and Helen Phillips have begun a study exploring the links between mixed-layer and thermocline variability and ocean primary productivity off Java and the Sunda Arc.

- Argo data are now a primary in situ data feed for the routine subsurface ocean data analyses performed by Neville Smith's group at the Australian Bureau of Meteorology's Research Centre:
  http://www.bom.gov.au/bmrc/ocean/results/climocan.htm#subsurface

2. Delayed Mode QC

We are still testing our procedures to enable the calibration of floats. The main hurdles are the complexity of each individual case and the uncertainty about the quality of the climatology for parts of the Southern Ocean which maybe exerting an unrealistic correction to some floats. There is no one size fits all solution or general procedure. However, we have recently made good progress by liaising and talking through a lot of these issues with BODC. This collaboration has generated some interesting ideas.

In the short term we will be able to submit Delayed Mode QC for five floats in mid-November 2004 that require little or no calibration. We expect to be operational within 5 months for the floats that require more complex attention.

Of the 10 older floats deployed in 1999 as part of our Argo pilot, we have found that the SeaBird conductivities have generally drifted salty, either linearly with time, or some quadratic-like behaviour (see figures below). To date we have not yet gained a physical understanding of this drift to saltier values. We are interested in whether other long-lived SeaBird sensors show the same tendency.

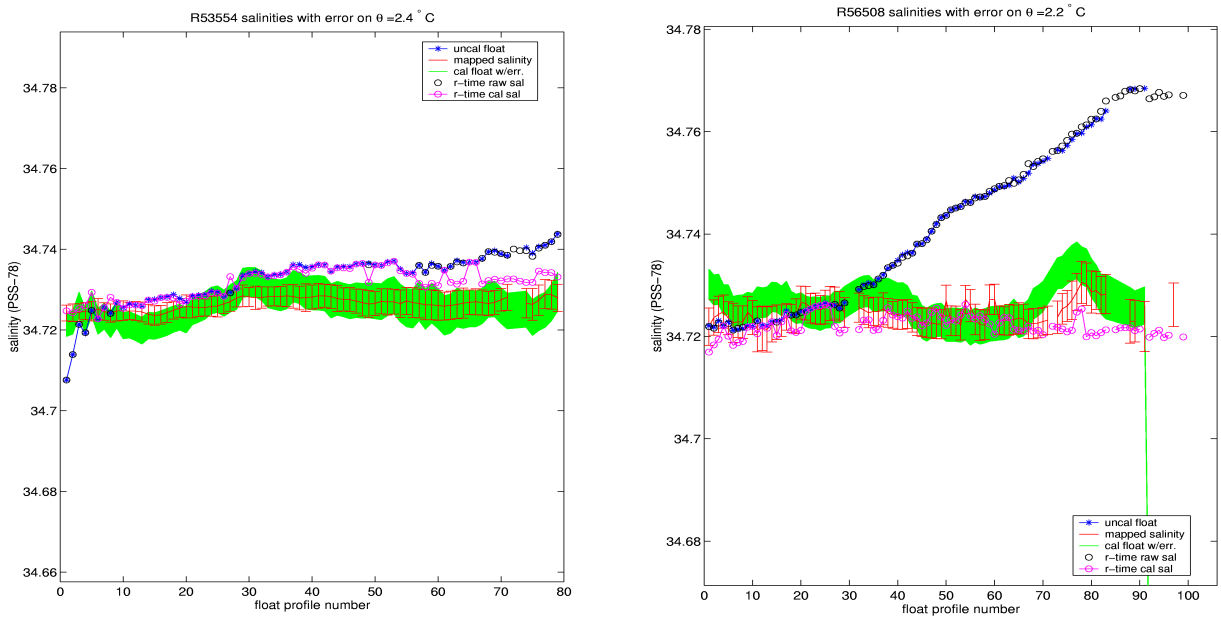
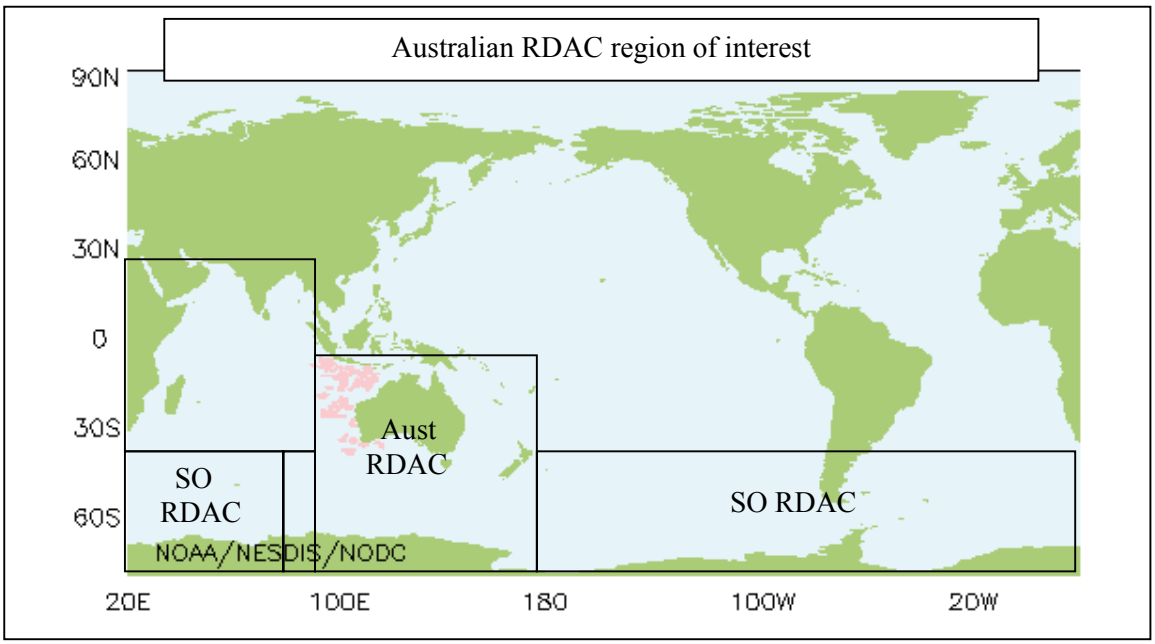


Figure 1: Salinity on a deep isotherm for two pilot Argo float SeaBird sensors. The unadjusted WJO formalism with the NODC data base was applied to give the green range, and the realtime adjusted salinities are shown in pink (adjusted to WOCE 1995 and DOTSS 2000 high precision CTD cruises).

4. Regional Centre Functions

We have now received funding for a further full time scientist to concentrate on Argo activities starting June 2005. With these resources, CMR now anticipates becoming an RDAC for the Australian region within the next year. While flexible, envisioned boundaries for the region of responsibility are roughly 100 to 180E and 70S to the equator. We are also participating in the Southern Ocean RDAC in which the UK is taking the lead. In the Tasman Sea area, we will overlap with the activities of the Pacific RDAC which is a cooperative effort between JMA and IPRC. This will also allow comparisons of results in areas of overlap and validation of our respective methods.

We are coordinating closely with IPRC, JMA and BODC and hope that this collaborative approach will benefit all parties, resulting in better and faster development of our RDAC capabilities.



Argo National Data Management Report for Canada – 2004

1. Status

Data acquired from floats: Currently, we are tracking 98 active floats. Of these, 14 may be in trouble or may have failed.
Data issued on GTS: All of the data are issued to the GTS. On average 85% of data are issued to the GTS within 24 hours of the float reporting. Longer delays are usually caused by incomplete sets of messages received from the floats, or the message transmitted failed the CRC check. However, all of the delayed data are issued to the GTS.
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 routinely sends data to the PI on the same schedule as the data are issued to the GTS.
Delayed data sent to GDACs: The PI is routinely using the Wong et al software. He regularly returns the data which pass with no problems and those with corrected salinity. The data are sent to MEDS on a monthly basic. MEDS has the software that transforms the data into the latest format version of NETCDF, updates our database and sends the data to the GDACs. We have sent 3740 delayed mode NETCDF profiles to the GDACs.
Web pages: MEDS maintains pages that show float tracks, and all of the data collected for all of the Canadian floats. Both real-time and delayed mode data are also available to download, but we alert viewers that the official version resides at the GDACs. Pages are updated daily.
We also show some information about the global programme including the positions of floats over the previous month, the success rate of meeting the 24 hour target for getting data to the GTS, the number of messages transmitted, and statistics of float performance.
Readers may go to:
http://www.meds-sdmm.dfo-po.gc.ca/meds/Prog_Int/Argo/ArgoHome_e.html
to see the page
We have deployed three Apex floats with the Aanderaa Oxygen sensor in May 2004. They were deployed at 44.43 N 55.84 W, 59.76 N 49.11 W, and 49.99 N 147.01 W. The WMO numbers of these floats are: 4900497, 4900494 and 4900524. 4900497 is doing well since deployment. 4900494 has experienced some looping instability in the T/S curve, and the oxygen sensor of 4900524 is not working properly. The data has not been sent to the GDACs because the current NETCDF format can't store the additional temperature measurement.

2. Delayed Mode QC

Howard Freeland has designated Ron Perkin at IOS to handle 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 the Wong et. al. software as "source" matrices and graphically views the profiles from each float to flag any additional outliers before they get into the fitting process. The Wong routine takes about 6 hours to run on his PC. He applies the criterion that each float is working well until its data exceeds 2 standard deviations from the mapped climatological data. These data pass to delayed mode unchanged. He uses 0.008 as the minimum salinity error in the event that the fit-to-climatology standard deviation falls below this value. For profiles known to be bad, he forces the QC flag to 4 and leaves fill values in the PSAL_ADJUSTED array.
For floats where visual inspection of the plots leads him to believe that the salinities are showing a real deviation from climatology, he allows the minimum salinity error to be 0.040. Typically, these are where the float salinities are stable but the climatology is jumping around or in the Labrador Sea where the salinities seem to have changed. If fouling occurred, correction is applied to those floats. Once he finishes, he 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.

3. GDAC Function

Canada has no GDAC function

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:

China Argo National Data Management Report
The Operational Running and Service of China Argo Data Center

China took part in the global Argo program in January 16th,2002. Until now 24 Argo floats have been deployed by China and 16 ~ 24 further floats will be deployed in north Pacific, west equatorial Pacific and east Indian Ocean. In order to implement the Argo data management and service, China Argo Data Center was authorized to set up in National Marine Data & Information Service in Nov. 2002 and began to run operationally in July 2003.
At present, the operational system of receiving, processing, managing Argo data has been established. China Argo Data Center processes the data of alive Argo floats deployed by China after the complete profile is received within 24 hours and authorize CLS and IFREMER to insert data to GTS. We have established the global Argo database, distribute Argo data through China Argo Data Center website and distribute Argo data to Chinese users regularly.
The real-time data QC procedure is based on AOML Argo real-time process system and IFREMER help us to issue the data to GDACs. Based on abundant historical data and empirical QC conclusions and oceanographic characteristic, we established Argo Quality Control System for delayed-mode data, which includes four parts: preprocessing, automatic QC, manual QC and data export.

1. Preprocess Argo Data

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

2. Automatic Quality Control

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

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

Export Data And Generate Figures
This part exports the data in ASCII format generates float and profile index files, generates temperature and salinity profile maps, waterfall maps and T-S relationship maps.
Based on the QC results of global Argo data, we find that the data is satisfying in general, but also has some problems:

1. The Julian day or location of the profile is missing. We eliminate these profiles.
2. Abnormal drift speed: (we suggest that the speed limitation be no more than 1.0 m/s), set QC flag '4' for this profile.
3. The observation time of two or more profiles of the same float are very closed to each other. We reserve one profile, eliminate others.
4. Abnormal profile number “000”, it is common in gts, we don't know why this happens, so we reserve it temporarily.
5. Illogical profile sequence. Cycle numbers conflict with the “JULIAN DAY” values, we rearrange the profiles according to “JULIAN DAY”.
6. The value of "STATION_PARAMETERS" is empty, it's not consistent with the parameters in data files. We revise this item according to variables existing in data files.
7. Unrealistically high pressure values (greater than 2500dbar) or inverse pressure with pres_qc ‘1’. We set pres_qc ‘4’ for the pressure.

8. Temperature or salinity values in a profile are constant or near constant. Set QC flag '4' for temperature or salinity profile.
9. Only a few of data in the profile are bad but the profile QC flag is '4'.We apply a more reasonable profile QC flag according to QC flags of each data value.

Moreover, we suggest to add MD5 checksum into the index files on the FTP site of the global Argo data center. At present, the FTP site provides index files of the meta-data files, trajectory files and profile files, the index files contain the data file name, observation time, longitude, latitude and the last update time. Argo users can download the data files which meet the conditions conveniently.
But as a result of the huge downloading quantity, the unreliable network, and the software may have bugs, the data files downloaded maybe are not absolutely same as the ones on ftp site. The full name of MD5 is Message-Digest Algorithm 5 which came forth in the nineties of the twentieth century and evolved from MD2,MD3 and MD4.This algorithm can figure out a 128-bit message digest from plenty of information. Different information leads to different message digest. So that we can figure out the message digest of each file based on MD5 algorithm and put it into the index file on the global Argo data center's FTP site.
Therefore, users compare the MD5 checksum of the downloaded data files with the MD5 checksum in the index files to judge whether the downloaded data files are right or not. If not, users must download the data files again. At present, many web sites adopt this technique to validate downloaded data. Using this method, we can assure that users can download complete and right Argo data.
With the implementation of China Argo Project, many organizations and institutes take more attention to Argo and study the application of Argo data. China Argo Data Center promotes using of Argo data in China oceanography research, the main functions are:

10. Process the data of alive Argo floats deployed by China within 24 hours, authorize CLS and IFREMER to insert data to GTS. Copy Argos messages obtained from APEX floats and send it to IFREMER for data processing and distribution.
11. Download near real-time Argo data from global Argo data center.
12. Process and distribute near real-time Argo data.
13. Get, process and distribute Argo deployment information form AIC.
14. Perform quality control to delayed-mode Argo data and distribute them through web.
15. Develop some products using Argo delayed-mode data.
16. Make Argo data CD
17. International Argo data cooperation and exchange.
18. Edit newsletter about Argo operational work.

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

Argo National Data Management Report of France
November 1st 2003 - September 21st 2004

The French Argo data management activity is supported by the Coriolis data centre which acts as part of the Coriolis project – french project for operational oceanography

Status of the DAC

- Data acquired from floats
  November 2003 to end september 2004
  Profiles controlled : 5711
  Floats reporting : 230

  October 1999 to end september 2004
  Floats deployed 427
  Profiles controlled : 16666
  Inactive floats : 197

Coriolis data center is the French data assembly center (DAC). For the moment we process data from 110 Provor , 110 Apex floats, 8 Metocean / provor floats and 2 NEMO. These floats are deployed by national programs from 8 countries and 16 scientific projects.
See figure 1

During the past year, in coordination with CLS Argos we have processed Apex 28 bits format floats which are not hosted by a national DAC.
Since the past report, we don't process anymore Indian floats data. India has developed its own DAC .

For the moment the Coriolis data centre is able to process:

i. 11 different format for Apex
ii. 6 different formats for provor
iii. 2 formats for Metocean
iv. 1 format for Nemo

Country	Active floats	Total floats
Korea	13	16
China	9	18
Netherlands	3	3
Spain	9	9
Germany	56	128
France	95	147
European Union	45	101
Denmark	0	5
Total	**230**	**427**

Scientific project	Active floats	Total floats
Argo Kordi	13	16
Argo Greenland	0	5
Argo Spain	9	9
BSH	29	34
CICIO	4	15
CMGP	6	15
CORIOLIS	41	82
Argo Dutch	3	3
ETO BB	15	19
FLOSTRAL	26	30
GOODHOPE	13	16
GYROSCOPE	36	88
IFM	15	37
Argo China	9	18
MFSTEP	9	13
WECCON	2	27
Total	**230**	**427**

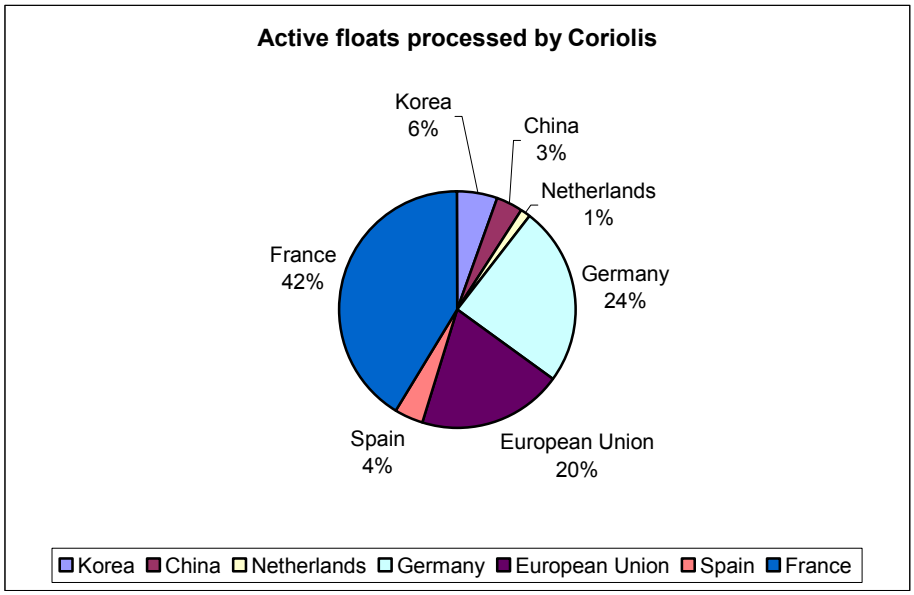


Fig. Active floats processed by Coriolis

- Data issued to GTS

All data processed by Coriolis are distributed on the GTS by way of Meteo-France. This operation is now automatically performed. After applying the automatic Argo QC procedure, the Argo profiles are inserted on the GTS every 2 hours. So, Argo profiles are now inserted on the GTS 365 days per year, 24 hours a day.

- 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 regularly issued to the GDACs

- 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

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 is being applied.
Within the European project Gyroscope, each float has been scrutinized (coordination between the PI and the data centre). The delayed mode data will be implemented in the database, the generation of the corresponding files will be done and delivered to the GDACs before the end of september

- 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.

Since last report, new functionalities have been implemented on the Coriolis web site:

- Argos transmission statistics: http://www.coriolis.eu.org/cdc/reports/cdcStatistics_coriolis.asp
- Overview of the different Apex and provor formats processed at the Coriolis data centre: http://www.coriolis.eu.org/cdc/reports/cdcDataCenters.asp

Argo National Data Management Report - India

1. Status

- *Data acquired from floats*

India has deployed 56 floats so far. Out of these, 14 floats are not working. Remaining floats are processed and sent to GDAC from 15 June 2004. Presently, the processing is done manually once in a day and real-time quality controlled data are sent to GDAC. From November 2004, we will be in a position to send data to GDAC after real-time QC automatically twice a day. Also, INCOIS is setting up a Regional Data reception centre for receiving Argos data directly from NOAA satellites. This will enable faster delivery of data to GDAC.

- *Data issued to GTS*

Presently we do not have GTS access; hence we could not send Indian floats data to GTS. We have requested Argos CLS to send Indian floats data to GTS. Efforts are underway to get GTS access at INCOIS.

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

Data from 42 floats are sent to GDAC after real-time QC. However, we have some problem in sending the trajectory file, which will be sorted out after this meeting.

- *Data issued for delayed QC*

All Indian float data is ready to be subjected to delayed mode QC procedures.

- *Delayed data sent to GDACs*

PMEL delayed mode QC software has been configured in INCOIS system. As a test case, limited numbers of floats have been subjected to DMQC. However, we have not sent to GDAC.

- *Web pages*

INCOIS maintain Web_GIS based site for Indian Argo Programme. It contains entire Indian Ocean floats data with trajectory.

Argo floats deployed by India are processed and made available at INCOIS website. Data from the floats deployed in the Indian Ocean by other countries are received from GDAC and made available at INCOIS website in ASCII format. User can download data from selected number of floats, region, depth, parameters and/or time.

- *Statistics of Argo data usage*

Presently, Argo data are used by India Meteorological Department for their operational use.

Argo data are used for some of the applications related to Monsoon, Cyclone, equatorial Indian ocean variability, water mass identification, etc.,

In India, INCOIS is nodal agency for Indian Argo Project. Currently, 4 different groups in India are using Argo data for different applications.

- *Products generated from Argo data …*

Presently, waterfall plots are made available at INCOIS website for the Indian floats. However, from November 2004, other products will also be made available.

2. Delayed Mode QC

PMEL software for DMQC has been configured at INCOIS. Test calibrations for limited number of floats have been carried out. However, in case of many floats, the WOA 2001 climatology used by the software is inadequate to make a meaningful calibration in the North Indian Ocean. Climatology for this region will be improved using the data sets available from the Indian Research Cruises conducted from 1965 to 2004. India is already collecting number CTD profiles during deployment of Argo floats and other oceanographic cruises, which will be used for improving climatology of this region.

Further, one Scientist from INCOIS is being deputed to IOS, Canada under POGO fellowship immediately after this meeting to get familiarized with DMQC.

Delayed mode QC data will be sent to GDAC from January, 2005.

3. GDAC Functions

India has no GDAC function.

4. Regional Centre Functions

INCOIS, India propose to act as a Regional DAC for the Indian Ocean from 30 N to 30 S and 20 E to 120 E. INCOIS has already placed a full time position for this activity. We plan to implement the required functions of an RDAC such as float to float comparisons, float-nearby CTD comparison, and development of high quality climatologies. A web site for the Regional Data Centre will be ready from Feb, 2004.

INCOIS is currently acting as deployment coordinator for the Indian Ocean and plans to continue in the future.

Argo National Data Management Report

Japan

1. Status

The Japan DAC (Japan Meteorological Agency: JMA) has processed data from 350 Japanese profiling floats, including 219 active floats by the end of August 2004. There are seven national PIs who agreed to provide data to the DAC. Argos messages from the active floats are being transferred to the DAC in real-time. All profiles from the floats are issued to GTS in TESAC form after real-time QC. JMA started work for code migration to BUFR such as reviewing the proposed template for profiling data and proposing template for trajectory data. All the profiles issued to GTS are transmitted to GDACs in NETCDF format at the same time when they are issued to GTS. JAMSTEC applies delayed QC to their own floats. By the end of August, delayed-mode QC have been applied to 10,109 (83%) profiles, and 67 delayed-mode profiles were sent to GDACs.

JMA and JAMSTEC have developed Argo web sites. The former shows global float coverage and each profile based on GTS TESAC messages and the status of Japanese floats (http://argo.kishou.go.jp/). JAMSTEC shows the tables, trajectories and (P,T,S) profiles of all floats that it is responsible for. JAMSTEC also provides search function for the float profiles, GDAC mirror site, ascii data sheets of each profile (up to March 2005) and so on through its web site (http://www.jamstec.go.jp/ARGO/J_ARGOe.html).

JMA uses Argo data for its operational oceanographic and climate prediction models. Surface temperature (observation at the shallowest level) data are useful source for its operational SST analysis and ground truth of satellite observations. Oceanographic products such as current, subsurface and surface temperature maps are available on the JMA web site. JAMSTEC is also one of the users of Argo data for OI mapping of physical oceanographic quantities such as Temperature, Salinity, Density, Dynamic Height Anomaly and Relative Geostrophic Current and for ocean data assimilation model. OI mapping, together with some statistics are shown on the JAMSTEC web site.

As one of the GOOS Regional Alliance activities, JMA has been operating NEAR-GOOS (North-East Asian Regional GOOS) regional real time data base, which provides global GTS messages to registered users through a web site and ftp server with maximum delay of one day after GTS input. There are about 130 registered users, who are potentially use Argo data scientifically or operationally.

2. Delayed Mode QC

JAMSTEC has to go through to write NETCDF files for the delayed mode profiles. Our corrections from real-time profiles are as follows:

1) adding data by BitErrorRepair,
2) correction of the position (Lat, Lon) and time (Juld, Juld_Location),
3) manual change of flag of each layer by Visual QC,
4) change of Number of layers using delayed or repaired messages,
5) pressure correction using SSP and subsequent salinity recalculation,
6) salinity correction using WJO.

Description of the calibration and history records in NETCDF file is given in **Appendix B**.

During the past year, JAMSTEC has done validation of salinity correction based on WJO about 8000 profiles using nearby CTDs (**Appendix C**).

A gray list of the floats which are judged to start reporting abnormal data have been developed by JAMSTEC and JMA. The gray list criteria and delayed-mode flagging procedures for doubtful pressure measurements are in **Appendix A**.

3. Regional Centre Functions

IPRC, CSIRO and JAMSTEC had the meeting about Regional Center of the Pacific in 28-30 July 2004. The followings were agreed at the meeting:

- ✓ Establish a regional website for the PACIFIC by IPRC.
- ✓ About a geographical ocean area, JAMSTEC does whole Pacific to ~30S (until 2008). CSIRO will do region around Australia, 90-200E (or 180), 10N (or 0N)-Antarctica. The duplicated zone along the equator will be set for inter-comparison among the Pacific-RCs. Who will do the SE Pacific?
- ✓ About functions, CSIRO and JAMSTEC do float-float and float-nearby CTD comparison of Argo (T,S) profile. IPRC gather recent data for QC and coordinate.

Other points at issue will be reported by P. Hacker at the meeting.

Appendix A.

Grey list criteria

Abnormal salinity drift and offset is judged by the salinity increase or decrease by the amount of 0.03 at around 2000db from the deployment.

Abnormal pressure is judged by the critical value of 2200db. If a float starts to report larger value, such as 3000db, it is nominated as a candidate. If subsequent cycle reports larger values and profile get shallower, it is listed in the table.

Delayed-mode flagging procedures when the pressure values are doubtful

1. When PRES>2200db or PRES_QC=4 (by rQC),
   flags of PRES, TEMP and PSAL = 4

2. Otherwise, profiles P-T, P-S, T-S of a cycle are compared with previous ones.
- ✓ When they can be considered as normal (discrepancies are small),
  - ✧ flag of PRES, PSAL = 2 and flag of TEMP = 1
- ✓ When the discrepancies are seen in all three figures,
  - ✧ flag of PRES, PSAL and TEMP = 3
- ✓ When the discrepancies are seen in P-T and P-S figures but small in T-S,
  - ✧ flag of PRES = 3 and flag of PSAL, TEMP = 2

3. When the maximum depth is shallower than 500db,
   flags of PRES, TEMP and PSAL = 4

Subsequent pressure correction using Surface Pressure is not performed in the cases that
- ✧ Surface Pressure is abnormal,
- ✧ flag of PRES = 3 or 4.

Appendix B

JAMSTEC puts delayed mode history records into the NETCDF file as follows when:
2) correction of the position (Lat, Lon) and time (Juld_Location),
5) pressure correction using SSP and subsequent salinity recalculation,
6) salinity correction using WJO have done.
Here is an example.

Calibration Section *(N_PARAM=3, N_CALIB=2, only 3 in 6=2x3 are shown)*
PARAMETER =
"*PRES*", // Pressure correction
"*PSAL*", // Recalculation of Salinity
"*PSAL*" ; // Salinity adjustment using WJO
SCIENTIFIC_CALIB_EQATION =
"*PRES_ADJUSTED = PRES+ThisCycleSSP-NextCycleSSP*",
"*PSAL_ADJUSTED = PSAL(PRES_ADJUSTED,TEMP,Conductivity)*" ;
"" or
"*PSAL_ADUSTED = PSAL_ADJUSTED + deltaS, where deltaS is calculated by WJO*" ;
SCIENTIFIC_CALIB_COEFFICIENT =
"*ThisCycleSSP=4.4, NextCycleSSP=4.4*",
"",
"" or "*r=0.9994(±0.0001), deepest deltaS=-0.025(±0.008)*" ;
SCIENTIFIC_CALIB_COMMENT =
"*Pressure Correction using SeaSurfacePressure of this(before) and next(after) cycle(profile) in Technical Data*",
"*Salinity Recalculation using ADJUSTED Pressure*" ;
"*No adjustment is needed*" or "*WJO(2003) salinity adjustment is adopted with SeHyD1*" ;

History Section
HISTORY_INSTITUTION =
.. ,
"*JM*", // Change JULD_LOCATION
"*JM*", // Change LATITUDE
"*JM*", // Change LONGITUDE
"*JM*", // Pressure correction
"*JM*", // Recalculation of Salinity
"*JM*" ; // Salinity adjustment using WJO
HISTORY_STEP =
.. ,
"*ARGQ*", // JAMSTEC's rQC
"*ARGQ*", // JAMSTEC's rQC
"*ARGQ*", // JAMSTEC's rQC
"*ARCA*", // JAMSTEC's calibration (Pressure correction)
"*ARCA*", // JAMSTEC's calibration (Recalculation of Salinity)
"*ARSQ*" ; // JAMSTEC's calibration (Salinity adjustment using WJO)
HISTORY_SOFTWARE =
.. ,
"*WJO*"; // Schemes used in salinity adjustment
HISTORY_SOFTWARE_RELEASE =
.. ,
"*1*"; // program version of WJO
HISTORY_REFERENCE =
..... ,
"*SeHyD1*"; // Name of the data set used with WJO

```
HISTORY_ACTION =
  .. ,
  "CV",          // Change Value of JULD_LOCATION
  "CV",          // Change Value of LATITUDE
  "CV",          // Change Value of LONGITUDE
  "CV" or "IP", // ChangeValue or Operate on the complete input record of PRES
  "CV" or "IP", // ChangeValue or Operate on the complete input record of PSAL
  "CV" or "IP", // ChangeValue or Operate on the complete input record of PSAL
HISTORY_PARAMETER =
  .... ,
  "DAT$",              // Change Value of JULD_LOCATION
  "LAT$",              // Change Value of LATITUDE
  "LON$",              // Change Value of LONGITUDE
  "PRES",              // Pressure correction
  "PSAL",              // Recalculation of Salinity
  "PSAL" ;             // Salinity adjustment using WJO
HISTORY_START_PRES =
  .... ,
  99999.,
  99999.,
  99999.,
  99999.,              // Pressure correction
  99999.,              // Recalculation of Salinity
  99999.;              // Salinity adjustment using WJO
HISTORY_STOP_PRES =
  .... ,
  99999.,
  99999.,
  99999.,
  99999.,              // Pressure correction
  99999.,              // Recalculation of Salinity
  99999.;              // Salinity adjustment using WJO
HISTORY_PREVIOUS_VALUE =
  .... ,
  19402.0216435185,    // JULD_LOCATION
  44.726,              // LATITUDE
  169.86,              // LONGITUDE
  99999.,              // Pressure correction
  99999.,              // Recalculation of Salinity
  99999.;              // Salinity adjustment using WJO
```

Appendix C

Validation of Salinity Correction based on WJO method Using shipboard CTD : statistics

Definitions

Argo Float → S_{obs} : observed salinity

WJO estimation → S_{est} : estimated salinity

σ : estimation error

Defined quantities:

$$\Delta S = S_{est} - S_{obs}$$

For the validation we use an avaraged value over whole profiles for each float.

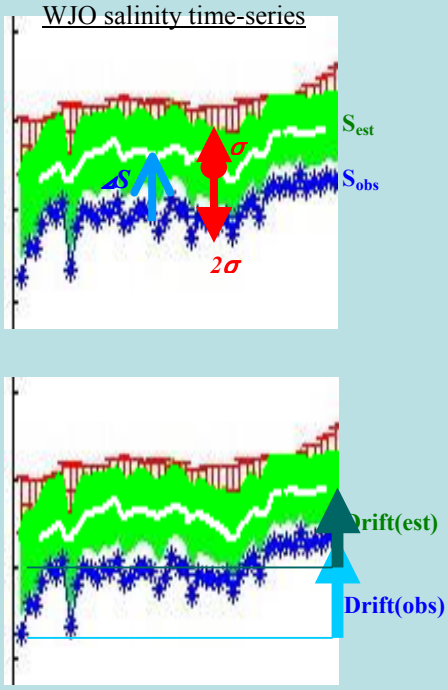
$\overline{\Delta S} = |S_{est} - S_{obs}|$: avaraged over whole profiles

Drift(obs) = S_{obs}(first profile) – S_{obs}(last profile)

Drift(est) = S_{est}(first profile) – S_{est}(last profile)

For the validation we use a salinity observed by shipboard CTD.

→ S_{DP} : salinity observed at deployment of a float
→ S_{RC} : salinity observed at recovery of a float
→ S_{NB} : salinity observed by nearby CTD



Judgment whether our choices of S_{obs} or S_{est} are good or not is done on the inspection of S_{obs} and S_{est} time-series with CTD salinity on it, that is

$|S_{obs} - S_{CTD}| <> 0.01$ for choice of S_{obs}
$|S_{est} - S_{CTD}| <> 0.01$ for choice of S_{est} (threshold is taken 0.01psu).

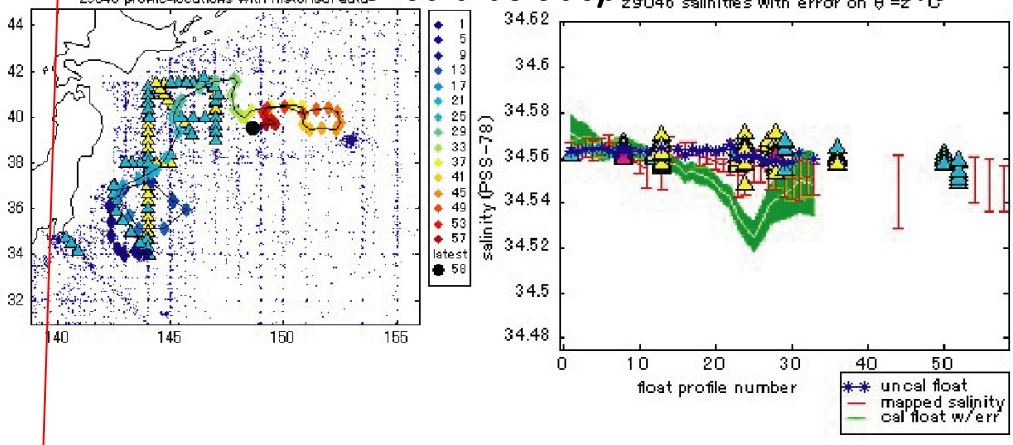
Number of floats that automatic choice is reserved (1<□S/σ<2) amounts to 15% of all 104 floats used here. When reserved floats are reduced to Obseved (Choice by □S/σ<>2) or Estimated (Choice by □S/σ<>1), a percentage of correct answers exceeds 90%. When reserved or all floats are inspected visually, a percentage of correct answers exceeds 95%.

Automatic Choice whether Adjusted Value =S_{obs} or S_{est}		Observed Value when ⊿S/σ<1		Estimated Value when 2<⊿S/σ		Reserved 1<⊿S/σ<2	
Judgment by shipboard CTD	**No.**	**Good**	**Bad**	**Good**	**Bad**		
CTD@deployment	**95**	**59** 62%	**3** 3%	**19** 20%	**0** 0%	**14**	15%
nearby CTD	**72**	**43** 60%	**0** 0%	**18** 25%	**1** 1%	**10**	14%
CTD@recovery	**6**	**5** 83%	**0** 0%	**1** 17%	**0** 0%	**0**	0%

Mischoice by Automatic Choice

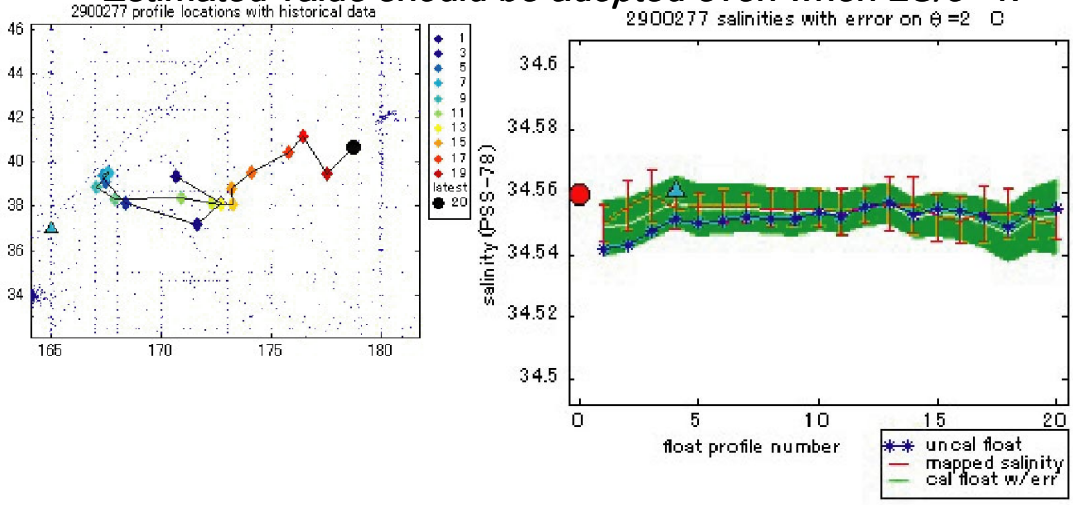
WMO29046(A2, 58cycles): ⊿S/σ=2.1

Observed value should be adopted even when ⊿S/σ>2.



WMO2900277(A3, 21cycles): ⊿S/σ=0.4

Estimated value should be adopted even when ⊿S/σ<1.



Korea Argo National Data Management Report
5th Argo data management meeting

1. Status

- Data acquired from floats

Deployment of Korea Argo floats

Year	Organization	Number of deployed Argo floats				Total
		East/Japan Sea	Northwest Pacific	Antarctic Ocean & Others	Subtotal	
2001	KMA	3	7		10	18
	KORDI/ MOMAF	5	1	2	8	
2002	KMA	5	10		15	25
	KORDI/ MOMAF	6		4	10	
2003	KMA	5	10		15	33
	KORDI/ MOMAF	8		10	18	
2004	KMA	5	10		15	36
	KORDI	11		10	21	
2005 (plan)	KMA	5	10		15	30
	KORDI	5		10	15	

KMA : Korea Meteorological Administration
MOMAF : Ministry of Maritime Affairs and Fisheries
KORDI : Korea Ocean Research and Development Institute

KODC has been improving the system to get all data by automatic download from the CLS database everyday.

- Data issued to GTS
  Within 24 hours of data collection, all data of KORDI is issued to GTS by Coriolis in France temporarily and all data of KMA is issued to GTS by KMA in Korea.

- Data issued to GDACs after real-time QC
  Real-time QC system for Argo data from METRI/KMA was developed in February 2004. KORDI and METRI/KMA have been developing an automatic real time QC systems in which local characteristics in the vertical temperature and salinity distributions are considered.

The KORDI system is very flexible and data from different types of profilers can be incorporated easily. This system will be operational during the fourth quarter of 2004.

- Data issued for delayed QC

In order to carry out higher level of DMQC, the KODC has been collecting and analyzing data of the serial oceanographic observations which are carried out bimonthly on 69 fixed stations from 8 lines in the East/Japan Sea since 1961.

- Delayed data sent to GDACs

In 2005, the KODC will send delayed data to GDACs after delayed QC using a program and manual QC by specialists. KORDI has been developing delayed mode QC schemes and salinity calibration methods for data obtained in the East/Japan Sea. Data with delayed mode QC will be distributed next year.

- Web pages

The KODC has operated and upgraded a Korea Argo web page (http://kodis.nfrdi.re.kr/argokorea/), which consists of DM data and RT data linked to KMA(http://argo.metri.re.kr). The KODC has also developed temperature offering system for Korean distant water fisheries in near real-time using Argo data. Its webpage is http://kodis.nfrdi.re.kr/argo/ temporarily.

KORDI will open its own webpage (http://argo.kordi.re.kr) during the fourth quarter of 2004. Seoul National University has operated Argo homepage (http://eastsea.snu.ac.kr/pfloats.html) for profiling floats in the East/Japan Sea since 2000.

- Statistics of Argo data usage

Many scientists have applied the Argo data to the researches for data assimilation, intermediate level circulation of the East/Japan Sea, global statistics of inertial motions, upper ocean response to tropical storms and distant water fisheries. There are two national PIs in Korea.

2. Delayed Mode QC

PI of each program is primary responsible for the Argo DMQC and the KODC has developed a program in order to control Argo DMQC and DMDB in Korea. In 2005, the KODC will send delayed data to GDACs after delayed QC using a program and manual QC by specialists.

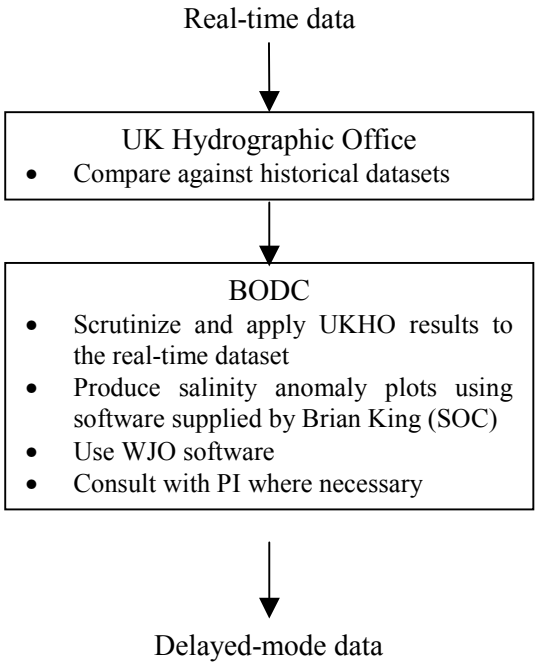
UK Argo National Data Management Report
5th Argo Data Management Meeting

1. Status

- *Acquiring data from floats* – Data from all UK floats is received at BODC by automatic download from the CLS database once every 24 hours.
- *Data issued to GTS* – All UK data is issued to the GTS by CLS.
- *Data issued to GDACs after real-time QC* – All UK data received at BODC is passed through the agreed real-time quality control tests within 24 hours of the data arriving at BODC. All data that has been processed at BODC is queued for transferred to both GDACs which occurs daily. Any file that fails to be transferred is queued for the next transfer attempt the next day.
- *Data issued for delayed QC* – All UK float data is ready to be subjected to delayed mode quality control procedures.
- *Delayed data sent to GDACs* – The WJO software has been installed at BODC and floats are beginning to be pushed through it. Work is still being done on writing delayed-mode data to the NETCDF files. We hope to have delayed-mode data being sent to the GDACs by the end of September 2004.
- *Web pages* – BODC hosts the main data information and access pages. These pages contain for example of a list of the current status of all UK floats deployed, automatic request system for all UK float data, links to both GDACs and other Argo related sites and an interactive map giving information on last known positions, deployment positions and direct links to profile plots of the last profile reported by every float. Other information about Argo is also available. This site is currently being updated and will be going live at the end of September 2004.
- *Statistics of Argo data usage* – At least 8 research grant funded projects are currently running in the UK that make use of Argo data. Scientific applications that use Argo data are looking at long-term monitoring, seasonal variability and climate change.

2. Delayed Mode QC

BODC is in the final stages of setting up the system and software to enable delayed mode data to be provided to the GDACs. The organization of performing delayed mode qc is shown in the diagram below. It is anticipated that the first UK delayed-mode NETCDF files will be produced by the end of September 2004.



3. GDAC Functions

The UK does not run a GDAC.

4. Regional Centre Functions

See separate report on Southern Ocean RDAC.

Argo National Data Management Report of United States
October 16st 2003 - September 10th 2004

1. Status

•Data acquired from floats:

a- October 2003 to September 2004

Floats deployed:	*345*
Floats failed on launch:	*2*
Floats reporting:	*691*
No reports last 30 days:	8
Profiles quality controlled:	*16,866*

b- 1997 to September 2004

Floats deployed:	*904*
Floats failed on launch:	*21*
No reports more than 30 days, considered inactive:	*224*

1. Data issued to GTS:

During the reporting period, Service Argos and AOML put 14,658 QC'ed profiles on GTS.

2. Data issued to GDACs after real-time QC:

During the reporting period, *16,854* NETCDF profiles, technical and trajectories NETCDF files and about *400* meta NETCDF files have been issued to both GDACs.
Total numbers of NETCDF files issued: *50,960*

3. 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

4. Data sent to GDACs after delayed QC:

Data (profile and trajectory files) have been submitted several times

5. 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 site for Argo products is at:
http://www.aoml.noaa.gov/phod/ARGO/Products.

2. Delayed mode QC

Consistency test proved to be valuable, especially for trajectory files.

History section of trajectory files is very large. Suggest improvement (agenda item).

Potential problem: currently a real-time file is not accepted by the GDAC if a delayed-mode file exists. A need to do this can arise if reprocessing of data becomes necessary and is done after a delayed-mode profile was generated. Routinely, we reprocess profiles after we receive the CDrom from Argos. In most cases this happens before the delayed-mode QC is done. Occasionally, we have to do it after software-related problems were eliminated.

Argo DATA MANAGEMENT REPORT
FRENCH GDAC

Argo GDAC Functions

- National centres reporting to you :
  Currently, 8 national DACs submit regularly data to the French GDAC. In 2004, INCOIS (India) and KMA (Korea) started to send data and meta-data.
  The additional GTS DAC contains all the vertical profiles from floats that are not handled by a national DAC. These data come from GTS and GTSPP projects.

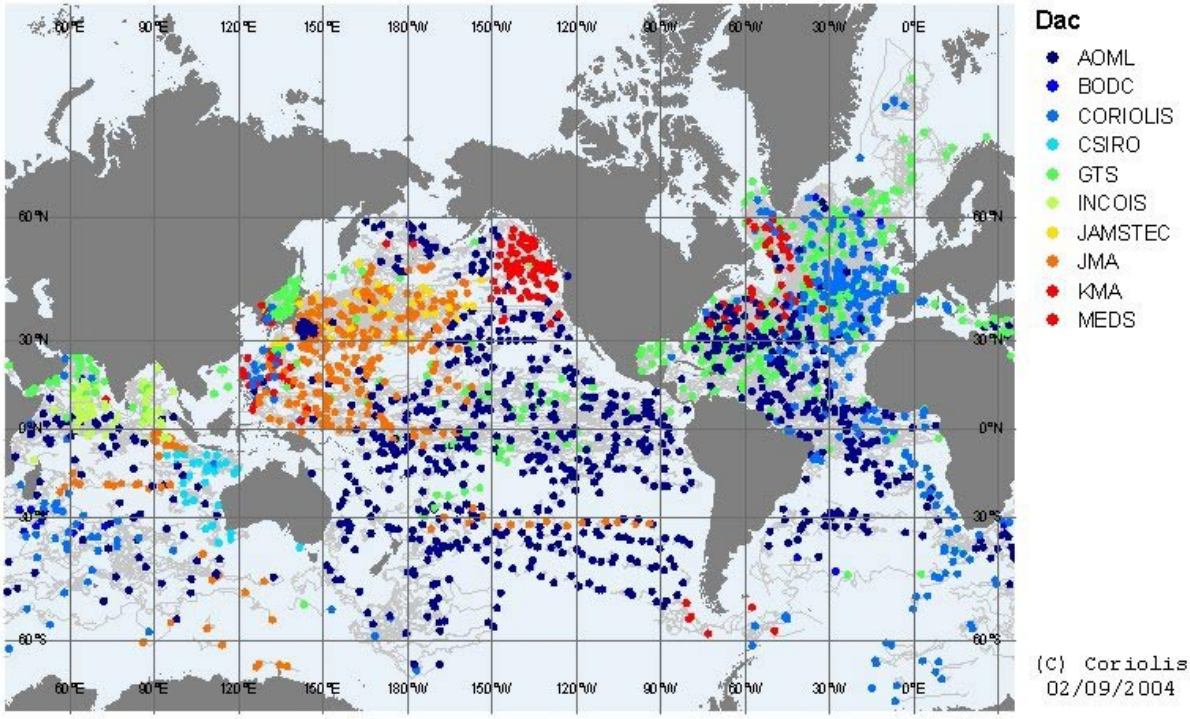
  On September 21th, the following files were available from the GDAC FTP site :
  - AOML, USA
    - File types: meta-data, trajectory, technical and profile
    - 906 meta-data files accepted
    - 35549 profile files accepted
    - 869 trajectory files accepted
    - 869 technical data files accepted
  - BODC, United Kingdom
    - File types: meta-data, trajectory and profile
    - 130 meta-data files accepted
    - 5538 profile files accepted
    - 123 trajectory files accepted
    - 0 technical data files accepted
  - IFREMER, France
    - File types: meta-data, trajectory, profile and technical
    - 405 meta-data files accepted
    - 16082 profile files accepted
    - 364 trajectory files accepted
    - 364 technical data files accepted
  - CSIRO, Australia
    - File types: meta-data, trajectory, profile and technical
    - 31 meta-data files accepted
    - 2246 profile files accepted
    - 30 trajectory files accepted
    - 31 technical data files accepted
  - INCOIS, India
    - File types: meta-data, profile
    - 55 meta-data files accepted
    - 773 profile files accepted
    - 0 trajectory files accepted
    - 0 technical data files accepted
  - JMA, Japan
    - File types: meta-data, trajectory, profile and technical
    - 348 meta-data files accepted
    - 17163 profile files accepted
    - 347 trajectory files accepted
    - 349 technical data files accepted
  - KMA, Korea
    - File types: meta-data, trajectory, profile and technical
    - 39 meta-data files accepted
    - 1485 profile files accepted
    - 33 trajectory files accepted
    - 33 technical data files accepted
  - MEDS, Canada

        - File types: meta-data, trajectory, technical and profile
        - 120 meta-data files accepted
        - 6131 profile files accepted
        - 120 trajectory files accepted
        - 120 technical data files accepted
    - GTS (data collected by GTSPP)
        - File type : profile only
        - 25362 profile files accepted

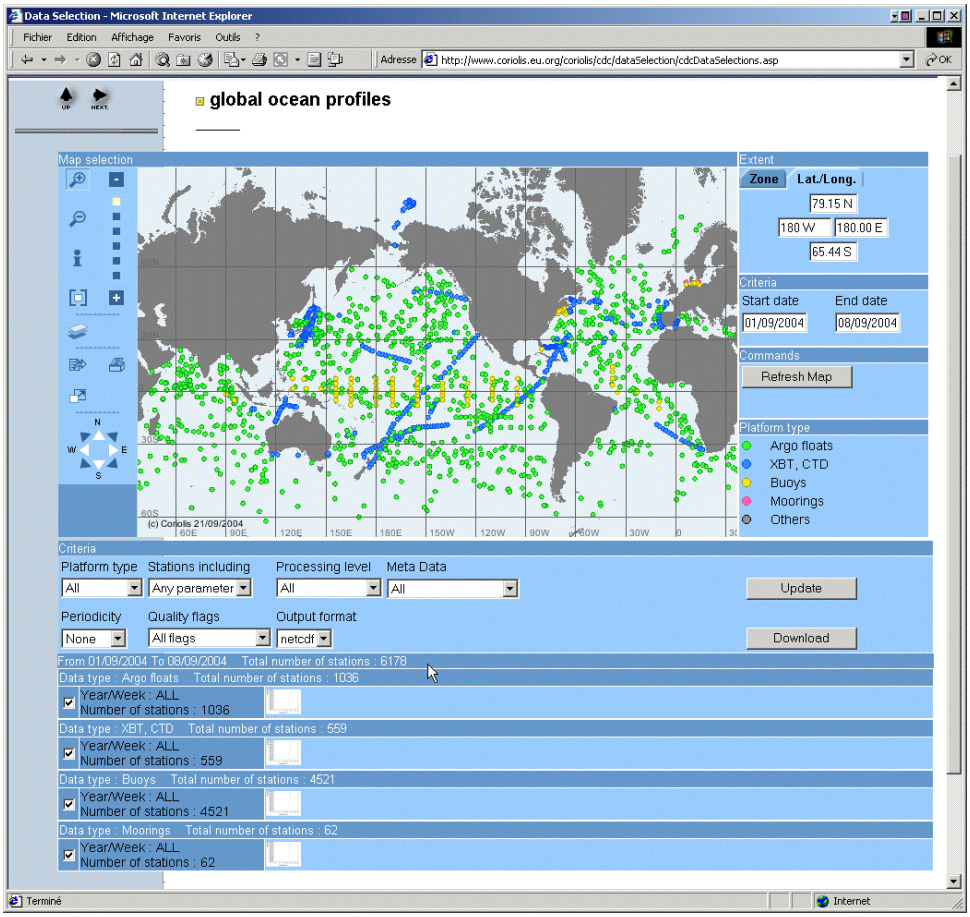
- Operations of the ftp server :
    - Meta-data, profile, trajectory and technical data files are automatically collected from the national DACs ;
    - Index files of meta-data, profile and trajectory are daily updated ;
    - GDAC ftp address: ftp://ftp.ifremer.fr/ifremer/argo .

- Operations of the www server :
  Ifremer maintains a web site with real-time and delayed mode data or meta-data collected by GDAC. The following features are available :
    - Display of Argo profiling floats
        - http://www.coriolis.eu.org/coriolis/cdc/floats/cdcFloats.asp
        - Display all active/old floats per ocean
        - Display technical information and graphics for floats and measurements
        - Distribute data in Argo NETCDF format or medatlas Ascii format.
    - Web data selection interface :
      http://www.coriolis.eu.org/coriolis/cdc/dataSelection/cdcDataSelections.asp
        - Select data by date, location and meta-data informations
        - Select Argo data and additional profiles from GTSPP program (XBT, CTD, buoys)
        - Distribute data in Argo NETCDF format or medatlas Ascii format.
    - Display GDAC monitoring statistics
      http://www.coriolis.eu.org/coriolis/cdc/argo_gdac_monitoring.htm

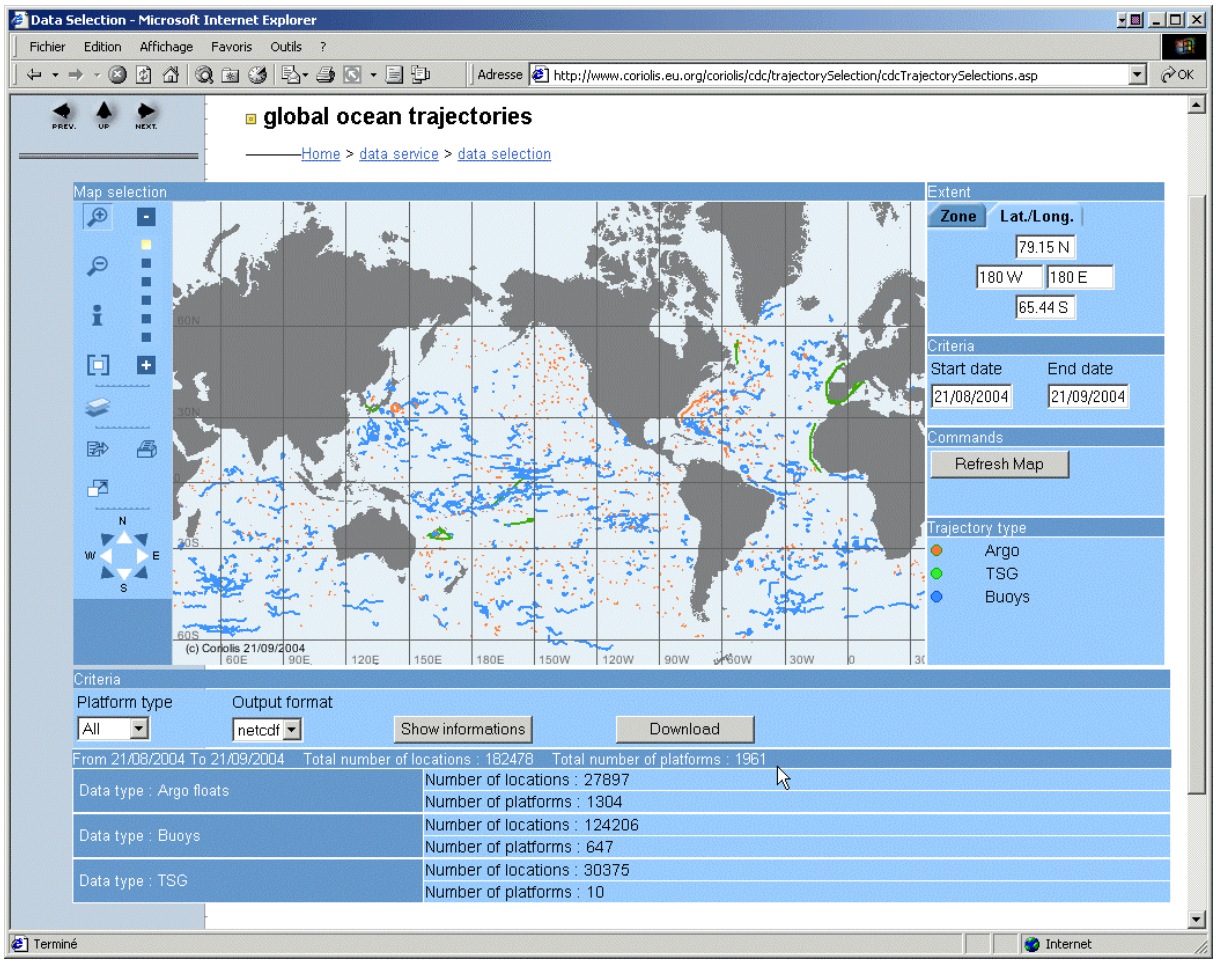
- Data synchronization :
    - Implemented on 20/02/2003, the synchronization with US-GDAC is performed once a day.



Argo profiling floats availables from GDAC in September 2004 (This map includes active and old floats)

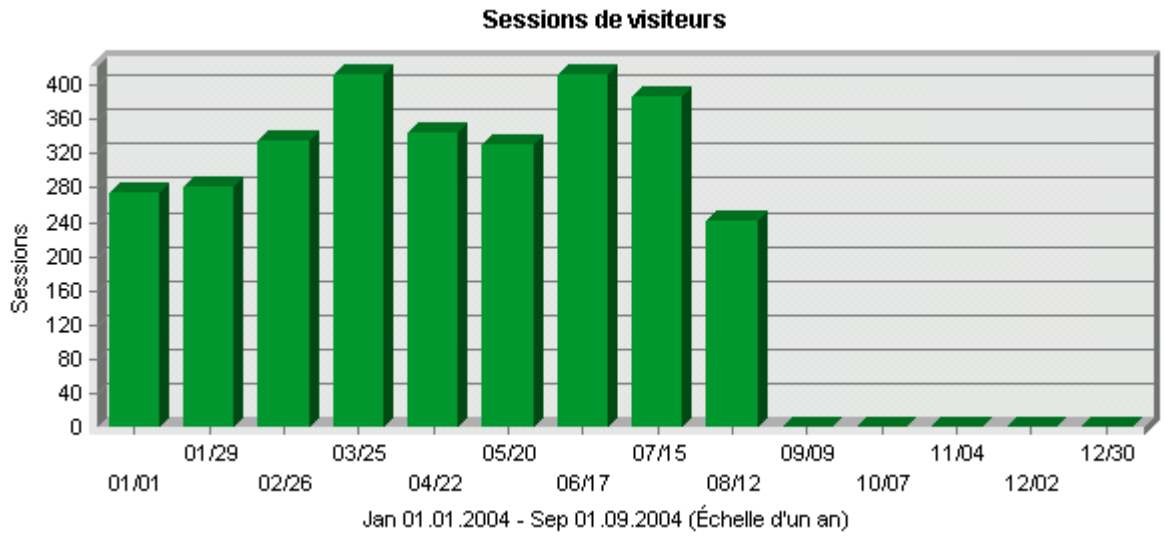


Argo and other GTSPP profile data available from the data selection interface, on the first week of September 2004.

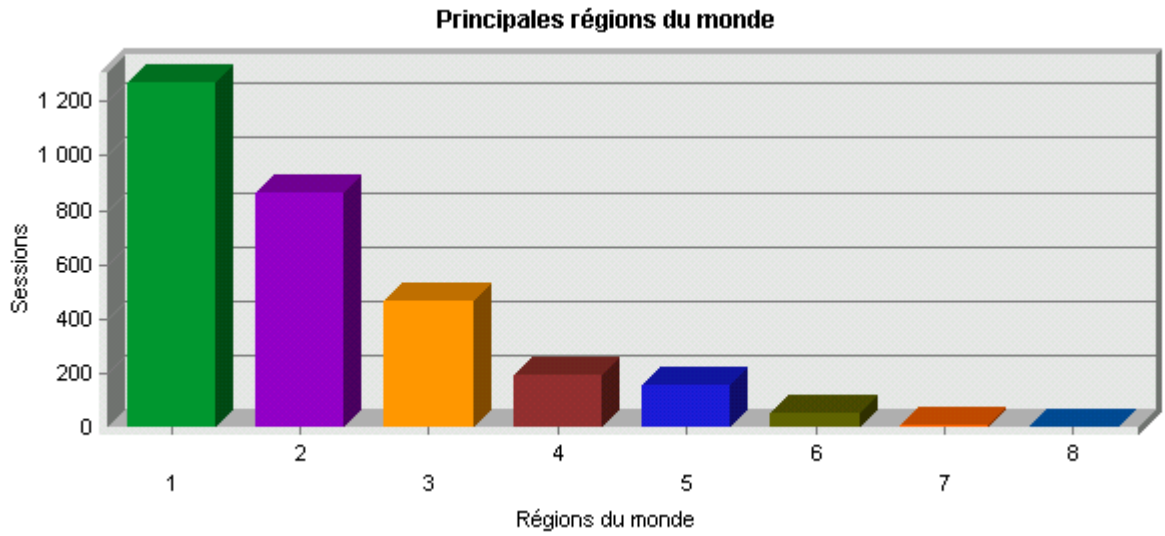


Argo and other trajectory data available from the data selection interface, on September 2004 (Orange lines: Argo trajectories, blue lines : DBCP buoy trajectories, green lines : Gosud thermosalinographs)

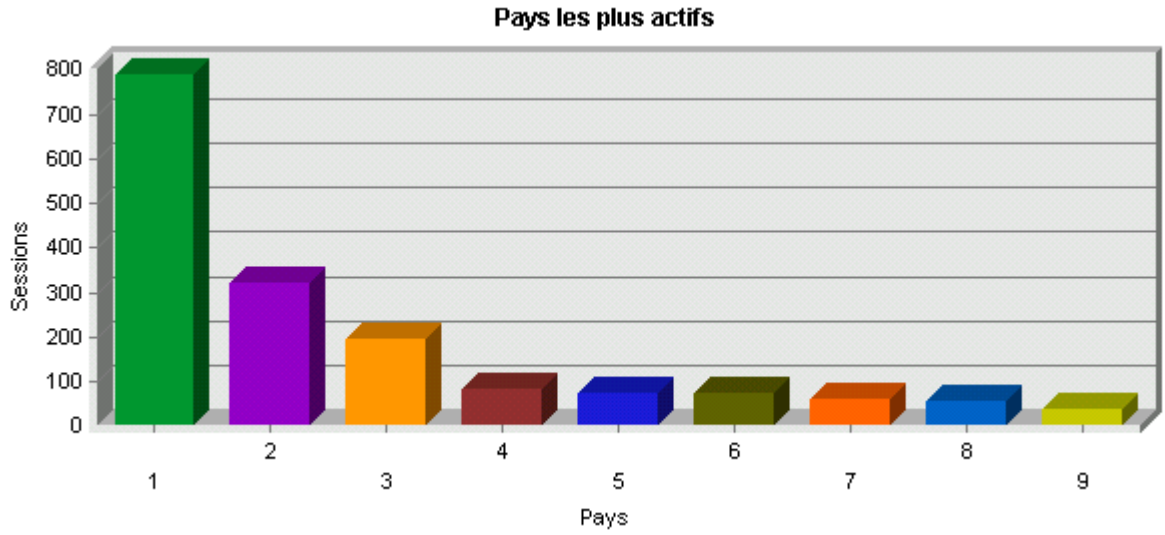
- Use statistics from GDAC FTP site



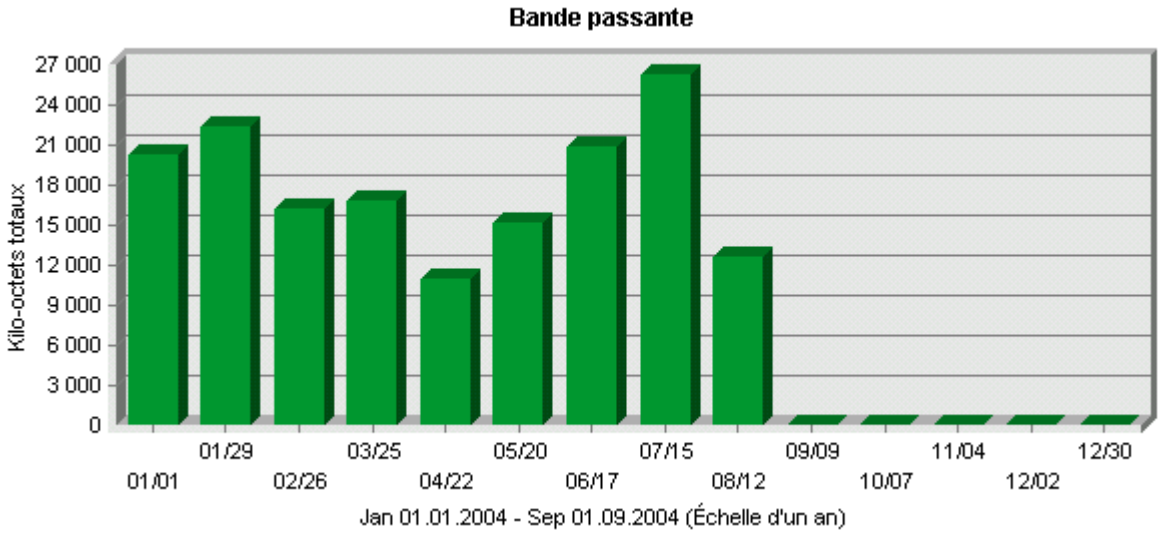
Number of FTP sessions on GDAC, from January to September 2004



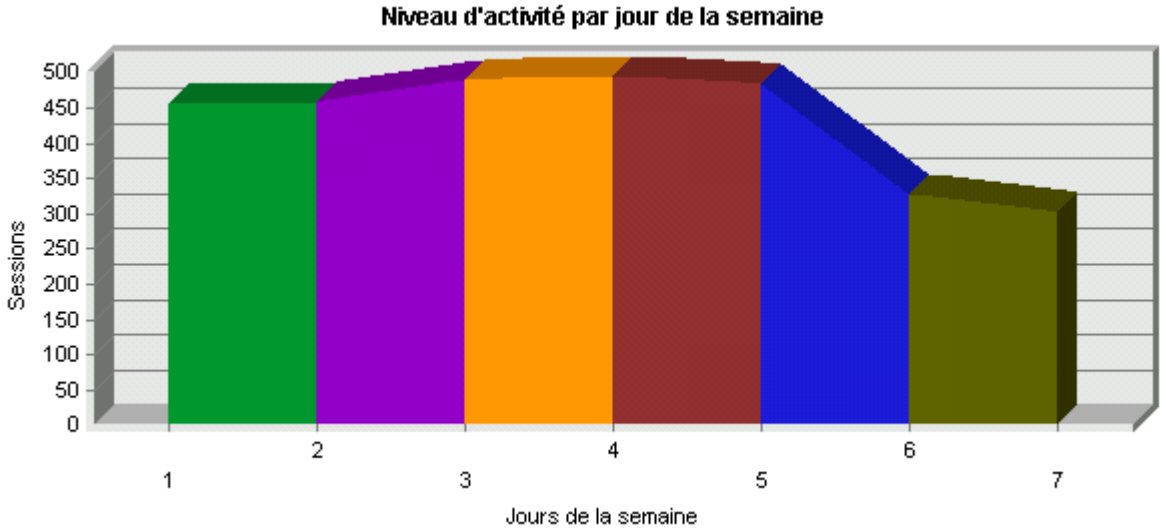
Origin of FTP sessions, main areas, from January to September 2004
1 : unspecified origin, 2 : North America, 3 : Occidental Europe, 4 : Northern Europe, 5 : Asia, 6 : Australia, 7 : Oriental Europe, 8 : Southern Africa



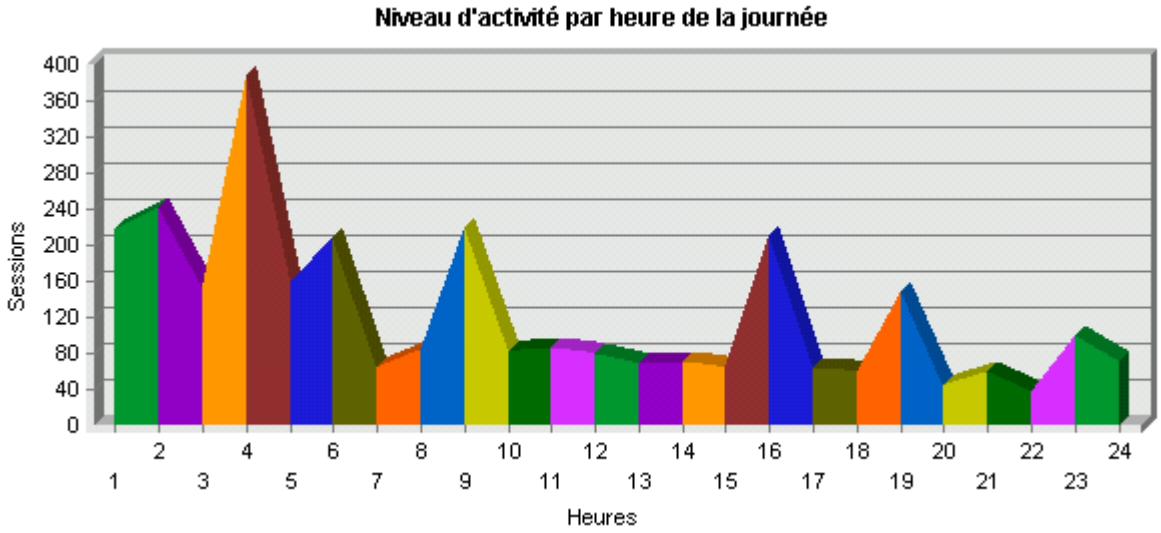
Origin of FTP sessions, main countries, from January to September 2004
1 : USA, 2 : France, 3 : Norway, 4 : South Korea, 5 : Canada, 6 : Germany, 7 : Japan, 8 : Australia, 9 : United Kingdom



FTP monthly bandwidth, from January to September 2004



FTP activity level per day of the week, from January to September 2004
(1 : Monday – 7 : Sunday)



FTP activity level per hour of the day, from January to September 2004

Status of the US GDAC
September, 2004

1. DACs reporting

Summary:
- 8 DACs (plus the GTS) reporting - 2 new DACs during 2004
- 2,514 floats (1,342 active)
- 109,175 profile files (8,840 delayed-mode)

Detail:

Australia (CSIRO)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 31 floats (18 active)
- 2,250 profile files

Canada (MEDS)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 120 floats (84 active)
- 6,135 profile files (5,295 delayed-mode)

France (IFREMER)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 433 floats (177 active)
- 16,085 profile files

India (INCOIS) -- started reporting during 2004
- Reporting: Meta-data and Profile data
- 56 floats (38 active)
- 815 profile files

Japan (JMA)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 348 floats (218 active)
- 17,175 profile files (70 delayed-mode)

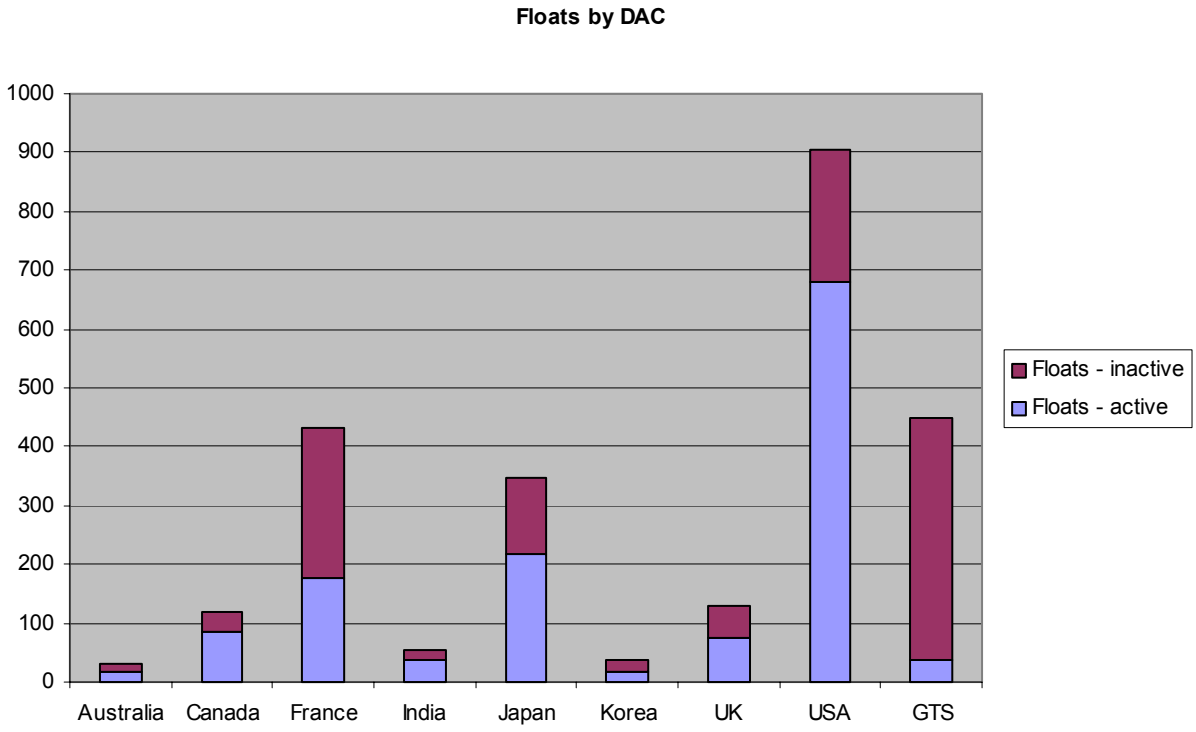
Korea (KMA) -- started reporting during 2004
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 39 floats (17 active)
- 1,490 profile files

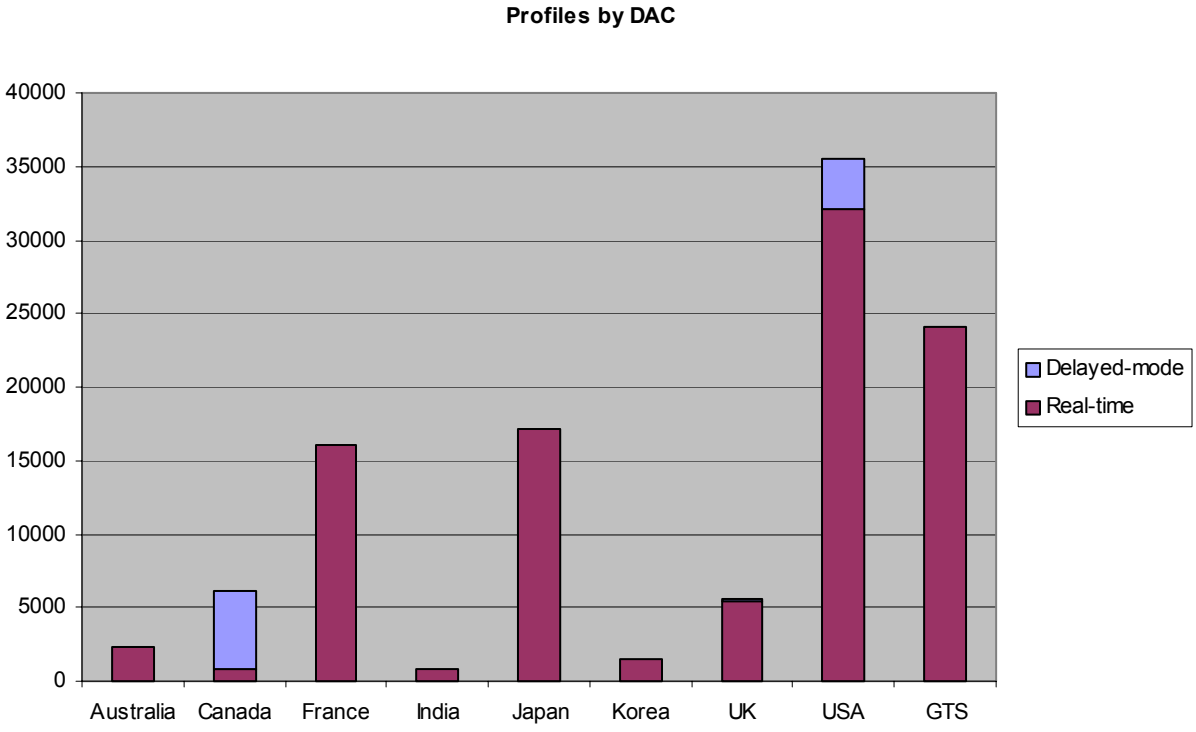
UK (BODC)
- Reporting: Meta-data, Trajectory, and Profile data
- 130 floats (75 active)
- 5550 profile files (45 delayed-mode)

USA (AOML)
- Reporting: Meta-data, Technical, Trajectory, and Profile data
- 906 floats (680 active)
- 35,550 profile files (3,430 delayed-mode)

GTS

- Reporting: Profile data
- 449 floats (36 active)
- 24,145 profile files


Floats by DAC
1000
900
800
700
600
500
400
300
200
100
0
Australia
Canada
France
India
Japan
Korea
UK
USA
GTS
Floats - inactive
Floats - active


Profiles by DAC
40000
35000
30000
25000
20000
15000
10000
5000
0
Australia
Canada
France
India
Japan
Korea
UK
USA
GTS
Delayed-mode
Real-time

Server

Synchronization:
- Meta-data, Trajectory, and Profile files being synchronized with the French GDAC twice per day at 0000 and 1200 GMT.
- All GTS files present on US GDAC only through synchronization with French GDAC. (Coriolis formats GTS files into Argo NETCDF format.) Older GTS files still not available on US GDAC because depths need to be converted to pressures.

Future Plans:
- Improved error and consistency checks

2. 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
- Custom Data Browser Application:
    - Allows selection of profiles by:
        - region, time, DAC, Float ID, and Delayed-mode status
    - 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
    - Generates plots for property/depth (waterfall), property/property, 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

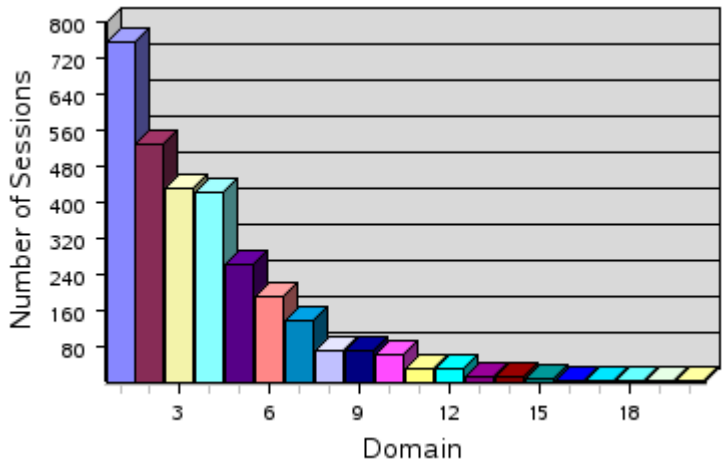
3. Usage Statistics

FTP Statistics

USGODAE FTP: Domain Summary January 1, 2004 - September 16, 2004

Filters Applied: Directories that contain argo

Domain Breakdown



Legend:

1. Japan
2. United States Government
3. Unresolved
4. United States Educational
5. France
6. Canada
7. Russia
8. Australia
9. United States Military
10. United Kingdom
11. Network (.net)
12. Korea, Republic of
13. Commercial (.com)
14. Norway
15. Germany
16. Netherlands
17. Brazil
18. New Zealand
19. Mauritius
20. Chile

	Domain	Last Session	Downloads	Sessions
1.	Japan	Sept. 15, 2004 at 8:30 a.m.	1,130,340 (4.4%)	753 (1.4%)
2.	United States Government	Sept. 15, 2004 at 12:00 a.m.	721,952 (2.8%)	526 (1.0%)
3.	Unresolved	Sept. 15, 2004 at 3:00 p.m.	504,556 (2.0%)	428 (0.8%)
4.	United States Educational	Sept. 14, 2004 at 9:57 p.m.	691,796 (2.7%)	421 (0.8%)

5.	France	Sept. 14, 2004 at 8:53 p.m.	18,810 (0.1%)	261 (0.5%)
6.	Canada	Sept. 14, 2004 at 2:43 p.m.	573,397 (2.2%)	189 (0.3%)
7.	Russia	Sept. 14, 2004 at 5:13 a.m.	304 (0.0%)	135 (0.2%)
8.	Australia	Sept. 15, 2004 at 1:00 a.m.	165,642 (0.6%)	69 (0.1%)
9.	United States Military	Sept. 1, 2004 at 3:53 p.m.	34,943 (0.1%)	69 (0.1%)
10.	United Kingdom	Sept. 12, 2004 at 7:01 a.m.	2,693 (0.0%)	62 (0.1%)
11.	Network (.net)	Sept. 11, 2004 at 9:16 p.m.	838 (0.0%)	30 (0.1%)
12.	Korea, Republic of	Sept. 4, 2004 at 2:04 a.m.	206,714 (0.8%)	28 (0.1%)
13.	Commercial (.com)	Sept. 4, 2004 at 6:51 a.m.	20 (0.0%)	11 (0.0%)
14.	Norway	Jan. 13, 2004 at 3:40 a.m.	32 (0.0%)	11 (0.0%)
15.	Germany	Sept. 6, 2004 at 7:38 a.m.	15 (0.0%)	7 (0.0%)
16.	Netherlands	July 19, 2004 at 2:11 p.m.	10 (0.0%)	3 (0.0%)
17.	Brazil	May 31, 2004 at 5:32 p.m.	2 (0.0%)	2 (0.0%)
18.	New Zealand	Aug. 9, 2004 at 9:51 p.m.	2 (0.0%)	1 (0.0%)
19.	Mauritius	July 19, 2004 at 7:46 a.m.	3 (0.0%)	1 (0.0%)
20.	Chile	June 16, 2004 at 2:55 p.m.	2 (0.0%)	1 (0.0%)
Domains represented: 20 out of 60 (33.3%) Domains matching filters: 27		Downloads represented: 4,052,071 out of 25,730,547 (15.7%) Sessions represented: 3,008 out of 55,015 (0.0%)		

Page Help

This report shows how many visitors are coming to your site from each country or sector (nonprofit, educational, commercial, etc.). Use this report to plan global marketing strategies.
Domain - A domain. If the only domain listed is Unresolved, you are not currently resolving host names.
Last Session - The date and time of the last session from this domain.
Downloads - The number of downloads by visitors from this domain.
Sessions - The number of sessions from this domain.

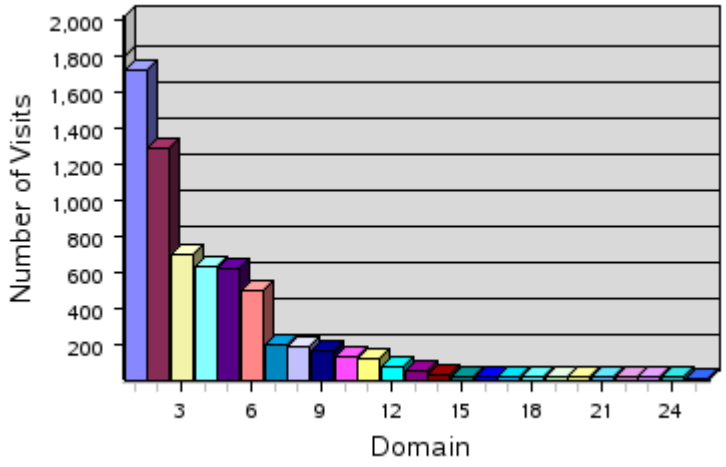
Report generated on Sept. 16, 2004 at 7:25 p.m. using NetTracker® 6.0 Enterprise

HTTP Statistics

USGODAE-WEB: Domain Summary January 1, 2004 - September 16, 2004

Filters Applied: Pages that contain argo

Domain Breakdown



Legend:

1. Unresolved
2. Japan
3. Network (.net)
4. United States Educational
5. Commercial (.com)
6. United States Military
7. United States Government
8. United Kingdom
9. Canada
10. Australia
11. France
12. Online Services
13. Germany
14. Russia
15. Spain
16. New Zealand
17. Organization (.org)
18. South Africa
19. United States
20. Portugal
21. Netherlands
22. Singapore
23. Brazil
24. Argentina
25. Mauritius

	Domain	Last Visit	Views	Visits
1.	Unresolved	Sept. 15, 2004 at 11:45 p.m.	150,990 (4.1%)	1,719 (0.5%)

2.	Japan	Sept. 14, 2004 at 6:05 a.m.	19,705 (0.5%)	1,287 (0.3%)
3.	Network (.net)	Sept. 15, 2004 at 10:19 p.m.	1,946 (0.1%)	694 (0.2%)
4.	United States Educational	Sept. 15, 2004 at 8:45 p.m.	7,750 (0.2%)	624 (0.2%)
5.	Commercial (.com)	Sept. 15, 2004 at 10:34 p.m.	1,220 (0.0%)	620 (0.2%)
6.	United States Military	Sept. 15, 2004 at 6:42 p.m.	16,468 (0.5%)	491 (0.1%)
7.	United States Government	Sept. 13, 2004 at 4:46 p.m.	47,388 (1.3%)	189 (0.1%)
8.	United Kingdom	Sept. 15, 2004 at 12:04 p.m.	1,052 (0.0%)	182 (0.0%)
9.	Canada	Sept. 14, 2004 at 5:29 p.m.	998 (0.0%)	165 (0.0%)
10.	Australia	Sept. 15, 2004 at 3:29 a.m.	556 (0.0%)	131 (0.0%)
11.	France	Sept. 15, 2004 at 3:26 p.m.	340 (0.0%)	121 (0.0%)
12.	Online Services	Sept. 15, 2004 at 5:50 p.m.	133 (0.0%)	72 (0.0%)
13.	Germany	Sept. 8, 2004 at 3:53 p.m.	162 (0.0%)	51 (0.0%)
14.	Russia	Aug. 11, 2004 at 1:53 p.m.	201 (0.0%)	28 (0.0%)
15.	Spain	Sept. 15, 2004 at 10:39 a.m.	88 (0.0%)	20 (0.0%)
16.	New Zealand	Sept. 14, 2004 at 10:55 p.m.	182 (0.0%)	20 (0.0%)
17.	Organization (.org)	Sept. 13, 2004 at 7:14 a.m.	49 (0.0%)	20 (0.0%)
18.	South Africa	Sept. 14, 2004 at 12:16 p.m.	115 (0.0%)	19 (0.0%)
19.	United States	July 6, 2004 at 1:36 p.m.	41 (0.0%)	19 (0.0%)
20.	Portugal	Aug. 10, 2004 at 10:38 a.m.	179 (0.0%)	17 (0.0%)
21.	Netherlands	Aug. 25, 2004 at 2:59 p.m.	26 (0.0%)	16 (0.0%)
22.	Singapore	Aug. 21, 2004 at 3:10 a.m.	19 (0.0%)	16 (0.0%)
23.	Brazil	Sept. 15, 2004 at 7:56 p.m.	45 (0.0%)	15 (0.0%)

24.	Argentina	Sept. 14, 2004 at 3:13 p.m.	17 (0.0%)	15 (0.0%)
25.	Mauritius	Sept. 2, 2004 at 2:55 p.m.	185 (0.0%)	11 (0.0%)
Domains represented: 25 out of 164 (15.2%) Domains matching filters: 65		Views represented: 249,855 out of 3,652,499 (6.8%) Visits represented: 6,562 out of 373,776 (1.8%)		

Page Help

This report shows how many visitors are coming to your site from each country or sector (nonprofit, educational, commercial, etc.). Use this report to plan global marketing strategies and to develop content that appeals to each demographic.

Domain - A domain. If the only domain listed is Unresolved, you are not currently resolving host names.

Last Visit - The date and time of the last visit from this domain.

Views - The number of views seen by visitors from this domain.

Visits - The number of visits from this domain.

Report generated on Sept. 16, 2004 at 7:05 p.m. using NetTracker® 6.0 Enterprise

Status of the Global Argo Data Repository
U.S. National Oceanographic Data Center
3 décembre 2004

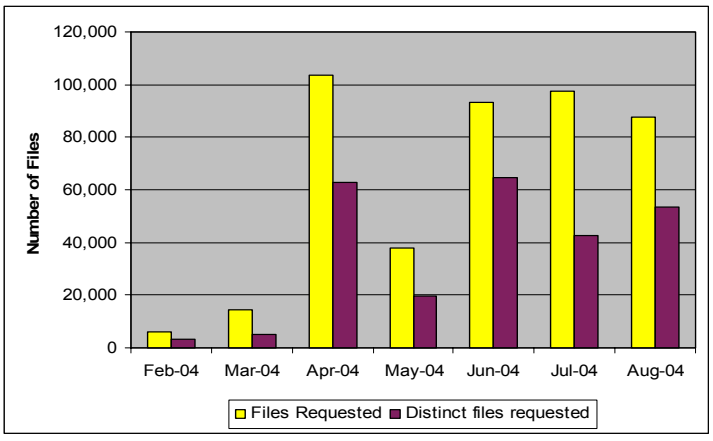
1. Primary Functions of the Global Argo Data Repository (GADR)

   - o Archive delayed-mode profiles, metadata, trajectory and technical information received from the GDAC on a monthly basis.
   - o Provide tools to allow transformation of Argo and other profile data into other forms.
   - o Provide use statistics, data system monitoring information and problem reporting facility.
   - o Register the Argo data in international data inventories
     Subscripted and provided metadata to NASA's Global Change Master Directory: http://gcmd.nasa.gov/getdif.htm?Global_Argo_Data_Repository
   - o Provide WWW data integration tools to allow client to get Argo float data combined with data collected with other instruments.
   - o Provide hardcopy data sets for distribution to users.
   - o Provide offsite storage of data.

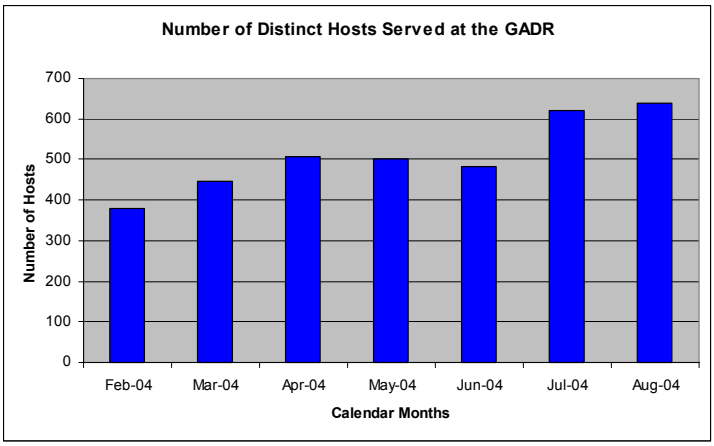
2. Extended Functions

   - o Archive latest ("daily') profiles received from the GDAC on a weekly basis.
   - o Provide WWW and OPeNDAP accesses to the NODC version of profiles received from the GDAC.
     WWW URL: http://www.nodc.noaa.gov/argo
     OPeNDAP/DODS: http://data.nodc.noaa.gov/cgi-bin/nph-dods/argo

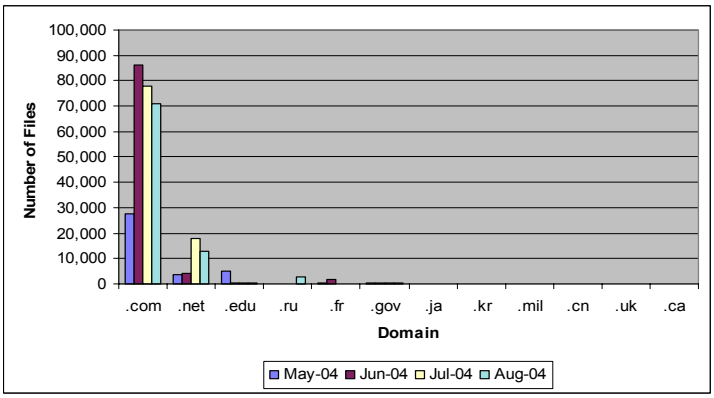
3. GADR HTTP File Downloads



4. GADR Web Server Statistics



5. GADR User Domain Breakdown

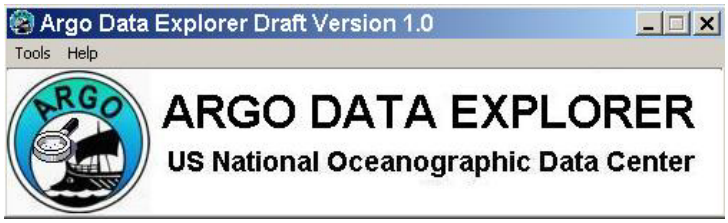


6. Major Accomplishments

- Completed a draft version of Argo Data Explorer (ADE) – A Java application that allows transformation of the Argo NETCDF format to the ASCII text format.
- Completed a draft version of Argo NdEdit – A Java application that allows to search/sub-set an Argo inventory file on Argo CD.

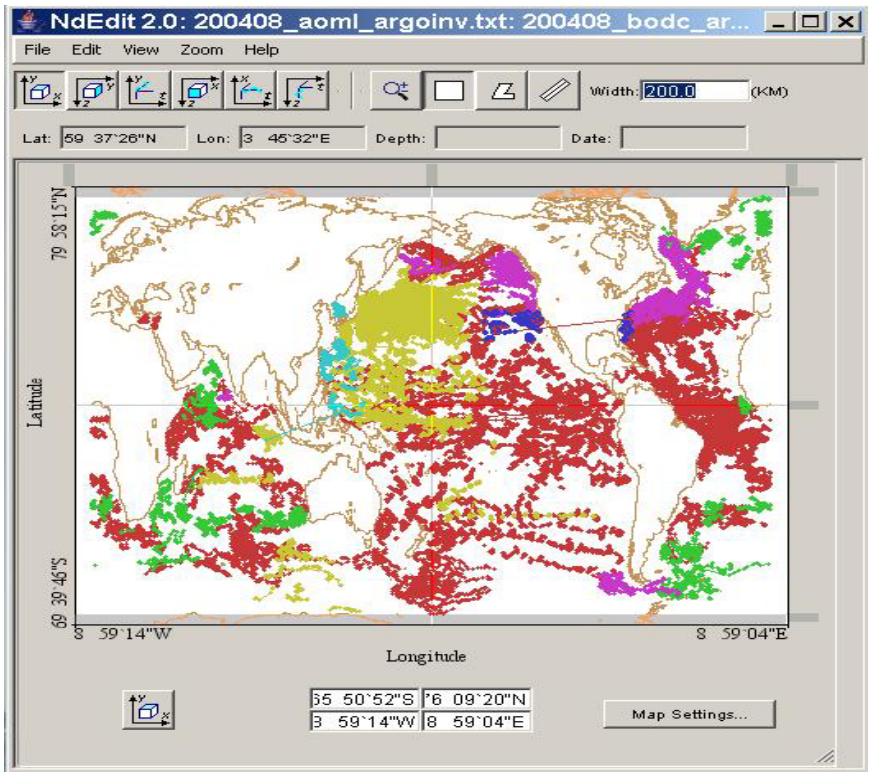
7. Argo Data Explorer

A Java application allows a user to convert Argo data from the NETCDF format to the ASCII text format.



http://argo.nodc.noaa.gov/cd_1/tools/Argo_NdEdit_Draft/install.htm

8. Argo NdEdit



http://argo.nodc.noaa.gov/cd_1/tools/Argo_NdEdit_Draft/install.htm

9. General Discussion

- Issue: Data transferring between GADR and US GDAC
  Current methods: FTP
  Suggested methods:
  RSYNC or
  CDFSynch: a program that automatically synchronizes NETCDF datasets from a remote data server

10. Future Work Plans

- Continue the GADR operation.
- Focus on the GADR system enhancements.
- Provide WWW access to and update the content of the draft version of Argo CDs on a quarterly basis.
  http://argo.nodc.noaa.gov/
- Complete the "Argo NdEdit" software by June 2005.
- Complete the "Argo CDFSynch" software by June 2005.