11th ARGO DATA MANAGEMENT MEETING

Hamburg
20th October - 22nd October 2010

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1. Objectives of the meeting

The 11th ADMT meeting was hosted by BSH, Hamburg, Germany. The meeting was opened by *Pr Bernd Brügge head of the oceanography department at BSH* who welcome the participants to Argo Data Management meeting. He pointed out that Argo was providing an incredible source of observations that Germany has decided to contribute to via sustained funding. He wished that many other countries will fund this network in the long term and that it will be extended to other parameters. 39 persons from 10 countries and 25 institutes attended.

The objectives that had been fixed for the meeting were the following:
- Review the actions decided at the 10th ADMT meeting to improve Real-Time data flow (considering all aspects of the system from transmission from the float to arrival at GDAC and accessibility of data by users)
- Review the status of surface Pressure correction
- Review the status of Delayed-Mode quality control and Progress to reduce backlog
- Review the metrics regarding Argo program to document future (and if possible past) growth and performance of the array and the data system
- Review Regional Argo Data Centre progress
- Report from the Two-way communication format meeting

The meeting started at 9 on Wednesday 20th October and finished at 13h30 on Friday.

2. Feedback from 11th AST meeting

Susan Wijffels provided feedback from the AST11 meeting and guidelines for priorities in the coming year.

The OceanObs 2009 conference highlighted the community's recognition of Argo's success, not just in its concept and successful implementation through international cooperation, but that the Argo data system is now setting new standards for GOOS/GCOS. Kudos to the ADMT.

In assessing gaps, the meeting recognised the deep ocean below 2000m, the ice-covered seas and the need to collect information on ocean chemistry and ecosystems as the primary areas of future development for the broadscale observing system.

The great improvement in delayed-mode (DM) data throughput was recognized as a key achievement, and reflects that DM tools are maturing as well as that the reference data base (Argo and modern CTD) has helped greatly. The AST recognized the need to keep working on timely access to high-quality CTD data for Argo calibration.

The AST also thanked outgoing co-chair, Howard Freeland for his many years of service to Argo.

2.1. Challenges for Argo:

The core issue facing the Argo data system is the tension between the timeliness and quality of Argo core-mission data versus the inclusion of new missions/sensors. This was discussed at length. The AST:
1. confirms its priority and focus on completing the core mission and meeting goals on the quality of those data streams. There is still much work to be done in this regard.

2. recognizes the need to adapt the Argo data format to allow distribution of data on different pressure axes. This is needed to allow Argo to hold to the principle that all data from an Argo float is freely shared in near realtime.

3. re-iterates that Argo cannot carry out quality control of new data streams without new resources.

4. requires that communities which approach Argo to collect and distribute new data types

    a)   work with Argo to define meta and technical data standards for new parameters and provide these to Argo to allow data distribution

    b)   define QC protocols, document them and fund their application to the data stream

Argo has undertaken that pressure biases in the Argo data set will be identified and corrected by the end of 2010, or uncorrectable profiles be clearly identified. This remains an urgent issue. Much progress has been made, but we need to ensure we meet this target.

In the near term, Argo faces the logistical challenge of recovering from the hiatus in deployments in 2009 due to microleaks in Druck pressure sensors. A large backlog of floats exists across most national programs. It will be challenging to deploy so many floats quickly and it will likely take more than one year to make up for the nearly halving of deployments in 2009. More active sharing of deployment opportunities might be needed to get floats deployed quickly and prevent a degradation of data coverage.

Trajectory and meta-data files and standardization were recognized as the next areas to focus on. Increasing interest in deep velocity science and diurnal cycle science provide a growing user base for Argo and stronger demands on the integrity of these data files.

2.2.   New sensors/new applications:

Near Surface Temperature – pilot deployments of several floats attempting to deliver temperature data right up to surfacing are underway. The AST is still not certain that standard Argo sensor hardware can deliver to the needs of the Global High Resolution Sea Surface Temperature (GHRSST) Project, as requirements might be beyond the accuracy of currently installed pressure sensors. A full analysis of the utility of the pilot float data is needed.

Bio_Argo – a proposal to deploy multiple biogeochemical sensors on around 20% of Argo profiling floats. A technical committee is being organised to coordinate and deal with Bio-Argo data. Besides resourcing, sensor performance and operations under international law remain challenges for this effort. Bio-Argo also wants some mission restrictions e.g. Bio-Argo floats will only profile at night.

Iridium in Argo – we have an opportunity to standardize sampling - e.g. 2db throughout the profile.

Glider data – AST encourages a small international working group to form. It is currently not clear that the Argo data format is ideal for glider data.

Deep Argo – Japan and US are trialing technology – as yet as sampling design is not available. International workshops are being mooted to come up with global design for the abyssal observing system and Argo needs to be engaged.

Argo under Ice - ice covered seas are a blind spot in the GOOS. Argo can continue to pilot technologies to determine the cost basis of expanding core mission into the seasonal ice zones.

3. Status of Argo Program and link with Users

3.1.   Review of the Actions from last ADMT

Sylvie Pouliquen reviewed the status of the action items from ADMT-10. Decent progress was made during the past year with 22 actions completed, 16 actions still ongoing, and 4 that were not started.

She stressed, *in the strongest terms*, the need to complete the actions *throughout the year* and to r*eport the status* of action items as progress is made. She noted that, even now, we don't have feedback from all of the actions. See the annex 3 for detailed status.

As a summary, the priority of surface pressure correction an TNPD processing has been well taken by ADMT and great progress has been achieved.. Because of limited man power both at DAC and DM operators, the other reprocessing activities have not progressed (meta-data file, trajectories, oxygen).

The real-time data processing is still in good shape and the main issue is to implement a more robust and less permissive FileChecker at the GDAC both for R and D-File. This is a priority for 2011.

Real progress has been made regarding Delayed mode processing and the backlog is not far from being absorbed by most of the dm-operators.

A major impediment to progress on the trajectory items is the lack of a leader during the inter-session. Without someone to promote progress, the trajectory action items are not progressing as hoped. This has not been the case in past years and Megan is willing to play this role in the future.

3.2.   *Argo Status and AIC development (M Belbéoch)*

M. Belbeoch, the Argo Technical Coordinator, presented a status on the Argo programme.

Regarding national contributions, he reminded the ADMT that Argo was still underfunded and that the growing involvement of Europe will be crucial for the array maintenance. On the other hand, cooperation with new partners in South America and Africa will be important to fill regional gaps and increase international support to Argo.

He remarked that only 85% of the array was fulfilling the original AST requirements, with a lack of floats in the Southern Ocean. It was suggested to exclude from the "core mission" status the diurnal cycle floats. Deployments slowed down dramatically in 2009-2010 due to the Druck sensor problem and the array has started to decay. If the supply of CTD should resume in 2011, a single manufacturer has revealed to be an issue for Argo.
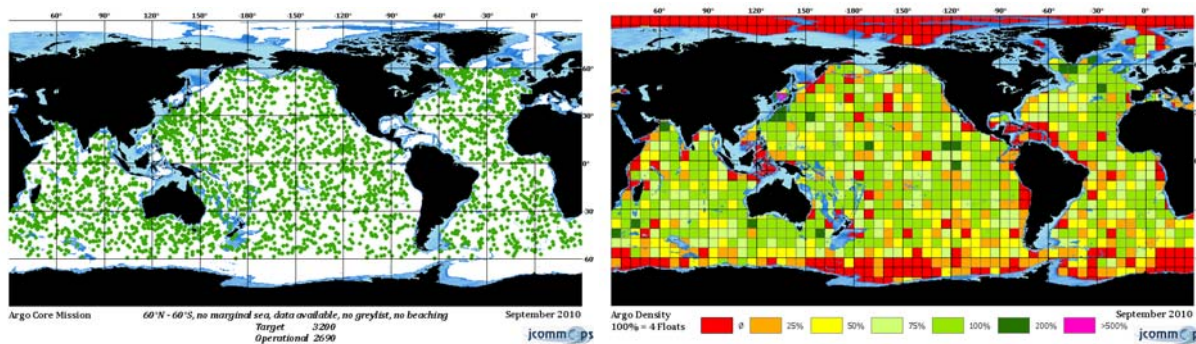
He reminded the ADMT that any float deployment must be registered at the AIC before data distribution and encouraged float operators to continue their efforts in that regard, keeping in mind that the he could always assist. TC thanked some of the deployment managers for the regular and rigorous work in notifying floats and in using the scoring system. TC recalled that some regional gaps could be only addressed through the use of dedicated charters (as the R/V Kaharoa). JCOMMOPS has been preparing a special deployment opportunity to fill some of these gaps. The Lady Amber (a 20m sailing vessel) will sail from Durban, South Africa from December 9-23 on a trial voyage to deploy floats just outside of the S. African EEZ. After this, and if it's a successful trial, she will be chartered to deploy floats south of Madagascar.

TC provided then a status on the Argo data flow. The ADMT discussed the issue of delays at GDACs (average in September 2010: 49h) While it was noted that the GDACs were introducing an additional and substantial delay in the data distribution, the AIC was invited to continue refining the monitoring statistics with the GDAC managers.

Action (AIC, GDACs): *Improve the monitoring of the delays between observation data and availability at GDACs. Implement a detailed index file at US GDAC.*

TC presented the progress made regarding delayed-mode data distribution. He was invited to provide a detailed report on the DM status to help identify and quantify the problematic datasets (equivalent contributions to Argo, regional specificities, old T-only floats, netCDF tech file available or not, etc) so that the issues can be resolved (mainly in USA) and the "non-dmodable" floats removed from the monitoring statistics.

Action (AIC, M. Scanderbeg): *Provide a detailed report on DM status. (if possible before the US Argo panel meeting).*

TC presented a step of metrics on the array status, including sampling strategies, float reliability and improvements of the array (Iridium, surface layer observations). Regarding the growing activity on Argo ancillary arrays (such a ArgO2, Bio Argo, etc), TC recalled that if the addition of new sensors should be cost-neutral for core-Argo, the concerned communities have to be invited to participate in data management and infrastructure efforts. As DACs are busy and reaching a limit in terms of resources, can we quantify the cost for an established DAC to process a new group of floats? TC presented an attempt to evaluate the data management cost (RT and DM).

Action (AIC, B. King): *Improve cost model for RT and DM processing with Program/DAC managers, including e.g. PI involvement time, new sensor issues, etc.*

TC presented briefly an update on the Google Earth layer for Argo and the development made from July-September 2010, and invited the ADMT to give feedback. http://argo.jcommopos.org/argo.kml He recalled that feedback on data quality could be made directly from the balloon. (e.g. remarks on Altimetric QC feedback) Regarding ADMT 10 action item #44, TC recalled that there was some need for synchronizing the Program name in the AIC/JCOMMOPS database, and meta file at GDACs to identify official and equivalent floats in the dataset. More generally, the TC suggested that a dedicated working group should make proposal regarding a common vocabulary (e.g. to name float models) to be used in key metadata.

Action (AIC, CSIRO, SIO, WHOI, JAMSTEC, BSH): *propose some changes in meta files to harmonize and improve vocabulary, in particular on PLATFORM_MODEL, PROJECT_NAME, PTT, FIRMWARE VERSION, etc.*

TC proposed to run a detailed survey on Argo data users, and in particular on operational centres, to have a better perspective on their practices with regard to quantitative and qualitative data access (contacts, data sources, monitoring tools available, etc).

Finally the TC recalled that JCOMMOPS was facing a transition period, and that the replacement of the DBCP/OceanSITES coordinator will also affect its functioning and medium term plans.JCOMMOPs has however an I.T. team in place and well trained, and is building new foundations to secure and focus on its essential web tools and services. To be noted that Japan has started to support financially the AIC and that the IOC/UNESCO will work with France to review the conditions of the hosting of JCOMMOPS. JCOMMOPS is also working to fund and establish a Cruise Information Centre that would be an element to encourage the sharing of CTD data and deployment opportunities.

Additional Actions (DM QC issues)
AIC to automatically email DM Operators and DAC managers for each float identified in Altimetric QC feedback.
AIC to download J. Gilson/SIO quarterly file (on dmode formats issues), archive in AIC DB, and automatically email DM Operators and DAC managers.

3.3. Citation Index for Argo

Justin Buck presented a presentation for Leslie Rickards regarding Argo and Digital Object Identifiers. The underlying objective is to have an "object identifier" for use in citing data sets used in published research. The DOI system is one available mechanism to achieve this goal.

The DOI system provides a mechanism to persistently identify a fixed data set. That is, while the physical location of data set may change, the data set itself is fixed and the DOI always "points" to that fixed data set. For a data set like Argo that is always under refinement, a DOI could only be assigned to a permanent "snapshot" of the Argo dataset stored separately from the evolving Argo GDAC dataset. A report describing DOI system by L Rickards is included in Annex 6 to this report.

There is general acknowledgment that a mechanism such as this is required for Argo but there is no clear agreement that the DOI system is the best choice. ADMT agreed that BODC should continue to investigate this issue and report back at the next ADMT meeting.

4. Real Time Data Management

4.1. GTS status

ISDM, previously known as MEDS, receives Argo data via GTS in TESAC format from the following bulletin headers: AMMC (Australia), CWOW (Canada), EGRR Exeter), KWBC & KARS (Washington & Landover), LFPW (Toulouse), RJTD (Japan), RKSL (Seoul). On average, 91% of Argo data reach the GTS within 24 hours of the float's arrival at the surface. Each month we receive about 9000 Argo messages. There are a small amount of duplicate and partial Argo messages on the GTS. There are some differences in observation time ranging from minutes to hours between TESAC and JULD in the NETCDF files generated from AOML, BODC, CSIRO, CSIO, INCOIS and KORDI DAC.

ISDM also receives Argo data transmitted in BUFR format with the following header: RJTD, CWOW and LFPW on a regular schedule since September 2009 and KWBC started in late October 2010. BODC, CSIRO and Coriolis DAC are in the process of sending their data on the GTS in BUFR format. KMA is validating their BUFR messages. The volume of BUFR messages is lower than that of TESAC messages. Therefore, it's necessary to get copies of BUFR messages collected at different GTS nodes to account for missing BUFR message while it transmitted on the GTS.

Actions:
- DAC to verify the time difference between GDAC and TESAC.
- Mark to run a more comprehensive comparison of both the TESAC and BUFR data at the US GDAC after the meeting

4.2. Status of anomalies at GDAC

Real Time Objective analysis (ISAS) is performed each day at the Coriolis data center on data younger than 21 days. An operator checks the profiles rejected by the analysis. If needed, a correction is done on the QC of the measurements. Then a message is sent to the DAC for which a correction has been done and a file is made available on the ftp site: ftp://ftp.ifremer.fr/ifremer/argo/etc/ObjectiveAnalysisWarning. This message is preferentially sent to generic address. The content of the message has been explained to be sure each DAC understands the information. No more than 10 messages are sent to each DAC each month. It seems that the message is not yet taken into account by all the DACs even if some of them (CSIRO, MEDS, BODC) have sent feedbacks to the Coriolis data center. INCOIS and KMA have problem with the generic addresses and DAC responsible address will be added to the recipient of the messages. AOML is working on a program to read the messages and correct flag son measurements. Coriolis asks to each DAC to provide feedbacks if the correction done seems incorrect in order to change flags in its database and be homogeneous with the netcdf files on the ftp site.

DAC	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
AOML	11	9	8	9	6
BODC	2	0	0	4	5
CSIRO	4	1	2	4	3
CSIO	1	1	1	0	0
INCOIS	2	1	2	4	1
JMA	3	0	6	7	9
KMA	0	0	1	1	5
KORDI	1	1	7	2	4
MEDS	1	1	3	3	3

Number of messages sent by month and by DAC

The mains anomalies detected this year:
- Drift on salinity
- Bad data on the last measurement (and first measurement)
- Bad salinity associated to spikes
- Bad data on a part of the profile (doubtful sensor)
- Bad data_qc or/and bad position_qc

Christine pointed out that an operator visually controls the profile detected by the alert system so that the corrections can be trusted.

It was decided that a new history code should be added to trace when flags are corrected after this analysis. The COOA code will be added in the user manual.

Claudia asked that the update date of the profile be added in the alert message to Dac.

4.3.   Status of anomalies detected with Altimetry

The Altimetry check is performed every four months since June 2008. The number of floats reported by the method goes from ~110 floats before November 2009 to less than ~50 after November 2009. Some backlogs have thus been corrected. Since November 2009, the list of the floats extracted by the method has been separated into two categories in order to help to prioritize the corrections: active floats or which data have been modified during the last three months (to be corrected first) and floats of which data have not been modified during the last three months. Some active floats reporting very bad measurements are still in the list for one to two years and need urgent action. An email will be sent directly to the DM-operator and DAC responsible for these floats (M. Belbeoch). In order to increase the capacities of the method in detecting smaller anomalies, new mean dynamic heights (i.e. synthetic climatologies) will be used during next analysis.

ADMT recommends the DM-OPERATOR to look at the anomalies and correct their file as nobody will do it for them.

Mathieu will establish a mechanism at the AIC to automatically send "targeted" e-mails to DACs and PIs when one of their floats is on the list.

4.4.   Proposal to keep information on sensor failure with data

There was a discussion of how to record information about sensor failure at the end of a float's life. Thierry Carval pointed out a method to record this is already in version 2.2 of the metadata file. The group agreed that for this to be useful a standard grammar would be required.

In general, the group is having trouble identifying the real utility of this field and decided that this information is redundant with information stored with the data files and is not needed.

4.5. Feedback on test on upgrades of tests (Jump Test density test)

Feedback on implementing the jump test proposed at ADMT9. Based on the assumption that a jump in salinity between consecutive profiles, when not accompanied by a jump in temperature, probably indicates bad data. Applied to historical UK Argo data which yielded a fail rate of about 1 per 1000 profiles, with roughly 1 in 10 of these proving to be false positive. Some areas of high variability are not handled well, with up to half of the bad profiles being missed due to temperature variability suppressing the test. Possible solutions include looking at deeper levels, or increasing the DeltaT threshold, with associated increase in false positives.

As this new test may be redundant with the OA test performed by Coriolis, it was agreed that Sam will compare results from the new Jump test proposed by B King and the OA alerts and provide feedback at next ADMT.

4.6. Density Test

An issue was raised by Virginie Thierry and Catherine Lagadec regarding the density inversion test. According to their study a strict implementation of the test flags good values as bad in many instances. They proposed using a threshold to "relax" the test. The 2 db data is likely to further exacerbate the problem.

How do we set the threshold? And is it regional in nature? CSIRO will test threshold on CTD data; Birgit will test a threshold on Norwegian Sea; Sam Jones will test the Southern Ocean.

4.7. Status on application of common method for determining position and time and attribute the appropriate QC

At ADMT10, we decided to define standardized procedures to identify the variables JULD,
- JULD_LOCATION, LATITUDE and LONGITUDE.
- LATITUDE and LONGITUDE are defined as the first valid position reported by the float.
- JULD_LOCATION is the time and date associated with this location only.

JULD has been handled indifferent ways by different groups. Some floats report when they arrive at the surface and this is the JULD that should be assigned to the profile. APEX floats do not directly report their surface arrival time and it must be calculated according to the method proposed by Michel Ollitrault and Jean-Philippe Rannou.

Information about the surface arrival time is transmitted in the first message block of the profile message as the number of times this message has been transmitted since transmissions started. To calculate surface arrival time, you need to know this number, the number of messages in the complete profile and the repetition rate of the transmitter (usually between 42 and 46 seconds but this can vary).The most reliable method takes 2 copies of this first message and calculates how long it took to send a complete profile. This means you don't need to know profile length or repetition rate because it is inherent in the calculation. You then use this 'profile message transmission duration' to back-calculate when the float arrived at the surface. Because APEX floats sit on the surface for 10 minutes before beginning transmission, you must subtract this from the final calculation. The full method description and details of the calculation can be found at http://www.argodatamgt.org/Media/Argo-Data-Management/Argo-Documentation/General-documentation/Data-format/common-method-for-determining-position-and-Time-and-attribute-the-appropriate-QC.
If you do not receive two copies of message 1, then a simple calculation from the repetition rate, number of times this message has been transmitted since the surface arrival and the number of messages in the complete profile can be used to calculate JULD.
Finally, if no copy if message 1 is received, then JULD is defined as the date and time of the FIRST message received from the float, regardless of the message number.

Some groups have changed their processing to incorporate these new requirements. Some have not.

> *CSIRO Done*
> *Coriolis Done on Provor to be checked on APEX*
> *CSIO : Done*
> *KMA: started*
> *JMA: done*
> *DFO: To be done*
> *INCOIS : Done*
> *AOML: Ok for RT. Need to be done in delayed mode*
> *BODC : soon.*
> *CLS : to be done*

Our goal will be to have all data eventually providing consistent dates for the profiles. To accomplish this without reprocessing the hex data, we can make use of the work done by Michel Ollrault and Jean- Philippe Rannou. Once the trajectory files are re-run, then we can merely replace JULD in the profile files with JULD or JULD_ASCENT_END from the new trajectory files.

The action item will be for all groups to begin using the proper method to calculate JULD for all real-time data. If necessary, fixing older profile files can wait until the trajectory files have been fixed.

4.8.   Near surface data Real time QC

NEMO floats observe PTS from 2000dbar to 2 dbar. The CTD pump is turned off at 5 or 10 dbar. The salinity values are not reliable when the pump is off, so the values should be flagged with 3 in real time. It will be discussed with the topic of the multiple profile format how to write the pump situation in the profile files. Some Provor floats provide unpumped near surface salinity that are flagged at 1 in RT and DM-Operator flags them at 4. . As this behavior is related to some version of floats these data should be rejected at decoding level. Only the Temperature should be kept but should go in the near surface profile that records unpumped temperature, not in the regular temperature profile..

5. Pressure correction

5.1.   CSIRO audit of technical, meta data and pressure

A system to process the Argo data set has been developed to check that pressure biases are being correctly applied to form PRES_ADJUSTED fields. DAC treatment of TNDP floats and appropriate labeling and QC flags applied is also examined. This audit will be routinely carried out at CSIRO. Reports are presented for each DAC, as well as global statistics on corrections and compliance. Plots for each float are made to help DACs and others quickly recognize and reconcile problems, either in the audit or DAC treatments. These can be found at
http://www.cmar.csiro.au/argo/dmqc/audits/

At this time the audit is a work in progress, but we aim to reduce discrepancies and errors as much as possible. The audit has already uncovered sources of error and DACs are giving input to improve the audit and/or correcting these errors. Perfect agreement with DAC assessments will never occur, but differences should be slight. The audit shows that most DACS have made tremendous progress in both updating and standardizing technical files and pressure corrections (especially in the APEX fleet) compared to the situation in December 2008. The audit has also drawn attention to the need to standardize meta data and how to enhance the utility of the already much improved technical data files. The audit also highlighted that the knowledge of how to handle all the float variations is not available to all.

Sources of discrepancies between the CSIRO Audit and DACs:
- operator/PI override of treatment
- approach to surface pressure series smoothing (usually small < 1db)
- spike assessment (although if CSIRO and the DACs stuck to the manual there should be agreement)

5.1.1. <u>Recommendations so far:</u>

Meta files: Overall, there is a lack of standardization with each DAC taking a different approach.
1. PLATFORM_MODEL and related fields: there seems to be poor understanding of what is required here. If it is desirable to put in a range of information, eg "apex sbe apf7" then we should standardize the separators and order. This field might work ok for labelling outputs, but is presently of marginal use for automatic parsing.

2. Is it necessary to know controller firmware version? If so, where should it go?

3. Pressure entry for SENSOR field is not standard enough to be useful

Tech files
1. Good compliance to new formats/tables - maybe all of the few apparent defects are in fact related to dud floats.

2. Surface Pressure Offset parameter names: support John Gilson's drive to get these standard and meaningful so that a non-expert can understand the relationship between PRES and PRES_ADJUSTED just by reading this technical name. A new table should be formed; the implied relationship between PRES_ADJUSTED and PRES, and this should be clearly documented for future users who want to do their own pressure audit/checks.

Here we really could do with a published table in the Argo data manual relating the applicable names (or even if this field is required) to each variation of float, AND relating the names or names / model_variations to treatment of SP, PRES and PRES_ADJUSTED.

5.1.2. <u>TNDP definition and actions</u>

It would seem that as of mid-September 2010, there was still a way to go with compliance in TNDP detection and treatment!
- There is an urgent need to resolve definition of TNDP (see action below)
- Need to resolve treatment e.g. should pressure QC=2 for whole float series even if TNDP arises quite late in the series?
- Can users easily find TNDP floats/profiles? Not currently unless strict (parse-able) labeling in comment fields is carried out (Gilson checks).

5.2. Status check of DMQC TNPD labeling in profile netcdf files

A survey of the number of Argo floats that have been identified as TNPD (Truncated Negative Pressure Drift) was completed. The survey used a GDAC mirror snapshot of October 5th for all DACs except for AOML, BODC, and CORIOLIS whose data was downloaded on October 13th. A TNPD float was identified by the agreed upon SCIENTIFIC CALIBRATION COMMENT string "TNPD: APEX float that truncated negative pressure drift". Once identified, the <PARAM>_ADJUSTED_QC flags were confirmed to be set to at least '2'. Identified TNPD floats total 494 across all DACs, although not all of these completely matched the file requirements. As recent estimates of possible

TNPD candidates are around 1000, the progress of the Argo program in documenting TNPD floats is roughly 50% complete.

5.3. Status check of Pressure Adjustment in R and D files on the GDAC

A census of the progress in correcting the Argo NetCDF profile files for pressure drift was performed on the October 5th Argo GDAC mirrors. The necessary correction was obtained from the technical files variable with name beginning "PRES_SurfaceOffset". For non-auto correcting floats such as the APEX it was assumed that the correction for cycle n came from the cycle n+1 surface pressure (SP) reading. All Provor, Nemo, and most SOLO floats were assumed to be auto-correcting and the correct pressure adjustment for cycle n was SP(n+1)-SP(n). In general the guidance for auto-correcting floats is that no adjustment is usually required even with a non-zero SP(n+1)-SP(n) value. In this check, by requiring the correction, some auto-correcting floats which might require additional adjustment in delayed mode are highlighted. If a measured SP reading is not available, the check defaults to the last good SP value. Similar quality control as the real-time procedure to the SP measurement was performed. With the exception of KORDI, the non-auto-correcting floats have successfully updated their technical files with proper identification of the SP variable so that the majority of profiles can be examined. KORDI's profile files were unable to be verified. The auto-correcting floats technical files need additional updates, especially SOLO float models.

Some subjectivity, especially in delayed mode, is likely in the application of a surface pressure correction. Thus in this automated SP analyses, profiles can be identified though the applied correction is proper. Because of this, DACs with less than 1% 'flagged' profiles are assumed to have successfully completed application of the SP correction to their data.

<u>Non-Auto-Correcting floats: Realtime</u>

All DACs with verifiable profiles have implemented realtime correction of pressure in newly processed non-auto-correcting data. In addition, BODC, CSIRO, INCOIS, JMA, and KMA have corrected their entire datasets. MEDS and CSIO have a small number of realtime profiles to correct. CORIOLIS and AOML currently have some backlog of uncorrected realtime profile files. In the case of AOML, the majority of the uncorrected files are older, ARGO-Equivalent profiles.

<u>Non-Auto-Correcting floats: Delayed Mode</u>

Several DACs have completed the correction of pressure to their delayed-mode dataset. These include AOML, BODC, CSIRO, and JMA. INCOIS has a small backlog of uncorrected delayed mode profiles, while CORIOLIS, CSIO, KMA, and MEDS currently have a larger backlog.

<u>Auto-Correcting floats: Realtime</u>

In realtime, there is typically no applied correction for pressure drift. However INCOIS and JMA have a few floats that were assumed to be auto-correcting which were adjusted.

<u>Auto-Correcting floats: Delayed Mode</u>

A number of DACs have a backlog of delayed mode profile files that did not include a profile correction equal to the SP(n+1)-SP(n) found in the technical file. But of those, nearly all had no correction applied, which is acceptable. However, a large number of flagged profiles could indicate that the technical surface pressure variable is badly filled, is noisy, or is drifting strongly and thus should be a candidate for a small correction in delayed mode.

It is suggested that all auto-correcting floats use PRES_SurfaceOffset variable names distinct from non-auto-correcting floats to provide users a more clear signal as how to correctly apply the correction to the profile file.

5.4. The following actions have been decided :
- Clarify the TNPD definition

- Jeff and John to rerun their analysis beginning of November to identify clearly the really critical ones (presently there are lots of false alarms)
- AST co-chairs to email directly the APEX groups who are not on target to clean up their tech files and re-process their APEX TNPD files before end of 2010.

6. Reference database progress since ADMT10

6.1. Summary of the actions since ADMT-10

A new reference database has been provided in February 2010. This version is based on the WOD2009 and the data older than 1990 have been integrated. Complementary quality control has been done at the Coriolis data center since the NODC QC is mainly done on standard levels. When too many profiles were detected in boxes, a reduction has been done taking into account only post-1995 data. A new version is in preparation and should be provided for the end of 2010. Some feedbacks from Jan Reissmann and Marek Stawarz about duplicates and invalid pairs have improved the new version. Coriolis is also working on the integration of new CTDs provided by scientists and CCHDO. The link with the CCHDO is not working very well, no information is sent to Coriolis when a dataset is available.

6.2. CCHDO-NODC progress

S Diggs presented the activities CCHDO started to get more CTD data in a more rapid way. The strategy CCHDO has chosen is to become the data manager for main CDT programs such as DIMES, GO-SHIP, US Global Ocean Carbon hydrographic program, and GETRACES with a priority on the southern ocean as decided 2 years ago. S Diggs and M Belbeoch are trying to get extra funding to coordinate vessel activities at JCOMMOPS both for deployment opportunity facilities and CTD exchange. Finally the SEAHUNT web site under development at CCHDO was presented and could be a good community tool on these issues. S Pouliquen pointed out that a connection with the POGO development on research vessels cruises handled in collaboration with SeaDataNet by BODC would be useful. US-NODC also assembled a new CTD in 2010 but these were not yet provided to Coriolis for the Reference database.

There was n agreement that the communication between CCHDO/US-NODC and Coriolis should be improved and that both S Diggs and T Boyer should warn C Coatanoan each time new CTD cruises are available.

7. GDAC status:

7.1. GDACS updates

Thierry Carval reported on the status of the GDACs. During this year the automated file removal mechanism, MD5 signature generation, and technical file synchronization were completed. During file removal, the geo files are updated as well as the multiprofile files of the float but not the latest directory. The removal is done 4 times a day at French GDAC and every ½day at US GDAC. The removal process should be done first at GDAC to allow the file replacement.

The reformatting of the latest_data directory was completed at both GDACs but some final changes to the file layout are still needed to make the two GDACs consistent. The latest directory no longer mixes R and D files. It's updated 8 times a day at French GDAC and a bit less at US-GDAC (this should be run more often) It is proposed that the latest directory is updated more often for R files in the latest directory and once a day for D files to speed up data delivery to operational users. To monitor this an additional time should be added in the detailed index file and be monitored by AIC. The "delay" was added to the detailed index file at the Coriolis GDAC and it was documented in the latest revision of the User's Manual. The US GDAC still needs to implement this; see the Action List.

There were concerns raised by users that it was taking quite long to update their mirror site. To know if the problem came from overload on GDACS it was proposed to provide statistic on the Argo FTP sites and the activities (download , users, number of access) Can GDAC and DACs provide access to the statistic on Argo FTP (users, volume,…) GDACs should investigate if useful and possible to implement zip file on DAC directory.

The items related to the Format Checker were not completed as discussed below.

7.2.   *Status check of DMQC format issues in profile netcdf files*

A survey of formatting errors found in the GDAC Delayed-Mode profile files was completed using a mirror snapshot of October 5ᵗʰ for all DACs except for AOML, BODC, and CORIOLIS whose data was downloaded on October 13ᵗʰ. This updates the quarterly format checker results. Compared to one year before, the number of flagged files was reduced by 25% (~18000 versus ~24000).   As a percentage of total Delayed Mode files on the GDAC, the current number of problem files is 3.7% of the dataset. Improvement varied greatly by DAC. BODC reduced their problem files by 100% while 4 DACs had their problem files increase. Submission of files with formatting errors continues.

ADMT recommended the DM operator and DAC to correct the format error pointed out by J Gilson (ftp kakapo.ucsd.edu cd pub/Gilson/AST11/DMQC_format_check).

Mathieu will integrate in its data base the anomalies detected by John and send , as for Altimetry checks, individual emails to DAC and DM Operators when a problem is detected on their files and not corrected between two run of the checks.

7.3.   *Status of Format Checking operations*

Mark Ignaszewski reported on the status of the format checking enhancements underway at the US GDAC. Mark reminded the group of the details of the checks that will be performed. Mark apologized for extreme delay in implementing the checker.

The current status is that the checker has been under routine test operation at the US GDAC since early in 2010 but the detailed analysis of the results and working with the DACs to correct the systematic errors has not been performed. This process will begin in mid-November with full operational implementation targeted for early 2011.

There was a request to add tech file check before AST12and when Metadata file are standardized this will be added in the format checker.

The checks will be first implemented on incoming data and then on the complete GDAC.

7.4.   *Connection to Ocean Data Portal*

Ocean Data Portal (ODP) is an initiative launched by IODE. It aims at making oceanographic data from various data centers seamlessly available to users via web services. ODP is interoperable with the WMO information system and other system such as SeaDataNet to serve a number of applications including climate. Since Argo is a program that continuously manages and improves its data quality through various quality control procedures, it is important that users who download Argo data always get the latest best version available. Making Argo data discoverable on the ODP and linking it to its real source (the Argo GDACs) would prevent unfortunate situations where a user could download an Argo profile from a non-Argo database, such as the GTSPP database (discoverable on the Ocean Data Portal) or the World Ocean Database (soon to be discoverable on the Ocean Data Portal), while a better version of the profile exists, with delayed-mode adjusted pressure / salinity or revised quality flags after examination by a PI. Therefore it would seem that making Argo data available on ODP would be of some   benefit both to the Argo community as well as the IODE community.

There are two ways to be part of ODP:
1. One ways is GDAC installs data provider software available on ODP website that facilitates the meta data access between the Integration Server at IODE and the local data system.

2. Or data centers(GDAC) register their metadata inventory file at a remote data provider at http://www.oceandataportal.org which points to source files on HTTP or FTP servers. The metadata inventory file should be represented as structured files with separator ";" or "," and be available for downloading for remote data provider.

ADMT agreed that the second option was the best for Argo and that one of the two GDACs would need to be connected to ODP.

8. Delayed mode data management activities:

8.1. Review backlog of DMQC

A table of delayed mode data status as of October 5/13 2010 was presented. BODC and CSIRO have processed over 95% of their eligible dmode files. This is a good improvement for BODC. The four main PI's at AOML are also in the 90% or above. The equivalent floats are lowering the percent of dmoded files at AOML. CSIO and INCOIS are also in the 85% or higher range. Coriolis, JMA and MEDS are in the 70% or higher category which leaves room for improvement for these DACs. The real problem DACs are KMA and KORDI which have 55% and 0% respectively. Overall the percent of eligible files that are dmoded is 79%. Raising the percentage of dmoded floats remains a high priority for Argo.

Some questions were raised about how to dmode the NAVOCEANO equivalent floats that have no PI assigned to them. Additionally, these floats are often deployed in difficult areas to dmode. The US float panel has agreed to look at this, but there is only a limited number of resources that can be assigned to dmode.

DAC	#dmoded files >12 mo	# files > 12 mo	% dmoded	# young D	# young R	# total D files
AOML	262593	318299	82.50	9286	58217	271879
BODC	23679	23697	99.92	2867	1283	26546
Coriolis	60392	81340	74.25	3897	9276	64289
CSIO	2778	3183	87.28	524	554	3302
CSIRO	24195	24945	96.99	2462	6936	26657
INCOIS	18789	22043	85.24	1347	1292	20136
JMA	62679	88414	70.89	1995	10711	64674
KMA	5195	9478	54.81	0	1924	5195
KORDI	0	9238	0.00	0	1009	0
MEDS	17403	23128	75.25	286	4150	17689
GTS	0	2	0.00	0	0	0
Total	477703	603767	79.12	22664	95352	500367

It was agreed that it would be good to identify the Argo equivalent floats separately . For orphan floats it would be good to have a clearer idea of the technical information available to dmode them before a DM operator agree to process it.

8.2.   Action stats DMQC-4 Workshop

B King made a review of the actions decided at DMQC4 last year:

- Actions 1,2,3. TNPD floats. The action items were all in progress, and were reviewed extensively under other agenda item at this ADMT.
- Action 4. Microleak offsets. The best report we have from SBE is that when the pressure offset (due to Microleaks) is small, the depth variation of pressure offset is no greater than 10% of the size of the offset. Therefore this is not a problem for microleakers whose offset is less than 20 dbar.
- Action 5. CellTM: Other priorities mean that this action is still pending.
- Action 6. Manual update: done
- Action 7. DM operators editing Raw variable flags: each DM group has its own practice.
- Actions 8, 9. D format checks: done. DACs urged to continue to review format anomalies identified on their files.
- Action 10. Sharing of regional expertise. Reported and discussed in next ADMT agenda item.

8.3.   Sharing of regional expertise

The sharing of Argo delayed mode regional expertise has been a long standing agenda item and it is almost universally agreed that it is a good idea. The primary aim of the process is to "increase the sharing of regional expertise knowledge between Argo delayed mode operators". Most regions of the ocean have multiple delayed mode operators and there are significant advantages to sharing our regional expertise:

- It will make our lives easier and make DMQC quicker with more knowledge of specific ocean areas that have been already been resolved by other groups, e.g.:
- Highlight areas with poor spatial or temporal reference data coverage.
- Areas with significant natural variability.
- Areas or depths undergoing decadal water mass changes.
- Aid consistency in QC decisions made by delayed mode operators on how such areas are treated. Unless we share our knowledge, there is the potential to apply calibration is some areas when other groups are not doing so.

As an example the presentation to show the kind of information to share is from 24 South in the Atlantic Ocean where DMQC is showing salinity offsets between 0.01 and 0.02 but when the early float profiles were compared to deployment CTD data no offset was found.

During Argo DMQC at BODC Justin has kept a log of the more interesting or difficult areas for Argo DMQC including examples from the Indian, Atlantic and Southern Oceans. Previous approaches to share this information were not working so Annie Wong and Justin feel a less formal approach than was decided previously is needed. He has forwarded this information on to the active DMQC operators and welcomed feed back or additions. The OW software is flexible and it is possible to get similar results with different settings so there will likely be differing approaches between Argo groups. This subject will be reviewed at the next ADMT meeting (progress on this work being a recommendation of the ADMT11) and this is the last foreseeable attempt to get to make progress on this action item.

8.4.   Updates to the Argo QC Manual

Annie Wong informed the meeting of the updates that would be included in the next release of the Argo QC Manual. In particular, a new definition for APEX TNPD was needed in the QC Manual to clarify some of the ambiguities in interpreting pressure sensor behaviour. The new definition needed to emphasize that (a) TNPD labels only applied to part of a float's life whose pressure was unadjustable, but not necessarily an entire float series, and (b) microleakers were only a subset of TNPDs.

Annie Wong and Justin Buck proposed that TNPD should refer to the part of a float's life from which valid SP-5dbar, after despiking, read continuously zero, and that the continuously zero-reading period needed to span at least 6 months. This would capture the microleakers whose oil leak rates were fastest; it would also account for seasonal variability from half of an annual cycle. Susan Wijffels agreed to refine this proposed definition after the meeting. It was also agreed that groups that had plans to conduct automated checks on pressure adjustment should first focus on checking for the clearly bad cases, and not inundate the analysis results with grey area cases for the time being.

Discussions were conducted on whether a more appropriate TNPD comment string in the netcdf files could be: "TNPO: truncated negative pressure offset". The originally agreed comment string, "TNPD: APEX float that truncated negative pressure drift", could be misleading since "APEX float" implied that the entire float pressure time series was affected, and "drift" implied a trend that was not necessarily observed. The consensus was that changes to the originally agreed TNPD comment string was not necessary.

9. Format Issues

9.1.   BUFR Format : Status on the experimentation phase

The DACs were questioned about the current status of their BUFR data dissemination:
- CLS (for KORDI, China, Incois): Done
- BODC: Doing it through Exeter (Exeter is planning on using them operationally)
- CSIRO: Generated and sent to the Bureau. Expect GTS distribution in November 2010
- JMA : Done (for a long time)
- AOML: Done
- MEDS: Done
- KMA: Still working on it
- Coriolis: Generating messages. Still working with MeteoFrance for GTS distribution.

9.2.   Status on Tech Files updates

We have all done a lot of work in the last year and made real progress on updating and standardizing the tech file contents.   We now have over 600 technical names defined for all float types. This is dynamic and will continue changing in response to new requirements as new floats are produced and deployed.

We still, however, need better definitions for some variables, and still need to make sure we have all the names that are required.   In addition, we will need to assess these names at some time in the future to see if any should be retired and removed from the list. I suspect that some names may never actually be used and if this is the case, then we should avoid confusion by removing it from the table. Surface pressure offset variables are still an issue that needs more input from the users. The current table has names that cover most, if not all, float behavior but we need the treatment of these variables described so users can understand how these offset values should be used. The table as it stands is:

PRES_SurfaceOffsetTruncatedplus5dbar_dBAR
PRES_SurfaceOffsetNotTruncated_dBAR
PRES_SurfaceOffsetNotTruncatedplus5dbar_dBAR
PRES_SurfaceOffsetBeforeReset_dBAR
PRES_SurfaceOffsetBeforeResetTruncated_dBAR
PRES_SurfaceOffsetAfterReset_dBAR
PRES_SurfaceOffsetBeforeReset_1dBarResolution_dBAR
PRES_SurfaceOffsetBeforeReset_1cBarResolution_dBAR
PRES_SurfaceOffsetBeforeReset_5cBarResolution_dBAR
other suggestions????

A subset of the technical table, concerned solely with the PRES_SurfaceOffset variables and how they should be used will be available as part of the user manual (Table XXXX?).

Jeff Dunn at CSIRO has done an analysis of the tech files for surface pressure offset information and has found that most, if not all, of the files are now in the new format.   And I repeat – everyone has done a great job in the last year getting this done.

If anyone needs more names, wants advice on how to use the existing names, or has issues with the existing names, you should contact Ann Gronell Thresher at Ann.Thresher@csiro.au .

9.3.   Status on Meta-Files Update:

The transition to new meta-data format is just beginning. With the increase in Iridium floats and the increased possibility of changing missions, it is an opportune time to evaluate standard names and procedure for transitioning to the new format.

There was much discussion about the cross-over between tech and meta, what should be recorded, and what the granularity is. It is believed that this has mostly been decided already and the basic decisions are recorded in other meeting notes.

It was acknowledged that new configuration parameters will be required and they can be accommodated as necessary. It was also agreed that there is a need to standardize various variables such as PLATFORM_MODEL, SENSOR_*, and others to support easier investigation of the data set. Mathieu will oversee the development of the standards along with experts on each float type: John Gilson; Breck Owens; Sylvie Pouliquen and Serge; Birgit Klein; Mizuho Hoshimoto; Esmee Van Wijk.

Further, the current Technical parameter names, which contain some meta-data names, will be separated into separate technical and meta-data tables.

9.4.   Multiple sensors and multiple axes after endorsement by AST11

At AST-11, the AST endorsed the multi-axis approach for dealing with "exotic" sensors, near-surface profiles, bouncing profiles, etc.. Example files have been generated by Thierry Carval and are available on the ADMT website (http://www.argodatamgt.org/Documentation/Argo-NetCDF-sample-files).

We need to have a way to capture the more complicated vertical sampling schemes that are possible. Options range from additional variables in profile file to vert_samp_scheme at each level to config file to nothing.

It was recognized that an additional variable may be required to capture information about the purpose of the additional profile. In essence, the "vertical sampling scheme", though this term does not capture all of the uses. Further, this term would have to be standardized so that it is easily understandable and searchable. The change needed in the meta-data file format is more important: it needs the addition of a vertical_sampling_scheme and an additional dimension to the sensor description (SENSOR* and PREDEPLOYMENT_CALIB*).

Multiprofile files in latest, geo and Dac directories won't provide access to these additional profiles but only the core mission (NPROF=1).

9.5. *Improvement needed to be CF compliant*

Thierry Carval briefed the participants on efforts to become "magically CF compliant". His studies indicate that Argo can achieve this mostly by just adding both global and per-variable attributes.

In some cases, this "cleans up" omissions in the original Argo format. In others, it is a simple case of added CF standard attributes. For instance, everything has to have a long_name and an axis attribute.

It was noted that that just adding the attributes doesn't mean CF-aware tools can use the Argo data. Many of the tools expect specific variable names (lat, lon, time) and dimensions. None of our variables are defined that way. It can be argued that the tools are not really CF compliant. It seems reasonable to provide CF compliance and then put burden on the tools to meet Argo half way.

Action Thierry to circulate a proposal for CF updates and when validated to update the user manual. The update of the past files will be done by GDAC while DACs will do the new ones. Jim Potemra will contact the CF people and main software providers (ODV, Grads, THREDDS...) to be sure they will be able to handle these new files.

9.6. *Status on Oxygen data resubmission*

Taiyo Kobayashi briefed the group on the status of the Oxygen data resubmission. The proposal for standard procedure is available on ADMT website. It was originally submitted August 20, 2010 and; version 1.1 with only a minor change of COUNTS changed to COUNT in one variable was submitted on Sep 23. No comments have yet been received. The group agreed to approve the proposal

Brian would like to see some type of unit in attr for things like COUNT_DOXY (unitless) – maybe just use "count".

The DOXY variables contain several that cannot ever be adjusted. The group felt that these should never have *_ADJUSTED fields. This will complicate the format checker somewhat (currently enforces a blanket *_ADJUSTED policy).

It was also noted that more space is needed for pre-deployment parameters. These are currently limited to 256 characters but 512 are needed.

Status:

Dac	Have O2 floats?	Status	Date
AOML	Yes	Not started	ADMT-12
BODC	No		
Coriolis	Yes	Underway	ADMT-12
CSIO	No		
CSIRO	Yes	Not started	Very soon
INCOIS	Yes	Not started	Next March
JMA	Yes	Not started	ADMT-12
KMA	no		
KORDI	no		
MEDS	yes	underway	ADMT-12

Reprocessing of past files is lower priority

9.7. Feedback from 2-way Format Workshop

Aside of the ADMT meeting, the TC organized a workshop on the new telecommunication systems used on floats.

The aim of this workshop was to have a good overview on the practices, gathering direct feedback from users, and provide a forum to share the knowledge, discuss the impacts on data processing chains and data formats, discuss advantages/disadvantages, problems, plans, to finally encourage a broader use of the new systems and report back to the AST. On the other hand, some long run objectives could be to rationalize the raw data formats management, reduce processing costs, harmonize practices and discuss within the AST on the follow up.

Most of ADMT members attended the workshop and welcomed the initiative. Information definitely needs to circulate further.

The proportion of Iridium floats deployed every year has grown up to 20% in 2010 and most of Argo groups are experimenting with Iridium or plan to do so. The first Argos-3 float will be deployed in November 2010.We had a good overview on the practices, and a specific report will be compiled about float mission and data flow details.

Some discussions on sampling requirements were initiated and should be continued via the AST. Some potential biases on the global array were identified if mission parameters become too heterogeneous (using downlink or interactively, as some floats have an internal intelligence). Some users suggested that float manufacturers could be invited to implement the compressions of the .msg files in dialup/RUDICS system to decrease air-time costs. Some users mentioned serious difficulties in using dialup; as multiple connections were required in practice, and thus costs dramatically increased. Setting up a reasonable number of levels and implementing a "kill cmd" might help reduce costs. This issue, and the price of the hardware upgrade seems to be a break in the turnover to Iridium.

It was recalled that it will be necessary for the DACs to archive raw data in the long run, as there is no central archive as for Argos.Some difficulties to fill meta files are encountered and it was recommended to transmit mission configuration changes by floats when possible so that DAC can process data and metadata as appropriate. It was suggested to use some standard Argo vocabulary in .msg file (not possible in .sbd) and in manufacturers Users' manual.

The AIC recalled it need to track the iridium floats in real-time and impartially. Several solutions were anticipated:
- Cc of .sbd messages (reserve an email address for the aic, aic@jcommops.org)
- FTP access (upload/download) to dialup/RUDICS .msg files [ftp.jcommops.org user=iridium / pw=argofolks]
- Harmonize a standard block of information for the AIC tracking in the formats

It will be also needed to clarify the value of the field TELECOM_ID at the AIC notification, or PTT in the meta files (IMEI, board#, etc).

Finally it was suggested to run another workshop aside of the AST meeting.The TC suggested to set up a Task Team to work on data formats and see where harmonization is possible and, where recommendations can be made to Argo groups and manufacturers, in order to, strengthen the Argo core mission, reduce data management costs and allow flexibility for the future.

A set of action items were identified:
- Compile a report on the practices
- Make recommendations regarding netCDF file. Update Manual.
- Make recommendations regarding TESAC levels compression. Update Manual.
- DACs to make sure to archive all raw data (Iridium)
- AST to make recommendations regarding sampling scheme
  (China/India to send their sampling details).
- All Argo Programmes to cc AIC on iridium data (.sbd, .msg). To work ad hoc.
- Discuss the workshop outcomes and potential follow up within the AST. (Agenda item for AST#12 and why not another workshop)

10. Trajectory from Argo data

10.1. Feedback on Trajectory progress since ADMT10

B King reported on progress made on ANDRO project by Ollitrault/Rannou at IFREMER, based on discussions and email from MO to BAK. Previous reports describe the nature of checks and corrections being undertaken.

Table summarizes work completed, and sequential plans to arrive at a dataset processed for data to end 2009.

	# floats	done up to	# floats	planned up to
AOML	2788	Dec 2008		
Coriolis	753	Mar 2008	1059	Dec 2009 expected end 2010
JMA	736	Dec 2008		
INCOIS	163	Dec 2008		
CSIRO			288	Dec 2009 expected Nov 2010
MEDS			273	Dec 2009 first half 2011
BODC			~300	Dec 2009 after MEDS data recently passed to IFREMER
AOML/JMA/ INCOIS				Dec 2009 after BODC
KORDI/KMA CSIO				last set of floats to be completed

Work is mainly undertaken by J-P Rannou under guidance of M Ollitrault. Rannou is employed by ALTRAN and must be contracted at 10 keuro per month. So far, IFREMER has allocated roughly 300 keuro in this activity. Funding for Rannou is available until end 2010 and early months of 2011. This is unlikely to be enough to complete the task as presently planned (data to end 2009), so further finance is required.

Considerable benefit has already accrued to Argo, through feedback from ANDRO to DACs. Many DACs have implemented corrections to cycle times (traj files), park pressures (meta data) and grounding flags. This has lead to significant reduction of bad data in, for example, the YoMaHa products.

Future availability of ANDRO: ANDRO does not have a public link, but interim versions have been provided to a number of investigators on the basis of one-to-one contacts. The ANDRO workers would prefer to be able to complete all basins and then publish ocean circulation at the common park depth, rather than have circulation schemes published by competing investigators that are based on interim datasets with varying proportions of the full dataset. The present target is to have a final product, including documentation and all data up to end 2009, ready by end 2011.

There is no present plan by MO to run this operationally for data after end 2009. Another mechanism will be required to maintain high-quality delayed-mode trajectory files. A number of steps are required:
1. Team of mainly scientists should define exactly what is required from trajectory files, to enable best possible calculation of surface and subsurface ocean velocity. This should be done soon, possibly in association with next AST.

2. Refinements may be required to traj.nc files to reflect these requirements. A significantly enhanced delayed-mode 'product' trajectory file may also be required, with extra estimated/interpolated information.

3. The requirements must be passed to DACs, with detailed manuals and guidance for correctly and completely populating these files from raw telemetered messages from all float types, without the need for a single centralized trajectory reprocessing facility such as the ANDRO team. These procedures should implement all the best practice experience gained from ANDRO.

4. DACs need to spin up DMQC of trajectory files (QC flagging of locations; grounding; this must also implement best practice learned during ADNRO. Note that where PRES or PSAL have been adjusted in the prof.nc, then they should also be adjusted in the traj.nc). This will likely need a workshop for DACs & operators engaged in preparing traj.nc files in RT and DM. [Beware that traj.nc files (one concatenated per float) are regularly rebuilt/extended by RT DACs, so we must be careful to preserve changes made in DM. This problem is solved if DM operators generate and edit a different DM 'product' file.]

10.2. *Status on trajectory file checks*

M. Scanderbeg presented on the status of the trajectory files from the viewpoint of making a velocity calculation. Overall, about 6200 trajectory files, including ones from each DAC, were examined and most were found to contain improved cycle timing information. There were inconsistencies between DACs as well as differences from guidelines stated in the manual. The main differences from the user data manual concerned the cycle number, cycle stage and position qc variables. It was agreed that position_qc should never have a fill value and if the position is a fill value, the position_qc should be a '9' or, if no qc is performed, the position_qc value should be a '0'.

M. Scanderbeg noted that the cycle timing variables, (JULD_ASCENT_END, etc), should have a cycle number associated with them. This variable was crossed out in the data user manual 2.3, but needs to be kept to make it possible to easily associate the correct timing information with each cycle.

The cycle timing variables, especially JULD_ASCENT_END (JAE) and JULD_DESCENT_START (JDS), are important for making velocity calculations and vary by float type. Therefore, the status variables were investigated in all files. It appears only a small number of floats are not having their cycle timing and cycle timing status variables filled correctly. It was also noted that information should be recorded so that it is clear which floats send what type of cycle information.

APEX floats with an APF8 controller can also give exact information to fill the JULD_START_TRANSMISSION (JST) variable if the raw ARGOS message is correctly decoded. It was decided at the meeting that the JST status variable for APEX floats should be a '2'. The JAE is calculated by subtracting ten minutes, and thus, the JAE status variable should be a '1', signifying an estimated value. Currently most APEX float JAE status variables are filled correctly with a '1'.

Fixing the trajectory files has been a lower priority for the DACs than correcting the profile files and M. Ollitrault and J.P. Rannou have spent considerable time working with AOML, Coriolis, JMA and INCOIS to clean their trajectory files. Work is currently ongoing at CSIRO with plans. With the profile files close to stable and the work almost completed by Ollitrault and Rannou, the time is correct to focus on improving the trajectory files. To start, M. Scanderbeg will contact the DACs concerning the errors and inconsistencies discovered.

It was then agreed that a trajectory working group would be formed and would address three main points: to investigate what information floats should be returning to give complete timing information to make velocity calculations and work with float manufacturers to get this returned by the floats, to

finalize the trajectory file format based on the necessary timing information, and to begin thinking and documenting a path for a trajectory file dmode process. This includes documenting the current float timing information and thinking about how things will change with the increased use of 2-way communication systems.

Finally, M. Scanderbeg wondered if it would be beneficial for the DACs to use the JAMSTEC position qc tests in real time. JMA agreed to investigate this over the next year.

It was pointed out that it could be the right timing to plan for a trajectory workshop to progress on finalizing the trajectory format and define the delayed mode process.

10.3. Information on new Argos doppler position calculation

A new processing system for Argos positioning will be available in early 2011 for all Argos platforms, included Argo floats. It will reduce positioning errors, eliminate mirror locations and provide systematic information about the precision obtained.

With the current processing system, positions are calculated by a traditional 'least squares' estimation method. In the new system, positions are estimated by applying Kalman filtering to the Doppler measurements.

In order to validate precisely this new method, CLS has chosen a representative sample of Argos platforms, included Argo floats in nominal cases but also in extreme situation as beached floats or iced over floats. The results of validation will be presented to the Argo community (AST, ADMT, PIs) and the trajectory working group in a report made by CLS.

11. Feedback from ARC meeting

11.1. Feedback on action from last year ARC meeting

Prior to the meeting Claudia asked for a report from the ARC on the action progress. These reports are available in Annex 7 . The actions have progressed but most of the ARC are short on funding and do what they can on best efforts.
- Some new products have been developed and should be added to the table maintained by Megan.
- In Europe a lot of the activities have progressed within the Euro-Argo project that is setting up a sustained European research infrastructure.
- ARCs have set up some monitoring tools and provide the results to AIC coordinator
- No software tools were made available except the tool to help deployment planning developed by BSH

Claudia will update the action list and continue to animate communication between ARCs.

11.2. Feedback from Godae QC experiment

In November 2009 at a meeting of major assimilators of Argo data within the UK the question as to how real time automated QC run for operational data assimilations compares to Argo DMQC procedures. The question had been asked before and Jim Cummings (FNMOC) had produced an analysis of the operational QC results from 4 international operational centers:
- BMRC: Australia's Bureau of Meteorology Research Centre
- FNMOC: US Navy's Fleet Numerical Meteorology and Oceanography Center
- MEDS: Canada's Marine Environmental Data Service
- UKMO: UK's Met Office

Alastair Gemmell at the Earth System Science Centre (ESSC) in Reading has merged these results with the profile QC flag from Argo QC in the Argo profile files. The results are contained in a database a portal hosted at ESSC. Initial results suggest that the BMRC assimilation performs best.

This was the only assimilation analysed that includes data from both GTS and GDACs (compared to the other 3 which are purely GTS). The GDAC data, although not so timely, includes human screening and results of the Argo DMQC process.

The data and portal are still at a very early stage of development but it is hoped to include results from additional QC systems in the future. A small amount of time has been allocated at BODC for an initial analysis of the data. The portal is also available for members of the ADMT to visit and search, the link to the site is http://lovejoy.nerc-essc.ac.uk:8080/ObsQC/ObsQC.html.

The met office that has the best results is the one that both uses both GDAC and GTS data that tend to prove that the additional NRT tests that are performed by DAC between GTS distribution and GDAC updates improve the quality of Argo dataset. This is an interesting feature that would be interested to report also to AST. It seems worth continuing this collaboration with met agencies at these quality issues.

12. GADR activities

Charles presented the GADR activities:
- Mirrored Argo meta, profile, technical, and trajectory index files and the actual files located in the "dac" and its subfolders from Argo US GDAC server, Monterey,CA, twice a day.
- Produced monthly archives of the Argo data archived at the NODC and populated them at http://www.nodc.noaa.gov/ argo/archives/*.
- Implemented an automated procedure for acquiring the CLIVAR & Carbon Hydrographic Data Office (CCHDO) data from the Web for archive accession.
- Identified the deficiency of the Argo NetCDF format convention and developed a strategy for improving the Argo convention in compliance with the Climate and Forecast (CF) metadata convention. This was presented earlier in the format section

It was requested to archive the current manuals with the GDAC data in the monthly archives at GADR.

NODC was asked to make clear that the Argo data made available through the repository is a translation of original Argo with information removed.

C Sun asked GDAC to study the possibility to provide DAC directory compressed files to speed up the synchronization process.

13. Other topics

The action list was compiled, is available in annex4, and was approved by participants.

ADMT12 will be hosted by NIMR (National Institute of Meteorological Research) in Seoul/Korea.

14. Annex 1 Agenda

Wednesday 20th October

The meeting will be opened by Pr Bernd Brügge head of the oceanography department at BSH.

1. **Feedback from 11th AST meeting : (30mn) Susan Wijffels**
2. **Status of Argo Program and link with Users (2h)**
   o *Review of the Action from last ADMT (S Pouliquen)15 mn*
   o *Argo Status* (M Belbéoch)
   o **Real-time Monitoring** : (M Belbeoch) Summary on major anomalies detected each month, Requested actions from . Trying to identify why some anomalies are not corrected.
   o **DOI Index for Argo Data** (L Rickards)
3. **Real Time Data Management (2h00)**
   - **GTS status**: 30mn
     - Timeliness of data delivery: Review evidence provided by the MEDS statistics on the timeliness of data delivery via GTS. (A Tran)
     - Status GTS problems – Action 19 (M Ignaszewski)
   - **Status of anomalies at GDAC** (C Coatanoan) 20mn
   - **Status on Anomalies detected with Altimetry** (S Guinehut) 30mn Why no correction or feedback provided ?
   - **Proposal to keep information on sensor failure with data** (T Carval)- Action 25
   - **Feedback on test on upgrades of tests (Jump Test density test)** (S Jones) - Action 26 (15mn)
   - **Status on application of common method for determining position and Time and attribute the appropriate QC**(Ann Gronell) Action 27
   - **Near surface data Real time QC** (Mizuho Hoshimoto)
4. **Pressure Correction**
   - **CSIRO audit of technical, meta data and pressure corrections (**Susan Wijffels/Jeff Dunn)
   - **Status check of DMQC TNPD labeling in profile netcdf files** (J Gilson)
   - **Status check of Pressure Adjustment in R and D files on the GDAC** (J Gilson)

Thursday 21st October

5. **Progress on Argo Reference data base (1h00)**
   - **Summary of the actions since ADMT-10** (C Coatanoan)
   - **CCHDO-NODC progress** (S Diggs , T Bloyer**)**
   - **Discussion on improvement requested**
6. **GDAC Services (1h30)**
   - **Feedback on actions related to GDCA (File Removal, Synchronization, md5)** (T Carval, M Ignaszewski) Actions 9,10,11,12,14
   - **What's new at Coriolis and US Gdacs** (T Carval, M Ignaszewski)
   - **Status check of DMQC format issues in profile netcdf** files (J Gilson)
   - **Status of Format Checking operations (D-Files checking)** (Mark Ignaszewski)- Action 16-17
   - **Connection to Ocean Data Portal (** Ahn Tran)
   - **New needs?**
7. **Delayed mode data management (1h00)**
   - **Review backlog of DMQC** (Susan or Megan)
   - **Action stats DMQC-4 Workshop** (Brian and Annie)
   - **Sharing of regional expertise** (J Buck and A Wong)
   - **Discussions**
   - **Updates to the Argo QC Manual (Annie)**

8. **Format issues (2H00)**
   - **BUFR Format** : Actions 21 Status on the experimentation phase (ALL)
   - **Status on Tech Files updates** (Actions 28) (A Gronell)
   - **Status on Meta-Files Update:** Actions 36,37,38
   - **Multiple sensors and multiple axes after endorsement by AST11** (T Carval) Action 42
   - **Status on bounced profiles format -**Actions 39(C Schmid)
   - **Improvement needed to be CF compliant** Action 43(T Carval)
   - **Status on Oxygen Data resubmission** - Action 40 (T Kobayashi)
   - **Feedback from 2-way Format Workshop** (M Belbeoch)

Friday 22nd October
9. **Trajectory from Argo data (1h00)**
   - **Feedback on Trajectory progress since ADMT10** (B King)
   - **Status on trajectory file checks** (M Scanderberg)
   - **DACs to report on their trajectory data decoding** (DAC) action AST-11
   - **Status on implementation of trajectory file change** (DAC)–Action 7
   - **Information on new Argos position doopler calculation** (Yann Bernard)

10. **RDACs: provide an information on what done and what is planned (1h00)**
    - **Feedback on action from last year ARC meeting** (A Gronell & C Schimd)
    - **Feedback from Godae QC experiment** (J Buck)

11. **GADR (1h00)**
    - **Status of the Archiving centre** (C Sun)

12. **Other topics (1h00)**
    - **Summary of the 11th ADMT actions (S Pouliquen M Ignaszewski) 30mn**
         Location of 12th ADMT

15. Annex2 Attendant List

Mr.	Mathieu	Belbeoch	JCOMMOPS	France
Mr.	Yann	Bernard	CLS	France
Mr.	Udaya	Bhaskar	INCOIS	India
Mr.	Justin	Buck	BODC	United Kingdom
Mr.	Thierry	Carval	Ifremer	France
Mrs.	Christine	Coatanoan	Ifremer	France
Mr.	Stephen	Diggs	Scripps Institution of Oceanography	USA
Mr.	Holger	Giese	Bundesamt fur Seeschiffahrt	Germany
Mr.	John	Gilson	Scripps Institution of Oceanography	USA
Mrs.	Ann	Gronell	CSIRO Marine and Atmospheric research	Australia
Mrs.	Stephanie	Guinehut	CLS	France
Mrs.	John	Gunn	Earth & Space Research	USA
Mr. Dr.	Hartmut	Heinrich	Bundesamt fur Seeschiffahrt	Germany
Mrs.	Mizuho	Hoshimoto	Japan Meteorological Agency	Japan
Mr.	Mark	Ignaszewski	FNMOC	USA
Mrs.	Fengying	Ji	National Marine Data & Information Service	China
Mr.	Sam	Jones	British Oceanographic Data Centre	United Kingdom
Mr.	Brian	King	NOC	United Kingdom
Mrs. Dr.	Birgit	Klein	Bundesamt fur Seeschiffahrt	Germany
Mr. Dr.	Taiyo	Kobayashi	JAMSTEC	Japan
Mrs.	Katrin	Latarius	Institut fur Meereskunde	Germany
Mr.	Joon-Soo	Lee	National Fisheries Research and Development Institute	Korea
Mr.	Shaohua	Lin	National Marine Data & Information Service	China
Mr.	Breck	Owens	Woods Hole Oceanographic Institution	USA
Mr.	Intae	Park	Busan Regional Meteorological Administration	South Korea
Mr.	Chang	Pil-Hun	National Institute of Metorological Research	South Korea
Mr.	Stephen	Piotrowicz	NOAA/OAR/CPO/Climate Observations Division	USA
Mr.	James	Potemra	University of Hawaii	USA
Mrs. Dr.	Sylvie	Pouliquen	Ifremer	France
Mr.	Eduardo	Ramos	AOML/NOAA	USA
Mr.	Jan	Reißmann	Bundesamt fur Seeschiffahrt	Germany
Mr.	Lesley	Rickards	BODC	United Kingdom
Mrs.	Paul	Robbins	Woods Hole Oceanographic Institution	USA
Mr.	Christopher	Rushing	Naval Oceanographic Office	USA
Mr.	Kanako	Sato	JAMSTEC	Japan
Mrs.	Megan	Scanderberg	Scripps Institution of Oceanography	USA
Mrs.	Claudia	Schmid	NOAA/AOLM/PhOD	USA
Mr.	Marek	Stawarz	Bundesamt fur Seeschiffahrt	Germany
Mr. Dr.	Charles	Sun	NOAA/NODC	USA
Mrs.	Ann	Thresher	CSIRO Marine and Atmospheric Research	Australia
Mr.	Anh	Tran	Department of Fisheries and Oceans Canada	Canada
Mrs.	Susan	Wijffels	CSIRO Marine and Atmospheric Research	Canada
Mrs.	Annie	Wong	University of Washington	USA
Mr.	Liu	Zenghong	The Second Institute of Oceanography, SOA	China

16. Annex3 ADMT10 Action List

28 DONE; 12STARTED 4 NOT DONE 1 cancelled

		Action	Target Date	Responsibility	Status
	Monitoring Actions				
1		Calculate time delay for getting R-files and D-Files onto the GDAC. Investigate files slowly arriving.	End 2009	AIC	Stats available in AIC monthly reports Also now an action item from AST meeting
2		Make a page on ADMT www site on surface pressure processing and add a link to CSIRO TNPD page.	AST11	Sylvie and Annie	Posted pressure statement with info on how to recognize a TNPD float file. Decided not to link to CSIRO TNPD page because it is not being maintained.
3		Investigate DOI index to register usage of Argo Data as it's done for publications.	AST11	L. Rickards	Proposal will be made at ADMT11
	Trajectory Actions				
4		Coriolis to continue work with DACs to clean TRAJ files.	AST11	M. Ollitraut and DACs	AOML, Coriolis and JMA done through 2008. Will be posted on Coriolis website by end 2010. BODC, ongoing, data are being submitted to Coriolis (October 2010). Incois done August 2010
5		DACs to correct their metadata and decoders to avoid similar anomalies in the future.	ADMT11	All DACs	Coriolis: Done on French floats, started on german floats CSIRO received no feedback from Ifremer BODC, checking of BODC data has not commenced yet. Incois in progress
6		Inform on how to store dated measurements made during descent and ascent either in TRAJ or TECH (already possible in TRAJ format).	ADMT11	Thierry	Done in user manual 2.3 (section 3.15)

	Action	Target Date	Responsibility	Status
7	DACs to implement the TRAJ file format changes agreed at ADMT10 and documented in User Manual V2.3.	ADMT11	All DACs	CSIRO waiting for feedback from action 5 before re_running trajectory decoding… BODC, as per CSIRO. Incois in progress AOML waiting for file file checker update
8	DAC to plan dead float reprocessing .	ASAP	All DACs	Strategy for reprocessing defined at Coriolis. BODC, as per action 7. INCOIS: All dead floats are reprocessed with the implementation of CSIRO s/w
	GDAC Actions			
9	Finalize automation file removal according to the agreed procedure and document it.	End Oct09	GDACs	Coriolis: done on 3 Nov 2009. Updated in manual as well Done at USGDAC
10	Modify the "latest data" directory to handle a sliding of 3 months and separate R and D data.	AST11	Coriolis_GDACs	Done in Jun 2010 Updated in September to be homogenious with US-GDAC. The latest data organization has to be documented in the user's manual
11	GDACs have to see if they keep index file and index-detailed file and document it.	End 2009	Mark and Thierry	Description is provided in User Manual 2.3 and implemented at Coriolis . USGDAC is not keeping the detailed index file
12	Finalize md5 set up at GDAC and document .	End Oct09	GDACs	US GDAC and Coriolis produces md5 signature of all GDAC files. Documentation in User Manual 2.3
13	Document feedback on RT feedback from statistical test at Coriolis in QC manual.	End 2009	Thierry Carval	A section 2.4 has been added in the RT section of the QC manual
14	Implement tech file synchronization .	ADMT11	GDACs	Done at Coriolis June 2010 Done at USGDAC Sep 2010
15	Document File Checker in appendix in Qc Manual.	End October	Mark & Annie	Done

		Action	Target Date	Responsibility	Status
16		Turn to operation File checker with an interim period of 2 months and capability to relax it if too many files are rejected .	End 2009	GDACs and DACs	Ongoing - Mark is running checker on separate system
17		Update File checker to handle consistency checks and TECH file checking	ADMT11	Mark	TECH files not included yet
	Real-time Actions				
18		KMA to investigate why there is less messages from KMA on GTS in past 2 month.	End 2009	KMA	Done
19		INCOIS, KMA and JMA to investigate why there is still some small time differences sometimes between profiles on GTS and at GDAC and correct it on RT incoming files.	ASAP	INCOIS, KMA, JMA and Mark	JMA - done KMA – done INCOIS waiting for response from IMD, India to start processing their own GTS updates.
20		MEDS and JMA to investigate why some of the JMA BUFR messages are not seen by MEDS and FMNOC.	ASAP	Anh Tran , Mark and JMA	Solved by JMA.
21		DACs to finalize the setting up of BUFR transmission and warn Anh and Mark.	ADMT11	CLS, Coriolis, CSIRO, AOML, BODC,KMA, NAVO	File generated at Coriolis waiting for metoe-france to distribute them CSIRO send to BOM the BUFR target Novembre to send on GTS BODC, done, operational in September 2010. CLS doing in for INCOIS AOML ok on 18ᵗʰ October
22		DAC to assess their flags according to Coriolis statistical test recommendations and resubmit them.	ASAP	All DACs	CSIRO OK BODC OK INCOIS OK Started at AOML
23		DAC to assess their flags according to Altimetry and resubmit files or provide feedback in data are good after each quarterly check.	4 times a year	DACs	Most of the DACs update their profiles
24		Update QC manual and User manual to explain -when a float is introduced in the grey list -to users how to use it	End 2009	T. Carval, A. Wong	Done
25		-study how to keep the information of sensor failure	ADMT11	Thierry & Mathieu	Documented in User manual 2.3 Fill anomaly section in Metadata file
26		BODC to test the new Jump Test proposal made by B King at ADMT9	AST11	BODC	Report at ADMT-11

	Action	Target Date	Responsibility	Status
27	Implement the common method for determining the positions and observation times at DAC and document it in the User Manual .	ADMT11	DACs. Ann and Thierry	Documented in User Manual 2.3 To be implemented at DAC CSIRO: done but will revisit while reprocessing floats Incois done as using CSIRO software AOML Done BODC, will be implemented with trajectory actions.
28	Clean the tech file for surface-pressure.	End November 2009	AOML, Coriolis, KMA, NMDIS	AOML: done for new tech.nc files. Old files still need to be replaced Coriolis: done on Apex . On going on Provor KMA: done Feb 2010 BODC, done, tech files recently resubmitted with latest technical names. INCOIS done for all APEX floats AOML Done
29	Implement RT pressure correction on APEX .	End 2009	AOML, Coriolis, CLS, KMA	AOML done: on core argo Coriolis: done on new profiles. Done in delayed mode processing. done on RT files not processed in DM KMA: done Feb 2010 BODC, done. INCOIS done
30	Process old active float that are registered at AIC and not at GDAC.	ADMT11	AOML Coriolis	Coriolis : started AOML started
31	Include pressure in global range test in QC manual and DAC to implement it.	End 2009	Thierry and DACs	QC manual upated Coriolis done July 2010 CSIRO done INCOIS Done AOML pending
	Delayed-Mode QC Actions			
32	Modify QC manual on editing raw files and revise definition of PARAM and PARAM_QC.	End 2009	A. Wong	Done
33	DM operator to report back to DACs when a TNPD APEX float should go on grey list.		DM operators	Coriolis :done on German and med float Jamstec :done BODC, not applicable. INCOIS: No TNPD float
	Reference Dataset Actions			

	Action	Target Date	Responsibility	Status
34	Coriolis to update Ref DB in integrated new CTD from WOD09 and pre 1990 CDTs	Dec 09	C. Coatanoan	Distributed Feb 2010
35	NODC/CCHDO to collect CTD in sparse area for the REF DB and especially Southern Ocean	ASAP	T. Boyer and S. Diggs	Received one Australian cruise from CCHDO To be done with NODC
	Format Actions			
36	Finalize Repetition_Phase description	AST11	T. Carval & Claudia , Ann	Done
37	Revise the user manual according to meeting decisions and emails comments	End OCT 09	T. Carval	Documented in User Manual 2.3
38	Resubmit meta-files	ASAP	All DACs lead GDACs	CSIRO Started INCOIS Started Postponed for other Dacs
39	Finalize the delivery of bounced profiles	End Nov 09	GDACs and AOML	Link to action 42
40	Resubmit Oxygen float according to new recommendations	ASAP		Additional variables described in User Manual 2.3 Done for Coriolis TO be done at INCOIS AOML
41	Update TECH file naming convention to handle all the surface offset behavior and add a column to record whether an information is decoded or estimated	ASAP	Ann with Provor and Solo PIs	Done for PROVOR CSIRO done
42	Test the multi-axis format change proposal	AST11	Uday , Claudia, Thierry, MArk	Thierry will present at ADMT11
43	Test the CF –compliant proposal made by T Carval	AST11	Jim, Uday, Steve, Thierry, Charles	Target date ADMT11t
44	Investigate the content of the existing metadata files make suggestion for improvements	ADMT11	AIC	Proposal made at ADMT11
45	Start work with WMO to set up links between Argo GDACs and WIGOS	ADMT11	Thierry & Loic& AIC	Postponed

17. Annex 4 ADMT11 Action List

PRIORITY: H: High R/ Routine L: Low

		Action	Target Date	Responsibility	Priority	Status
		Monitoring Actions				
1		Improve the monitoring of the delays between observation data and availability at GDACs	AST12	Mathieu with contribution from Mark and Thierry	**H**	
2		Improve cost model for float RT and DT processing	ADMT12	Mathieu with input from DACs and GDACS	**R**	
3		Continue investigation on Citation index	ADMT12	Lesley	**R**	
4		Action on DM operator and DAC to correct the format error pointed out by J Gilson (ftp kakapo.ucsd.edu cd pub/Gilson/AST11/DMQC_format_chec k) after November run	End 2010	Dac and DM Operators	**H**	
		Pressure Corrections				
5		Annie to clarify the definition of APEX TNPD in the QC Manual..	30ᵗʰ Oct 2010	Annie , Justin and Susan	**H**	
6		All APEX groups to give Jeff Dunn feedback on how to improve the automated APEX pressure correction checks at CSIRO.	30ᵗʰ Oct 2010	Apex Group	**H**	
7		John and Jeff to rerun their check with the new TNPD definition and identify easily the really critical float to be corrected in priority	Nov 2010	Jeff and John	**H**	
8		AST co-chairs to email directly the APEX groups who are not on target to clean up their tech files and re-process their APEX TNPD files before end of 2010	Nov 2010	AST cochairs	**H**	
9		Apex group to finish TNPD float correction before end 2010	End 2010	APEX groups	**H**	
		GDAC Actions				
9		GDAC to perform File removal before file submission to allow quicker replacement of deleted profile	AST12	Thierry and Mark	**R**	

	Action	Target Date	Responsibility	Priority	Status
10	Update more often the Latest file with Rfile submitted to reduce delays. Dfile submission can be updated once a day	AST12	Thierry and Mark	**R**	
11	Implement detailed index file	End 2010	Mark	**H**	
12	Provide statistics on GDAC FTP servers analyzing the log files	ADMT12	Mark and Thierry	**R**	
13	Investigate providing DAC zip files to users and receiving ZIP files from DAC	ADMT12	Mark and Thierry	L	
14	Validate new file checker with DACS	Nov 2010	Mark	**H**	
15	Install File checker at French GDAC	Before January 2011	Mark and Thierry	**H**	
16	Turn to operation in advisory mode	January 2011	Mark and Thierry	**H**	
17	Connect one GDAC to ODP	ADMT12	Mark or Thierry	**R**	
	Real-time Actions				
18	DAC to verify the time difference between GDAC and TESSAC found by Ahn	AST12	Dacs	**H**	
19	Run the global check between TESSAC & BUFR and GDAC to see if things got worse in past year and report to DACs	End 2010	Mark	**H**	
20	Add COOA code in the user manual when flag corrected after warning provided by Coriolis using the Objective Analysis tool and Dac to use it in the history section	End 2010	Thierry	**R**	
21	Add the date of the update of the profile that was checked in the alert message send to the DAC	End 2010	Thierry and Christine	**R**	
22	AIC to send individual messages to DM operators and DAC when a float present an anomaly not corrected between 2 run of the altimeter check.	End 2010	Mathieu	**H**	
23	Compare results from the new Jump test proposed by B King and the OA alerts feedback at next ADMT	ADMT12	Sam	**R**	
24	Work on improving density test by introducing a threshold that can be different in the regions and on the resolution:.	ADMT12	Virginie , Ann, Birgit Justin	**R**	

	Action	Target Date	Responsibility	Priority	Status
25	all groups to begin using the proper method to calculate JULD for all real-time data	AST12	DAC	**H**	
26	Fix past data by using the reprocessed trajectory files by M Ollitrault to avoid reprocessing	ASAP	Dacs	**R**	
27	Modify the decoders of the Provor and Nemo version to get rid of the unpumped salinity . The unpumped temperature will be provided in the near-surface additional profile	End 2010	UK, Japan and French Dac	**H**	
28	Specify how to reduce sampling of high resolution profile to be sent in GTS in Tesac	AST12	Claudia & Dacs	**R**	
	Delayed-Mode QC Actions				
29	US-Argo to solve the Argo equivalent float DMQC issue	ADMT12	Steve P	**R**	
30	DM-operator to contribute to the sharing regional expertise initiated by Justin	ADMT12	Voluntary DM Operators and Justin	**R**	
32	Separated Argo from Argo.eq in DMQC monitoring	AST12	Megan	**R**	
	Reference Dataset Actions				
34	Improve the link between CCHDO, NODC and Coriolis by warning Coriolis when new CTD (public or restricted access) are made available	AST12	Steve, Tim and Christine	**R**	
35	CCHDO to contact BODC to use the POGO cruise data base as a source for the SEAHUNT tool developed by CCHDO to track where CTD have or will be made and inform on deployment opportunity	ADMT12	Steve and Lesley	**R**	
	Format Actions				
36	Harmonize PLATFORM-NAME SENSOR in metadata files and AIC DB	Proposal by AST12	Mathieu with Esmee, John, Breck, Serge,Mizuho and Birgit	**R**	
37	DAC to finalize BUFR generation and distribution (Don't forget to warn Anh when transmission starts)	ADMT12	CSIRO KMA Coriolis	**R**	

	Action	Target Date	Responsibility	Priority	Status
38	Per each float type , explain the use of the pressure offset technical parameters and propose a user manual update	AST12	Ann; John and Sylvie	**R**	
39	Update metafile with new Phase definition and standardized name when available from action 36	ADMT12?	Dac	**R**	
40	Thierry + DACS to provide multi-axis profile examples with the meta-files to assess the format specifications	AST12	Thierry with Claudia, Ann , Mizuho, Justin, Uday	**H**	
41	Dac to update their float profiles when Specification validated	ADMT12	Dacs	**R**	
42	Separate Config parameters from tech parameters files one on the 14B table	End 2010	Ann	**R**	
43	Thierry to circulate a proposal for CF updates and when validated update the user manual	AST12	Thierry to coordinate	**R**	
44	GDAC update the past file to make them CF compliant	ADMT12	Thierry and Mark	**R**	
45	Contact the CF and software providers to be sure they will be able to read this CF compliant format	ADMT12	Jim	**R**	
46	Provide the Oxygen data in the agreed format V1.11 for new data (reprocessing is ASAP but lower priority)	ADMT12	AOML Coriolis CSIRO+INCOIS JMA ISDM	**R**	
	Trajectory				
46	Cls to send new position for test float to validation by voluntary PIS for feedback	Nov 2010	Yann and Voluntary PIS	**R**	
47	Send message to DAC on anomalies that should be fixed	End 2010	Megan	**R**	
48	Megan propose to animate a working group to solve the unclear issues on cycle timing	Feedback ADMT12	Megan to coordinate	**R**	
49	Mizuho will test it on JMA files if the jamstec position-qc software is robust enough to be operated automatically and report on it	ADMT12	Mizuho	**R**	
	GADR				
50	Add the current user manual with the monthly archive	End 2010	Charles	**R**	

	Action	Target Date	Responsibility	Priority	Status
51	NODC to make clear that the Argo data made available through the repository is a translation of original Argo with information removed	End 2010	Charles	**H**	37
	Recommendation to AST				
1	Make communication to scientific community that not all profilers are Argo or Argo equivalent but if they use Argo WMO number that they have obligation in terms of notification, data management notification in IOC resolution…	ASAP	AST cochairs	**R**	
2	Recommendation that mirrors of Argo dataset should use as highest fidelity as possible with the GDAC dataset	ASAP	AST cochairs	**R**	

18. Annex 5 Information Note on the Argo Data Set and Digital Object Identifiers (DOIs)

18.1. Introduction

For some years there has been discussion of an appropriate mechanism for publishing and citing data sets in the oceanographic community and beyond. The use of Digital Object Identifiers is a technical mechanism for reliably referencing electronic resources (and also scientific data). This can be achieved with any type of persistent identifiers (URN, HDL etc.); see Tonkin (2008), for a review of different types of persistent identifier. However, DOIs provide the advantage of being a brand that is increasingly used and can be used as a reliable way of publishing and citing scientific data.

The Argo Data Management Team raised the issue of using DOIs for the Argo data set. This note provides some background on DOIs and DataCite (an initiative to establish easier access to scientific research data on the Internet), and looks at how Argo might use DOIs – raising some initial questions and issues.

Over the past five years or so within the marine community, there have been several meetings and workshops leading to the development of the SCOR/IODE initiative on data publication (see IOC Workshop report 207, 2010) for background and further details. This workshop provided a progress report on 2 pilot projects chosen to test the processes for data publication for two different case studies: (1) Creating data publications from existing and future holdings at national data centres and (2) Providing the "digital backbone" for traditional journal publications. Argo's interest in data publishing and DOIs was noted at the workshop. An important question was how to define a data set in this case, as the Argo data set changes daily as profiles are added, and a DOI points to a static unchanging data set.

One example of an organisation which uses DOIs is PANGAEA (Publishing Network for Geoscientific and Environmental Data) hosted by the Alfred Wegener Institute for Polar and Marine Research (AWI) and the Center for Marine Environmental Sciences (MARUM), University of Bremen. It is operated as an Open Access library aimed at archiving, publishing and distributing georeferenced data from earth system research. Each dataset can be identified, shared, published and cited by using a DOI. Data are archived as supplements to publications or as citable data collections. Citations are available through the portal of the German National Library of Science and Technology (GetInfo).

18.1. Digital Object Identifier (DOI®) System

The DOI system is for identifying content objects in the digital environment.

- DOI names are assigned to any entity for use on digital networks. They are used to provide current information, including where they (or information about them) can be found on the Internet.
- Information about a digital object may change over time, including where to find it, but its DOI name will not change.
- The DOI System provides a framework for persistent identification, managing intellectual content, managing metadata, linking customers with content suppliers, facilitating electronic commerce, and enabling automated management of media.
- DOI names can be used for any form of management of any data, whether commercial or non-commercial.
- The system is managed by the International DOI Foundation, an open membership consortium including both commercial and non-commercial members, and has recently been accepted for standardisation within ISO.
- Over 40 million DOI names have been assigned by DOI System Registration Agencies in the US, Australasia, and Europe.

- DOI names are widely used in scientific publishing to cite journal articles. More 98% of all DOI registered are for scholarly articles. The use of DOI names for the citing of data sets makes their provenance trackable and citable and therefore allows interoperability with existing reference services.

18.2. DataCite

DataCite is an international consortium to:
- establish easier access to scientific research data on the Internet
- increase acceptance of research data as legitimate, citable contributions to the scientific record, and to
- support data archiving that will permit results to be verified and re-purposed for future study.

DataCite promotes data sharing, increased access, and better protection of research investment. Just as science is global, with individual researchers working and publishing, DataCite with 12 members from 9 countries is global, with individual regional member institutions offering services and advice directly where they are needed by the scientists.
- global cooperation, because scientist work globally, scientific data are created and accessed globally.
- with national representatives, because most scientists are embedded in their national funding structures and research organisations.

Other countries and organisations are always welcome to join DataCite.

Some example citations from DataCite are given in Annex 2.

18.3. Argo requirements

Argo wants to be able to add persistent identifiers to the Argo data set. DOIs are one option. As noted above there are also other mechanisms for persistent identifiers available. An important consideration for Argo is that DOIs are links to unchanging data sets. So once a DOI has been attached to a data set, that data set must not be modified: as the Argo data set is continually being updates this is a major issue. The data set should be deposited in an appropriate repository, from where it will be able to be retrieved indefinitely into the future.

18.1.1. Some options for Argo

1. Periodic copy (snapshot) of the data set (annually, monthly?)

2. Finalised data for individual floats (after final DMQC when float has ceased to operate?)

3. Versions of reference data set

4. Others?

18.1.2. Issues

- Are DOIs the best persistent identifier for Argo?
- What does Argo want to use DOIs for? To allow better citation of data set? To be able to identify the status of the data set at a particular point in time?
- Who will be responsible? Relates to which options (above) are chosen
- Where will these copies of the data reside (is there a suitable and appropriate repository)?

18.1.3 Follow up?

- Do we want to continue to investigate this?
- ADMT to discuss and conclude on options and issues above (decide what we want to do for Argo)?
- Then, if we want to pursue this, we can address the technical issues
- ICSU CODATA conference next week has a couple of sessions on data publication/citation

References:
DOI website: www.doi.org

Datacite: www.datacite.org/index.html

Publication and Citation of Scientific Primary Data (STD-DOI project, www.std-doi.de)
Report of SCOR Summit of International Marine Research Projects, December 2006. www.scor-int.org/Project_Summit_2/Final_Report.pdf

Paskin, Norman(2010) 'Digital Object Identifier (DOI®) System', Encyclopedia of Library and Information Sciences, Third Edition, 1: 1, pp. 1586 — 1592 (ISBN: 978-0-8493-9712-7) www.doi.org/overview/DOI_article_ELIS3.pdf

UNESCO (2010) SCOR/IODE/MBLWHOI Library Workshop on Data Publication, UNESCO Headquarters, Paris, France 2 April 2010 Paris, UNESCO, 5 May 2010 (IOC Workshop Report No. 230) (English)

Tonkin E (2008) Persistent identifies: considering the options. Ariadne Issue 56, July. www.ariadne.ac.uk/issue56/tonkin/

19. Annex6 National Reports

Australian Argo National Data Management Report
ADMT11
Hamburg, 20-22 October 2010
Ann Gronell Thresher (CSIRO) and Lisa Krummell (Australian BOM)

Status of Array
Australian deployments in 2009-2010:
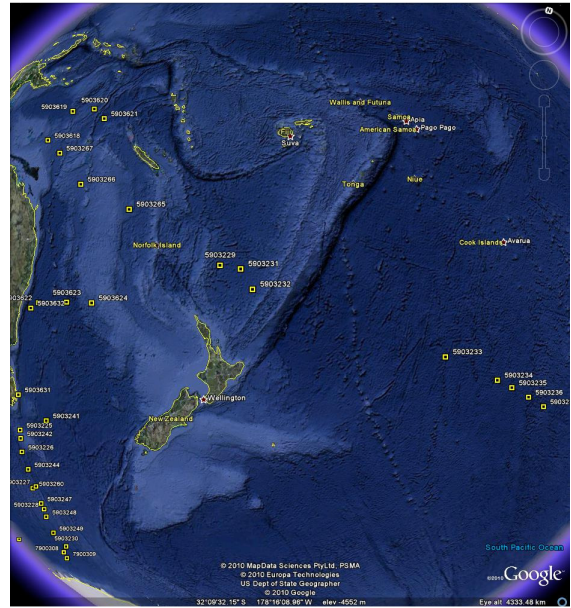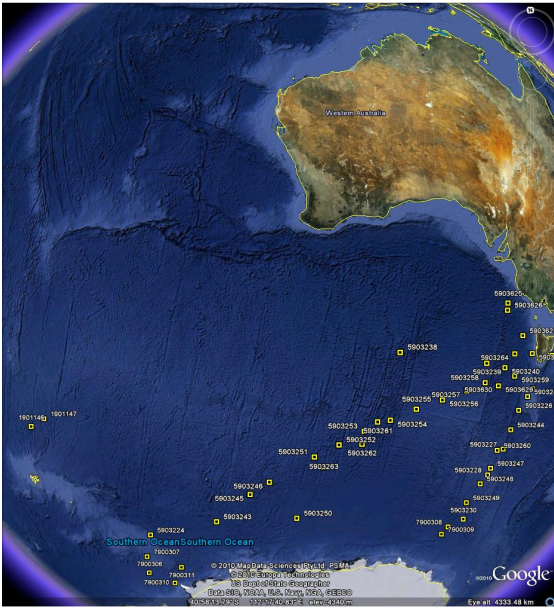
It has been a productive year. Australia deployed 69 Argo floats since the last meeting.
Deployments would have been higher if not for the Druck micro-leak problem. Nevertheless,
we now have 273 active floats giving good data from a total of 342 deployments. We also
have 177 floats either in the lab, or on order. This is a much higher number than usual
because of the backlog of orders to meet our performance and funding requirements. These
stocks should carry us over through 2011. We can potentially expect to deploy all floats
within the next year but this is optimistic. We will probably be able to deploy the
SouthernOcean floats, most of the Tasman/Coral Sea floats and a large percentage of the
Indian Ocean floats (depending on ship availablility). We are currently planning to charter a
vessel early in 2011 to deploy in the Western Indian Ocean.

Australian Deployment plans 2010-2011:
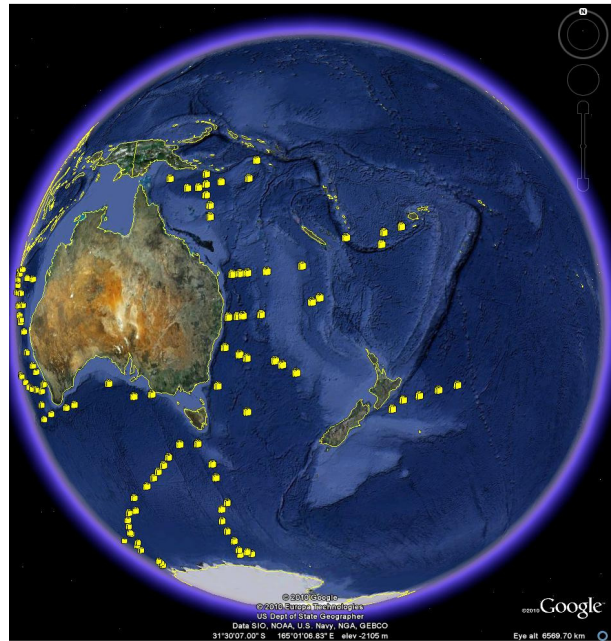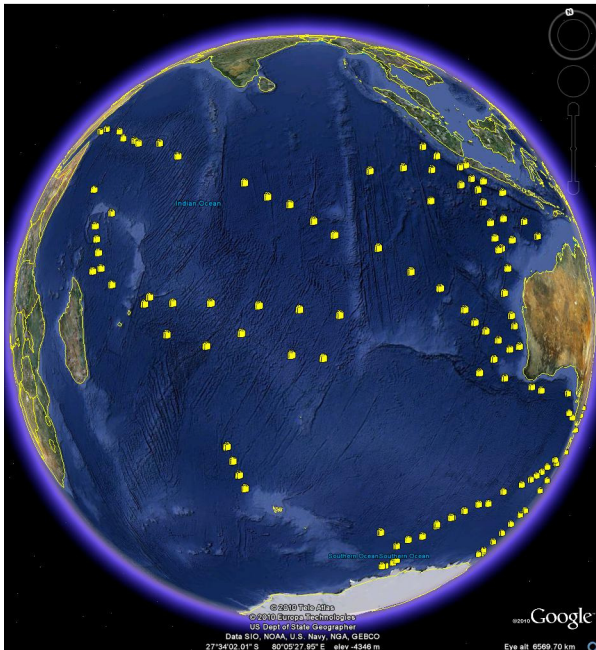
A scarcity of pressure sensors screened for microleaks has been our biggest problem this year. We were reluctant to deploy a large number of Kistler-equipped floats until they had been more fully tested in the field but did deploy a total of 9 because screened Drucks were hard to obtain. We are grateful for all the efforts made both by Webb and Seabird to resolve this issue and get floats shipped in time for deployment cruises.

Last year we reported that we had received one-off extra funding to almost double deployments, targeting the Southern Ocean in particular. This funding provided for an additional 46 floats but that they were required to be in the water by 6/2010. We managed to deploy 41 of these which was the result of fantastic work by our Argo team and help from TR Webb and Seabird. Funding this year is back to our baseline supporting deployments of about 50 floats per year. Due to the backlog, though deployments this year will be almost double as we work through the backlog caused by the deployment halt while the pressure-sensor microleak problem was being sorted out. Our program is also moving strongly towards deploying a larger number of floats using Iridium communications.

Funding for the latter part of last year and this next year has been good with a spend-down of the NCRIS funds, more floats than expected from the Bureau of Meteorology and additional floats from the ACE-CRC (a government funded centre with focus on the Southern Ocean).

In April 2009, CSIRO hosted the National Argo meeting in Hobart. This helps keep all Australian partners in Argo informed about developments in the program.

Technical Problems Encountered and Solved:

The past year has been mixed in terms of problems as well. Clearly the Druck microleaks have affected everyone. Our second biggest issue this year was with reliability of communications from our Iridium floats. We have now deployed over 40 floats equipped with Iridium transmitters. This is a fantastic development that allows us to return multiple park measurements as well much more highly resolved profiles with2db resolution. However, the cost to date has been higher than anticipated. Our floats seem to suffer call-interruptions and repeated drop-outs and we thus are paying for multiple calls each time a float reports, greatly increasing the communications costs. We have attempted to manage these costs by decreasing the sizes of the log files returned (which should reduce both costs and drop-outs) but we have also had problems with our modem setups (our head office changed our phone lines from 'voice+data' to 'voice only' so the floats couldn't maintain the connection) and the more wide-spread Iridium outage in May. Finally, Iridium changed our call plan without notice, resulting in high costs while our floats were being tested at Webb. We are now investigating a cheaper service provider, a different pathway to the modems, and alternative data formats. But this all takes time and we have floats in the field so there may be limits to what we can achieve.

We have continued to help others define names for the new Technical files. New names are still being added to the list so please check carefully when re-coding your files and ask if you need more names.

Software development:
Software development continues with the addition of new features, reprogramming of some functions and simplification of the routines.

Lisa Krummel (nee Cowen) has returned to the Bureau of Meteorology and they have hired a person to supplement her part time efforts. This should make installing software updates easier.

India continues to use our Argo Real-time software and we send them regular updates. We have also offered our software to Kordi and they will install it when they have time.

If anyone else is interested in our Argo Real-time software, it is a Matlab program that works from the raw Argos hex data to decode the profiles and create all required netcdf files for delivery to the GDACs and we are happy to help with getting it set up elsewhere.

Data Acquisition and delivery to the GDACs and GTS:
Data is acquired from the floats within a day of delivery to either Argos or to us via Iridium. It is then processed twice – once as soon as practical, then again in 2 days to ensure we have the maximum number of reports and the best possible message. After passing through the real-time QC, all netcdf files are generated and the data is then sent via FTP to both GDACs. Our processing is mirrored at BOM so each file is delivered 4 times in total, ensuring that the GDACs have the data if either CSIRO or BOM are offline for some reason. There have been problems with delivery to some GDACS (BOM was not able to deliver to GODAE due to ftp permissions: rectified 6 October 2010) so we rely on synchronization between GODAE and Coriolis to make sure that all files are on both servers.

The data is also issued to the GTS via TESAC messages immediately. We also generate BUFR messages and deliver these to the BOM node but they do not yet have the ability to pass these onto the GTS. They expect this ability will be implemented in November.

Over the 12 months to July 2010, approximately 83% of all profiles were delivered to the GTS within 24 hours of the float surface time. This value is estimated from the ISDM Global Data Management Information plots, as the Bureau's internal monitoring routines have not been functional during 2010. (The plot hasn't been updated for August yet, so can't give more recent data). The worst results were around December 2009 - possibly due to a large number of deployments, and new formats which needed to be programmed.

BUFR messages are being created within the Bureau but not delivered to the GTS at this time. It is anticipated that the Bureau will commence GTS delivery of BUFR messages from November 2010.

Data is available for delayed mode QC immediately but only considered valid for DMQC after 6 months. The Delayed Mode report is appended below.

Additional Data Distribution:
As noted last year, the National Collaborative Research Infrastructure Strategy (NCRIS) funds the Integrated Marine Observing System (IMOS) which is a major source of Argo funding for Australia. As part of this initiative, it is required that we have a local data delivery pathway. IMOS is now serving Argo data as a mirror to the US GDAC through its data portal which can be accessed at:

http://imos.aodn.org.au/webportal/

All IMOS data, from all nodes, can be accessed through this web site.

Float Performance:
Float performance has been excellent this year with one failure on deployment (reason unknown) and only minimal failures of existing floats. Three floats have now been confirmed with the Druck microleak fault and another 2 or 3 are suspected of having bad pressure sensors. It is almost certain that more will show up in our fleet as time goes on. We are now purchasing only APF9 controllers to make identification of suspect pressure sensors easier since they report negative pressure offsets, unlike the APF8 boards. Four more floats have been grey listed, primarily because of Druck snowflake problems, or grounding.

Web Pages:
The Australian Argo web pages are updated with the most recent data during the processing of the reports from the floats. They are therefore up to date as soon as float data is received. We have added web pages that contain details of the technical data from our floats, aiding in the diagnosis of problems. This is now done as a float is processed making them up-to-date and easy to find.

Home page for Argo Australia (IMOS)
http://imos.org.au/argo.html

The Australian data portal can be found at:
http://www.imos.org.au/facilities/argo-australia.html ;

Information on individual floats can be found at:
http://www.marine.csiro.au/~gronell/ArgoRT/;

There are links to the technical pages for a float from each profile page.

Information on our DMQC process and floats can be found at:
http://www.marine.csiro.au/argo/dmqc/

Home page for DMQC documentation of floats:
http://www.cmar.csiro.au/argo/dmqc/html/Argo_DM.html
and
http://www.cmar.csiro.au/argo/dmqc/index.html

Example DMQC documentation page for a float:
http://www.cmar.csiro.au/argo/dmqc/html/DMQCnotes_5901618.html

Statistics of Argo data usage:
Argo data is downloaded to a local mirror once a week. It is then converted to a Matlab format with an index table to help local users find the data they need.

Argo usage is a difficult list to compile, as Argo data are now being used routinely by many researchers nationally and globally. Not much has changed in the past year.

The data is being used with other data on the GTS to inform the Bureau of Meteorology's Seasonal Climate Outlook and is used in a dynamical climate forecast system (POAMA). As part of this the data are ingested into the BMRC Ocean Analysis
(http://www.bom.gov.au/bmrc/ocean/results/climocan.htm)

- Argo data is also being used in the BLUElink ocean forecasting system.
    http://www.bom.gov.au/oceanography/forecasts/index.shtml

- We are also incorporating it as a high quality background data field for our upper ocean temperature QC programs (QuOTA archives, SOOP XBT QC).

Research Projects which depend on Argo data include:
- Determining the ongoing rate of ocean warming and ocean thermal expansion - Domingues, Church, White and Wijffels, Barker, Centre for Australian Weather and Climate Research (CAWCR)
- Global Ocean Temperature Trends- Wijffels, Cai and Feng, CSIRO
- BLUElink Ocean Prediction. BLUElink Team lead by David Griffin, CSIRO and Gary Brassington, BoM
- Mixed-layer Structure and Biogeochemistry in Australia's Sub-Antarctic Zone- Tom Trull and Brian Griffiths

- Ecosystem Modelling Team- Beth Fulton, Scott Condie, Donna Hayes, Eric Grist, Penny Johnson, Randall Gray and Roger Scott
- Ecocspace modelling applications - Cathy Bulman. CSIRO Marine and Atmospheric Research (CMAR)
- Seasonal climate forecasting research and applications, POAMA group, CAWCR.
- Dynamics of Antarctic Circumpolar Current - Steve Rintoul and Serguei Sokolov, CAWRC
- Mean circulation around Australia - Jeff Dunn and Ken Ridgway, CAWCR
- Annual and interannual salinity variations in the Indian Ocean - Helen Phillips (U. Tasmania) and Susan Wijffels (CAWCR)
- Southern Ocean subduction processes - JB Sallee, Steve Rintoul, Susan Wijffels, CAWRC
- Improving global mean climatologies by combining Argo and altimetric measurements, Ken Ridgway and Jeff Dunn, CAWRC
- Dr Andrew Meijers, "Global estimates of mixing parameters and subduction rates using the Tracer-Contour Inverse Method", supervised by Trevor McDougall and Bernadette Sloyan.
- Australian Climate Change Science Program: Ocean Processes and Change - Rintoul/Wijffels/Sloyan; FY 2010/11; DCCCEE and CSIRO; annually funded
- Australian Climate Change Science Program: Sea Level Rise- Church/Wijffels; FY 2010/11; DCCCEE and CSIRO; annually funded.
- Antarctic Cooperative Research Centre [U. Tasmania, AAD, CSIRO, BoM, DIISR]
- Climate Variability and Change Program; Rintoul;
- Sea Level Rise Program; Church
- Ocean Control of Carbon Dioxide Oceans Change Program; Trull
- Pacific Climate Change Program; Oceans Component - Ocean change, variability and sea level rise; Church/Wijffels/Brown (CSIRO); Sen Gupta (UNSW); DCCEE/CSIRO/CAWCR/UNSW; Pacific Island Countries; ends 2011/12
- POAMA development: improving seasonal climate forecasting for Australia [BoM]; Alves/Hendon - ongoing
- BlueLink II/III - ocean forecasting for Australia; Oke/Griffin/Brassington; [RAN/CSIRO/BoM]; ends 2013/14.
- Mixing in the Antarctic Circumpolar Current; Phillips/Meyer/Bindoff; ARC/U. Tasmania;

PhD Projects include:
- Determining changes in global ocean water mass properties with inferences for changes in air sea fluxes of heat and water. Kieran Helm. University of Tasmania
- Long-term Salinity Changes and its Relationships to Atmospheric Forcing. Paul Durack, QMS, U. Tasmania
- PhD, Intraseasonal Variability in the Indian Ocean; Scripps Inst. Oceanography/CSIRO Fullbright Schem; Kyla Drushka; 2007-2011; Sprintall/Gille (SIO); Wijffels (CSIRO)

- PhD, Decadal Variability in the Indo-Pacific; QMS CSIRO/U. Tasmania; Mauro Vargas; Feb 2010 - 2013

Products Generated from Argo Data: some samples:
- operational upper ocean analyses of Neville Smith at the Australian Bureau of Meteorology: http://www.bom.gov.au/bmrc/ocean/results/climocan.htm
- BLUElink ocean forecasting system.
http://www.bom.gov.au/oceanography/forecasts/index.shtml

Delayed Mode QC (DMQC):
Delayed Mode processing has continued at CSIRO through 2010 with 84% of eligible R files processed and submitted to the GDACs by end Sep 2010 (see Table 1). The Australian Argo array was reprocessed from scratch through the DM system to take into account format and technical file changes and the surface pressure offset correction.

Australian DM Statistics (as at 30 Sep 2010)

D files submitted to GDAC	25977
Total R files	8063
R files eligible for DMQC	4862

Table 1. Delayed Mode processing statistics for the Australian array.

A total of 261 floats have been assessed through the DMQC process for drift of salinity and pressure sensors. Statistics for salinity drift are as follows: from a total of 261 floats, 219 (84%) exhibited no salinity drift during the float lifetime, 29 floats (11%) were corrected for a positive salty drift using OW software, 11 floats (4%) suffered from serious damage, drift or bad data and 2 floats (0.8%) were affected by long term biofouling (fresh offset corrected with OW). Fourteen floats (5%) suffered from TBTO fouling at deployment - this typically affected the first two to seven profiles.

Floats that required salinity drift correction were corrected using OW software using the most recent edition of the reference database and restricting the data to the deepest theta levels. The OW software works very well and some examples of floats with salinity drift correction are shown in Figures 1 and 2. From a total of 93 APEX floats with APF 8 controller boards and Druck pressure sensors, 48 (52%) were truncated negative pressure drifting (TNPD). Three floats have been confirmed as Druck microleakers (5901649, 5901689, 5901704); two of these were APF9's and one TNPD APF8. The Druck pressure sensor serial numbers on all 3 floats were all greater than 2324175. All three of these floats showed rapid gross pressure drift (-10 db within 18 and 23 cycles for the two APF9 floats respectively) and severely anomalous TS data within 20 to 30 cycles. We suspect several more floats from our fleet will develop DML symptoms in the near term but require more analysis before we can confirm this.

Software development has continued this year, with our DM processing system extensively rewritten and now essentially complete. The new system allows for float processing in "maintenance" mode whereby the end-stage QC flags from a previous round of processing can be applied to new R files if reprocessing or format changes have occurred. A new addition to the DM processing is routine checks of profile pressure before the first pass of the Gilson

screening so that bad pressure values are flagged early. Our nearby argo comparison tool has been enhanced by adding in a user-defined time window to restrict the data grab and by selecting either raw or adjusted nearby argo data. The surrounding data grab is also more selective spatially, i.e. and is now performed on a profile-by-profile basis rather than a box grab around the float trajectory. The climatology comparison tool can now cope with floats that profile at different depths and can be used to plot up the OW corrected data to check the salinity drift correction. A user-interrogated database now holds information for each float regarding sensor types, controller boards, communications type, TNPD status, calibration comments and whether a correction for TBTO or salinity drift has been applied and its magnitude.

The DMQC web pages for each float in the Australian array are available at:
http://www.cmar.csiro.au/argo/dmqc/html/Argo_DM.html
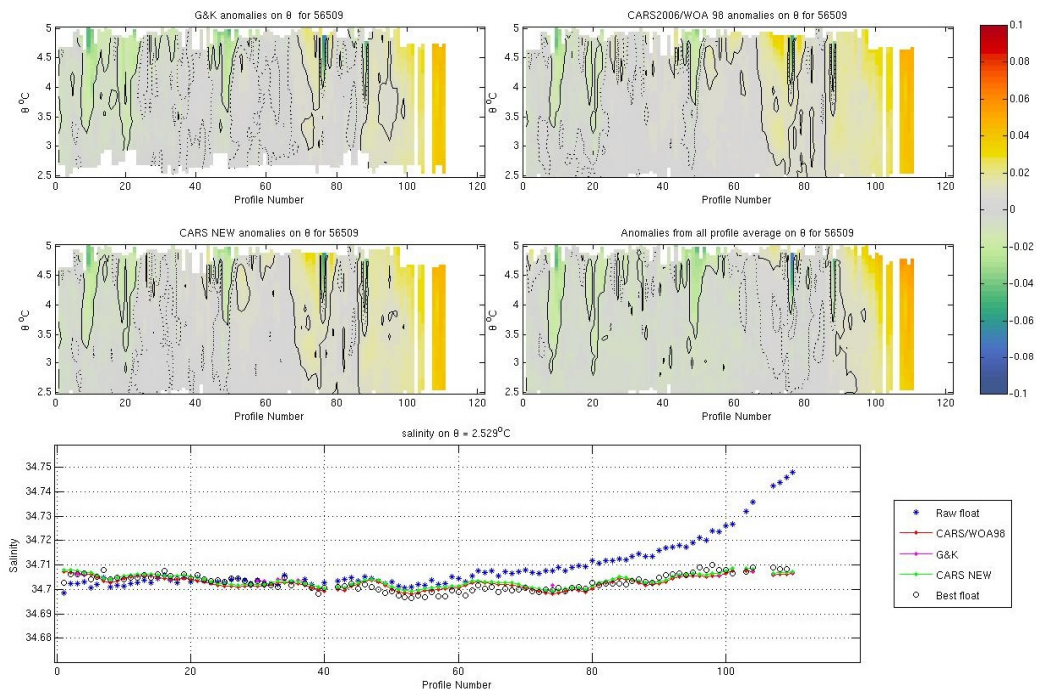
Figure 1. Comparison of float 56509 salinity data with climatologies on a deep theta surface. Raw float data (before OW correction) is denoted by the blue stars, adjusted salinity data (after OW correction) is represented by the open circles.
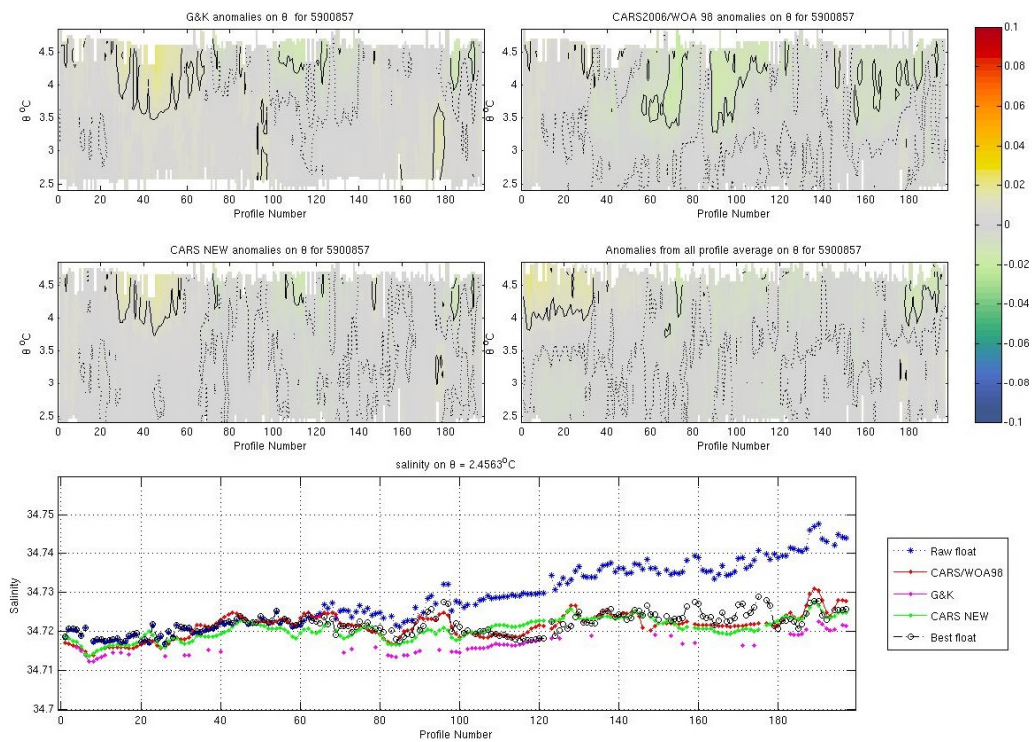
Figure 2. Comparison of float 5900857 salinity data with climatologies on a deep theta surface. Raw float data (before OW correction) is denoted by the blue stars, adjusted salinity data (after OW correction) is represented by the open circles.

Argo Canada National Data Management Report

ADMT11

Oct 20 – 22, 2010

1. Status

Data acquired from floats: We are currently tracking 144 floats. Of these 10 may be in trouble or may have failed to report within 6 months. In 2010, we deployed 8 floats with APF9A controller and Aanderaa optode sensors.

Data issued to GTS: All of data is issued to the GTS in TESAC and BUFR format. On average, 80% of data issued on the GTS within 24 hours in TESAC and BUFR between September 2009 to September 2010.

Data issued to GDACs after real-time QC: All of the profile, technical, trajectory and meta files are transmitted to GDACs in NetCDF format on an operational basis with some delay compared to the data sent on the GTS, because the two processes run on two different servers and the conversion process to NetCDF takes a long time. After some program modifications and optimization, now the time delay is reduced to 2 hours between the GTS data and the data sent to GDACs.

Data issued for delayed QC: Data are available for delayed mode QC as soon as they are sent to the GDACs but only considered valid for DMQC after 6 months.

Delayed data sent to GDACs: A total of about 5492 eligible files from 56 floats were quality-controlled for salinity (DMQC following WJO software) and pressure (delayed mode method according to the manual) and sent to the GDAC since June 2010.

Web pages:

http://www.meds-sdmm.dfo-po.gc.ca/meds/Prog_Int/Argo/ArgoHome_e.html

We maintain pages that show float tracks and all data collected by Canadian floats. Links for both real-time and delayed mode data are also available for download are directly from GDAC. The pages are updated daily.

We also show some information about the global programme including the position of floats over the previous months, the success rate of meeting the 24 hours target for getting data to the GTS at various GTS insertion points, the number of messages transmitted, reports of floats which distributed more than one TESAC within 18 hours and Canadian float performance statistics.

Statistics of Argo data usage: We currently have three PIs. Argo data have been used to generate monthly maps and anomaly maps of temperature and salinity along line P in the Gulf of Alaska. Line P has been sampled for 50 years and has a reliable monthly climatology.   For more information on the Line-P products and other uses of Argo to monitor the N.E. Pacific go to:

http://www.pac.dfo-mpo.gc.ca/sci/osap/projects/argo/Gak_e.htm

Real-time Argo data (GTS) is also ingested, along with other data streams (PIRATA and TAO arrays, XBTs, various TESACs from CTD profiles, animal borne sensors), in an optimally interpolated product generated at ISDM using ISAS-v4.1 analysis tool (developed at IFREMER). The fields are then used to identify, in real-time, profiles that either show suspicious deviation from climatology and/or neighbours. Those profiles are re-QCed. Several defective Argo profiles are identified this way and flagged accordingly (~30 per month, from ~15 floats, on average). An update is sent to US NODC whenever a profile is re-flagged.

2. Delayed Mode QC

As of September 2010, 20% of all eligible floats, active and inactive, had their profiles QCed visually and adjusted for pressure and salinity according to latest delayed-mode procedures. The salinity component of DMQC had been performed on 65% of eligible cycles. The following challenges or actions prevented the processing of more cycles and floats: memory limitations on server preventing the loading in memory of certain cells from the OW reference database, modifying the procedure to feedback RAW QC flags changed during pre-DMQC visual QC, implementing new delayed mode correction methods on pressure (namely the various TNPD cases), restructuring the process sequence to account for successive corrections, visually inspecting every cycle from inactive floats whose reviewed RAW flags had not been saved.

3. GDAC functions

Canada forwards TESAC data to the GDAC in Brest and NODC three times a week.

4. Region Centre Functions

Canada has no regional centre function.

Argo National Data Management Report 2010
China
The 11th Argo Data Management Team Meeting

1. Status

China deployed 15 Argo floats in 2010 which were all from SOA. The Chinese DAC has processed data from 47Argo floats since 2010, and 1080 R-files have been sent to GDACs. All the profiles were inserted into GTS at CLS. A total number of 3305 D-files have been sent to GDACs, which accounts for 79% of the submitted profiles.

About 8 Argo floats will be deployed in the Northwestern Pacific ocean in October.

Both the China Argo Data Center(NMDIS) and China Real-time Data Center (CSIO) has established their websites (http://www. argo.gov.cn and http://www.argo.org.cn) for Argo data inquiring and display.

The China Argo Data Center(NMDIS)provides access to the global Argo profiles data, meta data, trajectory data and deployment information from the daily updated   Argo Database. The users are able to access to the data conveniently on the website including netCDF raw data, near real-time data, meta data, trajectory data, delayed-mode data and download Argo data via FTP. In order to expand the usage of Argo data, China Argo Data Center has set up an Argo trajectory data quality control system, which can eliminate abnormal location data. Based on J.J. Parker method, China Argo Data Center also provides the global monthly averaged surface current and mid depth current maps derived from good Argo trajectory data. Besides these, many products of Argo data, such as waterfall maps, Argo trajectory maps are also provided. All these products can be downloaded from the website: http://www.argo.gov.cn.

The China Real-time Data Center web pages (http://www.argo.org.cn) are updated daily with the real-time data obtained from the floats. A web database which is monthly updated has been established for global Argo data inquiring and displaying.

Using various temperature, salinity profiles including Argo data and SSHA, a new reanalysis system has been developed by the NMDIS of China for the China coastal waters and adjacent seas to produce a dataset called China Ocean Reanalysis (CORA). The data assimilation scheme is a sequential 3D-Var implemented within a multi-grid framework. The CORA dataset includes sea surface height, temperature, salinity and current in the area and starts from Jan. 1986 and is real-time updated yearly and can be downloaded freely from the web site: http://www.cora.net.cn

2. Delayed Mode QC

OW method and thermal lag calibration has been applied for Argo salinity DMQC. SSP correction hasn't been applied due to lack of manpower.

In order to expand the usage of Argo data, China Argo Data Center has calibrated all (more than 5000 Argo floats which worked more than half year) the salinity profile data based on OW method. All the delayed-mode data can be downloaded from the web site http://www. argo.gov.cn.

Argo National Data Management Report

Dutch Argo

1. Status
(Please report the progress made towards completing the following tasks and if
not yet complete, estimate when you expect them to be complete)
- Data acquired from floats
- Data issued to GTS
- Data issued to GDACs after real-time QC

22 active floats presently. All floats have sent/are sending data
regularly. The data are issued to GTS and GDACs after real-time QC (done
by Coriolis).

- Data issued for delayed QC
- Delayed data sent to GDACs

Data until 2010 have been QCed and sent to GDACs

- Web pages

http://www.knmi.nl/~sterl/Argo - Dutch only

- Statistics of Argo data usage (operational models, scientific applications,
number of National Pis…)

no data usage, one national PI (A. Sterl, KNMI)

- Products generated from Argo data …

2. Delayed Mode QC
(Please report on the progress made towards providing delayed mode Argo data,
how it's organized and the difficulties encountered and estimate when you
expect to be pre-operational .)

Delayed mode QC is done by BSH (Brigit Klein).

3. GDAC Functions
(If your centre operates a GDAC, report the progress made on the following tasks
and if not yet complete, estimate when you expect them to be complete)
- National centres reporting to you
- Operations of the ftp server
- Operations of the www server
- Data synchronization
- Statistics of Argo data usage : Ftp and WWW access, characterization of
users (countries, field of interest : operational models, scientific
applications) …

n/a

4. Regional Centre Functions
(If your centre operates a regional centre, report the functions performed, and in

planning) n/a

Argo National Data Management Report 2010 Coriolis data center

Annual report September 2009 - October 2010
Version 1.0
October 15th, 2010
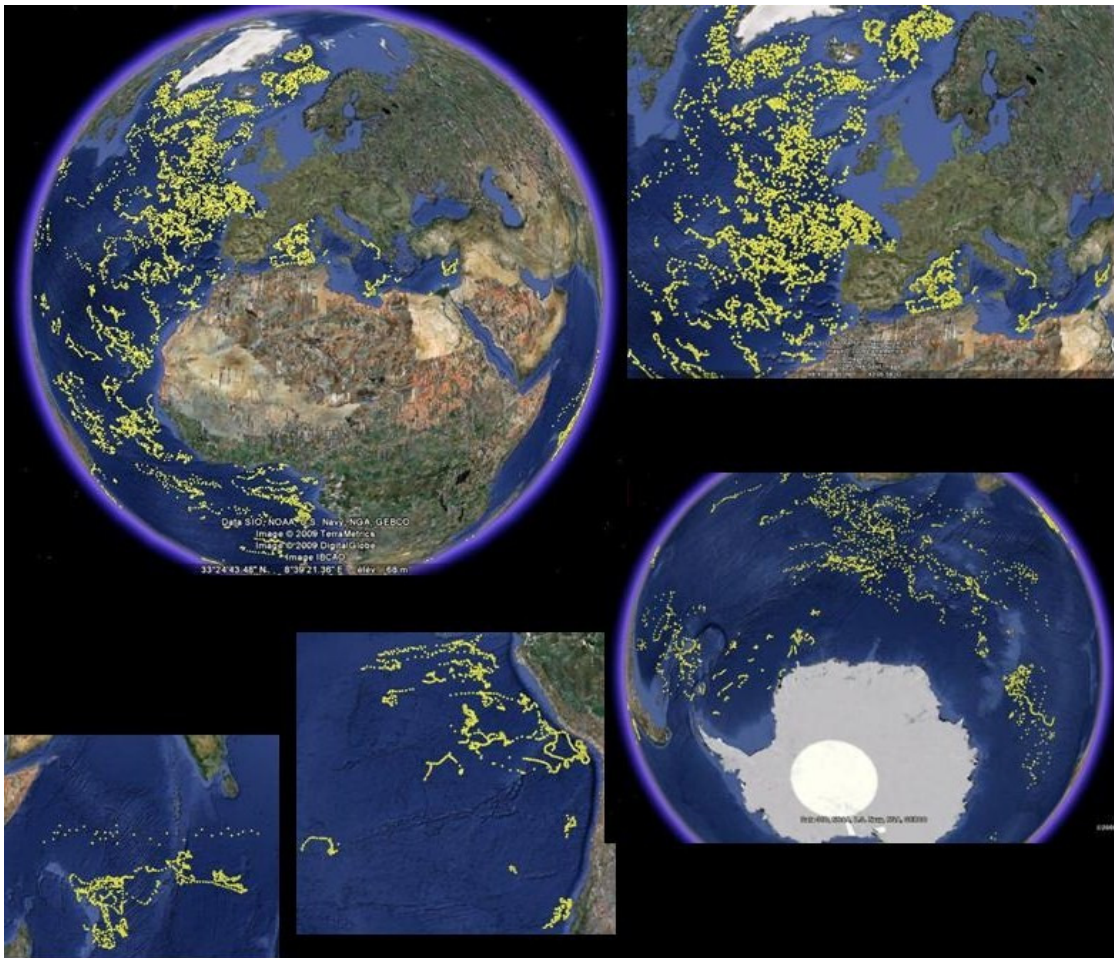
13 413 new Argo profiles from 444 floats managed by Coriolis DAC this current year.

Status

(Please report the progress made towards completing the following tasks and if not yet complete, estimate when you expect them to be complete)
- Data acquired from floats
- Data issued to GTS
- Data issued to GDACs after real-time QC
- Data issued for delayed QC
- Delayed data sent to GDACs
- Web pages
- Statistics of Argo data usage (operational models, scientific applications, number of National PIs…)
- Products generated from Argo data …

This report covers the activity of Coriolis data centre for a one year period from September 1st 2009 to September 30th 2010.

Data acquired from floats

During the last 12 months[1], a total of 13413 profiles from 444 floats where collected, controlled and distributed.

The 444 floats handled during that period had 37 versions of data format:
- APEX: 20 versions
- NEMO: 3 versions
- PROVOR: 14 versions

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[1] From September 2009 to October 2010

Argo data management   Coriolis DAC & GDAC report 2010
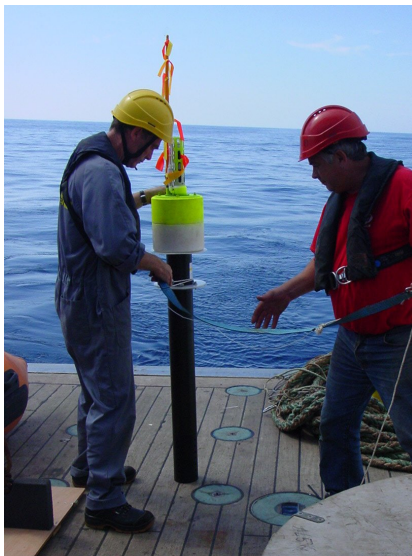
Arvor: a new type of float with Iridium telecommunication.
In 2010, among 37 versions of floats, a new type of Arvor float with Iridium telecommunication was processed. Its high speed data transmission allows short surface times, ideal for deployments in marginal seas such as Adriatic.

This new autonomous oceanographic profiling float has the same main characteristics and metrology than Provor. Lighter, cheaper, it is devoted to temperature and salinity measurements for Argo applications.

Its design has been performed by IFREMER and it is manufactured by NKE.
Arvor float can perform more than 200 cycles from 2000 meters depth to the surface (CTD pump in continuous mode).
It is deployable by only one person, with wireless connectivity using Bluetooth.

Data issued to GTS

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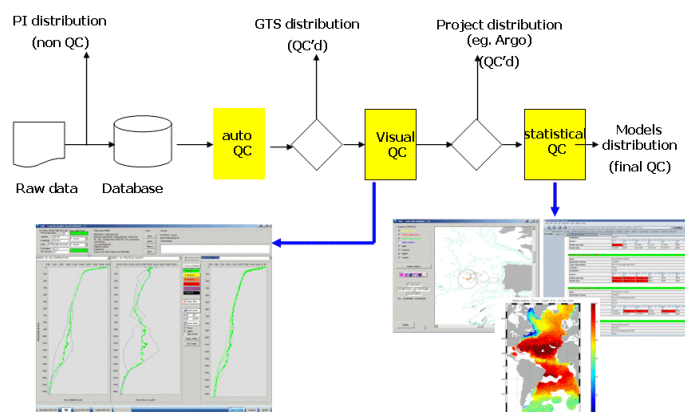
CORIOLIS DAC: Argo data flow

Argo data management   Coriolis DAC & GDAC report 2010

Data issued to GDACs after real-time QC

All meta-data, profiles, trajectory and technical data files are sent to Coriolis and US-GODAE GDACs. This distribution is automated.

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 Euro-Argo.

Delayed mode data sent to GDACs

An Argo delayed mode profile contains a calibrated salinity profile (psal_adjusted parameter).
A total of 22 570 new delayed mode profiles where sent to GDACs this year.
The number of delayed mode profiles increased by 54%.
A total of 64 289 delayed profiles where sent to GDACs since 2005.

Web pages

The web site of the French DAC is available at:

- http://www.argodatamgt.org

It provides:

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

Some pages of Coriolis web site are dedicated to technical monitoring:

- http://www.coriolis.eu.org/cdc/coriolis_floats_monitoring.htm
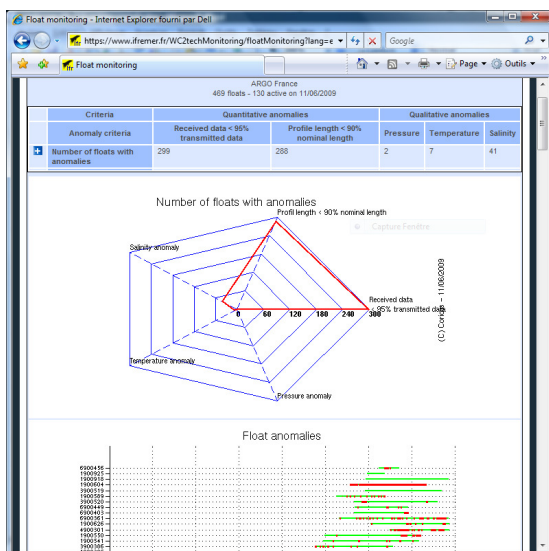
Example 1: technical monitoring of Argo-France floats
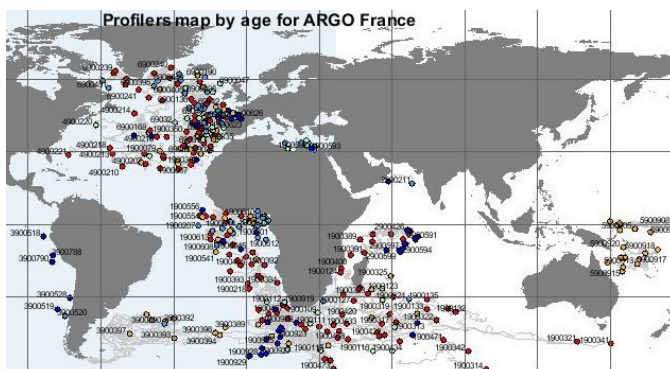
Exemple 2: age map of Argo-France floats.

Data centre activity monitoring: Coriolis operators perform an activity monitoring with an online control board.

Example 1: distribution activity on Tuesday 27th of May. An operator has to perform a diagnostic on an anomaly of Argo profile distribution (red smiley).
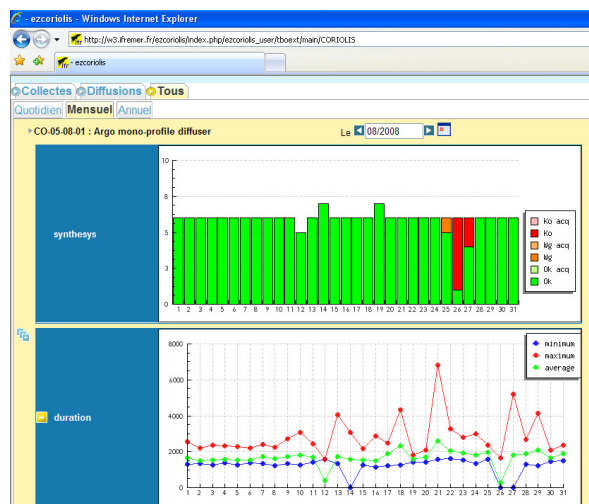
Exemple 2: data distribution to GDAC activity in August 2008. On August 26th, a severe capacity problem on a computer server delayed the data distribution. The problem started on August 26th at 07:40. It was fixed on August 27th at 11:39. However, despite of this problem, data files could be distributed (see first chart, no day is entirely red).

Statistics of Argo data usage (operational models, scientific applications, number of National Pis…)

Operational oceanography models; all floats data are distributed to:
- French model Mercator (global operational model)
- French model Previmer (regional operational)
- French model Soap (navy operational model)
- EU MyOcean models (Foam, Topaz, Moon, Noos)
- EuroGoos projects

Argo projects: this year, Coriolis data centre performed float data management for 36 Argo scientific projects and 44 PIs (Principal Investigators).
List of involved PIs in 2010:

Alain SERPETTE	J. VIALARD
Andreas Sterl	Jens MEINCKE
Andreas STERL	Jens SCHIMANSKI
Antoine POTEAU	Jianqing Zhou
Bernard BOURLES	Jose Luis PELEGRI
Bert RUDELS	Juergen FISCHER
Birgit KLEIN	Juergen FISHER
BOURLES Bernard	Juliet HERMES

Argo data management   Coriolis DAC & GDAC report 2010

C. Maes	K.-P. Koltermann
C. PROVOST et N. BARRE	Kjell Arne MORK
Christine COATANOAN	K-P. Koltermann
Detlef QUADFASEL	Louis PRIEUR
Dr Osvaldo ULLOA	Olaf BOEBBEL
Einar SVENDSEN	Olaf KLATT
Fabien ROQUET	Pierre Marie POULAIN
Frederic VIVIER	Pierre POULAIN
Gerard ELDIN	Sabrina SPEICH et Michel ARHAN
Gerasimos KORRES	Serge LE RESTE
Gilles Reverdin	Sunke Schmidtko
Gregorio PARRILLA	Virginie THIERRY
Holger GIESE	Xavier ANDRE
Isabelle TAUPIER-LEPAGE	Yves GOURIOU

List of scientific project managed in 2010:

ARGO_AWI	FLOPS
ARGO_CHILE	GOODHOPE
ARGO_FIN	IFM
ARGO_NMDIS	IFM2
ARGO_NORWA	IFM-GEOMAR
ARGO_SPAIN	MEDARGO
ASA	MEDARGO_IT
AWI Argo	MFSTEP
BIOArgo	OVIDE
BSH	PREVIMER
CICIO	PROSAT
CIRENE	SFB460
CONGAS	SHOM
Coriolis	TRACK
CORIOLIS	TRACK2010
DAP	WECCON
EGYPT	WEN

Products generated from Argo data …

Distribution of Argo oxygen observations to EU CarboOcean project.
Once a week, all Argo floats data with oxygen observations are distributed to the
German data centre Pangea using the OAI inter-operability protocol (Open
Archive Initiative).
This year, 7 284 new oxygen profiles from 215 floats were distributed.
A total of 29 750 oxygen profiles from 306 floats were distributed since 2004.
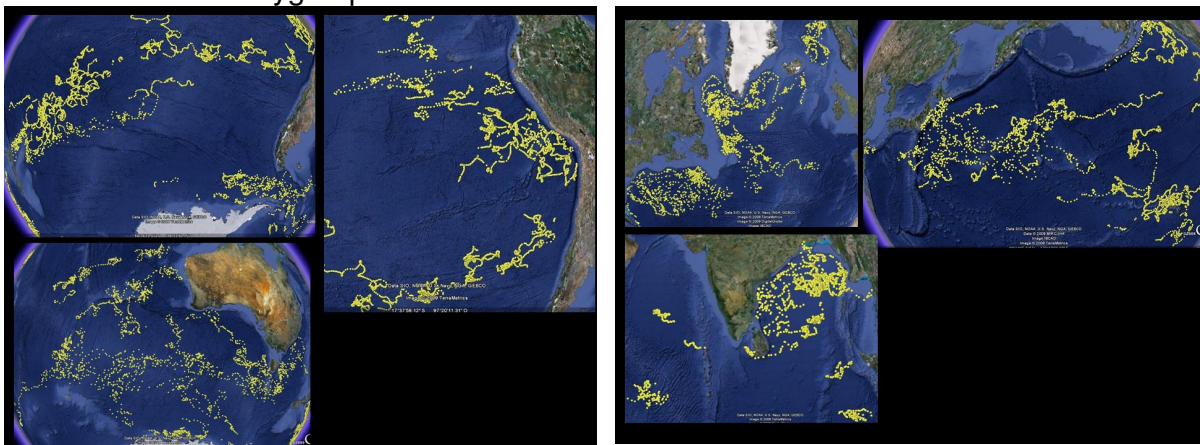
Oxygen profiles collected by all Argo partners since 2004 (yellow dots).

Sub-surface currents Atlas
Based on Coriolis trajectory data, Michel Ollitrault and the Coriolis team are
continuously improving the "Andro" atlas of deep ocean currents.
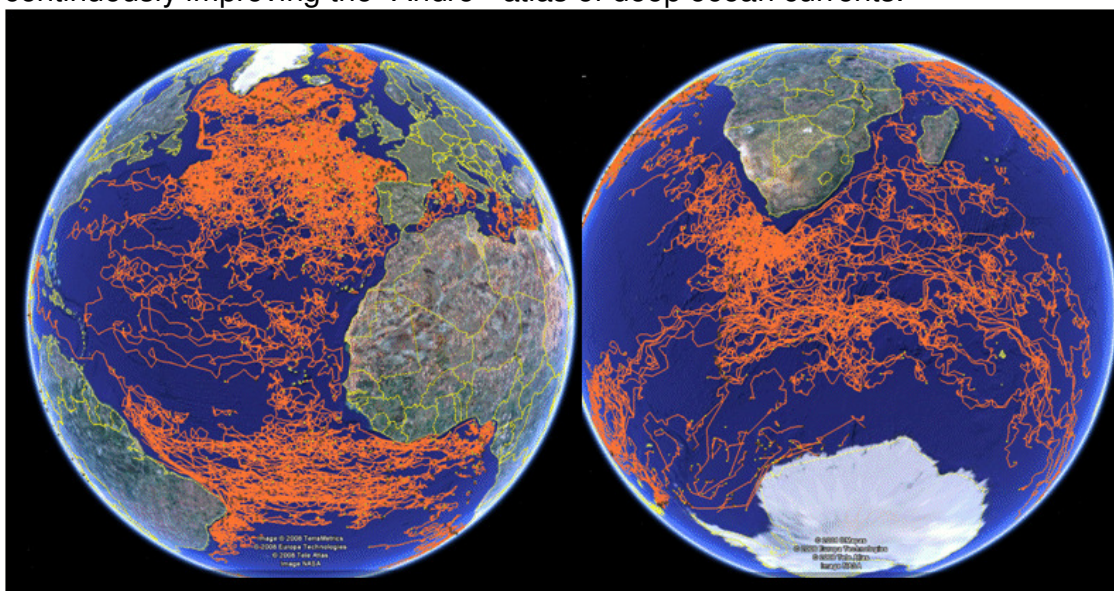
Argo trajectories from Coriolis DAC are carefully scrutinized to produce the
"Andro" atlas of deep ocean currents.

Delayed Mode QC

(Please report on the progress made towards providing delayed mode Argo data, how it's organized and the difficulties encountered and estimate when you expect to be pre-operational)

At the Coriolis data centre, we process the delayed mode quality control following four steps. Before running the OW method, we check carefully the metadata files, the pressure offset, the quality control done in real time and we compare with neighbour profiles to check if a drift or offset could be easily detected. This year, we have tried to work on this way with PIs to strengthen the delayed mode quality control.

Some floats have been deployed from some projects, meaning a lot of PIs and a lot of time for explaining the DM procedure to all of them. A few PIs are totally able to work on DMQC following the four steps but this is not the case for most of them. Since the unavailability of the PIs leads to work by intermittence and then extend the period of work on the floats, we did the work with a private organism (Glazeo) to improve the realization of the DMQC, exchanging only with the PIs to validate results and discuss about physical oceanography in studied area. Working in this way, we have largely improved the amount of delayed mode profiles.

For a few projects, there are still no identified operators to do DMQC, for instance the first run has been done by students which have now left institutes or are not available to carry on with this work. Some of those floats are German floats. Nevertheless we have made progress with BSH and some floats have been processed in DMQC or are in progress (we are finalizing delayed mode QC for some floats). Only a few projects are still waiting for PI's answers.

Concerning the APEX floats, some progresses have been done to correct the surface pressure. Most of the APEX belong to Germany, a lot of those German floats have been corrected by BSH. Some of the French APEX floats need to be review in the decoding step and are in the grey list.

During the last year, more than 20000 new delayed mode profiles where produced and validated by PIs. A large progress has been done.
A total of 64 289 delayed mode profiles where produced and validated since 2005.
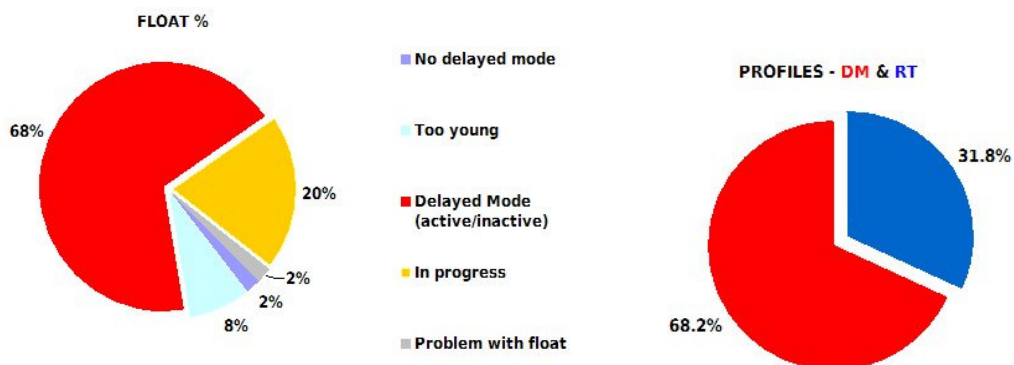
Status of the floats processed by Coriolis DAC. Left: in terms of float percent and right: in terms of profile percent (DM : delayed mode – RT : real time).

Reference database

A new version is available since February 2010. This database has been created from the WOD2009. A new version, which should be available for the end of this year, will take into account feedbacks from users about duplicate or invalid pair and some new CTD will be integrated.
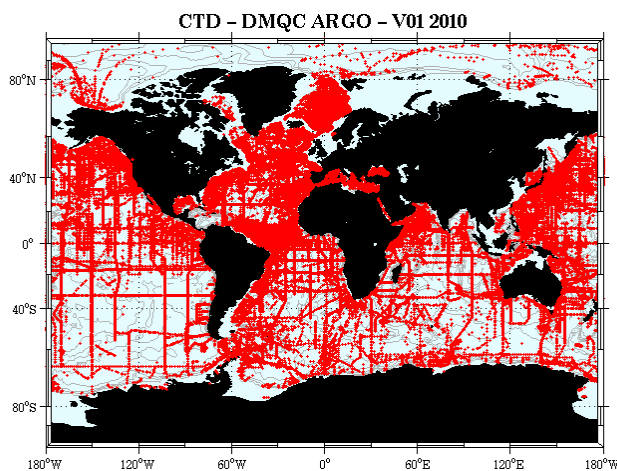
Example of delayed mode activity

A comparison between Argo float observations with SLA and DHA (SLA, Sea Level Anomalies; DHA, Dynamic Height Anomalies) is now used on a routine mode, performed 4 times a year.
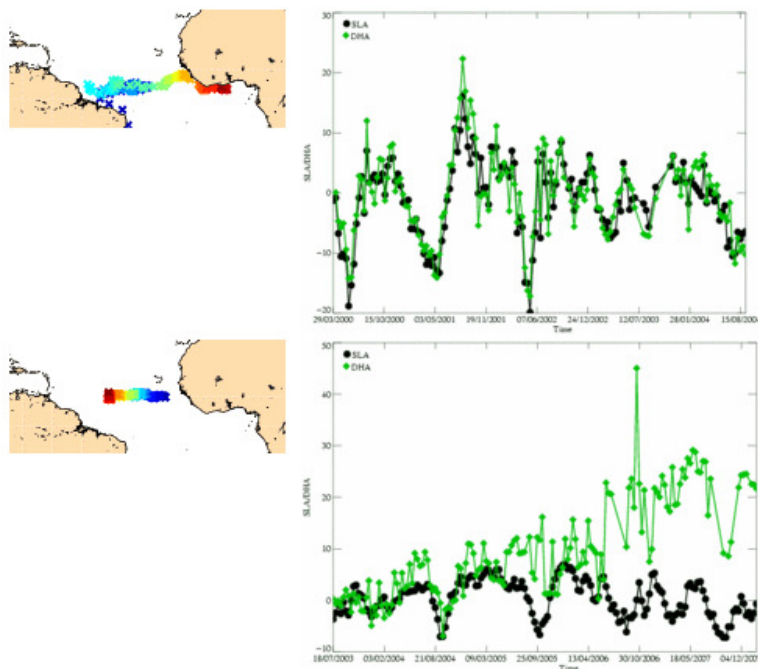
GDAC Functions

(If your centre operates a GDAC, report the progress made on the following tasks and if not yet complete, estimate when you expect them to be complete)

- National centres reporting to you
- Operations of the ftp server
- Operations of the www server
- Data synchronization
- Statistics of Argo data usage : Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …

National centers reporting to you

Currently, 10 national DACs submit regularly data to the French GDAC.

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. The GTS profiles are quality controlled by the French DAC (Coriolis).

On October 15th, the following files were available from the GDAC FTP site.

DAC	Meta-data files	Profile files	Delayed mode profile files	Trajectory files
AOML	3 450	386 300	272 134	3 340
BODC	318	27 888	26 546	298
Coriolis	1 150	94 608	64 289	1 084
CSIO	62	4 277	3 302	62
CSIRO	340	34 307	26 653	335
INCOIS	184	24 706	20 386	184
JMA	940	101 198	67 234	813
KMA	142	11 411	8 377	122
KORDI	115	10 127	0	115
MEDS	300	27 603	17 684	294
Total	7 001	722 425	506 605	6 647

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

Month	Nb files
October 2009	
November 2009	
December 2009	
January 2010	
February 2010	
March 2010	
April 2010	
May 2010	
June 2010	
July 2010	
August 2010	
September 2010	
Total	0

FTP server activity, number of downloaded files
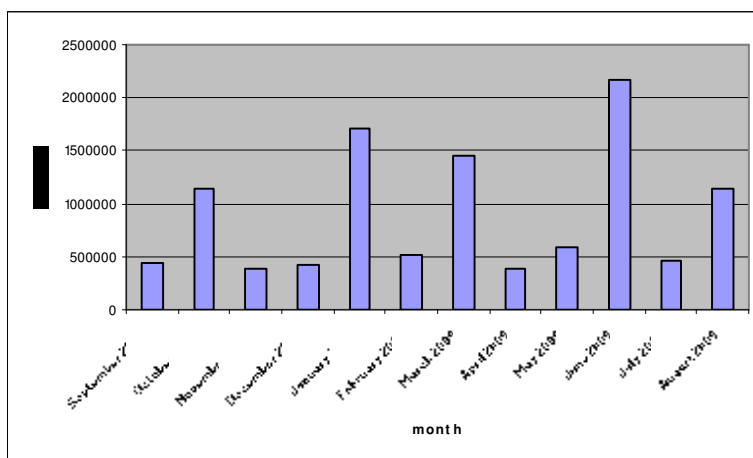
Operations of the www server

The web server address is: http://www.argodatamgt.org

Month	Nb pages
October 2009	
November 2009	
December 2009	
January 2010	
February 2010	
March 2010	
April 2010	
May 2010	
June 2010	
July 2010	
August 2010	
September 2010	
Total	0

Web server activity, number of downloaded files
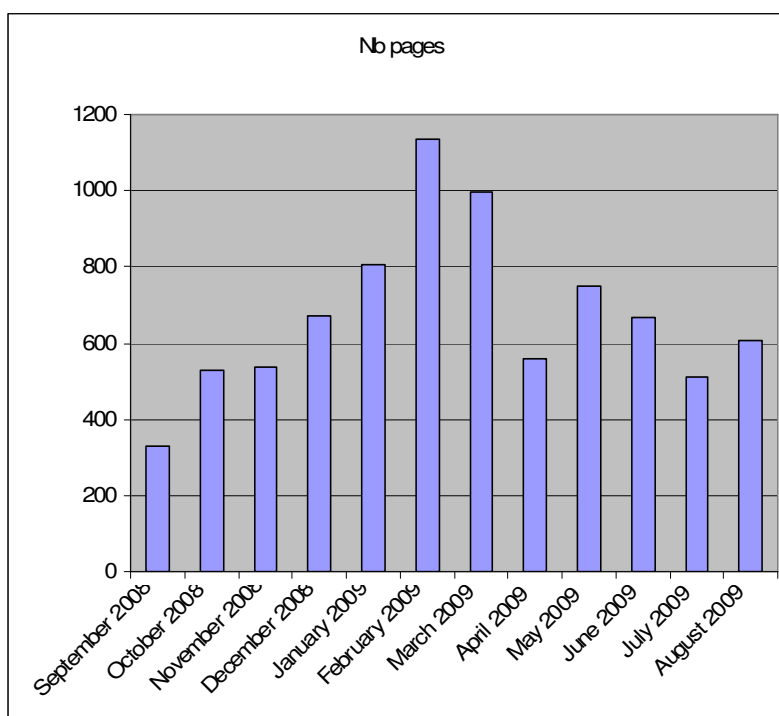
Data synchronization

The synchronization with US-Godae server is performed once a day.
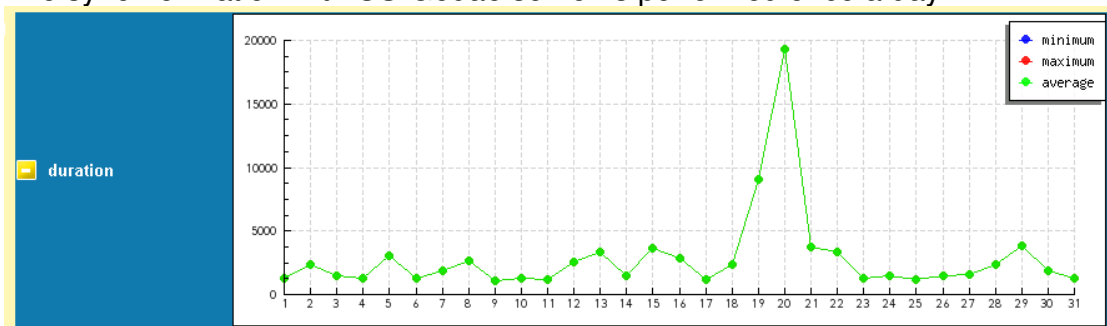
Example of synchronization monitoring: duration of the process in May 2009

Grey list

According to the project requirements Coriolis GDAC hosts a grey list of the floats which are automatically flagged before any automatic or visual quality control.

The greylist has 1 229 entries (October 16th 2010).

Argo data management   Coriolis DAC & GDAC report 2010

Statistics of Argo data usage: Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …
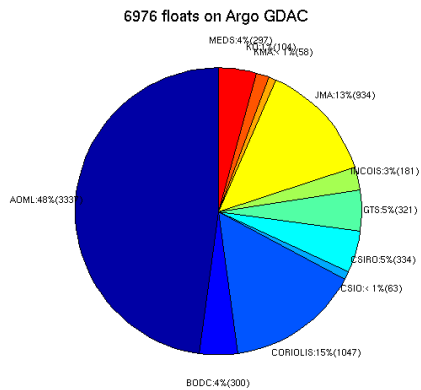
Argo GDAC : floats distribution per DAC in October 2010
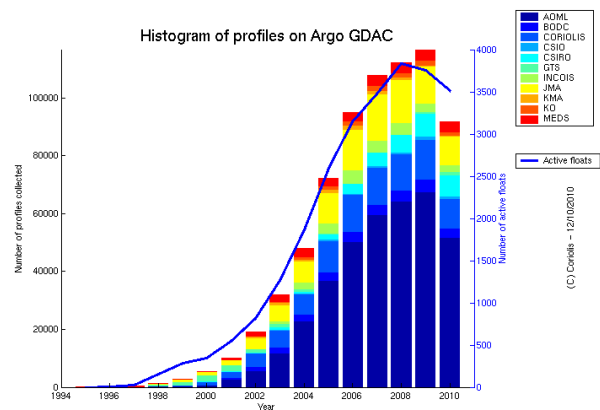
Argo GDAC : profiles distribution per DAC in October 2010[2]
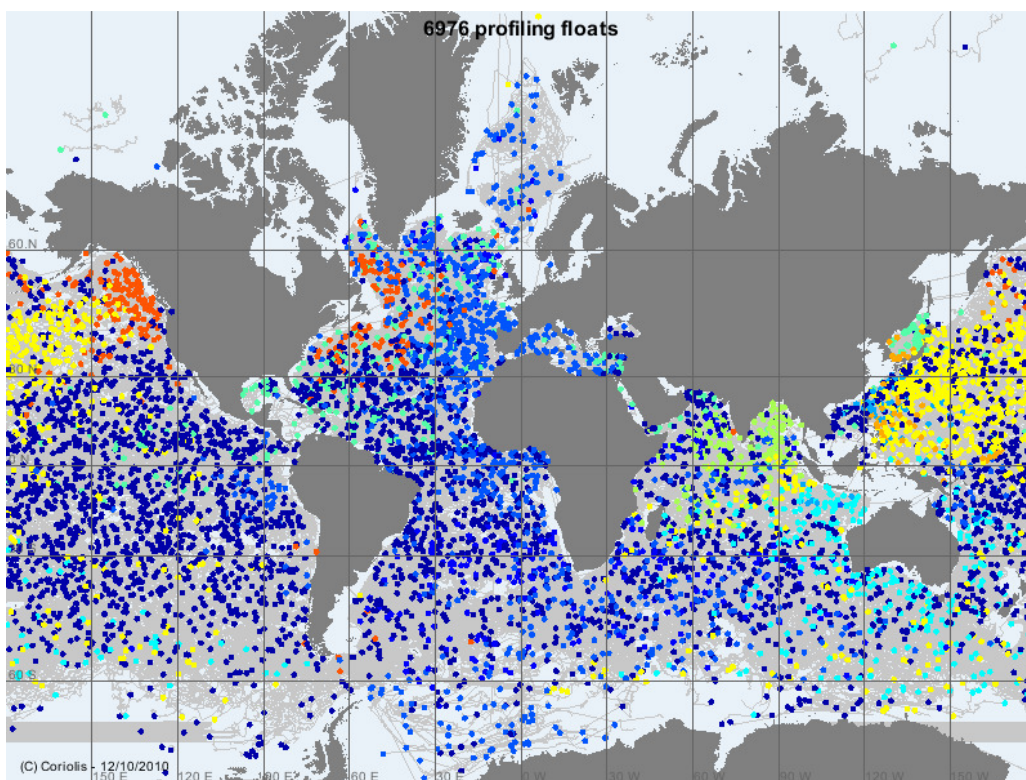
Argo floats available from GDAC in October 2010
(This map includes active and old floats)

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[2] Warning: the blue line displays the total number of active floats during a year. This total is different than the floats active at a particular day.
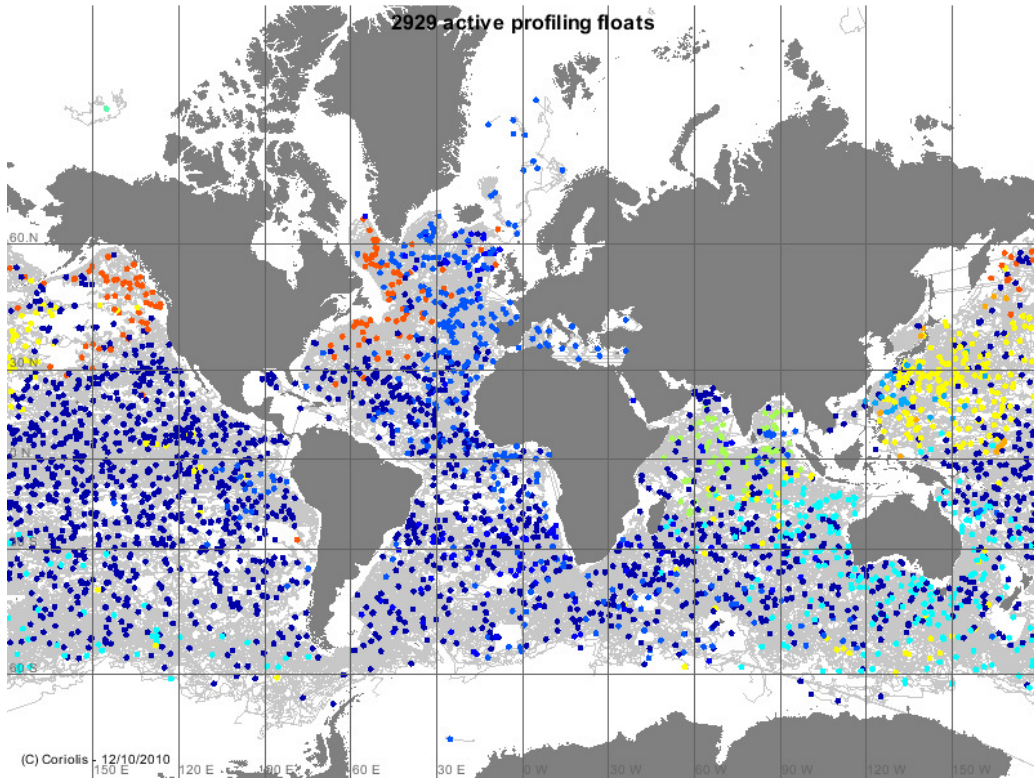
Active Argo profiling floats available from GDAC in October 2010

Argo GDAC : delayed-mode profiles available for delayed-mode in October 2010
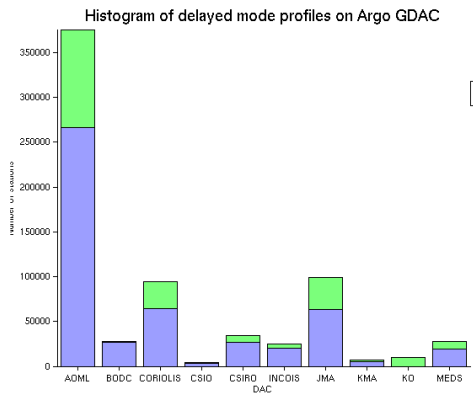
Argo GDAC : delayed-mode profiles
distribution per DAC in October 2010

Argo GDAC : delayed-mode profiles
distribution % per DAC in October 2010

Argo data management   Coriolis DAC & GDAC report 2010

494796 delayed mode profiles on Argo GDAC

MEDS:4%(19445) KMA:1%(6106)
JMA:13%(62995)
INCOIS:4%(20333)
CSIRO:5%(26641)
CSIO:<1%(3305)
CORIOLIS:13%(63991)
AOML:54%(266449)
BODC:5%(26513)
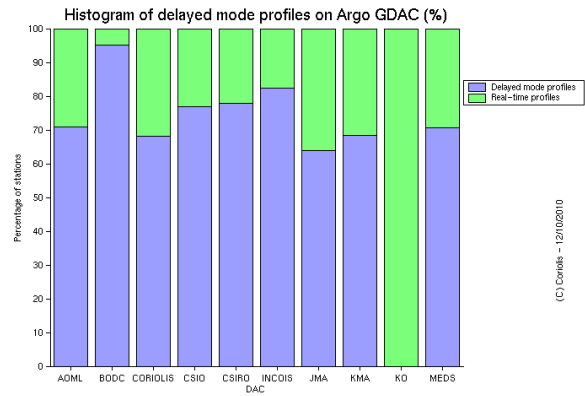
(C) Coriolis – 12/10/2010
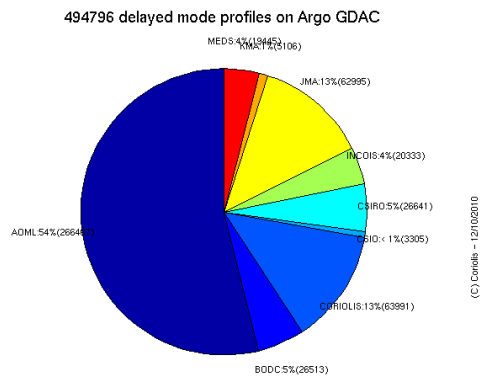
Argo profiling floats with delayed-mode profiles available from GDAC in October 2010

Regional Centre Functions

(If your centre operates a regional centre, report the functions performed, and in planning)
Coriolis is involved in the North Atlantic Argo regional centre. This activity is managed within the European project Euro-Argo.

This activity involves a regular monitoring of the consistency of the quality of data from various types of floats, with techniques such as objective analyses, comparison between floats and altimetry.

A new method is under study for floats salinity inter-comparison. Based on Owen & Wong method, it uses the observations of different floats in an area. This technique may prove useful in area with few CTDs available and to have a delayed mode adjustment with observations more closely related in time.
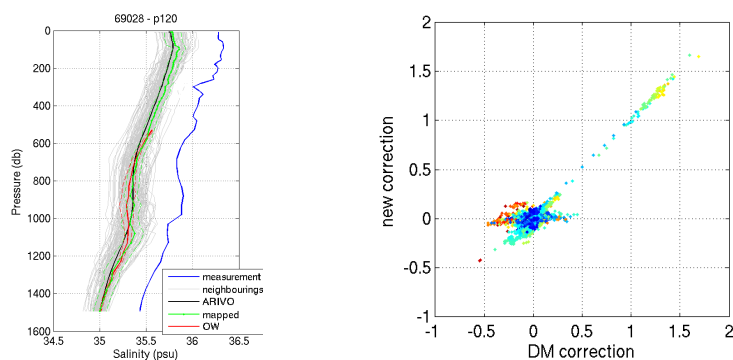
A comparison between real-time, delayed-mode and "newly" adjusted salinity profiles was performed on 200 north Atlantic floats (17 000 profiles)

CLS Argo Data Management Report 2010

Yann Bernard (CLS)

1. CONTEXT

The CLS Company, responsible for Argos system, has a DAC (Data Assembly Center) function for Argo programs which do not have real time processing capabilities. This operational (24h/24h on 365 days/year) data processing is a free added value Argos service. Argo data are processed by CLS for GTS distribution both in CLS France and CLS America Incorporation.

In September 2010, CLS America and AOML processed 1612 U.S. Argos floats and 74 Iridium floats from University of Washington. CLS America converts the Argos/Iridium raw data into a "phy" format (defined by NOAA/AOML) and inserts these files in real-time into the Argo server in CLS America computing center. That server is "operated" by AOML and "hosted" by CLS America. The approved Argo QC is performed on the server and then GTS bulletins are created and sent via ftp to the NWS (National Weather Service) gateway for dissemination onto the GTS. The details of U.S. floats monitoring are presented in the Argo National Data Management Report of United States provided by AOML.

In September 2010 CLS processed in real-time 122 floats for GTS distribution with the GTS-Argos subsystem. Data for these floats are sent via ftp to Meteo-France (Toulouse) in TESAC and BUFR bulletins and then Meteo-France put them on the GTS (Global Telecommunication System). The synoptic below summarizes the Argo data flow since their transmission by the float until their dissemination on the GTS.
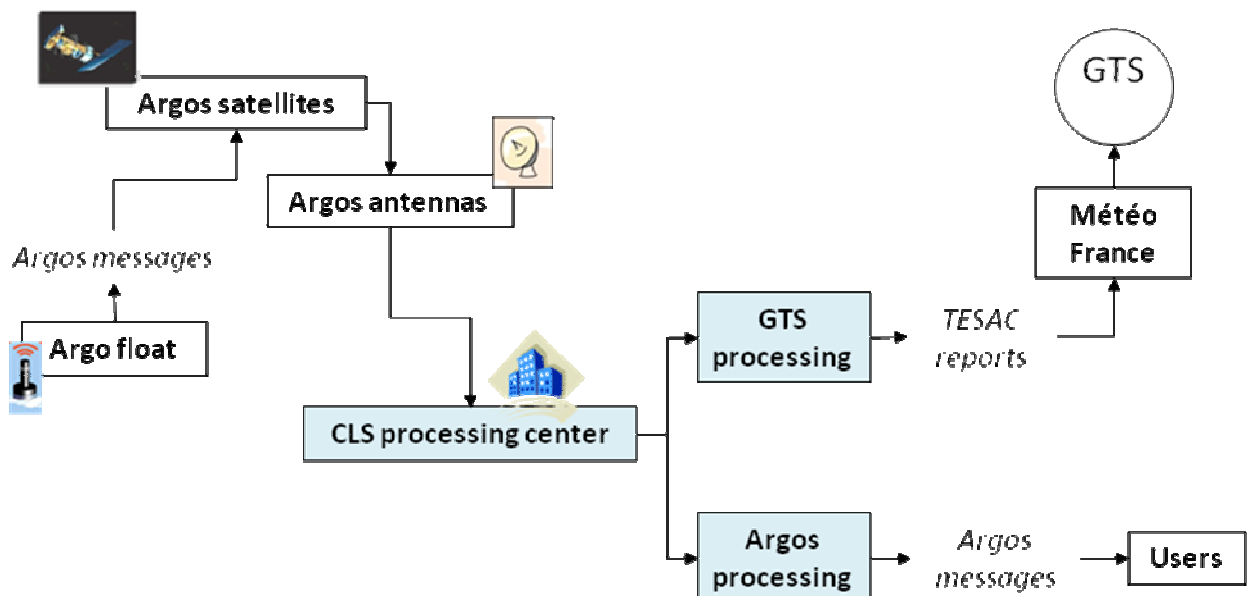
# 2. STATUS OF THE CLS DAC IN SEPTEMBER 2010

- **Data acquired from floats :**
    o 171 floats were declared in the CLS GTS database
    o 122 instruments were active in this month
    o 122 floats disseminated data profiles on GTS
    o 30 floats are inactive (no more transmission) or grey listed (failing status)
    o 19 floats are not yet deployed
    o 364 profiles from CLS were sent on GTS in September 2010

- **Description of the 171 floats :** CLS processed in real time floats for Argo program which are not hosted by a national DAC:
    o 78 INCOIS floats (India)
    o 53 SOA floats (China)
    o 40 KORDI floats (Korea)

All these floats are Webb Apex floats with 15 different Argos data formats.


- **Data issued to GTS:** All data processed by CLS are distributed on the GTS by way of Meteo-France. This operation is automatically performed and TESAC bulletins are sent to Meteo-France every 2 minutes. Before the encoding in TESAC bulletins, Argo data are filtered by Argo QC procedure. The GTS processing at CLS is operational and in backup with the CLS America processing center in Largo, Washington DC, 7/7 24/24.
    o 5325 profiles were relayed onto GTS between September 2009 and September 2010 (source: Météo-France)
    o 100% of TESAC produced by CLS are on the GTS (no more filtering by Météo-France)

- **Argo Real Time processing monitoring:** All different data formats are referenced and each format has a dedicated template (processing model) in the CLS GTS database. Each month, a monitoring is made for Argo floats present in the CLS GTS database:
    o Argos transmissions in the last month are checked for all floats,
    o GTS disseminations in the last month are checked for all floats,

o New floats to be set up for GTS are implemented in CLS GTS data base at each beginning of month with a list (table 10: "Floats to be set up for GTS") provided by JCOMMOPS (M. Belbeoch) in the Argo Information Centre Monthly Report.

o Active floats to be grey listed are removed from the CLS GTS database at each beginning of month with a list (table 15: "Active floats Grey list") provided by JCOMMOPS (M. Belbeoch) in the Argo Information Centre Monthly Report.
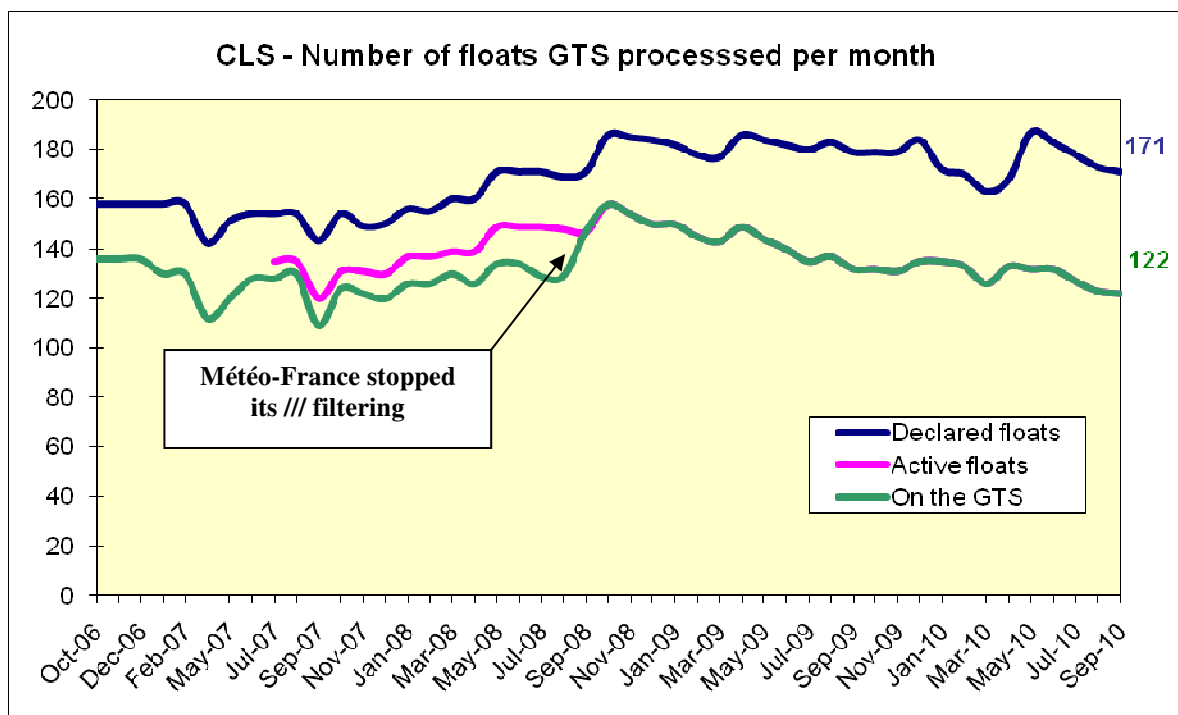

**Status of CLS Argo GTS processing**
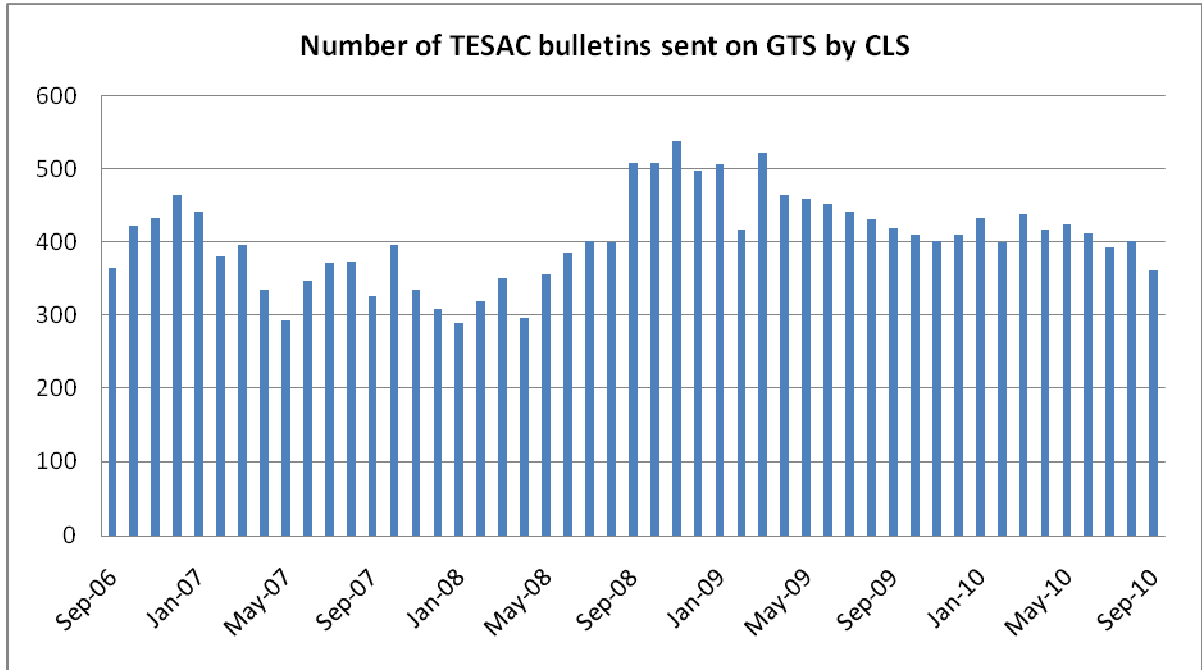
Number of profiles sent on the GTS by CLS per month

- **Web pages**: All GTS observations (profiles for Argo) are available on https://argos-system.cls.fr/cwi/Logon.do. It consists of a user access to his observation data.

- **BUFR format**: BUFR bulletins are produced in addition of TESAC bulletins for all floats GTS processed by CLS with only one header: IOPX92 LFVW.

- **Time of delivery on GTS**: A monitoring delay tool, specified with JCOMMOPS is operational since September 2008 at CLS. The average time of TESAC delivery on GTS is less than 6 hours. This time is computed with date/time of observation and the date/time of bulletin sending to Météo France. It depends of the float model and especially of the number of different Argos messages necessary to build the profile (= number of points in the profile). See below statistics on last three months.

Number of Argo floats processed per day
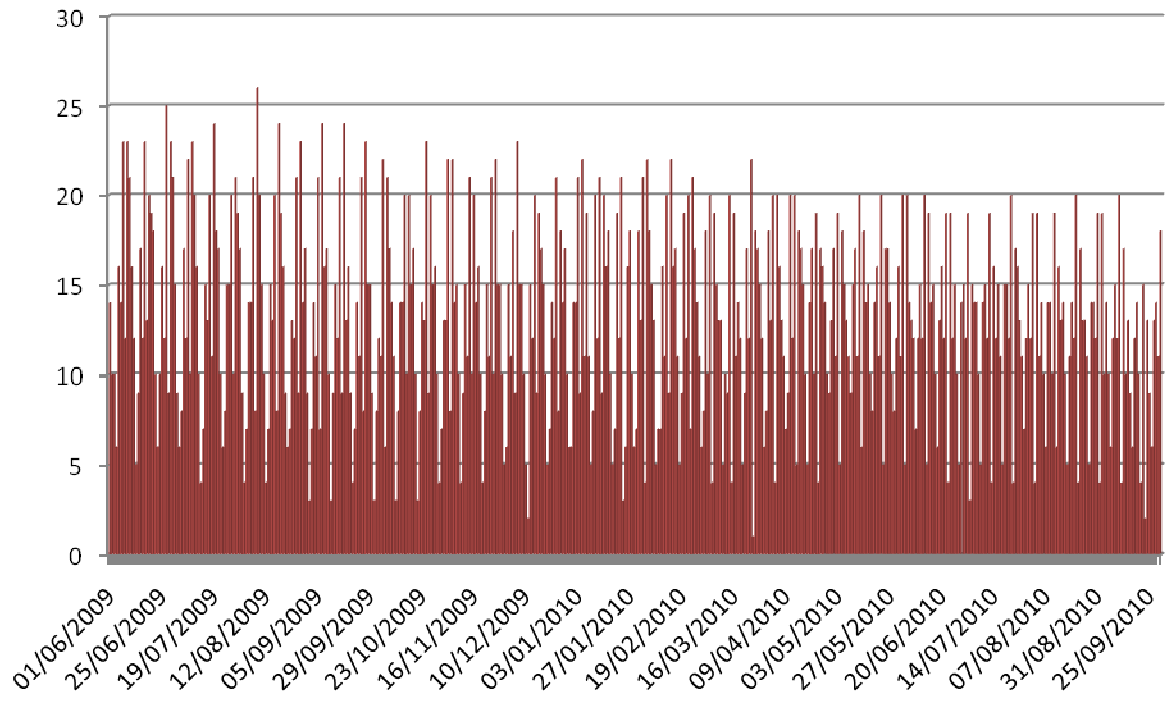
Daily average TESAC delivery time (in min) on GTS
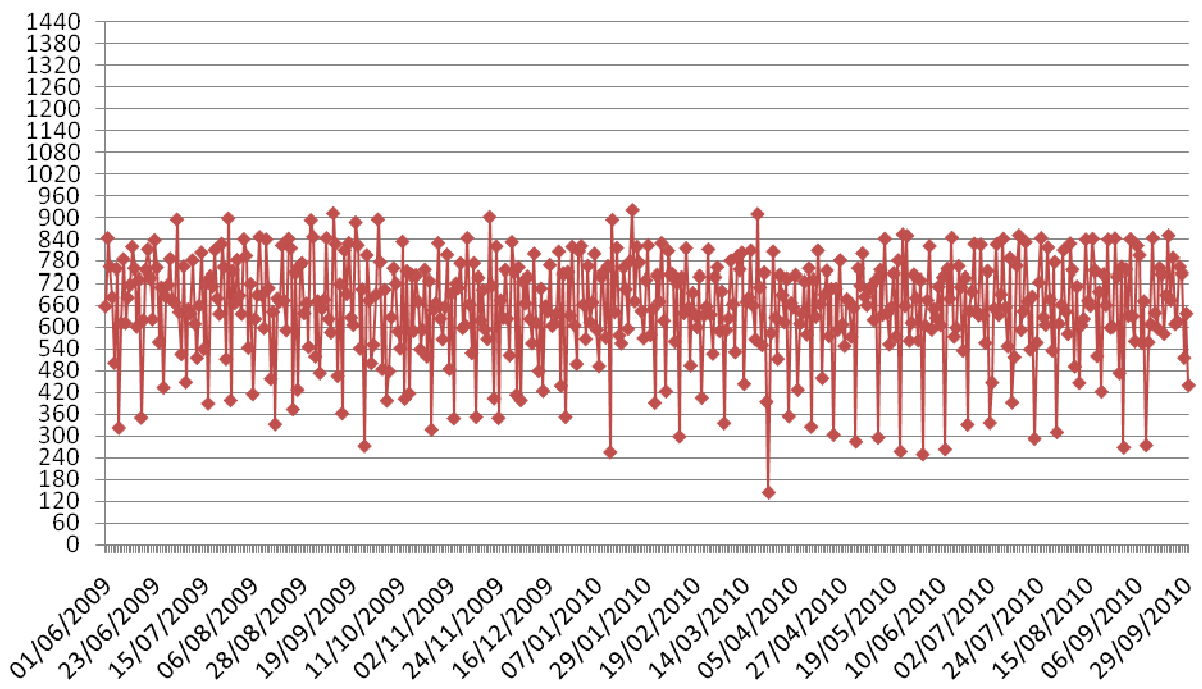
3. NEW PROJECTS AT CLS FOR ARGO PROGRAM

- Argos Web Service: all Argos data, including diagnostics data, are now available via a web service. This new service allows all Argo programs to get their data from the CLS database, via an XML request, in CSV format, XML format and soon in KML format (Google Earth format).
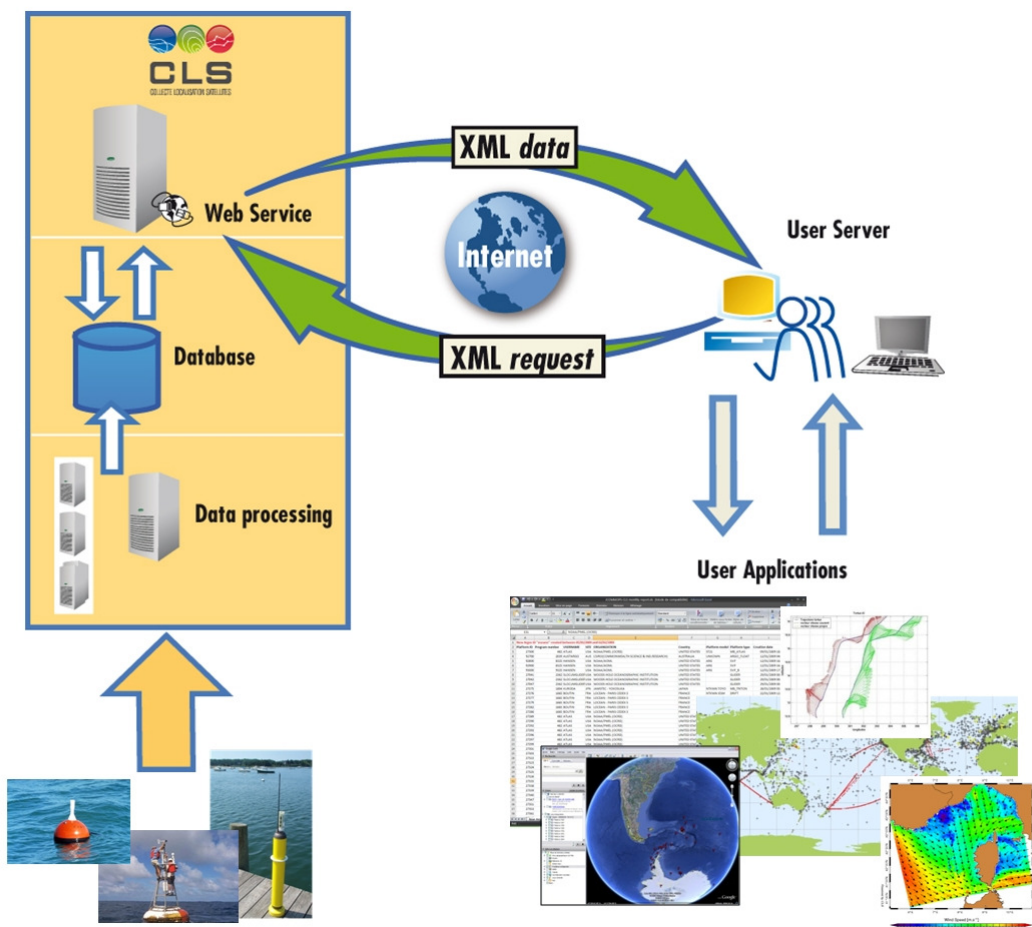
This Machine to Machine distribution data tool is free and specifications can be asked to ybernard@cls.fr.

The protocol used to communicate between the Argos processing center and the user is based on SOAP (Simple Object Access Protocol) over HTTP. The SOAP protocol allows exchanging data in XML format. This is an RPC (remote access protocol) object oriented in XML. The SOAP protocol can be used over HTTP, HTTPS, SMTP …

The web services defined hereunder are available upon following URLs:
http://ws-argos.cls.fr/argosDws/services
http://ws-argos.clsamerica.com/argosDws/services

- **New Argos location algorithm**: a new processing system for Argos positioning will be available at the end of 2010 for all Argos platforms, included Argo floats. It will reduce positioning errors, eliminate mirror locations and provide systematic information about the precision obtained.

With the current processing system, positions are calculated by a traditional 'least squares' estimation method. In the new system, positions are estimated by applying Kalman filtering to the Doppler measurements. Using this filter requires choosing a movement model for the beacon being tracked. A simple random walk is sufficient to obtain significantly improved positioning.

In order to validate precisely this new method, CLS has chosen a representative sample of Argos platforms, included Argo floats in nominal cases

ARGOS trajectory before switching to the new processing system.

but also in extreme situation as beached floats or iced over floats. The results of validation will be presented to the Argo community and the trajectory working group.


ARGOS positions calculated using the new ARGOS processing system. The mirror locations have disappeared.

- **Iridium data services:** In 2010 CLS started to provide Iridium data (Short Burst and Dial Up Data). Thanks to a VAR (Value Added Reseller) agreement with Iridium, CLS is an Iridium data provider for Argo. It's already the case for several Argo programs as Second Institute of Oceanography (China) Med Argo and Argo Norway.

Thanks to an IP connection with the Gateway, CLS and CLS America receive Iridium raw data from floats, then process and distribute them to the Argo users by email, FTP or Web service. The service is fully operational 7/7 24/24. If needed, GTS real-time processing (TESAC and BUFR bulletins) can be done by CLS. For all further information, please contact ybernard@cls.fr.

Synoptic below summarize the Argo data flow since their transmission by floats via the Iridium system until their distribution to the users for the 3 communication protocols used by Argo floats.
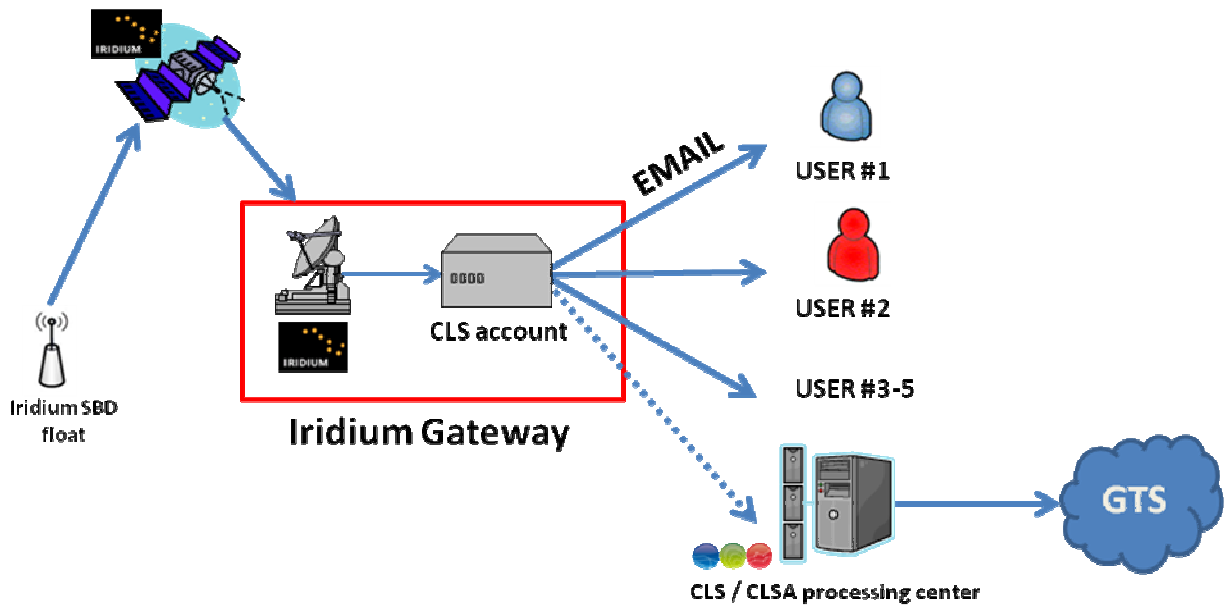
Iridium RUDICS float:
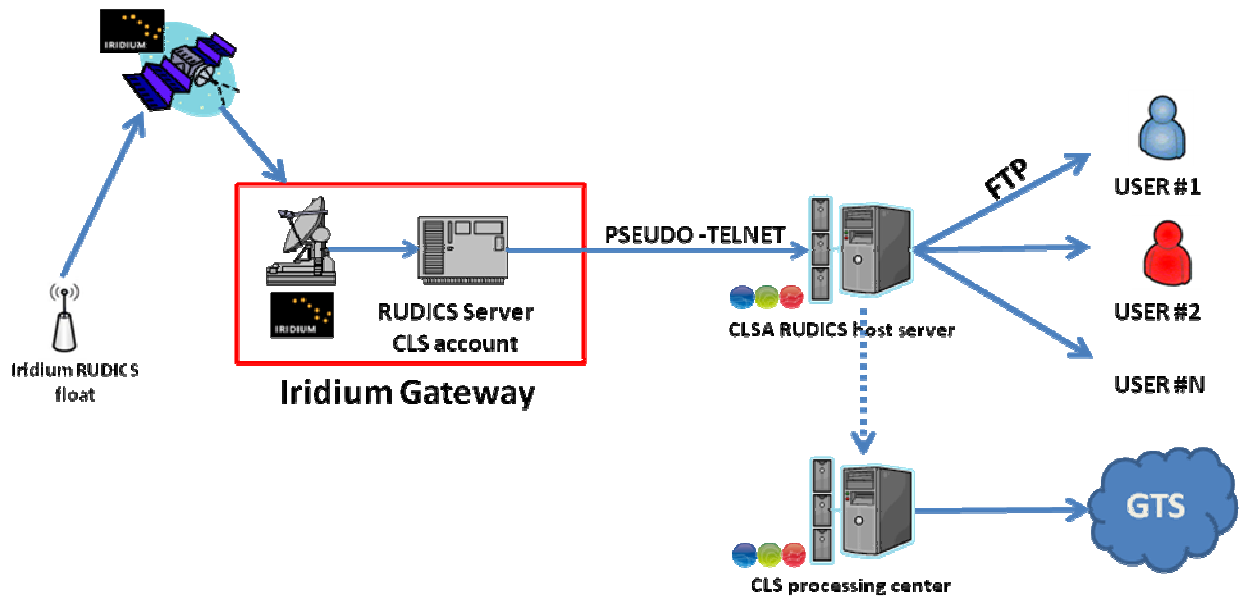
Iridium Circuit Switched float:
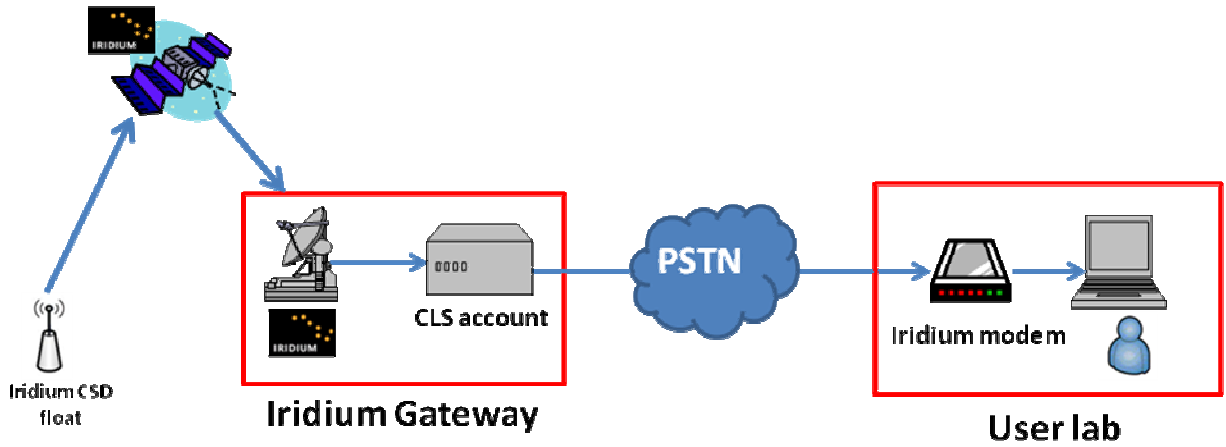
Iridium SBD float:

GERMAN ARGO PROGRAMME

PRESENT STATUS AND FUTURE PLANS

B. Klein, BSH
October 13, 2010

1. Background and organization of German Argo activities

The German Argo programme has been initialised as a partnership between three oceanographic institutions (AWI, BSH, IfM-Geomar) in Germany. German Argo began in 2004 and was funded by the Ministry of Research until the end of 2007. German Argo is an operational programme since the beginning of 2008 and the Ministry of Transportation is providing long-term funding for German Argo. BSH will manage the German contribution to the international programme. An expert group consisting of the BSH and partners from the oceanographic institutes has been establish to coordinate the German deployment plans.

Deployment of profiling floats started as early as 1998 within several research projects. All pre-Argo floats were declared Argo-equivalent floats and the respective data sets have been submitted to the GDACs through Coriolis. Floats deployed by IfM-Hamburg in the context of the Mersea and WEN projects have also been made available for the Argo programme.

The BSH and KDM (a consortium of German research institutes) are participants in the Euro-Argo project. Euro-Argo will aim at promoting an European contribution to Argo and establish an European structure from the various national programmes (to be defined in the Euro-Argo PP) after 2011.

1.1 Deployed floats

Since 1998, more than 380 floats have been deployed by Germany in a number of different geographic areas and programmes (ARGO_AWI, ARGO_Greenland, BSH, Clivar Marine German Programme, IFM2, IFM_GEOMAR, SFB460, TROPAT, WECCON, WEN). Deployments have focused on meeting specific German research requirements, but contributed also to the global array. The German contribution is comparable to that from other developed countries and has provided a significant contribution to the growing Argo array.

They main interest of Germany will remain in the Atlantic, but to maintain the global array floats could also be deployed in the other oceans if necessary. Recent deployments reflect the specific research interests and range from the Nordic Seas, the subpolar North Atlantic, the tropical Atlantic to the Atlantic sector of the southern Ocean.

Overall Germany plans to contribute to the Argo global array at the level of about 60-70 floats per year with funding from BSH/BMVBS (about 50 floats/year) and individual science programs (BMBF, DFG and national budgets at about 20 floats/year). The majority of the Argo-equivalent floats will be used for regional enhancements in the polar areas. In 2010 the agreed funding will amount (44/6) floats funded by BMVBS and (2/20) floats funded by science programmes. The numbers in parenthesis indicate core Argo/additional deployments.

Year	Deployed floats
2000	27
2001	21
2002	14
2003	27
2004	45
2005	65
2006	36
2007	39
2008	72
2009	35
2010	49 +??
2011 plans	50 + rest of 21 from 2010 + 20 science floats

Tab. 1: Floats deployed by Germany as a contribution to Argo since 2000

1.2 Float Development

Most of the floats deployed by Germany in the past are APEX floats purchased from Webb Research, but a smaller amount of floats are manufactured by the German company Optimare. Optimare has been working in close collaboration with the AWI and has developed a float type suitable for partially ice covered seas. These floats are equipped with an ice sensing algorithm which prevents the float from ascending to the surface under ice conditions and prevents it from being crushed. Float profiles are stored internally until they can be transmitted during ice free conditions. The ice sensing algorithm has been successfully tested in the Antarctic, in 2009 initial tests have been performed in the Arctic which will be continued in 2010.Most of the German floats are equipped with the standard Seabird CTD but occasionally additional sensors as Aanderaa optodes and Rafos acoustic receivers are installed.

Deployments in 2010 lag behind the original plans due to time delays in float procurement. But the remaining 21 floats will be deployed early 2011. Since the price of floats increased due to the dollar exchange rate a slightly smaller amount of floats could be purchased. The float deployment from the science community is also lagging behind the original plans for 2010. The deployment in the Southern Ocean is going to take place mainly in 2011. Until the end of the year the deployments will have reached 49 floats in the Northern and Southern Atlantic.
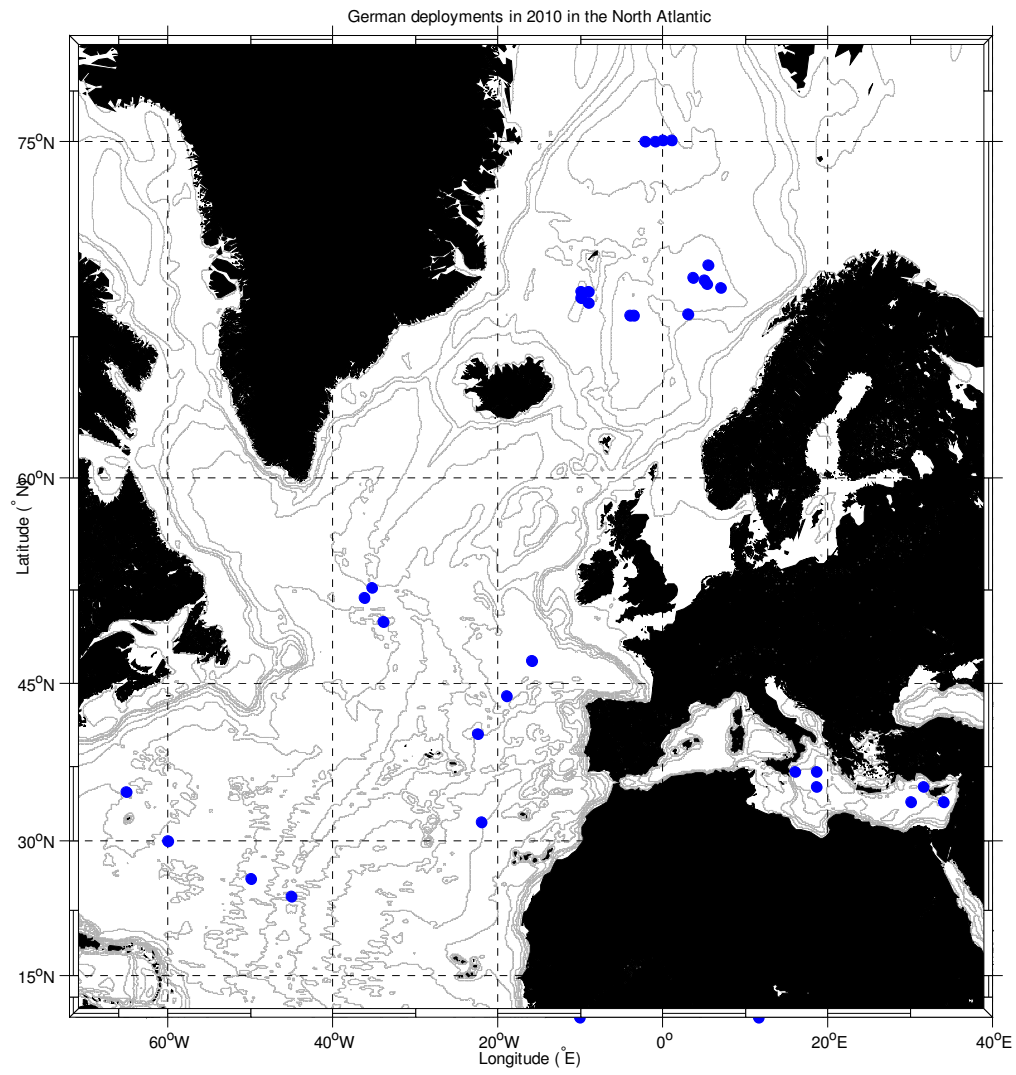
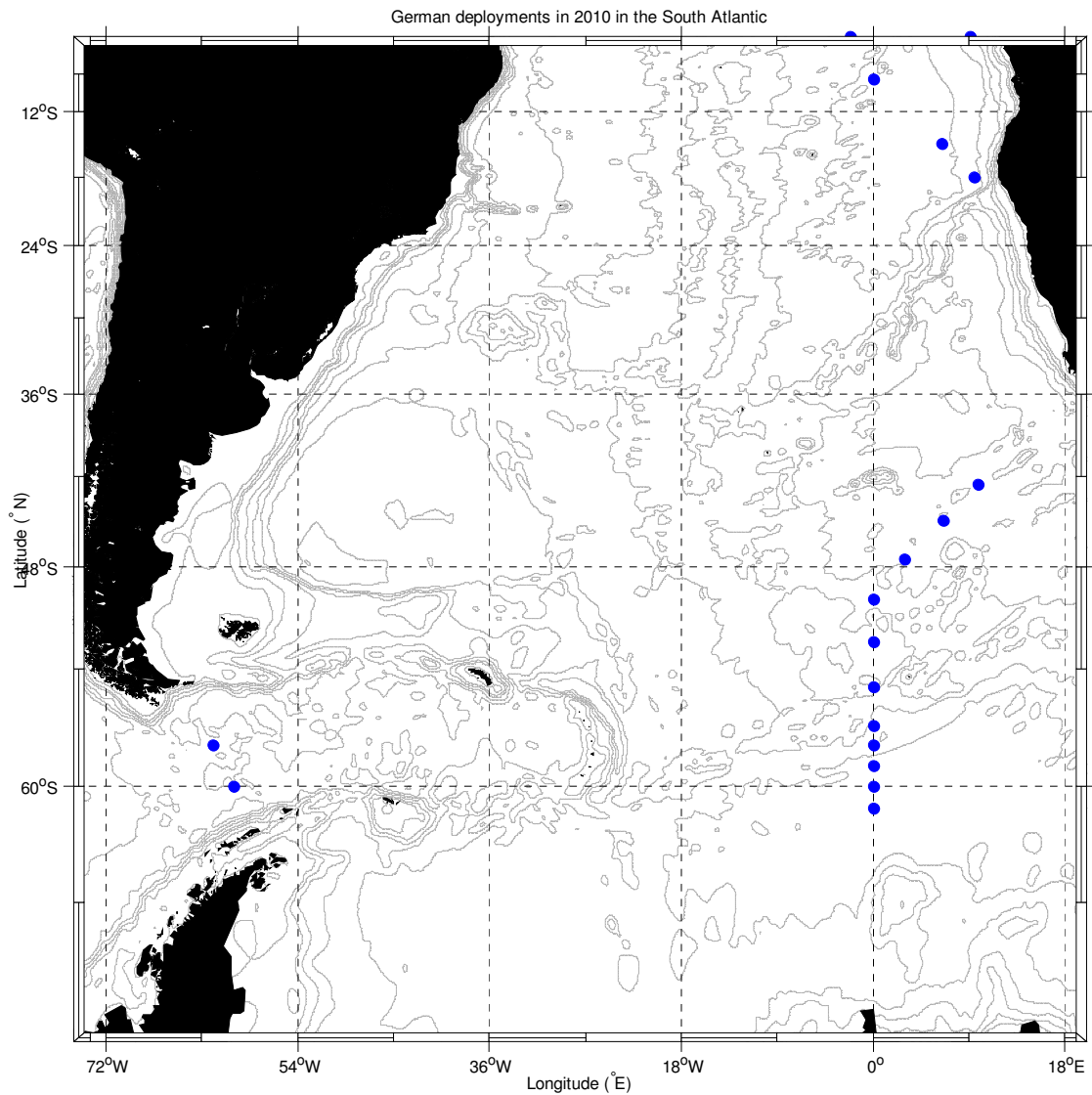Fig. 1a: Floatd feployment in 2010 in the Northern Atlantic.

Fig. 1b: Float deployments in 2010 in the South Atlantic

1.3 Data management

Real-time data processing. The real-time data processing for all German floats is performed at the Coriolis Center in France. Data processing follows the procedures set up by the Argo Data Management Team.

Delayed-mode data processing. The delayed mode processing is distributed between the various German institutions contributing to Argo, depending on their area of expertise. AWI is responsible for the southern Ocean, IfM-Hamburg together with BSH is processing the German floats in the Nordic Sea, and BSH is covering the tropical, subtropical Atlantic and subpolar Atlantic. The sharing of delayed-mode data processing will be continued in the coming years, but BSH will cover all the German floats which have not been assigned a PI.

BSH also has adopted some European floats which did not have a DMQC operator assigned to them. All German institutions have been working in close collaboration with Coriolis and delayed mode data have been provided on a 6 monthly basis. Delays in delayed-mode data processing have occurred occasionally due to changes in personal and delay in data transmission in the Southern Ocean due to ice coverage. Delayed-mode data processing follows the rules set up by the Data Management Team.

North Atlantic Argo Regional Centre (NA-ARC). Germany has contributed to the activities of the NA-ARC. Work has concentrated on acquiring recent CTD data to improve the reference data set for the North Atlantic Ocean needed for scientific QC of the float data and co-ordinates the delayed mode processing in the different institutes in Germany. Germany has adopted floats from different smaller Argo programmes as Norway, Netherlands, Finnland, Poland and Danmark.

1.4. Operational and scientific use of Argo data

A key aspect of the German Argo programme is to develop a data base for climate analysis from Argo data, to provide operational products (time series, climate indices) for interpretation of local changes and to provide data for research applications. German Argo is planning to host an annual user workshop where research applications can be presented and requests for operational products can be specified.

Ocean science: Argo data are being used by many researchers in Germany to improve the understanding of ocean variability (e.g. circulation, heat storage and budget, and convection), climate monitoring and application in ocean models (assimilations, boundary conditions,…).

2. Funding

2.1 Existing funding for German Argo

As noted above the German Argo Project has been funded by the Ministry of Research from 2004-2007 and will be funded by the Ministry of Transportation from 2008 onwards. Funding in 2007 was meant to ensure a smooth transition into the operational phase and covered only personnel costs. Overall the level of support is indicated in the table below. Approximately 50 floats per year will be contributed to the global array by Germany. Funding from the Ministry of Transportation covers only costs related to float procurement and transmission costs, personnel will be provided by BSH. This will consist of 1 scientist and 1 technician.

Year	Float related costs	Manmonth/Year
2007	0k€	36
2008	550k€	24
2009	600k€	24
2010	600k€	24
2011	600k€	24
2012	600k€	24
2013	650k€	24

Table 2. Previous and future funding for German Argo.

2.2 On the future funding and organization for German Argo – links with Euro Argo PP

Germany will to contribute to the Argo global array at the level of about 50 floats per year. Requests for financial contribution have been included in the national budgets for 2009-2013, but final budget negotiations will be carried out on an annual basis. As part of the Euro-Argo preparatory phase, BSH will work with its funding ministry to agree on a long-term European structure. The research community has also secured funding for floats in the order of 20 floats per year for the next 3 years which will mostly be used for regional enhancements in the polar areas.

3. Future plans for 2011

Float deployment in 2011 will be performed in co-operation with the German research institutes. Germany owns deployment capabilities for all oceans including the ice covered areas but foreign research cruises will be used as well to cover all intended deployment areas.

The main goal is to support the global array in the Atlantic ocean. The intended deployment areas cover particularly data sparse regions in the Atlantic, the Nordic Seas and the Mediterranean. Additional floats will be deployed in the Weddell Sea. Floats from the science community will be deployed in the Southern Ocean and the Pacific.

Argo National Data Management Report (2010) – India

1. Status

- **Data acquired from floats**

  India has deployed 9 new floats (9-APF9A with near surface temperature mission) in 2010 in the Indian Ocean taking its tally to184 floats so far. Out of these 68 floats are active. All the active floats data are processed and sent to GDAC.

- **Data issued to GTS**

  Presently we do not have GTS access and hence we are not able to send Indian floats data to GTS. Up on our request CLS ARGOS is still continuing to send Indian floats data in TESAC format to GTS.

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

  All the active floats (68) data are subject to real time quality control and are being successfully uploaded to GDAC. RT s/w obtained in collaboration with CSIRO is extensively used for the same. The support of CSIRO in term of the Real Time S/W is highly acknowledged.

- **Data issued for delayed QC**

  In total 73% of the eligible profiles for DMQC are generated and uploaded to GDAC. Lack of manpower is hindering rapid progress in generating DMQC profiles.

- **Web pages**

  - INCOIS is maintaining Web-GIS based site for Indian Argo Program. It contains entire Indian Ocean floats data along with trajectories. Further details can be obtained by following the link http://www.incois.gov.in/Incois/argo/argo_home.jsp. Apart from the floats deployed by India, data from floats deployed by other nations in the Indian Ocean are received from the Argo Mirror and made available in the INCOIS website. User can download the data based on his requirement.
  - Statistics of Indian and Indian Ocean floats are generated and maintained in INCOIS web site. The density maps for aiding people for new deployments are made available on a monthly basis. For full details visit http://www.incois.gov.in/Incois/argo/argostats_index.jsp.

- **Trajectory**

  1. A total of **167 trajectory** netcdf files were processed and uploaded to the GDAC. The process of generation of trajectory netcdf files undergoes quality checks like position, time, cycle number, etc., and corresponding quality status is assigned to each parameter. Finally a visual check is performed to verify that there are no missing cycles without cycle numbers and to check the surface time intervals.
  2. **17 (PROVOR) floats** are not eligible for the processing of the trajectory data files in current processing procedure and a new method has to be adopted.

- **Statistics of Argo data usage**

  Argo data is widely put to use by various Organisations/ Universities/ Departments. Indian Meteorological Department (IMD) is using Argo data for their operational purpose. Scientists, Students and Researchers from INCOIS, NIO, SAC, C-MMACS, NRSA, IITM, NCMRWF, IISc etc are using Argo data in various analysis. Many paper based on Argo data were also published in reputed journals. See the references below.

  INCOIS Argo web page statistics (for the past one year) are as shown below

Page	Hits	Visitors
Argo Web-GIS	2137	1017
Data download	8252	417
Live Access Server	1027	519
Argo products	812	302

- **Products generated from Argo data**
  1. Value added products obtained from Argo data are continued. Many products are generated using Argo temperature and salinity data. The Argo T/S data are first objectively analysed and this gridded output is used in deriving value added products. More on this can be see in the RDAC functions.
  2. Version 2.0 of DVD on "Argo data and products for the Indian Ocean" is released to public for use. This DVD consists of ~ 1,25,000 profiles and products based on the Argo T/S. A GUI is provided for user to have easy access to the data.
  3. Updation to Mixed Layer Climatology based purely on Argo observation is in progress. All the profiles from 2009 – 2010 will be used for this. This is being done on a special request from Indian Navy.
  4. To cater to many users of INCOIS LAS, it is enhanced in term of capacity. New Server is procured and new products will be made available in near future. For further details visit http://las.incois.gov.in.

2. Delayed Mode QC

- INCOIS started generating and uploading D files to GDAC form July 2006, and as of today, profiles belonging to all eligible floats have been subjected to DMQC.
- Advanced Delayed Mode Quality Control s/w developed by CSIRO is successfully transferred to INCOIS. Using this s/w all the eligible floats are reprocessed to tackle pressure sensor offset problems, salinity hooks, thermal lag corrections, salinity drifts.
- Lack of enough historical background data is hindering the DMQC processing. But majority of the Indian floats are found not to have big drifts in the salinity sensors.
- About 73% of the eligible profiles are subjected to DMQC and the delayed mode profiles are uploaded on to GDAC.

3. GDAC Functions

INCOIS is not operating as a GDAC.

4. Regional Centre Functions

- Acquisition of Argo data from GDAC corresponding to floats other than deployed by India and made them available on INCOIS web site.
- Delayed Mode Quality Control
  (Refer 2.0 above)
- Data from the Indian Ocean regions are gridded into 1x1 box for monthly and 10 days and monthly intervals. These gridded data sets are made available through INCOIS Live Access Server (ILAS). Users can view and download data/images in their desired format.
- Additionally SST from TMI and Wind from Quickscat, Chla from MODIS and OCM are also made available on daily and monthly basis.
- Data Sets (CTD, XBT) are being acquired from many principle investigators. These data are being utilized for quality control of Argo profiles.
- Value added products:
  Two types of products are currently being made available to various user from INCOIS web site. They are:

  (i) Time series plots corresponding to each float (only for Indian floats). This include the following plots:
    - Water fall plots
    - Surface pressure
    - Bottom most pressure
    - Surface temperature
    - Bottom most temperature
    - Surface salinity
    - Bottom most salinity
    - Trajectory of float
    - T/S plots.

  (ii) Spatial plots using the objectively analysed from all the Argo floats data deployed in the Indian Ocean. This includes:
   - Temperature (at 0, 75, 100, 200, 500, 1000 meters)
    - Salinity (at 0, 75, 100, 200, 500, 1000 meters)
    - Geostrophic Currents (at 0, 75, 100, 200, 500, 1000 meters)
    - Mixed Layer Depth, Isothermal Layer Depth
    - Heat Content up to 300 mts
    - Depth of 20 deg and 26 deg isotherms

  These valued added products can be obtained from the following link
  http://www.incois.gov.in/Incois/argo/products/argo_frames.html
- Regional Co-ordination for Argo floats deployment plan for Indian Ocean. The float density in Indian Ocean as on 08 Oct, 2010 is shown below.

Active Float Density as on 08 Oct 2010
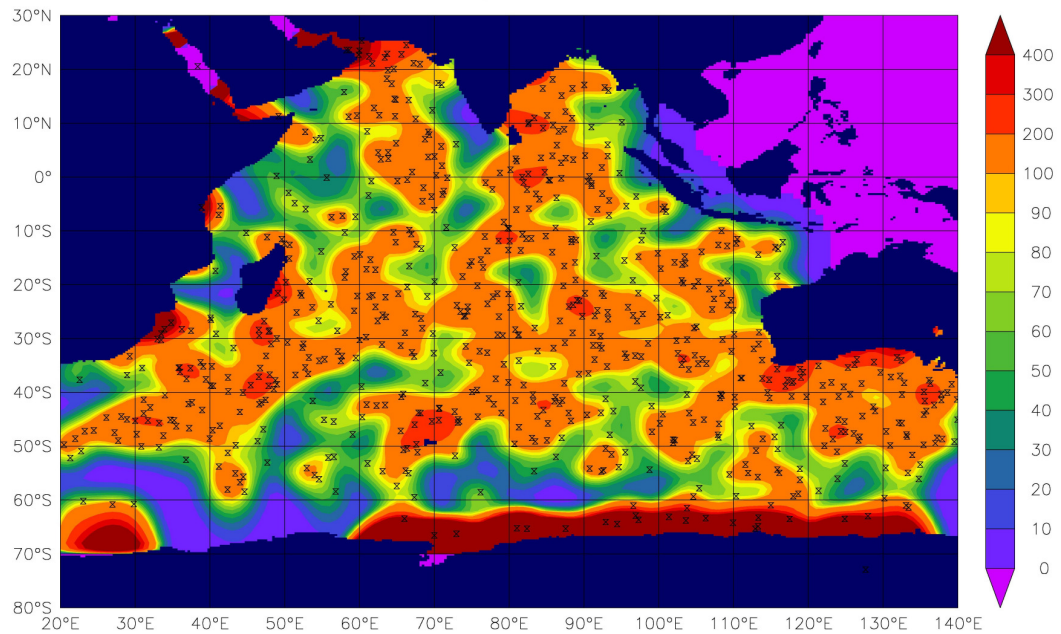
Publications:

1. Sindu Raj Parampil, Anitha Gera, **M. Ravichandran**, and Debasis Sengupta, (2010). Intraseasonal response of mixed layer temperature and salinity in the Bay of Bengal to heat and freshwater flux, *Journal of Geophys. Research*, Vol 115, C05002, pp 17.
2. V.V. Gopalakrishna, F.Durand, K.Nisha, M.Lengaigne, T.P.Boyer, J.Costa, R.R.Rao, **M. Ravichandran**, S.Amrithash, L.John, K.Girish, C.Ravichandran, V.Suneel,(2010). Observed intra-seasonal to inter annual variability of the upper ocean thermal structure in the south eastern Arabian Seaduring 2002–2008. DSR-Part 1, Vol 57 (6), pp 739 – 754.
3. Prasad Kumar Bhaskaran, Ravindran Rajesh Kumar, Rahul Barman, **Ravichandran Muthalagu**, (2010). A new approach for deriving temperature and salinity fields in the Indian Ocean using artificial neural networks. Journal of Marine Science and Technology, Vol 15 (2), pp 160 -175.
4. **Udaya Bhaskar, T.V.S**, Debadatta Swain, **M. Ravichandran,** (2010). Sonic Layer Depth variability in Arabian Sea. International Journal of Ocean and Oeanography, Vol 4 (1), 17 - 28.

Argo National Data Management Report of Japan, 2010

1. Status

The Japan DAC, the Japan Meteorological Agency (JMA), has processed data from 940 Argo and Argo-equivalent floats including 281 active floats as of October 5, 2010. There are nine Japanese PIs who agreed to provide data to the international Argo data management. The DAC is acquiring ARGOS messages from CLS and getting IRIDIUM messages via e-mail in real-time, thanks to the understanding and the cooperation of PIs. Almost all profiles from those floats are transmitted to GDACs in netCDF format and issued to GTS using TESAC and BUFR code after real-time QC on an operational basis. Some IRIDIUM floats have more than 1100 layers, and the profiles are provided only to GTS using BUFR code and to GDACs because of the limit of TESAC code.

The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) has done the Delayed Mode QC for all Japanese floats. JAMSTEC acquired the ARGOS messages for 11,905 profiles via CLS for delayed QC from October 1st, 2009 to October 13th, 2010. JAMSTEC sent 10,469 delayed profile files (D-files) to GDACs through the Japan DAC, JMA, during the period.

Web pages:

Japan Argo
http://www.jamstec.go.jp/J-ARGO/index_e.html
This site is the portal of Japan Argo program. The outline of Japanese approach on the Argo program, the list of the publication, and the link to the database site and PIs, etc. are being offered.

Real-time Database (JMA)
http://argo.kishou.go.jp/index.html
This site shows global float coverage, global profiles based on GTS TESAC messages, and status of the Japanese floats.

Delayed mode Database (Argo JAMSTEC)
http://www.jamstec.go.jp/ARGO/argo_web/argo/index_e.html
JAMSTEC's website shows mainly Japanese float list, trajectory map, profile chart, and QCed float data. Moreover, the position and trajectory maps of all floats of the world as well as Japanese floats by using Google Map. Brief profile figures of the selected floats are also shown. This site also shows global maps based on objective analysis (temperature, salinity, potential density, dynamic height, geostrophic current, mixed layer depth, etc.).

Statistics of Argo data usage:

Operational models of JMA
MOVE/MRI.COM-G (Multivariate Ocean Variation Estimation System/ Meteorological Research Institute Community Ocean Model - Global)
JMA has been operating the MOVE/MRI.COM-G for the monitoring of El Niño and the Southern Oscillation (ENSO) and for initialization of the seasonal prediction model (JMA/MRI-CGCM). The MOVE/MRI.COM-G

consists of an ocean general circulation model (OGCM) and an objective
analysis scheme.
Visit
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/move_mricom_doc.html
for more information.

JMA/MRI-CGCM (Coupled ocean-atmosphere General Circulation Model of JMA)

JMA has been operating JMA/MRI-CGCM as a seasonal prediction model
and an ENSO prediction model. The oceanic part of this model is identical
to the OGCM used for the MOVE/MRI.COM-G.
Visit
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/jmamri_cgcm_doc.html
for more information.

MOVE/MRI.COM-WNP (Multivariate Ocean Variation Estimation System/ Meteorological Research Institute Community Ocean Model - Western North Pacific)

MOVE/MRI.COM-WNP provides daily and monthly products of
subsurface temperatures and currents, for the seas around Japan and
northwestern Pacific Ocean.

Other operational models

JCOPE2 (Japan Coastal Ocean Predictability Experiment)

JCOPE2 is the model for prediction of the oceanic variation around Japan
which is operated by Research Institute for Global Change of JAMSTEC.
JCOPE2 is the second version of JCOPE, developed with enhanced model
and data assimilation schemes. The Argo data is used by way of GTSPP.
The hindcast data 6 months back and the forecast data 3 months ahead are
disclosed on the following web site: http://www.jamstec.go.jp/frcgc/jcope/.
More information are shown in
http://www.jamstec.go.jp/frcgc/jcope/htdocs/jcope_system_description.ht
ml.

FRA-JCOPE

FRA-JCOPE is the model based on JCOPE which is operated by Fisheries
Research Agency (FRA).

FRA-JCOPE2

FRA-JCOPE2 is the reanalysis data created by assimilating most available
observation data into the JCOPE2 ocean forecast system. The horizontal
high resolution is 1/12 deg. in order to describe the oceanic variability
associated with the Kuroshio-Kuroshio Extension, the Oyashio, and the
mesoscale eddies from January 1993 to December 2009. Collaboration
with Japanese Fishery Research Agency (FRA) has allowed us to
assimilated huge amount of in-situ data around Japan.FRA-JCOPE2
reanalysis   data   are   available.   The   website,

Products generated from Argo data:

Products of JMA

El Niño Monitoring and Outlook

JMA issues the current diagnosis and the outlook for six months of ENSO on the following web site. The outputs of the MOVE/MRI.COM-G and the JMA/MRI-CGCM can be found here.

http://ds.data.jma.go.jp/tcc/tcc/products/elnino/index.html

Subsurface Temperatures and Surface Currents in the seas around Japan

The following parameter outputs of the MOVE/MRI.COM-WNP can be found on http://goos.kishou.go.jp/rrtdb/jma-pro.html.

➢ Daily and Monthly mean subsurface temperatures at the depths of 50m, 100m, 200m and 400m analyzed for 0.1 x 0.1 degree grid points.
➢ Daily Surface Currents for 0.1 x 0.1 degree grid points.

Products of JAMSTEC

MOAA (Monthly Objective Analysis using the Argo data)

MOAA is the global GPV data set which was made by monthly OI objective analysis using Argo and the other available CTD and morring data. Various maps have been made using MOAA, and opened to the public on the Argo JAMSTEC web site,

http://www.jamstec.go.jp/ARGO/argo_web/MapQ/Mapdataset_e.html.

Objectively mapped velocity data at 1000 dbar derived from trajectories of Argo floats

The gridded velocity data at 1000 dbar is made by optimal interpolation analysis using YoMaHa'07. This dataset has been disclosed since October 2009. This dataset are updated every 6 months. This data is opened to the public on the Argo JAMSTEC web site,

http://www.jamstec.go.jp/ARGO/argo_web/G-YoMaHa/index_e.html.

Mixed layer data set from Argo floats in the global ocean

The gridded mixed layer data set in 10-day interval from 2001 to 2009 is made using Argo float in the global ocean. This data set will be disclosed soon.

Iridium activities:

Japan has up to now deployed 25 iridium floats and now operates 12 floats.

The first iridium profiler operated by Japan is POPS (Polar Ocean Profiling System) which had been set up near the North Pole in April, 2006.

Afterwards, 5 and 3 Apex floats were deployed in the Indian Ocean and the Pacific Ocean, respectively. They have already dead. JAMSTEC had set up the 5th POPS in Arctic Ocean in April 2010. Only the 5th POPS has been operating now. In May 2010, JAMSTEC has deployed 8 NEMO floats in the western part

of the tropical Pacific. Moreover, 3 NEMO floats and 1 APEX float with dissolved oxygen sensors were deployed in the subtropical Pacific.

2. Delayed Mode QC

Based on the mutual agreement by PIs in Japan in 2006, JAMSTEC has done the DMQC for all Japanese floats.
JAMSTEC has submitted the delayed mode files of 66,358 profiles to GDACs as of October 14th, 2010.
The procedure of DMQC in JAMSTEC is as follows.

(JAMSTEC floats and the most of Argo-equivalent floats)
  1. (within 10days)   data re-acquisition from CLS, bit-error repair (if possible), real-time processing, position QC, visual QC
  2. (within 180days)   surface pressure offset correction, cell TM correction (Apex only)
  3. (after 180days)   WJO and OW salinity correction, the definitive judgement by experts, D-netCDF file making

(Argo-equivalent floats that had ceased by 2007)
  JMA executes real-time processing again by using the latest procedure. The procedure after real-time processing is executed by JAMSTEC according to the same way as the foregoing.

  The OW software is mainly operated instead of WJO. The calculation result of WJO has been used at the definitive judgment. In order to decide the best parameter value, JAMSTEC will continue to use both OW and WJO.

3. GDAC Functions

The JAMSTEC ftp server has been providing the mirror site of GDACs since 2003.
    ftp://ftp2.jamstec.go.jp/pub/argo/ifremer/
    ftp://ftp2.jmastec.go.jp/pub/argo/fnmoc/

4. Regional Centre Functions

JAMSTEC operates PARC in cooperation with IPRC and CSIRO and has extended the responsible region into the whole Pacific including the Southern Ocean by request of AST-9 (Action item 9) since April 2008.
JAMSTEC is providing the float monitoring information in the Pacific region (e.g., float activity watch, QC status, anomaly from objective analysis, diagnosis plot for sensor correction, etc.), reference data set for DMQC (SeHyD and IOHB), the link to the CTD data disclosure site of Japanese PIs, some documents, and some QC tools on the following web pages (http://www.jamstec.go.jp/ARGORC/). JAMSTEC will plan to upgrade of the site which provides the float monitoring information.

Argo National Data Management Report of Korea
The 11th Argo Data Management Team 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	subtotal	
2001	KMA	3	7		10	18
	KORDI	5	1	2	8	
2002	KMA	5	10		15	25
	KORDI	6		4	10	
2003	KMA	5	10		15	33
	KORDI	8		10	18	
2004	KMA	5	10		15	38
	KORDI	13		10	23	
2005	KMA	5	10		15	33
	KORDI	10		8	18	
2006	KMA	5	10		15	33
	KORDI	13		5	18	
2007	KMA					9
	KORDI	9			9	
2008	KMA	5	10		**15**	29
	KORDI	11		3	**14**	
2009	KMA	5	7		**12**	17
	KORDI	5			**5**	
Total	KMA	118	75	42	**112**	235
	KORDI				**123**	

※ KMA: Korea Meteorological Administration
   KORDI: Korea Ocean Research and Development Institute

 - KMA has deployed 12 additional Argo floats in June 2010. During Nov. 2009
- Sep. 2010, 1531 R-files of KMA are sent to GDAC.

- Data issued to GTS
  Within 24 hours of data collection, the deployment all data of KMA Argo
floats are issued to GTS. BUFR formatted ARGO data are being prepared. There
still remain to correct code.
  Within 24 hours of data collection, the deployment all data of KORDI Argo
floats are issued to GTS by CLS in France.

- Data issued to GDACs after real-time QC

RTQC system at KORDI is so flexible that it can handle data from different type of profilers. Prior to communicating the Argo datasets to GDAC, the KORDI ARGO dataset is processed by CLS, France for dissemination to GDAC.

KMA RTQC system produces profile data, metadata, technical data and trajectory data with NetCDF format. Those 4 types of data are transmitted into GTS network and GDAC.

- Data issued for delayed QC

    During November 2009 – October 2010, KODC has acquired 5,315 profiles via GDACs for delayed QC.

- Delayed data sent to GDACs

    As of October 2010, KODC has sent 3,322 D-files to the GDACs after DMQC including pressure adjustment.

- Web pages

    The KMA has operated and upgraded Argo web page, which consists of RTQC data linked to KMA (http://argo.metri.re.kr). The KODC has operated webpages for distribtuion of delayed mode Argo data and oceanographic information system for pelagic fishery based on Argo data (http://kodc.nfrdi.re.kr). KORDI has also operated Argo webpage (http://argo.kordi.re.kr).

- Statistics of Argo data usage

    National PIs are Dr. Sang-Buem Ryoo from KMA and Dr. Moon-Sik SUK from KORDI. Many scientists have applied the Argo data to the researches and operational oceanography. For example, data assimilation, circulation of the East/Japan Sea, and operation of oceanographic information system for pelagic fishery.

- Products generated from Argo data

    ARGO data has been applied in the global seasonal prediction system (PNU/CME CGCM), and the products are referred to the seasonal prediction at KMA. In addition, the data has been used in the regional ocean model of METRI/KMA for producing ocean analysis fields.

UK Argo National Data Management Report 2010

1. Status

- *Data acquired from floats* - Data from all UK floats are received at BODC by automatic download from the CLS database every 12 hours. Since September 2009 the UK has deployed 25 floats including 6 with near surface firmware and 2 with ice detecting firmware. The aim was to setup floats for distribution of data to GTS and GDACs within a week of deployment. BODC also handles data from floats from Ireland, Mauritius and Saudi Arabia.

- *Data issued to GTS* - Data from all UK floats are sent to the GTS every 12 hours. Almost 100% of TESACs messages are available within 24h. Disruptions happened due to email server failures and server problems. BUFR message distribution has been setup and is operational with checks on the BUFR messages ongoing at the UK Met Office.

- *Data issued to GDACs after real-time QC* - All UK data received at BODC are passed through the agreed real-time quality control tests 1 hour after the data arrives at BODC. All data that have been processed at BODC are queued for transfer to both GDACs which occurs twice a day. Any file that fails to be transferred is queued for the next transfer attempt.

- *Data issued for delayed QC* – All delayed QC on BODC hosted floats is done within BODC.

- *Delayed data sent to GDACs* – The OW software is being used at BODC with latest reference data available from Coriolis. 99% of UK float profiles eligible for delayed mode QC have been processed and submitted to the GDACs in D-mode.

- *Web pages* - BODC hosts the main data information and access pages for the UK. These pages include 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. Specifications are being produced for a UKArgo web-site to be hosted at BODC, the aim is to bring together the existing UK pages and make information on UK Argo more accessible to the Argo community, both within the UK and further afield.

- *Statistics of Argo data usage*: In addition to GDACs, BODC hosted Argo data are also available from the UK Argo Data Centre web-site via an interactive map interface. In addition the technical files are updated once a week and these files are used by CSIRO Marine to populate the technical web-site. The variable names in the technical files have been updated to the latest agreed variable name specification in September 2010. Under plans to develop a UK Argo web-site to be hosted at BODC, technical data will be included on UK Argo pages. During the last year, UK metadata, trajectory and profile files have been provided to users through

BODC website. The site has handled 54 requests, made by 20 enquirers from 6 countries. Under the EuroArgo project the usage of Argo by the UK Argo community was investigated and the following summarises the findings:

Operational and scientific use of Argo data at the Met Office
- <u>Operational ocean forecasting</u>. All Argo data (alongside other in-situ and remotely sensed ocean data) are routinely assimilated into the FOAM operational ocean forecasting system run by the National Centre for Ocean Forecasting (NCOF).
- <u>Seasonal to decadal prediction</u>. Argo data are also in the GloSea (Global Seasonal) coupled model run to make seasonal forecasts for several months ahead. These are more reliable for tropical regions than temperate climates. Seasonal forecasting is still an area in which the science is being developed. On longer timescales the Hadley Centre DePreSys (Decadal Prediction System) is being developed for climate predictions on decadal timescales. Idealised model experiments shown sub-surface data, as provided by Argo, is necessary to provide plausible predictions.
- <u>Climate monitoring and prediction</u>. The Hadley Centre maintains the <u>HadGOA</u> (sub-surface global analysis) dataset of historical temperature and salinity. Variables are on a 2-degree grid and computed on number of fixed isotherms and fixed depths at monthly resolution. The dataset includes available Argo data and will include near real-time updates using Argo data. The dataset is used for global ocean heat content analyses.

Scientific use of the data within NERC and the academic community
- Argo data are also used extensively in a wide range of research projects in UK Universities and research laboratories and is a central component of several PhD and MSc projects. A survey carried about John Gould has indicated there are almost 50 projects/researchers (excluding the Met Office) that are using Argo data. The UK Argo Users' Group has provided a forum for engagement between these scientists and the UK Argo programme, although this activity has to some extent been taken forward in the context of a European Argo Users Group under the Euro-Argo project, there remains a need to improve the interaction with UK users of Argo data and a Users Workshop was held at Exeter on 16th March 2010.
- During 2009 a report was prepared for the UK Argo funders detailing the latest results from the application and scientific use of Argo data. The report stresses that Argo is an essential element of our climate observation system and that data from Argo has already led to improvements in understanding climate-relevant ocean processes and for predictive models. It concluded that '*the long-term funding of the Argo array of profiling floats is of highest priority for UK climate*

science and to ensure that the best climate science is used to inform government policies on climate change mitigation and adaptation'. The report is available at: http://www.metoffice.com/weather/marine/observations/gathering_data/Science_case_for_Argo.pdf.

- *Products generated from Argo data* - Data from all Argo floats are assimilated in to the Forecasting Ocean Assimilation Model (FOAM) run at the Met Office.
- *Iridium present/future activities* (not applicable at this time, potential for proposals for the UK to purchase such floats in future though)

2. Delayed Mode QC (DMQC)

The DMQC system at BODC is operational using OW software and the CTD_for_DMQC_V1 and ARGO_for_DMQC_V02 reference datasets. Reference data are updated when new versions are available.

During the summer of 2010 the backlog in DMQC of BODC hosted (Argo UK, Ireland, Mauritius, Saudi Arabia) Argo profiles was cleared. As of October 2010 99% of eligible BODC profiles are submitted to GDACs in delayed mode. This equates to 95% of BODC hosted profiles; the figure is so high because the suspension in deployments during 2009 meant the majority of BODC floats were eligible for DMQC.

This work included the following improvements to the BODC data system and D-mode data files:
- The resolution of existing format errors identified by John Gilson's format checker. A format checker has not currently been implemented at the DAC level meaning a few profiles that fail the checks get to GDACs. It is hoped that that this check can be introduced operationally at GDAC level in the near future.
- Resolution of issues in BODC technical files identified by Jeff Dunn's (CSIRO) audit of pressure corrections applied to Argo profiles.
- The flagging of data for APEX TNPD issues is complete with a handful of floats in need of review when the definition of TNPD is revised or clarified by the ADMT.
- Production of notes for the historic "sharing of regional DMQC expertise" ADMT action item.
- The cell thermal lag corrections are not applied by BODC yet.

3. GDAC Functions

Section not applicable to BODC.

4. Regional Centre Functions

Four organizations participate in the Southern Ocean Argo Regional Centre - BODC (Atlantic Ocean Sector), CSIRO ("Australian sector"), JAMSTEC (Pacific Ocean Sector) and the University of Washington (Indian Ocean Sector).

BODC hosts the main data and information web pages. These pages contain an animation of the Forecast Ocean Assimilation Model (FOAM) outputs (potential temperature, salinity and velocity at five metres and 995.5 m) and an interactive map giving information on last known positions, deployment positions and direct links to both GDACs ftp sites.

Under the MyOcean project funding the amount of SO ARC activities at BODC should increase. Initial plans include the working up and submission of relevant CTD profiles to the NODC, the goal is for these to filter through to the Argo delayed-mode QC reference data. Collaborative work with Alastair Gemmell (ESSC, Reading) is beginning that compares the results of Argo QC to several meteorological office assimilation QCs. It is hoped to identify potential improvements for both the Argo QC and meteorological assimilation QC systems.

Argo National Data Management Report of United States

September 15, 2009 - September 26, 2010

1. Status

- **Deployments and status of floats:**

a) 294 floats deployed in September 15, 2009 - September 26, 2010.
   Of those:
   - 261 are reporting as of September 26, 2010.
   - 33 are not reporting for more than 30 days as of September 26, 2010.

b) 3,442 floats deployed in1997 to September 26 , 2010.
   Of those:
   - 107 failed on launch.
   - 1,667 are reporting as of September 26, 2010.
   - 1,658 are not reporting for more than 30 days as of September 26, 2010.

- **Profiles collected, quality-controled and distributed to the GDACs:**

71,282   in September 15, 2009 - September 26, 2010
396,880   in 1997 to September 26, 2010

- **Trajctory and tecnical files issued to GDACs:**

During the reporting period, 71,282 real-time technical files and 71,282 trajectories files, as well as 294 new meta files have been issued to both GDACs.

- **Profiles distributed via GTS:**

During the reporting period, Service Argos and AOML distributed 54,089 profiles via GTS. About 90% of the profiles were available in less than 24 hours.
Many of the profiles that were not available in less than 24 hours correspond to Iridium floats that were under ice.

- **Operational web pages:**

The URL for the US Argo Data Assembly Center is:
http://www.aoml.noaa.gov/phod/argo/index.php
It provides links to:
- Documentation.
- Operations including data tracking.
- South Atlantic Regional Data Assembly Center
- FTP Services.
- Related Sites.

http://www.aoml.noaa.gov/phod/argo/opr/index.php shows profiles, sections, trajectories and pressure records for individual floats processed at the US Argo DAC.

- **Some tasks accomplished during the reporting year**
- Decoding of Iridium floats from PMEL and University of Washington
- Adjustement of parameter pressure in real time for APEX floats.
- Application of a new QC test to verify the accuracy of the date of the profile to detect if a float reports dates in the future.

- Calculation of JULD variable according to a new algorithm for APEX floats.
- Implementation of the trasmission of buffer files to GTS.
- Resubmission of technical files to GDAC in the new format.
- Implementation of a new automatic process to calculate the time elapsed between the profile date and the time when it reaches GDAC to monitor and assure the prompt distribution of the Argos data in the Global Data Centers.
- Collaboration with both GDACs to decrease the numbers of duplicate profiles found in their databases using the automatic removal lists.
- Improving the application of results from Objective Analysis provided by Coriolis in near-real-time to improve the QC flags (in progress).

2. Delayed mode QC

Scripps Group:
Scripps Institution of Oceanography (SIO) has evaluated, as part of delayed-mode quality control (DMQC), a total of 79,106 Argo stations (profiles). This is an increase of approximately 15,250 stations (418 float years) since the previous United States Argo National Data Management Report (October, 2009). At present, 99.3% of the SIO stations which are eligible for DMQC processing have been completed. At AOML a station is defined as being DMQC eligible if it was sampled more than 12 months ago . The above numbers include stations from several Argo New Zealand floats for which SIO performs DMQC.

SIO expects to be able to continue to maintain a high DMQC completion percentage during the coming year and will continue to revisit most floats every 6 months.

The DMQC procedures for SOLO floats mentioned in past reports were continued into 2010. Updates to the Argo Climatological Dataset for OW salinity calibration were created quarterly throughout the year. Special effort was made over the year to the maintenance and reporting of data returned by "Microleak" floats which suffer from a strongly negative drifting Druck pressure sensor. In the SIO fleet, 50 such floats have been identified. These floats now have a higher than normal 3 month DM processing rotation in order to remove from the GDAC any uncorrectable data and to adjust correctable data as quickly as possible. All SIO Microleak floats went through the DM process and submitted to the GDAC in mid-September 2010. Although SIO SOLO floats reset their pressure sensor each cycle, if the drift is of consistent sign and significant from one cycle to the next, a net bias results. Due to this bias, the "Microleak" floats do have the pressure values (and thus salinity) modified in DM processing.

A test float of the new generation SOLOII was deployed in February 2010. The SOLOII is similar to the present generation SOLO in most ways relevant to DM processing. Only minor modifications to the procedure are required, notably the rise rate, float cycle timing and surface displacement estimations. The test float returned 327 profiles over its 7 month life (approximately 14.5 hour cycle time). The addition of direct measurement and reporting of float timing information will add additional information into the Argo technical and trajectory files, over what was available from the SOLO. Moving forward over the next year it is expected that SIO will deploy increased numbers of SOLOII as the SOLO is phased out.

University of Washington Group:
As of September 2010, University of Washington had submitted 88,550 delayed-mode files to the GDACs via AOML. These are comprised of**:**

 a) 82,177 D-files belonging to University of Washington, representing 87% of UW profiles older than 12 months.
b) 6,373 D-files belonging to the KESS project from University of Hawaii, representing 54% of all UH KESS profiles.

A large part of the UW delayed-mode backlog during 2010 comes from Iridium floats, whose time series at the GDACs were discovered to be incomplete. The cause of this problem is being investigated, and delayed-mode processing of UW Iridium floats will resume as soon as their complete time series are restored.

During 2010, UW began performing delayed-mode processing for UH KESS floats in an effort to clear up some of the backlog from Argo-equivalent floats. This is a collaborative effort between Drs. Bo Qiu and Shuiming Chen from UH, and Annie Wong from UW.

Delayed-mode evaluation of conductivity sensor drift was done by using the statistical comparison method of OW (2009), in conjunction with the CTD reference database CTD_for_DMQC_2010v1, issued by Coriolis in February 2010. Visual comparison with nearby good Argo data was employed to complement the statistical method of OW. Results from Stephanie Guinehut's altimetry test were also taken into account as part of the dmqc process.

PMEL group:
As of 11 October 2010, PMEL had a total of 37,267 D-files at the GDAC. Of these, 36,481 were more than one year old – 90% of the total of 40,526 PMEL profiles that were older than one year at that time. At the time that last year's report was written, PMEL had a total of 24,803 D-files at the GDAC. Of these 23,780 were more than one year old – 85% of the total of 27,879 PMEL profiles that were older than one year at that time. Thus, while not at 100%, we are ahead of our DMQC percentages from last year. We are able to revisit DMQC for our floats on a roughly annual basis.

The PMEL float DMQC procedure currently consists of the following steps: We perform an automated correction, with visual check, of reported pressure drifts and correction for the effect of these pressure drifts on salinity, as well as an automated correction of conductivity cell thermal lag errors following Johnson et al. (2007). We do visual inspection and modification of quality control flags for adjusted pressure, temperature, and salinity using the SIO GUI. As of this summer, we now overwrite the raw PARAM_QC flags during this step as required. We use OW Version1.1 with SeHyD_090408 as a historical database for recently deployed floats and adjust run parameters to get appropriate recommended salinity adjustments. We accept or reject the OW recommendations on the basis of comparison with nearly historical and Argo float profiles using the SIO GUI. We are continuing use of WJO Version2.0 instead of OW Version1.1 with most floats that began DMQC using the former system.

We have gone through all PMEL floats to identify and categorize runs of TNPD profiles for affected floats as well as suspected or confirmed microleakers. We have flagged and

grey-listed all suspected or confirmed microleakers as appropriate. Our next priority is to redo the flagging and add scientific comments as required for TNPD floats.

WHOI group:
Since December 1, 2009, WHOI has launched 70 Solo floats. Vessels used in the past year for deployment include R/V Knorr, R/V Endeavor, R/V Ron Brown, R/V Thomas Thompson, R/V Aurora Australis, R/V Akademik Vavilov, R/V Cruzeiro do Sul, SSV Corwith Cramer, M/V Safmarine Ngami, and M/V War Admiral.

WHOI currently has 373 active floats in the water. Of that number, 291 are equipped with SeaBird sensors while 82 are equipped with FSI CTDs that are returning unusable or questionable data.

As of Oct 12, 2010, Woods Hole has submitted 66571 delayed-mode profiles to the GDAC via AOML. Of the target group of profiles older than 12 months, 63239 delayed-mode profiles have been submitted representing 91% of the total of this group.

3. Argo Regional Center

The South Atlantic Argo Regional Center (SAARC) is coordinating the effort of countries with interest in the Atlantic from 20^oN to 40^oS. The web site of the SAARC (http://www.aoml.noaa.gov/phod/sardac) provides background information, reports from the meetings and workshops with interested countries starting in 2005, access to consistency check results, as well as links to products.

Data consistency check is being performed for the SAARC. The software development is near completion. The results for 498 floats in the SAARC region are currently being evaluated prior to being released to the community. The results are presented on the web: http://www.aoml.noaa.gov/phod/sardac/post_dmqc/delay_mode.html

Deployment opertunities provided by countries participating in SAARC can be found here: http://www.aoml.noaa.gov/phod/sardac/logistics/opportunities/index.php

A float donation program has been put in place. This program facilitates the float deployment in remote regions and provides regional data to the volunteers in participating countries.

Products web pages:
http://www.aoml.noaa.gov/phod/sardac/products/index.php currently shows four types of products that are derived from hydrographic profiles collected by Argo floats and other instruments:
- Properties of the mixed layer (thickness, temperature and heat storage rate) as monthly fields.
- Zonal sections of temperature, salinity and dynamic height across the Atlantic as semi-annual and annual means.
- Seasonal climatologies of temperature and salinity (maps, senctions and scatter plots of the profiles, for 30^oS-40^oS, provided by Ariel Troisi).
- Maps of altimetry and geostrophic currents.

20. Annexe 7 ARC reports

NA-ARC action items

In preparation for the next Argo DM meeting: please provide an update from where things stand.

Topic: The "essential" and "optional" tasks of regional centres were reviewed, and it was agreed that these are still appropriate. Perhaps one recommendation would be for each ARC to specify a) who is responsible for each item, b) what resources are required, perhaps c) a time-line and/or plan for these.

	contact person	resources	plan
essential roles:			
· regional analysis of all Argo data to assess its internal & external consistency	C Coatanoan	A scientist and an operator at GDAC	Daily warning
	C Cabanes	A data manager and a scientist	Yearly update
· feedback to PIs about the results of the regional analysis and possible outliers	C Coatanoan	A data manager and an operator	Daily via automatic email
· contribute to Reference Data Base for delayed mode quality control	C Coatanoan with Euro-Argo		Periodic query within euro-Argo community
· Prepare and distribute Argo data products	V Thierry with Argo-France		
optional roles:			
· Coordinate Argo deployment for the region	N Lebreton		
· Develop new Q/C tests for region	V Thierry with Argo-France and Euro-Argo		
· Provide delayed-mode Q/C for	C Coatanoan		

regions without such capabilities	B Klein PM Poulain J Buck	
· Compare Argo data to models and assimilated fields	J Buck	
· Provide documentation of the procedures done at the ARC	C Coatanoan and C Cabanes	Early 2011

Presently there are two places where these activities are described http://www.argodatamgt.org/Argo-regional-Centers/North-Atlantic-ARC , Euro-Argo http://www.euro-argo.eu and in the Mediterranean Sea http://poseidon.ogs.trieste.it/sire/medargo

This a plan in Future to improve the NA-ARC www site

Topic: add links to AIC on regional centre pages
The link is on Argo Data Management www site

Topic: listing of products:
- update gridded products web catalogue maintained by Megan
- find new/better product descriptors/qualifiers for products table
- Provide uniform language for gridded data sets, e.g., "optimal interpolation" versus "objective analysis"
- completion of table; maybe merge with the catalogue maintained by Megan?
Information provided last year. No additional informal information requested

Topic: Lot's of discussion on Argo products and product development. Do we want to include at some level, s/w support (e.g., providing input on things like ferret, JOA, etc.)?
Please report if there are any news on this
No action taken

Topic: how to coordinate product development; issues include referencing originator, regional/global, documentation, etc.

Please report if there are any news on this.
No action taken

Topic: need to define precisely what we mean by Argo data products
Please report if there are any news on this.
Shouldn't this come from AST?

Topic: communication and coordination between ARCs, product developers and DMQC operators.
Please report if there are any news on this.
Nothing will be done without some leadership. Activities have been carried out within euro-argo between NA-ARC and SO-ARC

Topic: communication with CCHDO: ARCs should try to provide points of contact to Steve Diggs and CCHDO for planned/performed cruises. There is a large need for communication between those organizing cruises and his program that will archive CTD data.
Request sent to EuroArgo community

Topic: share scripts that display data/products (netcdf/kml/gis translations)
Please report if there are any news on this.
No action taken

Topic: communication with PIs, e.g. regarding problems found when qc'ing data (either through product development or otherwise). It was recommended that this be done via the AIC (i.e., send this back to Mathieu)
Done by M Ollitrault with the ANDRO Atlas Development and by C Coatanoan with Objective Analysis Alert system

Topic: continue education, outreach activities (e.g. deployment and data acquisition training for African Nations)
Done via Euro-Argo
http://www.euro-argo.eu/news_and_events/news_and_events_2009/euro_argo_educational_web_site

Topic: need to promote Argo, demonstrate value of the program to regional communities/countries; do this through ARCs
Done a European level within Euro-Argo

Topic: continue improvement of Argo Marine Atlas; perhaps use ARCs as method for distribution/user feedback
Please report if there are any news on this.
No action taken

Topic: AST to display list of data viewers
Please report if there are any news on this.
AST not ARC action

Topic: Deployment planning

Topic: Provide maps of float location, age, data quality (float quality) for deployment planning
A MATLAB tool has been developped within EURO-Argo by BSH and can be provided for test by Birgit.

Topic: Work on logistics (e.g., how to share information on potential deployment opportunities (AIC, BODC, JAMSTEC, AOML, Coriolis)
Please report if there are any news on this.
Action taken by AIC

Topic: the next meeting will involve DMQC operators, perhaps devoting the majority of the meeting to developing collaboration between these two groups (reference data sets, procedures, experiences, etc.)
It is encouraged that ARC representatives participate in the DM QC meeting.
It's the case for the NA-ARC

SA-ARC action items

In preparation for the next Argo DM meeting: please provide an update from where things stand.

Topic: The "essential" and "optional" tasks of regional centres were reviewed, and it was agreed that these are still appropriate. Perhaps one recommendation would be for each ARC to specify a) who is responsible for each item, b) what resources are required, perhaps c) a time-line and/or plan for these.

	contact person	resources	plan
essential roles:			
· regional analysis of all Argo data to assess its internal & external consistency	C Schmid V Halliwell	A scientist An IT specialist with oceanographic experience	Monthly or weekly
· feedback to PIs about the results of the regional analysis and possible outliers	V Halliwell	An IT specialist	Via automatic email
· contribute to Reference Data Base for delayed mode quality control			NOAA Chief Scientists provide their data to NODC
· Prepare and distribute Argo data products	C Schmid and V Halliwell		Semi-annual, monthly
optional roles:			
· Coordinate Argo deployment for the region	S Garzoli		
· Develop new Q/C tests for region	C Schmid		
· Provide delayed-mode Q/C for regions without such capabilities			
· Compare Argo data to models and assimilated fields	C Schmid		Ongoing
· Provide documentation of the procedures done at the ARC	C Schmid and V Halliwell		Early 2011

These activities are described under the Argo Regional Center Link on
http://www.aoml.noaa.gov/phod/argo/index.php

Topic: add links to AIC on regional centre pages
The link is on US Argo Data Center website

Topic: listing of products:
- update gridded products web catalogue maintained by Megan
- find new/better product descriptors/qualifiers for products table
- Provide uniform language for gridded data sets, e.g., "optimal interpolation" versus "objective analysis"
- completion of table; maybe merge with the catalogue maintained by Megan?
Products that are derived from hydrographic profiles collected by Argo floats and other instruments:
- Properties of the mixed layer (thickness, temperature and heat storage rate) as monthly fields.
- Zonal sections of temperature, salinity and dynamic height across the Atlantic as semi-annual and annual means.
- The other two products need to be removed.

Topic: Lot's of discussion on Argo products and product development. Do we want to include at some level, s/w support (e.g., providing input on things like ferret, JOA, etc.)?
No news

Topic: how to coordinate product development; issues include referencing originator, regional/global, documentation, etc.
No news

Topic: need to define precisely what we mean by Argo data products
No news

Topic: communication and coordination between ARCs, product developers and DMQC operators.
Sent someone to DM QC workshop.

Steve Diggs and CCHDO for planned/performed cruises. There is a large need for communication between those organizing cruises and his program that will archive CTD data.

No news

Topic: share scripts that display data/products (netcdf/kml/gis translations)

Only within the scope of Nigeria training

Topic: communication with PIs, e.g. regarding problems found when qc'ing data (either through product development or otherwise). It was recommended that this be done via the AIC (i.e., send this back to Mathieu)

Work in progress to report QC results via AIC. Developing the last stage of the QC is a primary focus.

Topic: continue education, outreach activities (e.g. deployment and data acquisition training for African Nations)

Continuing effort - previously held workshop in Nigeria; plans for Gabon training workshop in the works. Collaboration with Ghana (deployments).

Topic: need to promote Argo, demonstrate value of the program to regional communities/countries; do this through ARCs

Collaboration with various nations around the SA-ARC region.

Topic: continue improvement of Argo Marine Atlas; perhaps use ARCs as method for distribution/user feedback

No news

Topic: AST to display list of data viewers

No news. If an ARC has a data viewer or new products the AST needs to be informed, so that they can place it on the web.

Topic: Deployment planning

Ongoing.

Topic: Provide maps of float location, age, data quality (float quality) for deployment planning
A MATLAB tool has been developed at AOML.

Topic: Work on logistics (e.g., how to share information on potential deployment opportunities (AIC, BODC, JAMSTEC, AOML, Coriolis)
Done by AIC. Also efforts by Steve Diggs.

Topic: the next meeting will involve DMQC operators, perhaps devoting the majority of the meeting to developing collaboration between these two groups (reference data sets, procedures, experiences, etc.)
Yes, plan to do this on a regular basis if possible.

ARC action items

In preparation for the next Argo DM meeting: please provide an update from where things stand.

Topic: The "essential" and "optional" tasks of regional centres were reviewed, and it was agreed that these are still appropriate. Perhaps one recommendation would be for each ARC to specify a) who is responsible for each item, b) what resources are required, perhaps c) a time-line and/or plan for these.

	contact person	resources	plan
essential roles:			
• regional analysis of all Argo data to assess its internal & external consistency	Group?	Unknown	None yet as far as I know
• feedback to PIs about the results of the regional analysis and possible outliers	Either by group or By coordinator (Jim)		Done as needed
• contribute to Reference Data Base for delayed mode quality control	JAMSTEC/JMA		ongoing?
• Prepare and distribute Argo data products	All		ongoing
optional roles:			
• Coordinate Argo deployment for the region	Unknown		none
• Develop new Q/C tests for region	DMQC units?		unknown
• Provide delayed-mode Q/C for regions without such capabilities	By group		Done as needed
• Compare Argo data to models and assimilated fields	Science question, Done by group		unknown
• Provide documentation of the procedures done at the ARC	PARC coordinator (Jim)		Done as needed

Topic: add links to AIC on regional centre pages

Please report if this was done or when it will be done.
Done (had been there)

Topic: listing of products:
- update gridded products web catalogue maintained by Megan
- find new/better product descriptors/qualifiers for products table
- Provide uniform language for gridded data sets, e.g., "optimal interpolation" versus "objective analysis"
- completion of table; maybe merge with the catalogue maintained by Megan?

We are just continuing to update products already on the list.

Topic: Lot's of discussion on Argo products and product development. Do we want to include at some level, s/w support (e.g., providing input on things like ferret, JOA, etc.)?

Topic: how to coordinate product development; issues include referencing originator, regional/global, documentation, etc.

We have been doing this on a case-by-case basis by direct interaction (email requests/problems/questions) with users.

Topic: need to define precisely what we mean by Argo data products

No progress.

Topic: communication and coordination between ARCs, product developers and DMQC operators.

No progress.

Topic: communication with CCHDO: ARCs should try to provide points of contact to Steve Diggs and CCHDO for planned/performed cruises. There is a large need for communication between those organizing cruises and his program that will archive CTD data.

Not sure if this has been done.

Topic: share scripts that display data/products (netcdf/kml/gis translations)

No progress.

Topic: communication with PIs, e.g. regarding problems found when qc'ing data (either through product development or otherwise). It was recommended that this be done via the AIC (i.e., send this back to Mathieu)

We have been reporting problems back to AIC, I presume this goes back to the PI's?

Topic: continue education, outreach activities (e.g. deployment and data acquisition training for African Nations)

No progress.

Topic: need to promote Argo, demonstrate value of the program to regional communities/countries; do this through ARCs

Some training in American Affiliated territories in the Pacific (data acquisition, promoting the Scripps atlas)

Topic: continue improvement of Argo Marine Atlas; perhaps use ARCs as method for distribution/user feedback

No progress.

Topic: AST to display list of data viewers

Unknown.

Topic: Deployment planning

No progress

Topic: Provide maps of float location, age, data quality (float quality) for deployment planning

JAMSTEC has been doing this

Topic: Work on logistics (e.g., how to share information on potential deployment opportunities (AIC, BODC, JAMSTEC, AOML, Coriolis)

No progress.

Topic: the next meeting will involve DMQC operators, perhaps devoting the majority of the meeting to developing a collaboration between these two groups (reference data sets, procedures, experiences, etc.)

It is encouraged that ARC representatives participate in the DM QC meeting.

ARC action items

In preparation for the next Argo DM meeting: please provide an update from where things stand.

Topic: The "essential" and "optional" tasks of regional centres were reviewed, and it was agreed that these are still appropriate. Perhaps one recommendation would be for each ARC to specify a) who is responsible for each item, b) what resources are required, perhaps c) a time-line and/or plan for these.

The UK are one of the countries responsible for Southern Ocean ARC activities. Current MyOcean funding is envisaged to change to EuroArgo funding on future bids.

	contact person	Resources	plan
essential roles:			
· regional analysis of all Argo data to assess its internal & external consistency	Lesley Rickards/Justin Buck	Limited MyOcean funding	No plans at present
· feedback to PIs about the results of the regional analysis and possible outliers	Lesley Rickards/Justin Buck	Limited MyOcean funding	No plans at present
· contribute to Reference Data Base for delayed mode quality control	Lesley Rickards/BODC Argo	Limited MyOcean funding	To commence in November 2010
	Brian King	NERC projects	End of cruise CTD data goes directly to CCHDO.
· Prepare and distribute Argo data products	Lesley Rickards/BODC Argo	MyOcean/NERC Argo funding	Ongoing, FOAM images being updated at present
optional roles:			

· Coordinate Argo deployment for the region	??	MyOcean?	Difficult because UK deployments are not orchestrated within BODC.
· Develop new Q/C tests for region	BODC Argo	BODC NERC core funding	Jump test investigation reported at ADMT10
· Provide delayed-mode Q/C for regions without such capabilities	Justin Buck	EuroArgo/NERC core funding	BODC provide DMQC for Argo Ireland, Mauritius, and Saudi Arabia
· Compare Argo data to models and assimilated fields	Justin Buck	MyOcean	Assessment of operational QC vs. Argo QC, ongoing.
· Provide documentation of the procedures done at the ARC	Lesley Rickards/Justin Buck	NERC Core funding	It is hoped to address this during the creation of a UK Argo web site. Initially with DMQC documentation.

Topic: add links to AIC on regional centre pages

A significant redevelopment of the UK Argo pages is ongoing, this can be included.

Topic: listing of products:
- update gridded products web catalogue maintained by Megan
- find new/better product descriptors/qualifiers for products table
- Provide uniform language for gridded data sets, e.g., "optimal interpolation" versus "objective analysis"

- completion of table; maybe merge with the catalogue maintained by Megan?

no BODC developments.

Topic: Lot's of discussion on Argo products and product development. Do we want to include at some level, s/w support (e.g., providing input on things like ferret, JOA, etc.)?

no BODC devlopments.

Topic: how to coordinate product development; issues include referencing originator, regional/global, documentation, etc.

No BODC developments.

Topic: need to define precisely what we mean by Argo data products

No BODC developments.

Topic: communication and coordination between ARCs, product developers and DMQC operators.

Presentation at DMQC on the sharing of regional expertise?

Topic: communication with CCHDO: ARCs should try to provide points of contact to Steve Diggs and CCHDO for planned/performed cruises. There is a large need for communication between those organizing cruises and his program that will archive CTD data.

NOC cruises regularly submit data to CCHDO at the end of the cruise, Brian King is the contact.
BODC will be submitting historic data that we hold that falls outside the data Brian King is organizing. A list of potential cruises has been passed to Steve Diggs.

Topic: share scripts that display data/products (netcdf/kml/gis translations)

No BODC developments.

Topic: communication with PIs, e.g. regarding problems found when qc'ing data (either through product development or otherwise). It was recommended that this be done via the AIC (i.e., send this back to Mathieu)

BODC have reported issues when identified in the central index files from the GDACs, e.g. suspicious positions and times.

Topic: continue education, outreach activities (e.g. deployment and data acquisition training for African Nations)

No developments from BODC. But the UK participates in EuroArgo. EuroArgo has produced educational outreach materials that are currently hosted on the NOC website.

Topic: need to promote Argo, demonstrate value of the program to regional communities/countries; do this through ARCs

No developments from BODC, the UK participates in the EuroArgo programme though? BODC also hosts the data management for the first Saudi Arabia float.

Topic: continue improvement of Argo Marine Atlas; perhaps use ARCs as method for distribution/user feedback

n/a to BODC.

Topic: AST to display list of data viewers

n/a to BODC.

Topic: Deployment planning

No developments from BODC.
Argo expert group.

Topic: Provide maps of float location, age, data quality (float quality) for deployment planning

An interactive map of the southern ocean is maintained on the BODC pages.

Topic: Work on logistics (e.g., how to share information on potential deployment opportunities (AIC, BODC, JAMSTEC, AOML, Coriolis)

The UK use deployment opportunities where applicable e.g. UK deployments during the February 2011 Indian geotraces cruises in the Arabian Sea.

Promotion of UK cruises beyond the UK?

Topic: the next meeting will involve DMQC operators, perhaps devoting the majority of the meeting to developing a collaboration between these two groups (reference data sets, procedures, experiences, etc.)

It is encouraged that ARC representatives participate in the DM QC meeting.