14th ARGO DATA MANAGEMENT MEETING

Liverpool
16th October - 18th October 2013

Version 1.1
4th December 2013

TABLE OF CONTENTS

1 Objectives of the meeting....3

2 Feedback from 14th AST meeting....3

3 Feedback on BIO-Argo Workshop....5

4 Status of Argo Program and link with Users....5

4.1 Review of the Actions from last ADMT....5
4.2 Argo Status and AIC development....6
4.3 Citation Index for Argo....6
4.3.1 Approach b); cite a specific snap shot (a copy of the entire dataset made at a specific time)....6
4.3.2 Approach c); cite the continuously updated dataset, but add an Access Date and Time to the citation....6

5 Real Time Data Management....7

5.1 GTS status....7
5.2 Delays at GDAC....8
5.3 Status of anomalies at GDAC....9
5.4 Status of anomalies detected with Altimetry....10
5.5 Revising some qc tests for deep Argo floats....10
5.6 Status of density test implementation....11
5.7 Unpumped SST measurement RTQC implementation at DACs....11

6 Pressure correction....12

7 Reference database....12

8 GDAC STATUS....13

8.1 Operation status at US-GDAC and Coriolis-GDAC 30mn....13
8.2 Status of Format Checking operations (D-Files checking) 15mn....13
8.3 Proposal for patching profiles to upgrade to V3 for historical T&S floats at GDAC....14
8.4 V3 reprocessing....15

9 Format Issues....15

9.1 Status on Tech Files updates (Actions 33) (A Thresher-Gronell)....15
9.2 Status on Meta-Files Update: Esmee Vanwijk / M Belbeoch....16
9.3 Feedback on the audit on coherency between parameter declaration in metadata and occurrence in profile/trajectory (action 40) B King & all....17
9.4 Feedback on the audit on coherency between parameter declaration in metadata and occurrence in profile/trajectory (action 40) B King & all....17

10 Trajectory issues....17

10.1 Summary on the final agreement on traj format Version 3 (M Scanderberg)....18
10.2 Updates on the cookbook (M Scanderberg)....19
10.3 Status on Reprocessing of Trajectory from ANDRO DEP files (T Carval/JP RANNOU) 19
10.4 Reprocessing historical data between end of ANDRO and Real-time(all DACs)....20
10.5 Reprocessing historical data between end of ANDRO and Real-time(all DACs)....20

11 ARC status 20
11.1 North Atlantic ARC 20
11.2 South Atlantic ARC: 21
11.3 MedArgo ARC 21
11.4 Pacific ARC: 22
11.5 Southern Ocean ARC: 22
11.6 Indian ARC: 22
12 Feedback from Delayed mode data management 23
12.1 Review of DMQC status 23
12.2 Feedback from 5th DMQC workshop 25
13 GADR 25
14 All other business 26
14.1 Summary of the 14th ADMT actions 26
14.2 Location of next meeting 26
15 Annex 1 - Agenda 27
16 Annex 2 - Attendant List 29
17 Annex 3 - ADMT13 Action List 31
18 Annex 4 - ADMT14 Action List 34
19 Annex 5 - National Reports 36

1 Objectives of the meeting

The 14th ADMT meeting was hosted by BODC, Liverpool, UK. It started at 9am on the 16th November and finished at 13h00 on the 18th November. 52 persons from 12 countries and 32 institutes participated in the meeting.

The objectives that had been fixed for the meeting were the following:

- Review the actions decided at the 13th 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)
- Feedback from monitoring the quality of Argo float data processing in Real time and Delayed mode
- Review Regional Argo Data Centre progress
- Report from the 5th DMQC Workshop
- Report from 2nd Bio-Argo Workshop

Prof Chris Hughes from NOC welcomed the participants to Liverpool. He introduced the activities of NOC and took the example of sea level to show the progress made in the past and the complementarity between satellite, model and in situ. He recognized the importance of Argo and the importance of sustaining this network.

2 Feedback from 14th AST meeting

Argo is a maturing program, as seen in its million profiles, over 1400 research papers, and growing uses in ocean reanalysis and prediction, in national and international climate assessments, and in education and outreach. However, Argo faces tight funding in many national budgets and the Argo Program must take advantage of technology improvements to become more efficient and cost effective. Argo's top priority continues to be the (original) global Argo mission, including data coverage and quality for both profile and trajectory data, with longer float lifetimes and improved 2-way communications. The second priority includes the enhancements to Argo that have been recommended through community forums (e.g. OceanObs99) and endorsed by the AST. These consist of (i) enhancement of float density in western boundary and equatorial regions, (ii) expansion of the coverage to include more marginal seas and the high-latitude seasonal ice zones, (iii) full ocean depth sampling (Deep Argo), (iv) additional qualified sensors (Bio-Argo/Biogeochemical Argo), and (v) improved sampling of the near surface layer.

The present Argo array has stabilized at about 3600 active floats, sufficient for the global mission plus initial coverage enhancements that will eventually require a total of about 4100 floats. Because of the attractiveness of novel observations, national programs may find resources for enhancements while increases to offset inflation are difficult. This is acknowledged, while the overall balance of the program and priorities noted above should be maintained.

The Argo Steering Team is strongly concerned by the increasing workload on the data teams, magnified by the inflationary losses due to flat funding. Increased workload includes conversion to new file formats (e.g. Format 3.0), increasing numbers of Argo floats that raise the volume of delayed-mode quality control, and labor-intensive data management requirements of new sensors. DACs must not be expected to carry out functions for which they are not funded. The sustainability of the Argo data system is paramount, as is the strong focus on data quality. National Argo programs should consider whether a larger fraction of resources is needed in data management. New floats that require substantial effort to integrate in Argo, for example one-of-a-kind instruments, may be kept outside of Argo.

From the discussion that followed Dean's presentation, all DACs confirmed that the real time activities were managed even if tight, but reprocessing was more difficult and often took longer than expected by the PIs and AST.

Each DAC expressed what its situation was:

- AOML is totally stretched and has difficulty handling new floats types that are developed by US PIs, often to advance bio-Argo efforts. Occasionally, the information on new float types is not provided with sufficient time to adapt to the new formats. AOML is using the transition to the netcdf profile format versions 3.0 to do a large revision of the way the real-time adjustments, quality control, and generation of the profile netcdf files are done. This transition became necessary due to the complexities of floats with multiple sensors that frequently generate multiple parallel profiles. Once this development is completed, adaptations to new ways of profiling can be implemented more easily than is the case at this time.
- MEDS is fine and only has oxygen floats to manage
- INCOIS is fine and is setting up the Bio-Argo processing with Coriolis' help.
- BODC is tight but has some funding through EU projects to set up the Bio-Argo and NST processing chains. Justin envisages issues on DMQC of bio-Argo floats.
- Coriolis is fine even if reprocessing is not easy to handle. Setting up the Bio-Argo processing chain is not an issue as both additional man power from LOV and EU funding have been provided.
- China – CSIO and NMDIS are fine and are adding the NST floats (not Bio-Argo) and this will be handled.
- Japan – Real-time processing is short in manpower but manageable. There is no difficulty with core Argo nor the extension to oxygen.
- Korea – KMA is fine and managing the KIOST real time data stream also. KIOST is processing the backlog in DMQC and should be done before the end of the year
- Australia – There are real man power issues for DMQC and they are hiring a new technician to help with DMQC. For the extension to Bio-Argo, the PIs will need to provide additional resources

Recommendations:

- *DACs are not obliged to manage all the exotic floats deployed by PIs especially when PIs don't coordinate within them PRIOR to deployment.*
- *When at the end of the ADMT meeting the action list is reviewed, DACs should be careful and say clearly when they feel unable to do them.*
- *DACs should review their processing chains to facilitate reprocessing in the future*

M. Scanderbeg presented on the Data FAQ page put together for the AST website. This webpage was requested by the ADMT at the previous meeting to clearly document troubles with the data as well as the fluid nature of the dataset. The questions are divided up into five categories which cover the characteristics of the Argo dataset, the history of pressure problems, the Argo dataset over time, the new Argo data formats and how to access Argo data. The url is:

http://www.argo.ucsd.edu/Data_FAQ.html.

Please send feedback to mscanderbeg@ucsd.edu.

Action: ADMT members to send feedback to mscanderbeg@ucsd.edu before end 2013 at the latest.

3 Feedback on BIO-Argo Workshop

Hervé Claustre presented the summary of the two half days dedicated to Bio-Argo. Justin Buck presented the proposal for naming of the Bio-Argo parameters, which closed the action 2. Note that a "family parameter" suffix is added to easily identify the new parameter (cf. DOXY added to the oxygen raw parameters).

The processing of the Chlorophyll-a, the particle Backscattering and NO3 at the DAC LEVEL were presented. To handle the multiple optical wavelengths for the NO3 and the particle backscattering an extra dimension N_VALUES will be added to the Netcdf file. Some metadata configuration parameters must be added to account for different setup of the NO3 sensors and the offset due to the distance between the CTD sensor and the biogeochemical sensors.

Regarding the Chlorophyll-a RTQC, the range test (-0.1 – 50 mg/m^3), the adjustment at depth, the negative spikes identification and flagging and Non-Photochemical Quenching correction are adopted. The tests for gradient as well as for positive spikes are not relevant to RT. Regarding the particle backscattering, the range test (5.10^{-5}-10^{-1} m^{-1}) and the negative spikes test are adopted. For NO3, the range test is adopted (-5 – 46 micromole/$kg^{3)}$, as well as the gradient and the spike tests. An additional test for the spectral quality is proposed. These will all be described in the QC manual.

For Chla and bbp DMQC the following recommendations are adopted. The satellite data are only used to identify potential issues in their float counterpart; some metrics have to be developed and to compare their respective trends. Metrics are also required to characterize the deep value trends as a check for potential problems. With respect to the reference database, the use of several methods to define biogeochemical provinces have to be tested. Additionally for Chla, it is proposed that, when available, radiometry measurements are used to correct for the Chla profile. For the DMQC of Nitrate, the WOA is for the moment the best reference.

For detailed information refer to the 2nd bio-argo meeting report that will be available on the ADMT WWW site

4 Status of Argo Program and link with Users

4.1 Review of the Actions from last ADMT

Sylvie Pouliquen reviewed the status of the action items from ADMT13. At ADMT13 it was decided to identify the high priority actions from routine and low priority ones. It has also been agreed to organize phone meetings (one in February, one in June) to better monitor the progress and identify earlier when issues block progress. The February meeting focused on the high priority issues and the ones due for AST, while June focused on the rest of the actions. This way of functioning has proven to be efficient and all DACs agreed to work the same way next year. Some DACs have been difficult to reach and an updated list of DAC contacts was assembled at the meeting. The status of the actions is:

- High: among the 19 actions decided 10 were done, 9 partially
- Routine: Among the 29 actions 19 were done, 8 partially, 1 not done, 1 postponed after ADMT14

Some actions regarding trajectory and metadata were delayed as some of the specifications needed to be completed and were discussed at ADMT14.

See complete status in Annex 3.

4.2 Argo Status and AIC development

The Technical Coordinator, M. Belbeoch, reported on the status of the Argo program. On the infrastructure side, he mentioned that the JCOMMOPS office, has gained two new staffs this year: one software Engineer, and a Ship Coordinator that will provide support to the GO-SHIP program amongst others. Hence a better monitoring of CTD metadata can be anticipated. The office HQ will move to Brest/Ifremer early 2015, with additional financial support from local Breton authorities, and optimistic development perspective in support of Argo and other JCOMM/GOOS observing systems; new web-services, partnership with maritime operator and sailing communities.TC gave latest news on the Argo status with regard to international partners, float models, telecommunication systems. He noted that 60% of deployed floats are using Iridium. While the Argo network is stabilized above the initial target with 3606 active floats, only 2/3 of the 3°X3°array is covered at a given time, which is a reasonable achievement if we compare this metric to a random distribution of 3000 floats globally. Central Pacific and Indian ocean were particularly identified as showing spatial clusters of aged floats that will need to be replaced soon. He mentioned that 2005/2006 float generations have done more than 175 profiles in average and 2007/2008 more than 150.TC reminded everyone that the planning was important to maintain a global array and urges all operators to register their floats at the AIC as soon as possible. He concluded by inviting the ADMT to share further practices on (web) developments and proposed to host a meeting with a few technical experts (including S. Diggs and G. Maze) to work on an "Argo API" and democratize further the access to Argo data and metadata

4.3 Citation Index for Argo

In July 2013 DataCite introduced a policy for datasets that are continuously and rapidly updated. For citation, three approaches are possible:

a) Cite a specific time slice (the set of updates to the dataset made during a particular period of time);

b) Cite a specific snap shot (a copy of the entire dataset made at a specific time);

c) Cite the continuously updated dataset, but add an Access Date and Time to the citation.

(from “DataCite Metadata Schema for the Publication and Citation of Research Data”, version 3.0, July 2013).
Option c) has the difficulty that reproducibility of the data is not guaranteed if the data system is not sufficiently robust. These approaches were confirmed at a recent EUDAT workshop (European FP7 project) on dynamic data. Approaches b) and c) are both appropriate for use in Argo.

4.3.1 Approach b); cite a specific snap shot (a copy of the entire dataset made at a specific time)

It was decided that the temporal frequency for snapshots was to be monthly. An example of such a snap shot is:

ARGO (2013): Argo floats data and metadata from Global Data Assembly Centre (Argo GDAC) - Snapshot of Argo GDAC 10th October 2013. IFREMER. Dataset. http://dx.doi.org/10.12770/d623ede9-cf3a-4d81-924a-d807c95a2ee3

Ifremer have also minted three more at quarterly intervals for the past year to demonstrate the approach is viable. Also, since snapshots are versions of the dataset, they require unique identifiers/DOIs.

4.3.2 Approach c); cite the continuously updated dataset, but add an Access Date and Time to the citation

Ifremer have also minted a Digital Object Identifier (DOI) for the GDAC as a whole:

ARGO (2000): Argo floats data and metadata from Global Data Assembly Centre (Argo GDAC). IFREMER. Dataset. http://dx.doi.org/10.12770/1282383d-9b35-4eaa-a9d6-4b0c24c0cfc9

and the recent version of the user manual – *Argo data management (2013). Argo user's manual. http://dx.doi.org/10.13155/26387*

These are sufficient for Argo if long term reproducibility of the data is not required by users and can be used by real time users of the GDAC. An equivalent DOI is not yet possible for GTS data and the WMO are aware of the issue and investigating options.

If reproducibility of the open GDAC is desired then either file versioning needs to be introduced at the GDAC level or data management procedures need tightening at the DAC level. Either of these would be a long term goal.

This approach will be written up and tested for the next year. It will be reassessed when NODC are also capable of minting DOIs and providing landing pages.

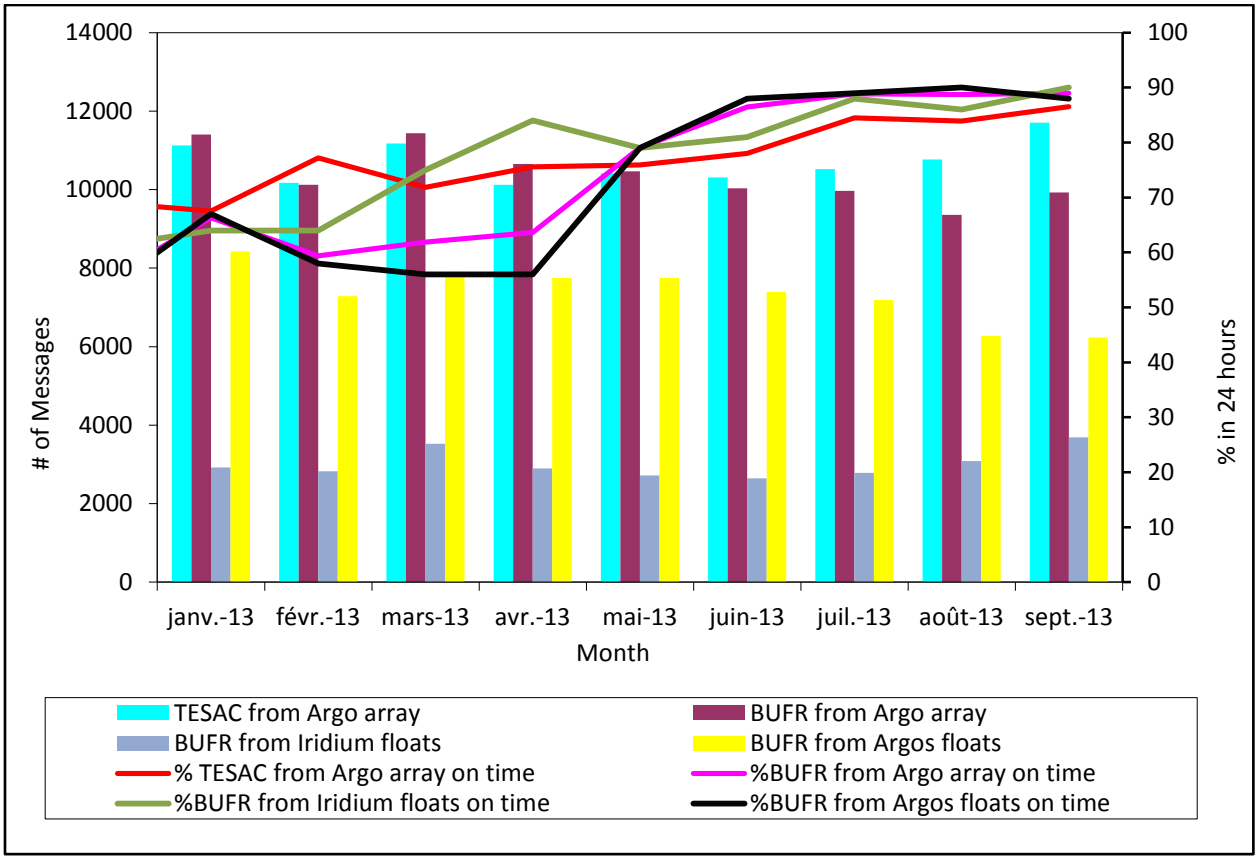
Actions:

- *Coriolis to perform monthly snapshot of the DAC directory (including Manual) and assign a DOI to the monthly snapshots.*
- *BODC and Coriolis to issue documentation or WWW page to teach users on how to use the Argo DOI*

5 Real Time Data Management

5.1 GTS status

ISDM routinely collected oceanographic data distributed on global telecommunication system (GTS). For Jan 2013 to October 2013, on average, each month we received 10704 messages in TESAC format and 10375 messages in BUFR format from Argo floats from various GTS nodes. On average, each month 78% and 76% of the Argo TESAC and BUFR were transmitted within 24 hours of the time when the float surfaced, respectively. Each month, the volume of BUFR received is always less than the volume of TESAC. In August and September 2013, there are about 1000 messages which didn't transmit in BUFR format in comparison with the TESAC volumes. For September 2013, there were 242 floats which reported data as TESAC messages but not in BUFR format. These floats are being processed by CSIRO (Australia), Coriolis (France), BODC (UK), AOML (USA, for US these must be NAVO floats). For BODC DAC, only 50 % of BUFR messages are on the GTS within 24 hours when compared to the timeliness of TESAC messages. There are no BUFR messages from the Korea and India DACs yet. Below is the plot showing the volume of Argo data on the GTS within 24 hours in TESAC and BUFR formats and the timeliness for each type of message.



Actions

- *CSIRO, Coriolis, JMA, to examine why they have fewer BUFR messages than TESACs,*
- *BODC to solve the BUFR issue on iridium floats*
- *INDIA and KMA to start BUFR*
- *CLS to check why they generate too many BUFR messages*

5.2 Delays at GDAC

The Argo Technical coordinator is monitoring the delays at GDAC from the detailed index files provided by GDACs. With regard to data distribution, the delays at GDACs had shown a large improvement for a couple of years. Major problems have been solved at GDACs and DACs following earlier detailed studies. A few minor problems were however noticed during 2013 and will be investigated further. The GDACs can now be considered as operational channels delivering most of their data within 24h.Actually today, more data in volume are published within 24h on GDACs than on GTS, even if the average shows differences. Some data are published after 30 days (limit for GTS) at GDACs and impact the average statistics (exotic floats, new data formats, old equivalent floats, problematic floats)..

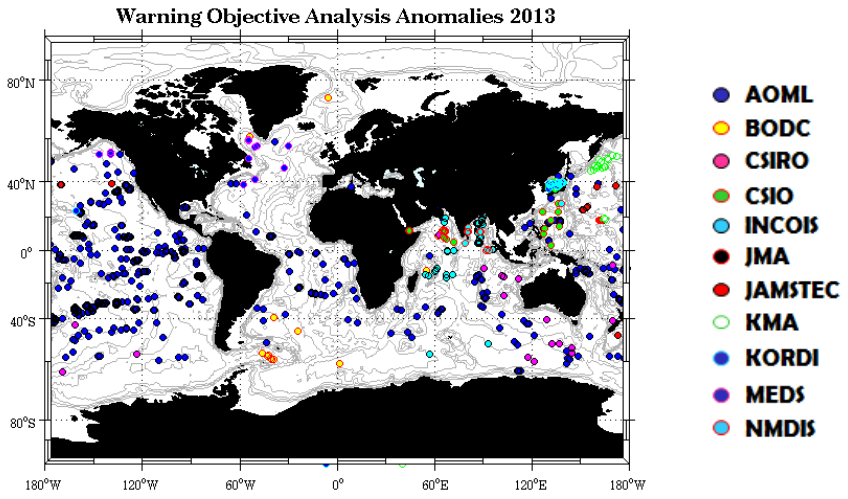
Actions

- *DACs to check negative delays list sent by AIC (AOML, BODC, CORIOLIS, CSIRO, INCOIS, KIOST, MEDS, KMA, SIO)*
- *AIC to perform delay analysis on two GDACs and provide a report to DACs highlighting issues*

5.3 Status of profile anomalies at GDAC

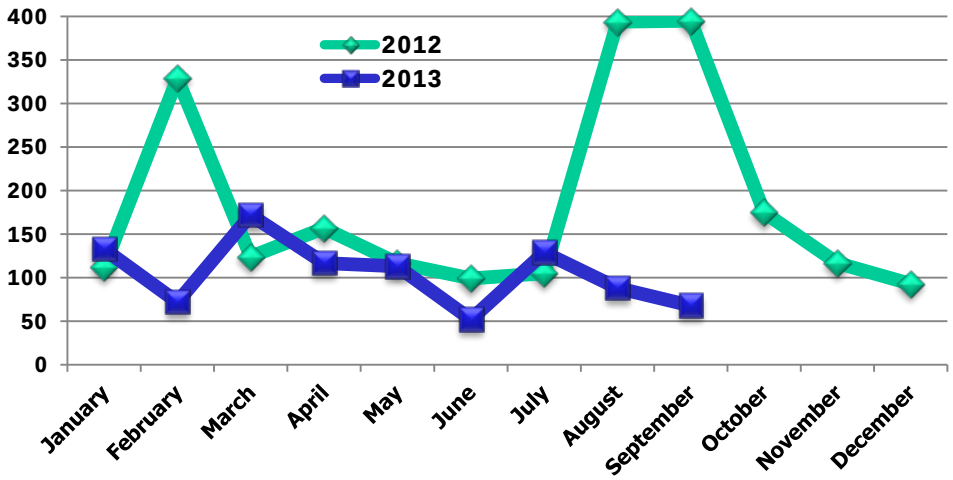
Monthly reports are provided to each DAC to summarize all the anomalies that are detected during the month. The report is sent to argo-dm@jcommops.org. The messages are available on the ftp site:

ftp://ftp.ifremer.fr/ifremer/argo/etc/ObjectiveAnalysisWarning/
and reports (pdf format) on:
ftp://ftp.ifremer.fr/ifremer/argo/etc/Report_ObjectiveAnalysisWarning/



Location of the profiles with anomalies for the year 2013 (1st January till 30 September)

Statistics on anomalies show a mean of 105 profiles failed each month, considering all DACs. For some DACs, the number decreased since spring 2013. Most of the DACs have done correction of profiles and if necessary sent feedback to Coriolis. Few of them need to be contacted again to identify problems with reception of the messages and/or to understand what corrections were requested (some of these were done during the meeting). During this year, some DACs have taken care of the messages sent after the objective analysis, some improvements have been made and the number of anomalies seems to have decreased for some of the DACs. Regarding the number of profiles submitted to GDAC, there are not a lot of anomalies.



Evolution of the anomalies number for the two last years. High values in 2012 (February, August and September) are due to a re-run of the objective analysis on a large period and do not reflect the anomalies detected monthly in real time.

A few profiles also have bad data that were not detected by the automatic tests, especially when the difference between values is smaller than the threshold of the gradient test and spike test, for levels shallower than 500 dbar. Without visual control and /or a climatology test, those profiles will keep getting into the Argo flow.

As at the last ADMT, problems have been detected in the file format. Concerning the fields of adjusted parameters, when the data_mode is A, for some DACs only pressure adjusted is filled. This is the case for BODC, INCOIS, KMA, MEDS. All are in progress of correcting this or it has already been done. INCOIS still has "old" RT files where the data_mode is R instead of A. For NMDIS, floats having delayed mode data have only a data_state_indicator corresponding to DMQC. They have to change the data_mode from R to D and to change the naming of the files from R<wmo_n°>_cycle.nc to D<wmo_n°>_cycle.nc. It was also noted that CSIO files do not report any adjusted fields in their R files, despite these floats requiring pressure correction based on their model and the Surface Pressure Offset name used in the technical files. They need to fix this problem.

It was also clear that some problems seen are the result of the file checkers not checking content for consistency and conformation with the rules. It is very important that the DACs provide feedback and fix anomalies in their files.

5.4 Status of anomalies detected with Altimetry

The Altimetry check has been performed every four months again this year and automatic emails have been sent through the AIC database to the DM-operator and DAC responsible for the floats with problems. 69 floats are currently on the list. For 22 of them feedback has been provided by ADMT14. Old anomalies have been recently corrected but some still remain. A new test has been implemented last year that compares SLA/DHA differences to SLA/DHAadj differences. Additional floats detected with this new test and thus careful analysis by the PI is required.

About 40 % of the detected floats show only one isolated very bad profile. The possibility to revisit the "Gross salinity or temperature sensor drift" test was discussed. The threshold value used for salinity (i.e. 0.5 psu) might be too loose.

General quality of Argo dataset was presented and showed stable statistics compared to last year. 840 594 Argo profiles with QC fields at '1' show very good agreement with collocated satellite altimeter observations with a correlation of 0.86 and rms difference of 24.8 % of the altimeter signal variance

After Christine and Stephanie's talks, Dean pointed out that it would be interesting to set up indicators not only on the quantity but also on the quality of the Argo dataset and its improvement through time

Action: Dean with Megan to propose indicators on quality by AST15.

5.5 Revising some qc tests for deep Argo floats

Presented by John Gilson, on behalf of Claudia Schmid who could not attend the meeting. The World Ocean Database was utilized to identify tighter limits for several real-time QC tests intended for application on Deep Argo data (2000-6000 dbar). The Global Range Test limits may be tightened for both temperature (-1.5 to 5.5^{o}C) and salinity (33.5 to 35.5 psu). The Spike Test and Gradient Test exclusion limits for temperature may be tightened to 0.2^{o}C. The test value for the Spike Test for salinity could be reduced to 0.02 psu, while the test value for the Gradient Test might be reduced to 0.1 psu. For density inversions no reduced threshold is suggested (it remains 0.03 km m^{-3}). Deep oxygen was not studied so modified test limits for oxygen were not presented, ; the bio-Argo community may want to consider if revised test values for oxygen can be implemented below 2000 dbar. Due to the limited spatial and temporal data coverage of the WOD database, the suggested RTQC test limits will need to be monitored on initial Deep Argo floats.

5.6 Status of density test implementation

All DACs should be familiar with the approved test for density inversions. An action item (#8) from ADMT 13 was to download a test data set from Thierry to ensure we are all applying this test consistently and getting the same results. Most groups have done this but some still need to finish this action. This file can be found at:

http://www.argodatamgt.org/Documentation/Validation-and-reference-data

A reminder that this test also applies to DM data and needs to be rerun after calibration of the data because calibration can change density gradients. The RT critical value is 0.03 – any density inversion larger than this should result in the data being flagged class 3 in RT. This was the threshold used for the audit of RT files and files within 90 days of present were checked to see if the DACs were applying this test correctly now. Legacy files were not checked and density inversions will remain until these files go through DMQC.

Some density inversion will remain in dynamic regions, even after DMQC. If you have float where you believe a density inversion identified in the audit is from good data, tell me the WMO id and profile number and it can be excluded from future audits. The critical value for DM files was slightly larger – 0.05. Audit files are available from:

ftp.marine.csiro.au
login anonymous
cd pub/gronell/argo

Results of the audit were sent out and feedback received from some DACs. Generally the audit appeared to be catching data errors that had slipped through DMQC but more DM operators need to check their results. RT errors have dropped but 50 files still contain density inversions larger than allowed. This need to be investigated by the DACs because this test is automatic and no such inversions should remain unflagged in these files. This is a simple but urgent action for the DACs.

Action DACs to check the density audit file and take action to correct errors or provide feedback if the file is ok

5.7 Unpumped SST measurement RTQC implementation at DACs

The proposed real time quality control test 22 for mixed air/water measurements at the top of the unpumped Near Surface Temperature (NST) profile measured by Teledyne Webb APEX floats that include the NST firmware option has been tested at BODC.

Test 22 was proposed as follows – For near-surface data collected by APEX floats with the NST firmware, if the difference in pressure between two successive measurements is less than 0.5 dbar*, then measurements from that level and all levels after that should be flagged as “no qc”. That is, PRES_QC = ‘0’, TEMP_QC = ‘0’, PSAL_QC = ‘0’.

It was shown that the test identified suspicious levels successfully but did flag good data in 20% of profiles. During subsequent discussion it became clear that the firmware either differs between UW and Teledynes floats or more investigation is needed to confirm exactly how they operate. It was decided that rather than flag values zero (no QC) they should be flagged 3 (probably bad) instead.

At the end, the status of near surface quality control implementation by DAC was summarised with the current status in the following table.

DAC	Status of near surface data QC
BODC	Method for APEX NST floats coded and testing on-going
AOML	We currently apply the qc tests for deep profiles to near surface profiles for some float types but not for others. This is the case because we are in a transition phase to a new way of handling these profiles.
INCOIS	Presently no additional QC for near-surface data
Coriolis	Apply proposed tests
MEDS	NOVA floats, standard QC no near surface tests

6 Pressure correction

Esmee van Wijk presented the CSIRO audit of surface pressure corrections on behalf of Jeff Dunn from CSIRO. The latest audit was run on files as found on the GDAC at the end of September 2013. This will be the last pressure audit run by CSIRO. A summary of the audit results and all plots and listings by float WMOID and DAC can be found at: http://www.cmar.csiro.au/argo/dmqc/audits/

Overall, the agreement between the DAC correction and the suggested audit correction was very good. A significant proportion of R files remain where problems have been identified (either zero or bad surface pressure offset values or the PRES_ADJUSTED field has not been filled).

Action: DACs to review the anomalies detected by the CSIRO audit and provide feedback to Jeff before the end of the Year

7 Reference database

One new version has been provided since ADMT13, in March 2013 (2013_V01). This version has been updated to eliminate discovered bugs (especially on dates for which the conversion failed for some CCHDO CTDs) and feedback from users.

A new version will be prepared for March 2014, taking into account OCL updates, CTD CCHDO if available and following procedures to QC check on all boxes. Detailed analysis of the deep water for all WMO boxes showed that a few boxes have bad profiles, some with a lot of noise when a zoom is done. A procedure has therefore been defined for preparing future versions, taking into account the following steps: study each box, diagram Theta-S with a zoom on deep water, scrutinize by profile, remove bad profiles, and for boxes of large size remove the oldest data, and perform a duplicates check. A similar examination for all new CTDs will be done before adding them to the reference database. We will also start to put in place feedback to US-NODC about anomalies.

Then Steve Diggs presented the work performed by CCHDO . Even if not much data has been sent to Christine, links with international program such as GO-SHIP (an ‘associated data unit’ part of IODE) or GEOTRACE/Japan has allowed CCHDO to collect about 3700 profiles (of which many are within 2 years of present) that are about to be sent to Christine. The action on information exchange and better knowledge of CCHDO/US-NODC/ArgoCTD-REFDB respective inventories is still an issue to be addressed. . It was agreed that there is a need for a more automated data transfer between CHHDO and Coriolis , with a little less manual intervention to get the data into the climatology in a more routine manner.

Action: Steve to work with Christine to streamline data provision from CCHDO to Coriolis for CTD-REF DB

8 GDAC STATUS

8.1 Operation status at US-GDAC and Coriolis-GDAC 30mn

The V3 new data formats for profiles and technical data are accepted on both GDACs since.

- May 2013 for profiles V3 user-manual 3.0
- August 2013 for profiles V3 compliant with user-manual 3.03
- September 2013 for technical files V3
- October 2013 for trajectory files V3 may be accepted

New features available on USGDAC (already on Coriolis GDAC):

- Allow compressed files submission: available on both GDACs since May 2013. This is important for submitting big batches of delayed mode data or reprocessed data
- Both GDACs generate an detailed index file that is used by AIC to monitor the delays

GDAC status

- Currently, 11 DACs submit data regularly to GDACs.
- On October 8th, 1 157 345 files were available from the GDAC FTP site
- Submitted files are automatically collected from the national DACs every 30 minutes.
- There is a monthly average of 823 (285 in 2012) unique visitors, performing 3397 (2397) sessions and downloading 3005 (1614) gigabytes. This is due to an important increase in Spring probably linked to the issue of the film named “Argo”.
- The ftp server statistics show a steep increase of activity on GDAC FTP in March, April and May 2013. This is probably related to the movie called "Argo" as previously.

GDAC ftp server monitoring

- Coriolis GDAC ftp server is monitored by a Nagios agent: every 5 minutes, a download test is performed.
- The FTP host is a virtual server on a linux cluster. We did not face any electrical power supply problem.
- The ftp server was available for 99.992 % of the time (99.98% last year)
- The 0.008% of failure represents 31 minutes of interruption (1 hour 53 minutes last year). The main problem occurred on week 34, in August 2013. The ftp server failed, but was reactivated on another node of the cluster.

The graphics and figures for the Argo data management web site are documented in the Coriolis DAC-GDAC annual report. The 11 actions related to GDAC activities listed at the ADMT13 meeting are now completed. The USGDAC is back to normal operations.

8.2 Status of Format Checking operations (D-Files checking) 15mn

The operational format checker controls NetCDF files global attributes, variable names and attributes, but, it does not control consistency of the files or variable contents.

List of enhanced checks, from Mark Ignaszewski's specification

- If the file data_mode is ‘A’ or ‘D’, adjusted variables should be filled
- Dates reported as strings should be valid
- Quality flag values should be valid
- PLATFORM_NUMBER: 5 or 7 numeric digits (second digit “9” for 7)
- DATA_STATE_INDICATOR: Reference table 6

- DIRECTION: 'A' or 'D'
- DATA_CENTRE: Valid for the DAC (Reference table 4)
- DATA_MODE: 'A', 'D', or 'R'
- FLOAT_SERIAL_NUMBER : set
- POSITIONING_SYSTEM: Reference table 9
- WMO_INST_TYPE: Reference table 8
- JULD_QC and POSITION_QC: Reference table 2

New requirements

- String padding should be consistent between DACs : all strings should be padded with blanks.
- Check the technical parameter and units names against the official list

Action: Mike to finalize the enhanced file checker that checks contents including conformity of techfile variable names and units with the agreed list

8.3 Proposal for patching profiles to upgrade to V3 for historical T&S floats at GDAC

Moving to V3 format requires we convert all the present historical files available at GDACs. While the DACs have to regenerate their Traj/tech/meta files because the V2 files don't contain all the required information, the situation is different for a majority of the profiles acquired by floats using Argos transmission. Therefore it was agreed last year that the DACs will first focus on generating the V3 file for the recent profiles while GDACs would study how to patch floats that only have one Cycle/Parking_Depth (add CF and extra dimension, Sampling-Schema, Mission_Number=1) as well as patch new profiles until DACs switch to V3.0 format.

Thierry and Mike have started to specify the converter that needs to be developed. It will be a Matlab tool that can be either used at DAC or at GDAC level. Thierry and Mike propose the following scenario for transition to Argo format 3.0: transition will be done DAC by DAC, at a date agreed between the DAC and GDACs. After this date, that DAC will no longer be allowed to provide V2.x profile files because the GDAC file checker will reject any V2.x files from that DAC. Three options will be proposed to the DACs

- Option 1: the DAC re-generates all its files in V3 format and submit them to both GDACs on an agreed date.
- Option 2: The DAC re-generates all its real-time files (R-Files and A-Files) and submit them to both GDACs on an agreed date. Mike converts the delayed-mode files (D-Files) and submits the converted files to both GDACs, in the submit directory of the DAC.
- Option 3: When the DAC is able to provide the recent profiles file in V3, Mike converts all the DAC files (R-files, A-files, D-files) and the converted files to both GDACs, in the submit directory of the DAC.

When a DAC has been converted a news will be issued on ADMT WWW Site. It was also agreed that we should better inform users about the V3 format and Megan agreed to prepare the news item based on the FAQ that she already wrote.

Finally Thierry and Mike initiated a GDAC cookbook containing all the GDAC services and tools. They will add a section on the conversion and will circulate it to ADMT members.

Actions

- *Thierry and Mike to finalize the first version of the GDAC cookbook*
- *Develop a Matlab V2toV3 converter for profile files that can be used either at GDAC or be provided to DACs to perform their file conversion without regenerating all their files*
- *DACs to provide new Real time profile files in V3*
- *DACs, with or without GDAC help, to convert historical V2.3 files into V3 profile files*
- *Megan to prepare a news information item for users to explain the changes in V3*

8.4 V3 reprocessing

The following plan was agreed for V3 transition for new profiles and reprocessing of Traj/tech/meta files

DAC	Profile RT	Metadata	Tech	Traj
AOML	mar-14	2014	2014	mar-14
BODC	dec-13	déc-13	dec-13	déc-13
CORIOLIS	done	mars-14	oct-13	2014
CSIO	dec-13	déc-13	dec-13	2014
CSIRO	done	déc-13	oct-13	dec-13
INCOIS	IDEM CSIRO			
JMA	2014			
KMA	nov-13	nov-13	nov-13	nov-13
KORDI	IDEM CSIRO			
MEDS	done	oct-13	done	dec-13
NMDIS	dec-13	2014	2014	dec-13

9 Format Issues

9.1 Status on Tech Files updates (Actions 33) (A Thresher-Gronell)

Unfortunately, technical file contents have not changed significantly since last year. This is understandable in light of the transition to V3.0 but we are going to require DACs to deliver fully compliant files once they make this change. The list of approved names is available on the web at
http://www.argodatamgt.org/content/download/15799/103249/file/ArgoTechnicalParameterNames_v5.3.xlsx

This list will be updated as soon as possible after the meeting. Problems this year are the same as last year

- slight differences between the name used and the approved name (PRES_SurfaceOffsetTruncatedplus5dbar_dBAR which should be PRES_SurfaceOffsetTruncatedPlus5dbar_dBAR)
- trajectory data in the technical files (PRES_AscentToSurfaceStart_dBAR)
- there are also some very strange names and these need to be investigated.

Some names from the currently approved list are moving to the trajectory or metadata files – consensus was that these moves were appropriate so you will no longer be able to use these names. If you have a problem, let Ann know and she will help you decide where the data belongs.

A text file containing the unapproved names for each DAC is available from:

ftp.marine.csiro.au
login anonymous
cd pub/gronell/argo

A major problem discovered this year was inconsistency in the names of the units used. Technical variables do not dictate the units to be used. These are to be provided by the operator and they should be correct for the variable reported. But many units are now meaningless or just wrong. In addition, new units are needed for additional data types and these approved names will apply both to technical variable names and metadata configuration variable names. In future, we will need to audit the units used in all files, as well as the technical names.

Representation of the units is also a challenge – we propose to use the Seadatanet BODC table P06 as the standard reference for how units will be represented in the files. For example, kilograms per meter cubed will be represented as "kg/m^3" If you have questions after you see the final list, please circulate them and we will attempt to find a compromise.

Action: Ann will circulate a list of 'approved' units within a month of ADMT. Review this and send your comment, criticisms and questions to the group for consideration.

9.2 Status on Meta-Files Update: Esmee Vanwijk / M Belbeoch

Historically the meta file contents have not been consistently populated or the input standardized between DACs. A large amount of effort has gone into standardization of content over the past couple of years culminating in the metadata version 3.0 format. Metadata variable names and configuration parameter names have been standardized, new variable names added to aid tracking of sensor and float performance and new reference tables (for PLATFORM_FAMILY, PLATFORM_TYPE, PLATFORM_MAKER, SENSOR_MAKER, SENSOR_MODEL) have been created to standardize input. The User Manual now specifies which variable names and configuration parameters are mandatory or highly desirable (if applicable) and those that are optional. Configuration parameters are identified by a CONFIG_ prefix and the suffix is selected from the standardized and approved list of parameters and units. We will maintain separate lists of Core Argo and Bio Argo parameters.

Most Argo floats have one mission for the life of the float. Some floats with two-way communications may have multiple missions. For floats with multiple missions the configuration from the first cycle is set to 1. Each subsequent configuration change has a new mission number, i.e. from 1 to N. Each time a new mission number is added the metafile will need to be rewritten. Argo best practice is a minimum of configuration missions.

With the advent of new float types that report vast numbers of configuration parameters at launch we agreed that the configuration parameters at launch/on deployment will be moved from mission 0 in the old scheme to a new launch configuration parameter section. The configuration parameter names stay exactly the same but only need to be reported once, unless they change. A new dimension will be defined and the new launch configuration section will be dimensioned by the number of launch configuration parameters.

Action Item: DACs to check the new standard reference tables (SENSOR_MODEL and SENSOR_MAKER, Mathieu Belbeoch), the updated core Argo configuration parameter table (Esmee van Wijk) and the new Bio Argo configuration parameter table (Catherine Schmechtig), to ensure that all their float types are covered. DACs to provide feedback to relevant person on any new required parameters that are not in the table. New parameters cannot be used unless they are first approved and added to the master tables.

Action: DACs to validate the table Standard-Decoders provided by Mathieu

Action: Thierry to update User manual according to meeting decision

9.4 Feedback on the audit on coherency between parameter declaration in metadata and occurrence in profile/trajectory (action 40) B King & all

Brian King completed an initial audit of parameter names in meta and prof files after ADMT13. There was some iteration with Ann Thresher, but the results were not disseminated to DACs. Since ADMT13 there has been evolution of parameter names in Ref Table 3, and agreement to make careful distinction between SENSOR and PARAMETER names in the meta files. Audit of those names should wait until the lists of names have been finalized. It would then be helpful to notify DACs of any inconsistencies with the new agreed tables.

However, Brian proposes to return to the audit to identify some inconsistencies in present files that are simply errors, which should be fixed when possible. Check will include:

1) 'null' or other illegal characters in string names. It has previously been agreed that names must be padded with space characters, and this is recorded in the QC manual. This means they must be properly initialized in NetCDF.

2) There should be one-to-one correspondence between the names in PARAMETER in profile files and the <PARAM> variables in the file. Glitches include out-of-date names such as 'BPHASE' or 'COND', errors such as 'CDNC', and errors probably arising from dimension faults such as '1111', '0TMP', 'TEMPTEMP'.

3) Mismatches in PARAMETER names such as TEMP_DOXY in PARAMETER linked to PSAL calibration information, or MOLAR_DOXY in PARAMETER and DOXY as the <PARAM>.

When an audit has been run, lists of faults will be circulated, and DACs asked to identify the causes of faults and fix their code and the files accordingly.

Action: Correct the parameter name anomalies detected by Brian's audit.

9.5 Storing BIO-ARGO Variables

This topic summarized the conclusion of the discussion that was held by email after the meeting on how to store bio-Argo data. Three solutions were proposed:

1. Core and Bio all in the same file
2. Core and Bio completely separated with measured Pressure common to the two files
3. Core with bio final variables in one file bio raw measurements in another file

Two types of comments were expressed:

- The first type came from delayed mode operators who work with the physical data and from the DACs that are mainly processing core mission floats. They expressed their preference for the option 2. They rejected the option 3 because, as core Argo mission DACs, they were concerned about the impact of the Bio activity on core activities. Reprocessing of the bio final variables will probably be more frequent in this starting up period. DMQC will be done by different teams working on the different data streams and this will require a high level of coordination if they share the same file.
- The second type came from the bio-Argo scientists, data managers and DMQC operators who process both T&S and Bio variables and from DACs that already have bio floats to process. Mainly European DACs expressed their preference for option 3 because they want to provide similar service to both bio and core users. Biological final variables will always be used with T&S information. As in these countries bio and core actors are already working closely together they thought that the synchro-nization issues between bio and core data processing were manageable because they were relying on a common DAC to perform these tasks.

We think that we can't ignore the concern of either community. Therefore to address the concerns expressed by the core mission DACs, the solution chosen is option 2 at DAC level. The DACs will therefore provide one file for the T&S floats (like now) and 2 files for the bio Floats (R or D file for CTD and BR or BD -file for bio-Argo) to the GDACs. To accommodate the needs of the bio-argo community, the GDACs will then merge the CTD (i.e.core) Argo file (R-file or D-file) and the b-file (BR-file or BD-file) for bio floats, creating a merged profile file that will contain the latest version of all the ocean state variables (MR-file or MD-File). Therefore data from bio floats will be available at the GDACs via 3 files: a CTD aka core file, a bio-file, and a merged file We will need to inform the users of the presence of this additional merged file for the bio-Argo floats. The naming convention described herein is designed to be transparent to the users. The merging tool will be developed by Ifremer and provided to US-GDAC.

This solution has no impact for the DACs that process only T&S profiles. For the DACs that process oxygen floats, they will have to modify their chain to create distinct CTD aka core files and bio-files. A similar strategy will be applied to trajectory files.

Thierry will now work with Justin and Catherine to update the user manual. The French and UK DAC will update their bio-Argo processing chain and start providing these files within the coming weeks and act as a test bed for the other DACS who don't have yet such floats to process.

We hope that this consensual solution will have the agreement of the entire group, including both core and bio PIs and DACs. This solution is the baseline for the coming years and will be presented at the AST meeting next march in 2014 and may be improved if needed at ADMT in November 2014 after the first delivery of bio-Argo data to GDACs

10 Trajectory issues

10.1 Summary on the final agreement on traj format Version 3 (M Scanderbeg)

M. Scanderbeg presented the status of the trajectory V3.0 format and the DAC cookbook. Since ADMT-13, the trajectory V3.0 format has been finalized and included in the User Manual. The V3.0 format is very flexible to accommodate newer float types and includes all the cycle timing information necessary to calculate velocities. It was agreed to go to a two-file system with both an 'R' and a 'D' file for trajectories. This allows DACs to manage the trajectories in real time and PIs/float owners to handle the delayed mode files to prevent overwriting by the DACs when a new cycle arrives. It was decided to keep 'R' files at the GDACs even when a float dies and the 'D' file is produced.

Next a presentation was given from the viewpoint of a user trying to use the trajectory files to create velocities at 1000m in the equatorial Pacific. The first algorithm to estimate Transmission End Time (TET) for Argos APEX floats listed in the DAC cookbook was applied to the appropriate floats in the region. For the group of 78 Argos APEX floats, there were 8 floats that showed anomalous plots of TET based on an automatic TET estimate. Two of the problems were due to an erroneous cycle time in the metadata information. Correcting the cycle time led to a good estimate of TET. One problem was the erroneous decoding of the Ascent End Time (AET) and Transmission Start Time (TST). Fixing these errors in decoding, would lead to a good TET estimate for that float. Another problem was a jump in the clock of an APEX float which means that the TET must be process in slices. Doing this will lead to a good TET estimate for this float. The other errors in TET were due to one anomalous cycle.

If the metadata information and the decoding are improved, then quite good TET estimate may be possible in real time. If DACs feel confident in this method, they should apply it according to the instructions in the DAC cookbook. If not possible, DACs can estimate the TET time based on

metadata and put the status flag to 0. Then, the other method for the TET estimate can be done in delayed mode.

This brings up the question of doing delayed mode quality control on the trajectory files. Given the variety of set ups for delayed mode operations in the different countries, the approach to handle trajectory data will differ. Some DACs might want to do this task once a year for cycle timing estimates rather than in real time for some floats. Other PIs may want to do the handle the delayed mode processing. Delayed mode quality control for trajectory files may involve cycle timing estimation, checking of positions and times, confirming metadata information related to trajectory files, application of salinity and pressure corrections, etc.

Finally thoughts were presented on what can be asked of the manufacturers. It is very important for floats to send back cycle timing information. Additionally, if floats are to include Iridium, it would be beneficial to the trajectory people to include more than one surface location. D. Roemmich requested more information on what we need to ask manufacturers to do to improve the timing information. These requests can be made at the AST-15 meeting when float manufacturers may be present.

Action : Megan to prepare recommendation for manufacturers for AST meeting

10.2 Updates on the cookbook (M Scanderbeg)

A short presentation was made on the DAC cookbook by M. Scanderbeg. The cookbook was created as a way to take the variety of floats that DACs own and create consistent trajectory V3.0 files. An update to the cookbook will be coming out soon which will include some additional coding for TET estimates for APEX Argos floats, a new method for creating the data from Argos messages. Questions were posed as to whether the Annex I entry point was useful for DACs or whether it should be changed to either an HTML file or an excel file. DACs responded positively toward the tables in Annex I. Therefore, these tables will continue and the pdf document will be the one going forward. An important part of this DAC cookbook is that when new float types are deployed, information must be added to it explaining how to take the data, match it up to MC codes and cycle timing information.

10.3 Status on Reprocessing of Trajectory from ANDRO DEP files (T Carval/ JP RANNOU)

A global ocean sub-surface displacement dataset has been generated from Argo float data. This product is called ANDRO for Argo New Displacement Rannou and Ollitrault but also because Andro is the name of a traditional dance of Brittany. The ANDRO project is directed by Michel Ollitrault (from IFREMER/LPO) and achieved by Jean-Philippe Rannou and Emilie Brion (from the Altran Company). 6 302 Argo floats, corresponding to the period from the beginning of Argo until the end of 2009, have been re-processed and checked so far. The technical paper describes all these processing steps : http://www.ifremer.fr/lpo/files/andro/ANDRO_JAOT_2013.pdf.

The first estimate (V0) of a sub-surface displacement can be defined between the last Argos location and the first Argos location of two consecutive cycles. The error induced by surface currents can be minimized by defining a second estimate (V1) between descent start and ascent end times of a given cycle. Ideally, we must consider also the vertical phases of a cycle, thus the best estimate (V2) of the displacement is defined between parking start and parking end times. The ANDRO file contains V0 estimates of the float deep displacements, each displacement is provided with its Representative Park Pressure (RPP) and Temperature (when available). The ANDRO file is generated from the DEP dataset (for DEPlacement, i.e. displacement in French). The DEP files gather all available information (cycle timings, dated and undated PTS measurements, Argos/GPS surface fixes) to compute V1 and V2 estimates of the deep displacements. Both ANDRO file and DEP dataset are available from http://wwz.ifremer.fr/lpo/Produits/ANDRO.

Argo can take advantage of the work done for the ANDRO project through the three following points: by using the experience gathered by the people who achieved the ANDRO project, by recovering cleaned meta-data for ANDRO Argo floats and by using DEP file contents to generate Argo delayed mode trajectory files. The first point has been carried out by Megan Scanderbeg who collected Jean-Philippe's knowledge of trajectory processing to write the DAC cookbook. The second point has been achieved by Jean-Philippe by providing (in ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/argo-andro-data/meta_data) the corrected version of the ANDRO float meta-data as well as some decoded (and checked) configuration parameters of APEX floats (UP_TIME, DOWN_TIME, DPDF (Deep Profile Descend Period) time and DPF (Deep Profile First) flag). Jean-Philippe encourages the DACs to collect the APEX float test messages and to distribute the decoded data in the configuration part of the meta-data NetCDF files. These information are crucial input parameters for the rules and algorithms described in the DAC cookbook.

Concerning the third and last point, DM trajectory sample files have been generated from all (669) ANDRO PROVOR Argos floats (see ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/argo-andro-data/DM_traj_samples). This work has not been finished yet so these draft files should not be used for Argo. Note also that some cycles from the DEP dataset seem to be missing in the Argo dataset. These data are provided in ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/argo-andro-data/lost_profiles. It's up to each DAC to use them to complete their profile dataset.

The DACs are invited to take a look at ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/argo-andro-data/argo-andro-data_20131010.pdf and, if needed, to ask Jean-Philippe (jean-philippe.rannou@altran.com) for additional information.

10.5 Reprocessing historical data between end of ANDRO and Real-time(all DACs)

Coriolis will process the data up to 2009, producing the v3.0 Traj files now that the format has stabilized. But there is the issue of going forward. How will the gap be filled between 2009 files and the new RT files. DACs will be initially expected to generate R files only. Note that the DM profile decisions have NOT been applied to ANDRO data files so this will still need to be done.

After questioning the DACs, it is clear that we don't have a way forward at this point. We will leave the question of filling the gap until next year, after the pre-2009 and more recent files have been converted to v3.0.

11 ARC status

11.1 North Atlantic ARC

The NA-ARC activities have been carried on two main topics. The first was to re-check delayed mode corrections in the North Atlantic. We have investigated the performance of the OW method (Owens Wong, 2009) in the North-Atlantic, North of 30°N. We first tested the OW method in a standard configuration against a subset of floats already processed in delayed mode and having no salinity bias or drift according to the PI's decision. We found that the proposed corrections have a large scale pattern and were systematically positive or negative regionally, independently of which reference database was used (CTD alone or CTD+Argo). The primary reason for the bias of the proposed corrections is the low frequency variability at decadal and interannual timescales. We have then slightly modified the OW method in order to take this large scale decadal to interannual variability into account in a better way. In particular, we have added a Gaussian decay with a time scale of 2 yr when computing the covariance matrix that is used to estimate the large scale field at the float profile position. Thus greater weight is given to contemporaneous reference data. Using this modified OW method with the test subset of floats produced corrections with a smaller systematic bias.

Subsequently, we used the modified OW method to re-check 186 floats with a significant delayed mode correction for a salinity offset or drift (the list is available on the SO-ARGO website, http://wwz.ifremer.fr/lpo/SO-Argo). Among these floats, we have found 34 floats for which we think it was necessary to revise the DM correction. 22 floats have been checked again by the PIs and the updated proposed correction has been approved (7 corrections transmitted to DACs, 15 still pending). The others floats have not been checked again yet.

The second activity has been to provide additional services to explore the Argo dataset in the North Atlantic. To help scientists engage with Argo data, it is important to provide simple services allowing them to access, explore and select data from the Argo array in the NA-ARC region. We developed 2 new services: a web API (REST: http://api.ifremer.fr/naarc/v1/) and a website (http://wwz.ifremer.fr/lpo/naarc). Those services aim to: (i) simplify access to information about all or a selection of Argo profiles, (ii) provide a single entry point to as much information as possible provided by other sources (meta data matchup) and (iii) provide an interactive user interface for data mining/visualization. The web API is the programmatic access point to the NA-ARC knowledge database. It formalizes and enforces information interoperability between NA-ARC and other data/service providers. The website complements the web API to provide an interactive user interface to the service. Example of services: statistics (number of profiles/floats, quality index, spatio/temporal coverage, technical parameters), profiles descriptions (issues, figures, maps), scripts to download data source files from the ftp GDAC servers.

11.2 South Atlantic ARC:

The tools developed by AOML to assess the consistency of the Argo data in South Atlantic Ocean are available for future use. Products on the web site are occasionally updated by AOML. Currently, AOML does not have resources to do the last stage of the delayed-mode quality control or to do any developments on the software used for this purpose. It is not clear at this time, when funding may become available for this work. AOML continues its involvement in the deployment planning in the SAARC region in close collaboration with WHOI (see US national report).

11.3 MedArgo ARC

Giulio Notarstefano presented the float fleet situation in the Mediterranean and Black Sea (Mediterranean ARC). The number of floats deployed since the year 2000 is around 200 (18 floats in the Black Sea) with the contribution of 11 countries/projects. Different float models were used (Apex, Provor, Arvor and Nemo) and Bio-Argo platforms were also deployed in both the basins. The number of profiles is now larger than 17000 (1700 for the Black Sea) and data from more than 50 floats per month are currently available (300 profiles per month), quite well distributed in the several sub-basins. The number of active floats is 53 (9 in the Black Sea) and two new countries joined the Argo community this year: Lebanon (1 float off the coast of Lebanon) and Turkey (2 floats in the Black Sea). The CTD reference dataset was recently updated in order to continue to perform an accurate quality control. About 95% of dead floats were checked in delayed-mode for the temperature and salinity variables and the D-files will be soon sent to the Coriolis GDAC. We experienced some problems with some files while running the OW method that have to be solved. A decision has also to be taken about some old NAVOCEANO floats without the technical and metadata files. 27 floats belonging to 8 countries were deployed during 2013 and more than 40 will be deployed next year (about 30 in the Mediterranean Sea and 13 in the Black Sea) with the contribution of 8 or 9 different countries; about 15 units will be equipped with biogeochemical sensors. New collaborations with Malta and Lebanon have already been established and will possibly continue next year. Other possible future collaborations can be extended to Algeria (to monitor the area north of the Algerian coast) and to Tunisia (Sicily channel).

Identification of floats that have been redeployed was discussed. It was decided that this information was already available indirectly from the AIC by comparing manufacturer serial numbers and so a new entry in the metadata files was not needed.

11.4 Pacific ARC:

PARC has been providing float monitoring information in the Pacific region and the products developed at JAMSTEC, IPRC, and KIOST on the web site. JAMSTEC will release the new products. One of them is Argo temperature and salinity profile data put through more advanced automatic checks than real-time QC. These data also expect to increase users of Argo data in not only ocean/atmosphere scientists but also any other fields.

11.5 Southern Ocean ARC:

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.
A submission of reference data to CCHDO of CTD data that has recently changed its status to public is on-going.
Partnership for Observation of the Global Oceans (POGO) work has continued with development of routines to automate the collection and submission of cruise plans to POGO. This effort has been enhanced in Europe due to the EU-funded EUROFLEETS project. The SIDERI project is also looking to use POGO to collect research vessel itineraries for the purpose of cruise planning. This is semi-automatic for the US University-National Oceanographic Laboratory System (UNOLS) managed ships whilst the data are publicly accessible.

11.6 Indian ARC:

As part of the ARC activities of Indian ocean, INCOIS has undertaken the following activities:

- Conducting user awareness and data utilization workshop to bring about awareness among the students of various universities. Students are encouraged to use the Argo data for their MSc dissertations.
- Encouraging various users groups to utilize Argo data by inviting project proposals for use of Argo data.
- Data search and archeology of high quality CTD for updating the Argo reference data base and also for use in DMQC of Argo data.
- Generation of Visual Quality Control tools for manual inspection and quality control of subsurface profiles including Argo. This tool is developed in Java and various users are encouraged to use it for their QC.
- Archiving of temperature and salinity profile data from floats deployed by Indian and other countries in the Indian Ocean and making them available through Web-GIS.
- Continue to supply DVD of "Argo data and product for Indian Ocean" to students and other researchers with low bandwidth capabilities. These DVDs are built with a GUI which has similar capabilities to that of Web-GIS. As many as 200+ DVDs were sent free of cost to the users upon request.
- Continue generation of value added products based on gridded products obtained from Objective and Variational Analysis methods. These value added products are made available on the web and also on the Live Access Server. We are also recording the publications arising out of this Argo gridded product. As many as 14 publications are available as of now.

12 Feedback from Delayed mode data management

12.1 Review of DMQC status

John computed the statistics on delayed mode processing and remaining anomalies

DMQC Format Errors identified in delayed mode profile files	AOML	BODC	Coriolis	CSIO	CSIRO	INCOIS	JMA	KMA	KORDI	MEDS	NMDIS
<PARAM_ADJUSTED_QC> == '0' or ' '			1			4		18		1077	
<PARAM> == FillValue but <PARAM_QC> ~= '4','9'	11			7			4	27			
POSITION_QC == 0 or ' '	5			1							
PROFILE_QC flag is bad (for example: not A-F)	25				1						
<PARAM_ERROR> variable == ' ', but <PARAM_QC> ~= '4','9'	42			36			3182	427		323	
<PARAM_ERROR> variable == '0'								849			
"9' flag inconsistent between <PARAM> and <PARAM_ADJUSTED>	3584		144			6	190	11		143	
Total	**3667**	**0**	**145**	**44**	**1**	**10**	**3376**	**1332**	**0**	**1543**	**0**
Percentage of Dmode	**1**	**0**	**1**	**1**	**<1**	**<1**	**4**	**13**	**NaN**	**7**	**NaN**
Total Change from Last Report	**-1**	**0**	**-322**	**0**	**0**	**0**	**0**	**0**	**0**	**-176**	**0**

2% of all Dmode files have bad formatting/data

Progess of DMQC per DAC	AOML	BODC	Coriolis	CSIO	CSIRO	INCOIS	JMA	KMA	KORDI	MEDS	NMDIS
Dmoded files older than 12 months	438033	30819	99950	7627	36850	25729	86612	13970	0	23472	(not run)
total files older than 12 months	532727	37026	124736	8258	63714	32661	128094	15785	14168	34979	will add next
% completion of DMQC (for files older than 12 months)	82,22	83,24	80,13	92,36	57,84	78,78	67,62	88,5	0	67,1	year
Dmoded files younger than 12 months	7865	402	2424	2514	85	68	1308	0	0	9	
Rmode files younger than 12 months	72565	4833	15929	1014	15180	3840	9080	2638	695	3001	
total Dmode files	**445898**	**31221**	**102374**	**10141**	**36935**	**26407**	**87920**	**13970**	**0**	**23481**	

12.2 Feedback from 5th DMQC workshop

The fifth Argo DMQC workshop (DMQC5) took place on the afternoons of Monday 14 and Tuesday 15 October. As the only manufacturer of the CTDs providing data discussed at the workshop, SBE were invited to attend DMQC5 to provide expert advice on the functioning of their instruments, and investigations they have undertaken into sensor stability.

The main topic for discussion was: Ensuring consistency between DMQC Operators in decisions to adjust PSAL in the DMQC calibration of salinity.

Dave Murphy of SBE presented an audit of DMQC decisions by the four major groups under the AOML DAC (Scripps, UW, WHOI and PMEL). In addition to that, Brian King presented a DAC-by-DAC audit of decisions on the global array (Histograms of size of adjustment and size of assigned uncertainty). It was noted that 87% of all profiles in the global dataset had adjustments smaller than 0.005.

Of the adjusted data, most DACs made adjustments that were roughly evenly split between small positive and small negative adjustments to PSAL. At opposite ends of the range of decisions in the Southern Ocean (lat < -30) were CSIRO (van Wijk, mainly negative adjustments to floats believed to have drifted slightly salty), and AOML-SIO (Gilson, mainly positive adjustments to floats believed to have drifted slightly fresh). There was no conclusion reached at the workshop about whether this was (i) a genuine difference in float and sensor performance, (ii) a consequence of different oceanographic regions, or (iii) a result of slightly different approaches in the application and decision making in the DMQC process.

Gilson and van Wijk agreed to each process a modest number of floats belonging to the other group. This is intended to reveal whether any systematic difference exist in how the DMQC procedure is applied, or whether there is a genuine difference in the performance of the two groups of floats (APEX vs SOLO, and different procedures in the lab before shipping for deployment).

The plan is to undertake this cross-comparison in time for it to be discussed at ADMT15 in March 2014.

A full DMQC5 meeting report will be produced and made available on the ADMT WWW site.

Discussion considered the mechanism of propagating the DM decisions to the Traj and secondary profiles. A proposal will be needed and this will be discussed at the next DMQC meeting.

13 GADR

Ann Thresher presented on behalf of Charles Sun the NODC contribution to the Argo program. They provide support to the Reference Data Base, and managing the archiving function of the Argo program. All the operations at GADR are running smoothly and a significant number of users are retrieving the data from NODC. The multiprofile files presently at NODC now contain the adjusted variables as requested last year. Brian King performed some tests and found some glitches however. On the NODC float page (http://www.nodc.noaa.gov/argo/floats_data.htm), the individual profile files contain the adjusted parameters but it seems that some multi-profile files have not been regenerated and don't contain them while it's correct for the same float in the DAC page (i.e. http://www.nodc.noaa.gov/argo/dac/aoml_data.htm)

Action : Charles to correct the glitches

14 All other business

14.1 Summary of the 14th ADMT actions

Sylvie and Ann have elaborated an action list from the ADMT14 discussions and the list was reviewed, actions assigned to DACs/operators, deadlines identified and priorities set. It was agreed that to reach more timely accomplishment of the actions, bi-yearly phone meetings will continue to be organized by the chairs in February, before AST15 and June involving mainly the DAC managers.

14.2 Location of next meeting

The location of ADMT15 is still under discussion.

15 Annex 1 – Agenda

Wednesday 16th October

Welcome address by *Prof. Chris Hughes from NOC (15mn)*

1.
2. **Feedback from 14th AST meeting** : *Dean Roemmich/Susan Wijffels (30mn)*

Status on the actions 38,48

- ***FAQ DATA page*** *Megan Scanderberg (5mn)*

3. **Status of Argo Program and link with Users (1h30)**

Status on the actions 1,2

- ***Review of the Action from last ADMT*** *(S Pouliquen) 15 mn*
- ***Argo Status*** **+ Real-time Monitoring** : Summary on major anomalies detected each month, Requested actions from DACs. Trying to identify why some anomalies are not corrected.*(M Belbeoch)30mn*
- ***Sustainability of the Argo Data Management system :*** discussion on how well the Data data system is coping with the major changes that we are now experiencing (reprocessing for trajectory, new requirements coming, consistency of the dataset) *(all) 30mn*

4. **Feedback on 2nd BIO-Argo Workshop (H Claustre) (1h00)**
5. **Real Time Data Management (2h30)**

Status on the actions : 3,4,5,6,7,8,9,10,11,12,13,15

- **GTS status**: *(A Tran) 30mn*
- **Delays from AIC** *(M Belbeoch) 10mn*
- **Status of anomalies at GDAC** *(C Coatanoan) 20mn*
- **Status on Anomalies detected with Altimetry** *(S Guinehut) 20mn*
- **Status on density test implementation** *(Ann Thresher-Gronell to review) Action 8(15mn)*
- **What about revising some RT tests for high resolution profiles** *(J Gilson) (15mn)*
- **Revising some qc tests for deep Argo floats***(C Schmid) (15mn)*
- **Unpumped SST measurement RTQC implementation at DACs(***J Buck) (15mn~~)~~*

6. **Status of Argo Program and link with Users follow up (0h45)**
   - **Citation Index for Argo Data** (Action 14)
     - **Progress on EU side** *(J Buck, T Carval) 15mn*
     - **Discussion on the way forward** (15mn)

Thursday17th October

7. **Pressure Correction (0h30)**

   Status on the actions : 16,17,18,19
   - **CSIRO audit of pressure corrections: What is the status on corrections at DACs and DM-Operators (**Esmee Vanwijk)
8. **Progress on Argo Reference data base (0h30)**

Status on the actions 42,43

- **Summary of the actions since ADMT-13 (**C Coatanoan)
- **CCHDO/US-NODC-progress** (S Diggs)

9. **QC Manual updates Annie Wong**

10. **GDAC Services (M Frost , T Carval) (1h00)**

Status on the actions : 25,26,27,28,29,30,31,32,40

- **Operation status at US-GDAC and Coriolis-GDAC** 30mn
- **Status of Format Checking operations (D-Files checking)** 15mn
- **Proposal for patching profiles to upgrade to V3 for historical T&S floats at GDAC** 15mn
- **New needs?**

11. **Format issues (2H00)**

While format is pretty well standardized for measurements and qc flags, experience at GDACs shows that there are discrepancies both at metadata and technical and history levels that ought to be resolved to the benefit of the community. Status on the actions : 33,34,5,36,37,39,40,41

- **Status on Tech Files updates** (Actions 33) (A Thresher-Gronell)
- **Status on Meta-Files Update:** Esmee Vanwijk / M Belbeoch
- **Multiple sensors, multiple axes, bio-argo floats : Status of implementation** (T Carval)
- **Feedback on the audit on coherency between parameter declaration in metadata and occurrence in profile/trajectory *(action 40)*** B King & all

12. **Trajectory from Argo data (2h00)**

Status on the actions 46,47,48,49,50,51,52,53,54,55,56,57,58,59,60

- **Summary on the final agreement on traj format Version 3** (M *Scanderbeg*)
- **Updates on the cookbook** (M *Scanderbeg)*
- **Status on Reprocessing of Trajectory from ANDRO DEP files** (T Carval/JP RANNOU)
- **Status on Traj3 implementation at DACs** (all DACs)
- **Reprocessing historical data between end of ANDRO and Real-time**(all DACs)

Friday 18th October

13. **ARCs: provide an information on what done and what is planned (1h30)**
    - **Update on ARC progress** (ARCs leaders) 15mn each
        - **North Atlantic** Cecile Cabanes
        - **South Atlantic** Claudia Schmid
        - **Mediterranean Sea** Gulio Nortastefano
        - **Pacific Ocean** (Kanato Sato)
        - **Indian Ocean** Uday Bhaskar

14. **Feedback on 5th DMQC Workshop (J Buck, B King) (1h00)**

15. **GADR Status of the Archiving centre** (C Sun) **(0h30)**

Status on action 42,43

16. **Other topics (1h00)**
    - **Summary of the 14th ADMT actions (S Pouliquen A Thresher-Gronell) 30mn**
    - **Location of 15th ADMT**

16 Annex 2 - Attendant List

N°	Name	Institute	Country
1	**Ann Gronell Thresher**	CSIRO Marine Research	Australia
2	**Esmee van Wijk**	CSIRO Marine Research	Australia
3	**Violeta Slabakova**	Institute of Oceanology-BAS	Bulgaria
4	**Howard Freeland**	Argo Director	Canada
5	**Anh Tran**	DFO/ISDM	Canada
6	**Joon Soo Lee**	National Fisheries Research and Development Institute	China
7	**Fengying Ji**	National marine data & information service	China
8	**Xiaogang Xing**	Ocean University of China	China
9	**Lu Shaolei**	The Second Institute of Oceanography	China
10	**Zenghong Liu**	The Second Institute of Oceanography	China
11	**Haili Wang**	Xiamen University	China
12	**Jean-Philippe Rannou**	ALTRAN	France
13	**Stephanie Guinehut**	CLS	France
14	**Yann Bernard**	CLS	France
15	**Catherine Lagadec**	IFREMER	France
16	**Christine Coatanoan**	IFREMER	France
17	**Guillaume Maze**	IFREMER	France
18	**Sylvie Pouliquen**	IFREMER	France
19	**Thierry Carval**	IFREMER	France
20	**Vincent Bernard**	IFREMER	France
21	**Antoine Poteau**	Observatoire Océanologique de Villefranche sur Mer	France
22	**Catherine Schmechtig**	Observatoire Océanologique de Villefranche sur Mer	France
23	**Hervé Claustre**	Observatoire Océanologique de Villefranche sur Mer	France
24	**Mathieu Belbeoch**	UNESCO/IOC-WMO	France
25	**Jan H. Reissmann**	BSH Federal Maritime and Hydrographic Agency	Germany
26	**Marek Stawarz**	BSH Federal Maritime and Hydrographic Agency	Germany
27	**Udayabhaskar Tvs**	INCOIS	India
28	**Giulio Notarstefano**	OGS	Italy
29	**Kanako Sato**	JAMSTEC	Japan
30	**Wataru Ito**	Japan Meteorological Agency	Japan

N°	Name	Institute	Country
31	**Moon-Sik Suk**	KIOST	Korea
32	**Byunghwan Lim**	Korea Meteorological Administration	Korea
33	**Hyeong-jun JO**	Korea Meteorological Administration	Korea
34	**Mingmei Dong**	???	Korea
35	**Clare Davis**	BODC	UK
36	**Justin Buck**	BODC	UK
37	**Nick Ashton**	Met Office	UK
38	**Brian King**	National Oceanography Centre	UK
39	**Roland Rogers**	NERC NOC	UK
40	**Carolina Berys-Gonzalez**	CCHDO	USA
41	**Elizabeth Forteza**	CIMAS/RSMAS University of Miami	USA
42	**Kenneth Johnson**	MBARI	USA
43	**Claudia Schmid**	NOAA/AOML/PHOD - could not attend	USA
44	**Vicki Halliwell**	PHOD/AOML through CIMAS	USA
45	**Dean Roemmich**	Scripps Institution of Oceanography / UCSD	USA
46	**John Gilson**	Scripps Institution of Oceanography / UCSD	USA
47	**Megan Scanderbeg**	Scripps Institution of Oceanography / UCSD	USA
48	**Steve Diggs**	Scripps Institution of Oceanography / UCSD	USA
49	**Michael Frost**	US GDAC --- Naval Research Laboratory	USA
50	**P.E. Robbins**	Woods Hole Oceanographic Institution	USA
51	**Annie Wong**	UW	USA

17 Annex 3 - ADMT13 Action List

PRIORITY: H: High R/ Routine L: Low

High High 19 :10 were done, 9 partially

Routine 29 : 19 were done, 8 partially, 1 not done 1 postponed after ADMT14

	Action	Target Date	Responsibility	Priority	Status
	Real Time Data Stream				
1	Run the check every Quarter and sent report to DACs . AIC should be involved in the feedback and monitoring of correction as for Altimetry check	AST14	Anh and Mathieu	H	Done in August 2013
2	Study the timeliness of BUFR for all DACs that are much below the 90% target	ADMT14	All DACs	R	first result in August report to be checked by DACs BODC are working to resolve BUFR issues from Iridium floats and these should be resolved by end of 2013
3	Each DAC to check header they are sending to GTS (both TESAC and BUFR)– should be on Anh's list.	December 2012	All DACs	H	csiro - Done ; kordi GTS data handled by CLS so no action necessary by them; jma done; incois has issues with tesacs not being seen by meteo france though japan and others are seeing the data. They are coding bufr but not sending it out until the tesac problem is solved. I asked them to send a bufr sample to Anh and perhaps consider sending the bufr onto the gts because they might get through even if tesacs are disappearing - by end of month. ok for the other DACs Nothing received from KMA - no bufr yet - tested. sent test files to check Anh said can't read the file. jamstec says is OK. so send to GTS and send header to Anh. nmdis handled by cls
4	Anh to coordinate with Mathieu to separate floats by telecommunications methods – Argos vs Iridium to see if the delays are correlated with communications system	AST14	Anh and Mathieu	R	done
5	CSIO don't have any adjusted fields at GDAC. They should have some if they were applying the Surface pressure correction for APEX. To be investigated.	AST14	CSIO	H	work in progress should qrrive by the end of 2013
6	The list of the anomalies detected for Adjusted parameters will be included in next anomaly report done By Coriolis	January 2013	Christine	R	done in March report but not in the following (To be checked by Christine)
7	AOML has anomaly on mixed DM and RT float that seems to be due to DM resubmission	AST14	Claudia & Elizabeth	H	Done
8	all DACs to run the new density test on the reference profile that Thierry put on the argodatamgt web site to test there density test .	AST14	All DACs	R	CSIRO done+ kordi and incois JMA doneDone for Meds AOML done: Coriolis done kma unknown - will check (probably not)to be done at BODC nmdis done
9	Document the Near Surface Temperature procedure in RTQC manual	AST14	Justin/Clare/Annie	R	done The manual has been provided by Justin BODC presenting testing of test 22 at ADMT
10	All DACs to provide feedback on Near Surface T surface procedure	ADMT14	All DACs	R	There is now a document on real-time qc for near surface data. This document contains feedbacks from BODC, Coriolis, MEDS, AOML. Annie plans to include this in the next version of the qc manual after ADMT in October
11	Look at AIC report and solve the issue about coherency between AIC/ GTS /GDAC	AST14	DACs	H	For German Floats the reason is that they were too late for delivery on GTS and therefore only present at GDAC Done for French Floats Done regularly by AOML, BODC to be checked by MEDS
12	DACs have to look at their process to check unnecessary delays and chaining processing as much as possible.	ADMT14	DACs	R	delays have improved markedly but room for more work
13	DACs to implement the 2047db anomaly detection described by Cecile. Document in cookbook and RTQC manual	ASAP	Coriolis, INCOIS , CSIO, JMA	R	JMA is still working towards this - it's complicated; incois has only one profile from one (dead) float and will fix this by hand. Done at Coriolis
14	Continue to progress on DOI issue	ADMT14	Justin and Thierry	R	Feedback will be provided at ADMT14
15	Document RTQC procedure for Oxygen	AST14	Virginie and Thierry	R	The RTQC manual has been updated and validated

	Action	Target Date	Responsibility	Priority	Status
	Pressure Correction				
16	Generate adjusted fields for APEX when SP=0	AST14	AOML, CSIO, KMA, Coriolis	H	Done for German floats kma working on it. Done for Coriolis Done at BODC started at AOML CSIO - progress unknown
17	DMQC rt files with all bad data so they don't contaminate the data set	ADMT14	DAC mentioned in CSIRO audit	R	Done for German floats To be done at AOML Pb that its mainly Argo equiv started BODC started at MEDS
18	Correct pressure for floats that don't auto-correct for surface pressure offset	AST14	AOML,BODC,CORIOLIS,MEDS, CSIO,KMA, KORDI	H	Done for German floats kma - working on this kordi done BODC - automatic in rt and updated in dmqc, procedures are operational done at AOML (except SP=0 see action 16)
19	Correct TNPD profiles that haven't been correctly treated – simply add required comment and fields and QC values and errors	AST14	AOML,BODC,CORIOLIS,JMA, MEDS, KMA, INCOIS	H	Done for German floats and French floats kma - working on this: Bodc Done; started at Meds Claudia to check with US DM Operators – DM operators are working on it. JAMSTEC is working in progress and will complete it by the end of 2013.
	Reference Database				
20	A specific comparison between ICES and US-NODC to better assess the quality; including looking at slices on the deep ocean to identify potentially offset cruises and remove them.	ADMT14	Christine	R	Will be presented at meeting
21	Inventory of cruises in Ref DB (basic ASCII file)	AST14	Christine and Steve	R	First list was initiated and still work to be done together
	Delayed Mode processing				
22	The list of orphan floats is in Mathieu report . DM-OPERATORS to be assigned for the remaining US equivalent floats	ASAP	Steve to coordinate	R	still no solution
23	DM-Operators to correct the D-files where anomalies we listed by John	AST14	All DM Operators	H	almost done for BSH for Coriolis Done BODC To be checked by Meds and AOML
24	Plan for DM workshop in 2013	déc-12	Justin and Brian	R	Planned before ADMT (14th -15th October 2013)
	GDAC				
25	KORDI and NMDIS don't have a gray list and probably need update.	AST14	KORDI, NMDIS	R	kordi grey list delivered in December Will be done for NMDIS
26	DACs , together with the DM-Operator, should update their gray list to remove the dead floats that have been processed in delayed mode	AST14	All DACs	H	CSIRO done, kordi done, jma done; incois done. Coriolis done , BODC done , Meds done, To be checked for AOML - ongoing process, kma checking this, nmdis has only one grey listed float and will put it on a list and submit.
27	Contingency Plan DACs to stop delivery to US GDAC Notice to be sent to users on US GDAC temporary outage US GDAC either to turn off presence and put a Warning message or move to a mirror of Coriolis GDAC	Dec 2012		H	csiro done, kordi done, kma done, jma done, incois done - Closed on 23rd May as USGDAC back online
28	Action to AST and FNMOC to validate the change of mission of the US GDAC until it's back working properly and the way to warn the users	Dec 2012	Susan and Steve	H	done
29	USGDAC to repair the operational operations Update gray list File Removal operation Detailed index-File provision Accept multi-axis format Accept compressed files (.tar.gz) Provide authorization for the DACs that change their server IP address Resynchronize with Coriolis GDAC	AST14	Mark	H	- Update Greylist: Completed (In discussions with Thierry this week, there will be slight enhancements to this process at both GDACs)- File removal operation: Completed (In discussions with Thierry this week, there will be slight enhancements to this process at both GDACs)- Accept multi-axis format: Completed- Provide authorization for the DACs that change their IP address: Completed- Resynchronize with the French GDAC: Completed- Detailed index-file provision: cone early July- Accept compressed files (.tar.gz): done mid July
30	GDAC to update multi-cycle processing to take into account multi-sensor/multi-axes format	January 2013	Thierry and Mark	H	Filechecker accept the MultiProfile cycle files . Started but not completed. both GDAC manage multi-profile files for new deliveries. The reprocessing of all of the merged files is scheduled for end May
31	Study if possible to populate automatically from profile file ACDD attributes	January 2013	Thierry	R	If done it will be done by GDAC while generating the multi-cycle file . So no impact on DACs

	Action	Target Date	Responsibility	Priority	Status
32	GDAC to study how to patch floats that only have one Cycle/Parking_Depth (add CF and extra dimension, Sampling-Schema, Mission_Number=1) as well as patch new profiles until DACs switch to V3.0 format	AST14	Thierry	R	Started Specification document under preparation. Will be presented at meeting
	Format				
33	Ann to sent the anomalies of the TECH FILE Audit to DACs and DACs to correct	Dec 2012	Ann and all DACs	H	tech file audits sent out in Jan 2013, jma corrected, csiro corrected, kordi corrected, incois corrected except for one file that died on deployment - tech file will be removed. Done for Coriolis BODC is working on it Done for MEDS Started at AOML no feedback yet from CSIO NMDIS checking
34	One contact for meta-data from each DAC to send to Esmee	Dec 2012	All DACs	R	csiro done (Esmee), kordi done (Moon-Sik), jma done (Mizuho), incois done (Uday) MEDS (Anh) AOML (Argo operation adress) Coriolis (Vincent) BODC (argo operation email) , kma - Dr. P-H Chang - see mailing list.
35	Update the meta-data format according to meeting recommendations	Dec 2012	Esmee and Mathieu	R	Done on format but not on reference tables. Missing input from ADMT. Mathieu to remind people that should contribute
36	Each DAC to provide with a web page with manual online and link to their decoder	ADMT14	All DACs	R	Started for UCSD Done at INCOIS, Coriolis,CSIRO , JMA other DACs have been reminded
37	Bio Argo and NST communities to check meta-data section of the manual and the configuration table and decide and advise which variables are required their floats		Catherine and Clare	R	done
38	Provide to AST for validation the Argo-Group definition	AST14	Esmee & Mathieu to AST	R	discussed at AST
39	Modify file checker to allow that no ADJUSTED parameter is possible for the PARAM that handle the raw measurement transmitted by a float	AST14	Thierry and Mark	H	done
40	audit on the parameter that occurs and parameter that are declared in meta-data and profile, trajectory	ADMT14	Brian, Thierry, Megan, Esmee	R	report at meeting
41	Update User Manual V3.0	Dec 2012	Thierry	H	Exist for Profile and Tech and Traj file is fine. Need to add reference table from Mathieu to be checked
	GADR				
42	GADR to switch to CORIOLIS GDAC to perform the monthly archive until USGDAC is back on line	Dec 2012	Charles SUN	H	done in Dec 2012
43	Check with US-NODC that the multi--profile files they distribute contain the adjusted variables when present	AST14	Charles SUN	H	done in May 2013
	Trajectory				
44	Modify TrajV3.0 description and cookbook to take into account feedback from meeting	January 2012	John	R	done
45	Coriolis and Scripps to transform ANDRO data to Traj3.0 until 2009	June 2013	Thierry and Megan	R	done for Provor floats at ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/argo-andro-data/7z/argo-andro-data/DM_traj_samples/ . Will be extended to all floats after meeting when traj3 format is finalized
46	Elaborate a proposal from CLS and Ifremer to process backlog (2009 and onwards) in TrajV3.0 for Kalman filter an processing	AST14	Yann & Virginie	R	will be presented at Ast14
47	DAC to process active floats TrajV3.0	June-ADMT14	All DACs	R	postponed after the ADMT14
	Recommendations to AST				
48	To AST: how to document the different issues that happened to the Argo data into a document for user information, e.g., pressure correction, micro-leak…	AST13	AST Chairs	R	Presented at meeting

18 Annex 4 - ADMT14 Action List

PRIORITY: H: High R/ Routine L: Low

	Action	Target Date	Responsibility	Priority	Status
1	Provide feedback to Megan on the FAQ page : http://www.argo.ucsd.edu/Data_FAQ.html	End December 2013	All ADMT members	R	
2	Coriolis to perform monthly snapshot of the DAC directory (including Manual) and assign a DOI to the monthly snapshots	Starting October 2013	Coriolis	R	
3	BODC and Coriolis to issue documentation or WWW page to teach users on how to use the Argo DOI	AST15	Thierry /Justin/Megan	R	
	Real Time Data Stream				
4	CSIRO, Coriolis, JMA, to examine why they have fewer BUFR messages than TESACs, BOBC to solve the BUFR issue on iridium floats	AST15	CSIRO,JMA, CORIOLIS,BODC	R	
5	INDIA and KMA to start BUFR	AST15		R	
6	CLS to check why they generate too many BUFR messages	AST15	Yann	R	
7	DAC to check negative delays list sent by AIC	AST15	AOML, BODC, CORIOLIS, CSIRO,INCOIS,KIOST, MEDS,KMA,SIO	R	
8	AIC to perform delay analysis on two GDACs and provide a report to DACs highlighting issues	AST15	Mathieu	R	
9	Define a set of metrics to monitor the quality of the Argo dataset and publish it on the AST and ADMT WWW	AST15	Megan Dean	R	
10	Update QC manual for Real time NST test and DMQC	End 2013	Annie	R	
11	DAC to check the density audit file and take action to correct errors or feedback if file ok	ADMT15	DAC concerned	R	
12	DAC who process deep floats to test the DEEP RTQC proposal made by Claudia	ADMT15	DAC concerned	R	
	Pressure Correction				
13	DACs to review the anomalies detected by the CSIRO audit and provide feedback to Jeff before the end of the Year	end 2013	all DACs	H	
	Reference Database				
14	streamline data provision from CCHDO to Coriolis for CTDREF DB	AST15	Steve	R	
	Delayed Mode processing				
	GDAC				
15	Finalize the enhanced file checker that checks contents including conformity of techfile variable names and units with the agreed list	ADMT15	Mike	R	
16	Develop a Matlab V2 to V3 converter for profile files that can be used either at GDAC or provided to DACs to perform their file conversion without regenerating all their files	AST15	Thierry	H	
17	Finalize the first version of the GDAC cookbook	déc-13	Thierry and Mike	H	
18	DACs to provide new Real time profile files in V3	AST15 Dec 2013	AOML, JMA BODC,CSIO,INCOIS,KIOST, KMA,NMDIS	H	
19	DACs , with or without GDAC help, to convert historical V2.3 files into V3 profile files	TBD	all DACs	H	
20	Provide a News information item for users to explain the changes in V3	end 2013	Megan	H	

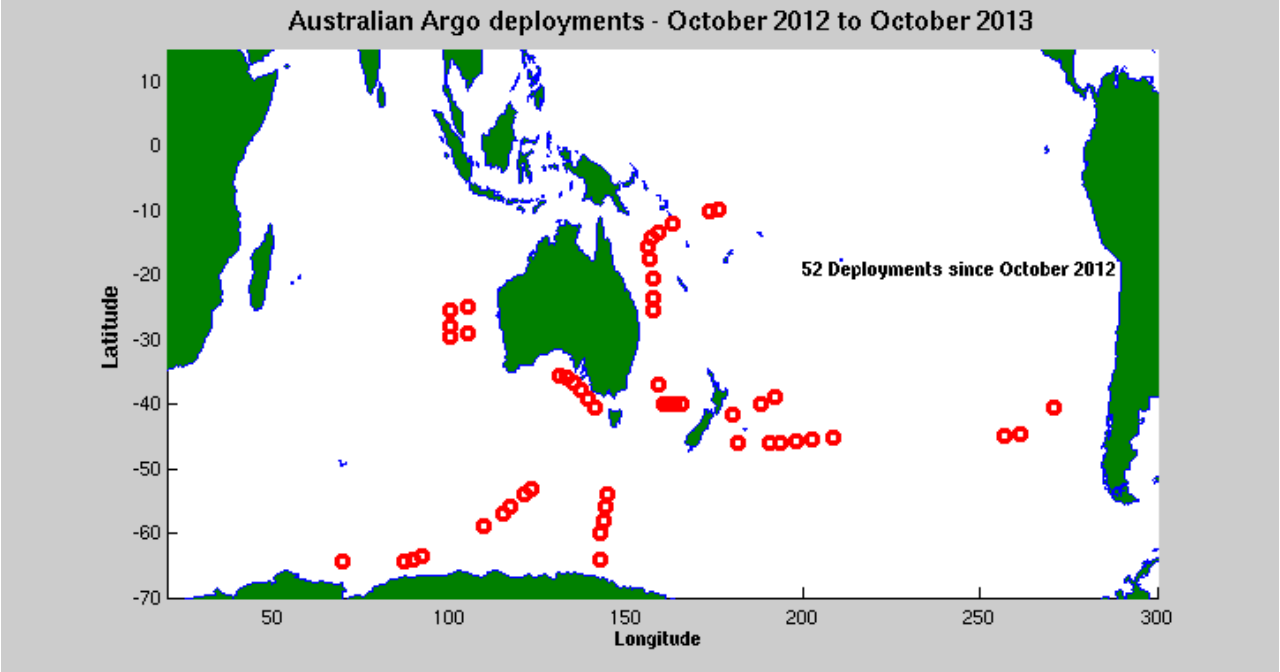
	Action	Target Date	Responsibility	Priority	Status
	Format				
21	DACs to correct the anomalies detected by the CSIRO audit (ftp.marine.csiro.au login anonymous cd pub/gronell/Argo) in their tech files at the latest when they move to V3	ADMT15	all DACs	H	
22	Propose a list of units to be used both in tech and meta file for validation and comments by DACs	Dec 2013	Ann with DACs	R	
23	DACs to check the new standard reference tables (SENSOR_MODEL and SENSOR_MAKER, Mathieu Belbeoch), the updated core Argo configuration parameter table (Esmee van Wijk) and the new Bio Argo configuration parameter table (Catherine Schmechtig), to ensure that all their float types are covered. DACs to provide feedback to relevant person on any new required parameters that are not in the table.	15/11/2013 end 2013	all DACs	R	
24	DACs to validate the table Standard-Decoders provided by Mathieu	end Nov 13	all DACs	R	
25	update User manual according to meeting decision	15-nov-13	Thierry	R	
26	Correct the parameter name anomalies detected by BRIAN's audit	while doing V3	all concerned DAC	R	
	GADR				
27	Correct the GADR multi-profile archive to be identical to GDAC holdings	AST15	Charles	R	
	Trajectory				
28	prepare recommendation for manufacturer for AST meeting B6	AST15	Megan to coordinate	R	
29	update the DAC cookbook	end Nov 13	Megan	R	
	Recommendations to AST				

19 Annex 5 - National Reports

Australian Argo National Data Management Report
ADMT14
Liverpool, UK, 16 - 18 October 2013
Ann Gronell Thresher (CSIRO)

Status of Array

Australian deployments in 2012-2013:



Australian Argo deployments between October 2012 and October 2013.
Red dots are newdeployments,

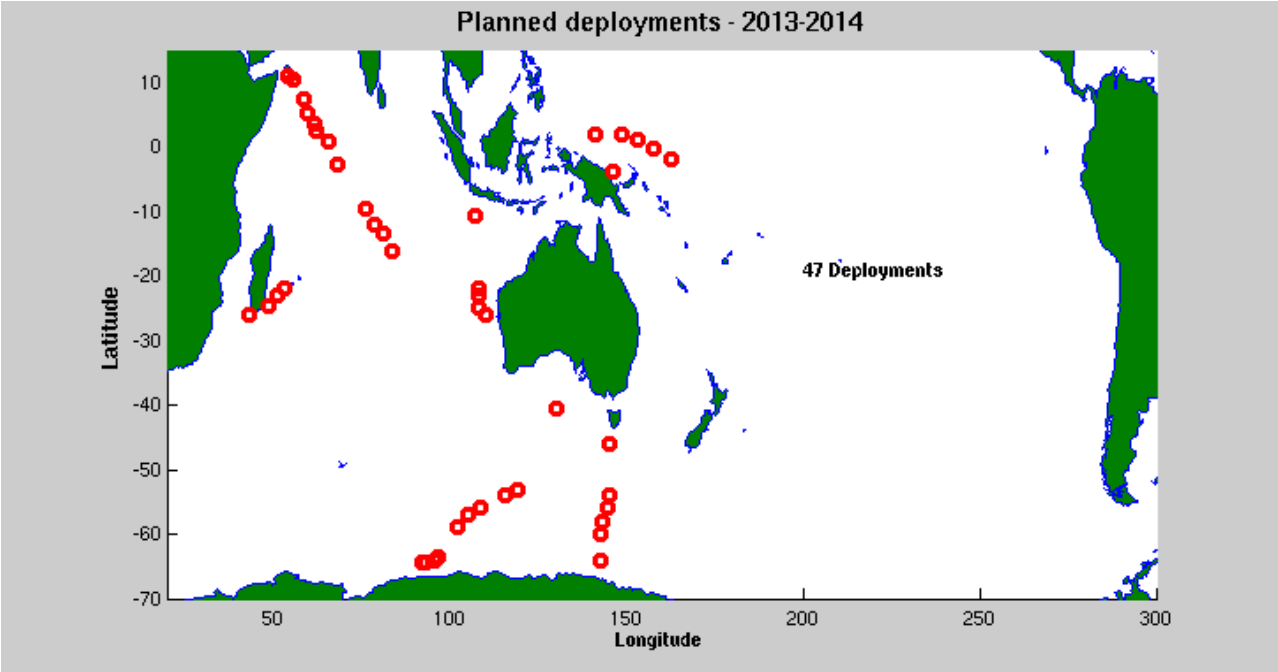
Australia has deployed 52 Argo floats since the last meeting, which is average for us. We currently have 398 floats giving us good data (an increase of 15 from last year) from a total of 585 deployments. We also have 74 floats in the lab or on ships about to be deployed with another 10 on order. We hope to order a further 15 – 25 floats depending on funding outcomes. These purchases will help us to maintain float density in our region.

As part of our deployments in the past year, we deployed 'Proof of Concept' floats – floats from new manufacturers or of new models as a test of the new technology. As mentioned in last year's report, these were purchased via tender with a view to assessing float performance before our next major purchase. Because of some delays in float deployments and other changes in our group, this trial is still on-going. It will include data from floats of the same models/manufacturers deployed by other groups because a 'trial' of 4-8 floats would not give significant results. In total, we deployed 15 floats, 10 of which are still active. We will finalise the assessment in 2014.

Deployment locations for the floats over the next year are shown below. We will continue to re-seed the Indian Ocean and currently have 14 floats on a Royal Australian Navy Vessel headed

towards the Arabian Sea. These will be deployed shortly and provide a significant boost to the number of floats in this region.

Australian Deployment plans 2013-2014:



Most of our Iridium floats have now been moved from dial-up to RUDICS. The remaining floats will be moved in the next year. This will help us reduce our communication costs which are increasing again as the Australian dollar drops against the USD.

Software development:

Software development continues with the development of code to deliver V3.0 for both Technical and Profile files. Trajectory files will be done soon. Until that code is finished, trajectory files have been turned off because of the way our code is structured. The change from comment to long-name means we use one or the other and cannot have different definitions (generally) in different files for the same variables. So there will be a gap of approximately 2-3 months in our trajectory files and then we will re-generate all in Version 3.0 and submit the complete set to the GDACs.

We have also distributed the V3.0 code to INCOIS and KIOST. In addition, we helped INCOIS with coding for processing of Provor CTS3 floats and delivery of NST data in the new format.

Data Acquisition and delivery to the GDACs and GTS:

Data processing has basically not changed. Raw data is processed within a maximum of 18 hours of delivery from either Argos or via Iridium. Argos data is processed twice – once as soon as practical, then again in 2-3 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. As insurance, we actually send each file 4 times in case of

transmission failures. Our processing is mirrored at BOM so each file is delivered 8 times in total, ensuring that the GDACs have the data if either CSIRO or BOM are offline for some reason. Problems this year appear to have been minimal.

Note that we are not currently delivering trajectory files because of issues with implementation of V3.0. We expect this to be solved shortly and all files except Metadata to be compliant with the new requirements. I have started coding the Metadata files but we need to finalize the format before these can be produced.

The data is also issued to the GTS via TESAC messages immediately. BUFR messages are now being generated and delivered to the GTS. We have confirmed that this data is being seen at the US GODAE.

Delays in data delivery appear to have improved but we will always have some floats that are under ice or have just been deployed and need processing before the data is sent out.

Data is available for delayed mode QC as soon as the real-time data is processed but only considered valid for DMQC after 12 months. The Delayed Mode report is appended below.

Additional Data Distribution:
As noted in previous years, 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:
Of the 585 floats we have deployed, 170 are now considered inactive. We have carried out a basic analysis of our float failures and find that the major attributable cause of loss is simply end of life and battery drain (58 floats), though 11 disappeared on deployment without any apparent cause. Twenty-one floats have just disappeared, 27 have grounded and disappeared, 23 had various failure modes and another 21 have leaked. Nine were lost under ice and never returned.

We have had several floats perform for more than 10 years, including two that are still active. However, we are now finding that floats are disappearing in groups, after 8, 7½ and 7 years in the field. We suspect that this decrease in longevity is due to the change of mission to more active management of the park period and an increase in the number of CTD samples collected during the park phase. Our iridium floats have not been in the field long enough to estimate a normal end of life for this combination of telecoms/continuous CTD profiling. The earliest were deployed 6½ years ago, containing a full complement of lithium batteries, and battery voltages in these are still good. It will be very interesting to see what the cost of iridium communications and 240 park measurements has on longevity in our program.

In addition, we have 17 floats on our grey list, mainly for salinity sensor problems, though some suffer from the Druck Microleak problem. We have received 13 CTDs via the warranty from Seabird while another four floats are still being assessed.

Finally, we have 61 floats on the 'missing' list – many (22) are under ice though 7 have been missing for over a year and are probably never going to reappear. I don't declare a float gone until it's been missing for at least a year so many on my missing list will never return. And many are in the group that was deployed between 7 and 8 years ago so I strongly suspect they are at their end of life.

Web Pages:
The Australian Argo real-time 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. Due to manpower limitations (the team is 1 person down) our DM webpages do not reflect the full list of floats completed. We hope to recruit to bring the team back up to full strength in the next 6 months, aiming to bring more effort into DMQC and technical data management.

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. In addition to the information below, there are numerous publications from Australian researchers which have used Argo data and have appeared in the last 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).

We report usage to our funders IMOS – the Argo report can be found at:

http://imos.org.au/imospublications.html

Please see Appendix A for a list of research projects using Argo data in Australia.

Delayed Mode QC (DMQC):

Australian DM Statistics (to 18 Sept 2013)	
D files submitted to GDAC	37964
Total R files	40489
R files eligible for DMQC	21982
Total eligible files for DMQC	59946
Total files at GDAC	78453

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

The Australian Argo array continues to grow rapidly with 52 floats deployed over the past year (18 Sept 2012 to 18 Sept 2103). A total of 585 floats have been deployed since the beginning of the Argo program and of these, at least 170 floats have died. Sixty three percent of eligible profiles (those that are greater than 12 months old) have been processed in delayed mode quality control.

The Delayed Mode processing is operating in maintenance mode with older floats re-assessed once each year and new floats assessed when profiles are 12 months old. We were previously assessing DM floats with profiles that were 6 months or older but to be consistent with other DACs and due to resourcing issues we are switching to a 12 month criteria for new float assessments. We have been working on incorporating new data formats and float models into the data stream.

A challenge for our program is the significant increase in data volumes of the standard P, T and S data in the Delayed Mode data stream as well as the development of new processes to QC trajectory data and other parameters such as oxygen. We are falling behind in the timely delivery of D files to the GDACs due to resource constraints (63% of eligible profiles delivered compared with 83% in the preceding year). Currently there is only one DM operator to QC the data from more than 400 active floats. There are now almost 80,000 R and D files available at the GDAC from Australian floats; this is an increase of 23% of the total number of profiles from the Australian array, in just the past 12 months. We are hoping to hire a half time position to help QC Delayed Mode data in the new year. There will be a significant spin-up time but once training of the new person is complete this will significantly speed up delivery of D files. Significant effort is also going into the trajectory files (real-time processing to start, with DM processing to follow). We are also hoping to have additional funds to employ a person to develop the oxygen QC process for Argo floats.

Further DM training was given to both India and South Korea in the past year. Esmee spent three days at INCOIS after the ADMT meeting last year training Uday on how to assess more complex cases of salinity drift in floats. Moon-Sik Suk also spent 8 days in Hobart in December 2012, getting Australian DM software installed and working through specific KIOST float examples.

The Argo Australia web pages are continuously updated and are available at the following website: http://imos.org.au/argo.html

There is a Delayed Mode webpage for every float that has undergone DMQC (including detailed plots and diagnostic information), these are available at:
http://www.cmar.csiro.au/argo/dmqc/html/Argo_DM.html

Druck microleaking floats:

This year we assessed data from suspected Druck microleaking floats to assess whether they were in fact Druck microleakers and eligible for a warranty claim. The analysis confirmed that 13 floats suffered from the Druck microleak issue and replacement CTD heads will be issued for these. Another 4 floats have been placed on a watch list as they are strongly suspected of having the Druck microleak issue but it has not developed fully enough at this time to be conclusive.

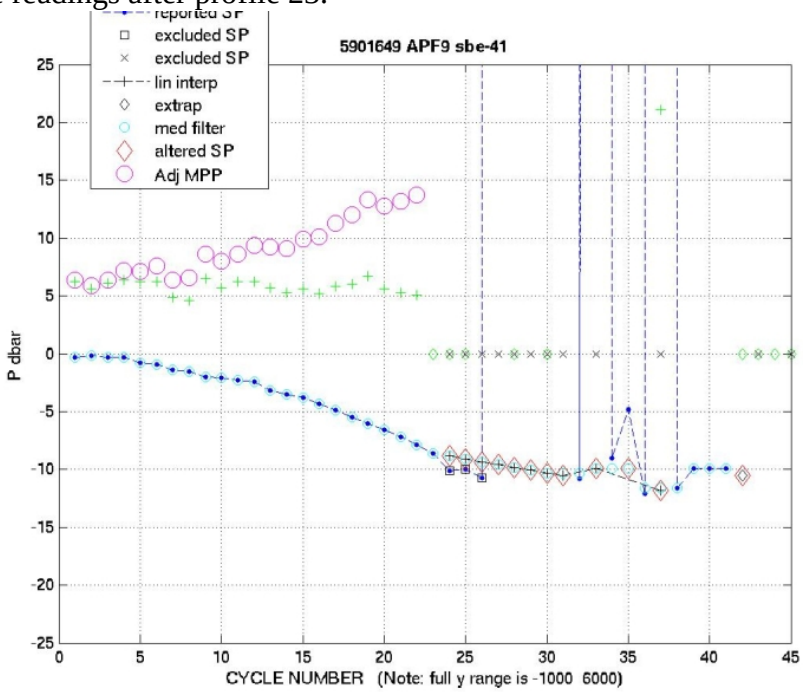
The WMOID's and Druck serial numbers are given below as other DACS may want to keep a close eye on their floats with neighbouring Druck serial numbers.

WMOID	CTD Serial Number	Druck Serial Number	Confirmed/Watch List
1901120	3590	2465225	confirmed
5901665	3600	2458981	confirmed
5901645	3602	2458983	confirmed
1901135	3612	2465206	confirmed
1901134	3613	2465208	confirmed
5901649	3630	2494625	confirmed
5901703	3706	2491217	confirmed
5901704	3709	2491214	confirmed
5901667	3710	2491221	confirmed
5901660	3717	2491262	confirmed
5901694	3739	2494625	confirmed
5901706	3909	2599072	confirmed
5901689	4159	2636957	confirmed
5901699	3609	2458991	watch list
5901644	3610	2465204	watch list
5901685	4150	2636931	watch list
5901690	4160	2636958	watch list

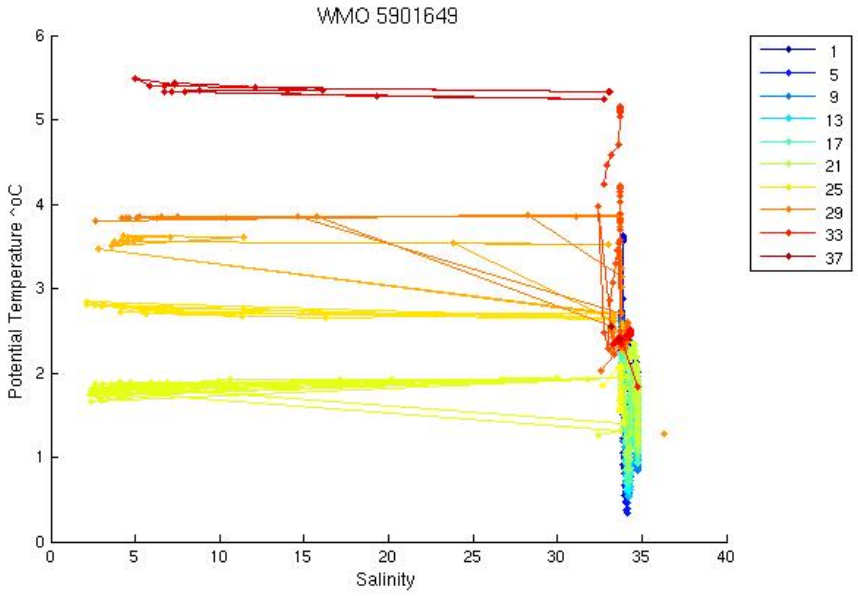
We seem to see a characteristic set of behaviours in floats that suffer from a Druck microleak and it seems useful to describe this behavior so other DACs can recognize the pathology of this failure.

An example is given below for float 5901649, an APEX APF9 float that shows precipitous drop in surface pressure offset after 20 + profiles. Once the microleak becomes severe enough to short (i.e. we often see profile pressures of over 3000db) the float 'thinks' it is too deep so it starts to adjust its piston by one count each profile in order to decrease it's profile depth. This is seen as a linear increase in the profile piston position counts. As this position increases, the float gets shallower and shallower, finally (and after a relatively short time) sitting on the surface. We can confirm this behaviour because the park temperatures are equivalent to surface temperatures and there is faster positional drift between profiles (as the float is sitting on the surface it is much more susceptible to movement through wind and surface currents). The plots below show the sequence of float behavior.

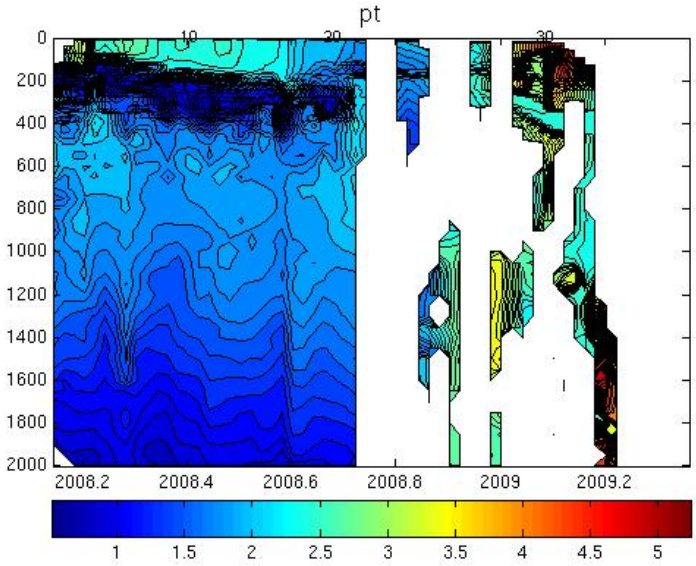
1). The surface pressure offset plot below shows the negative trending SPO with pressures that give erroneous pressure readings after profile 23.



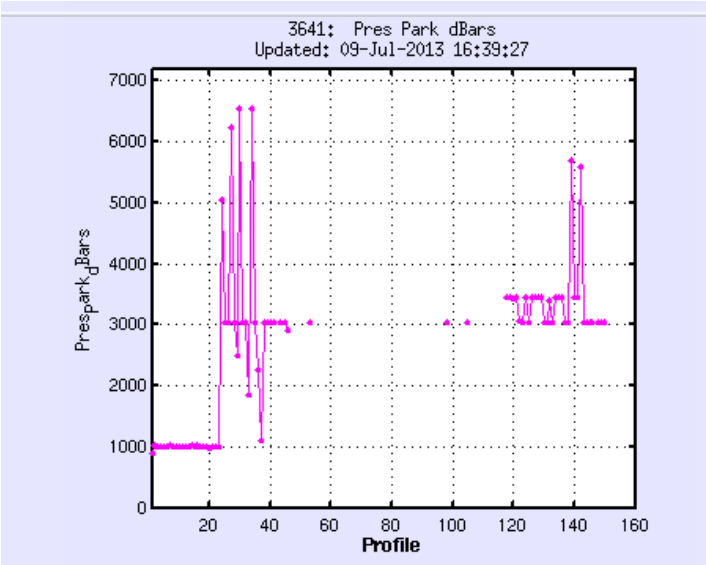
2). The TS plot shows T & S data after the float shorted.



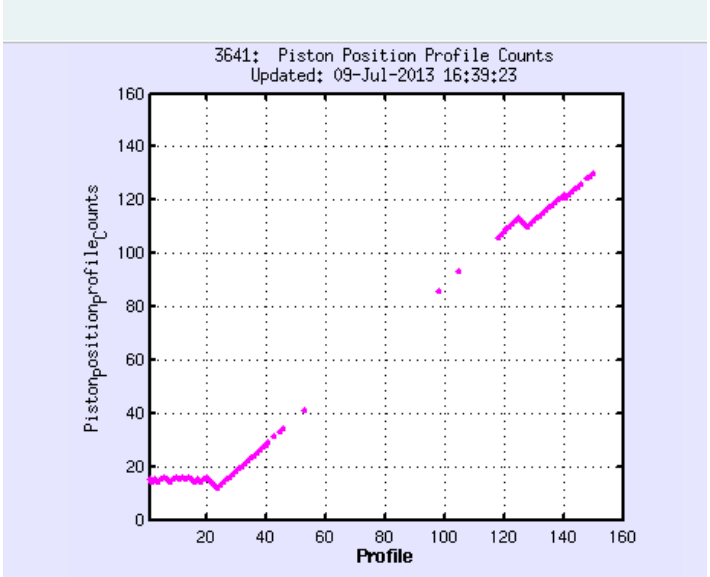
3). The potential temperature section plot below shows the gappy and irregular nature of the data received after pf 23.



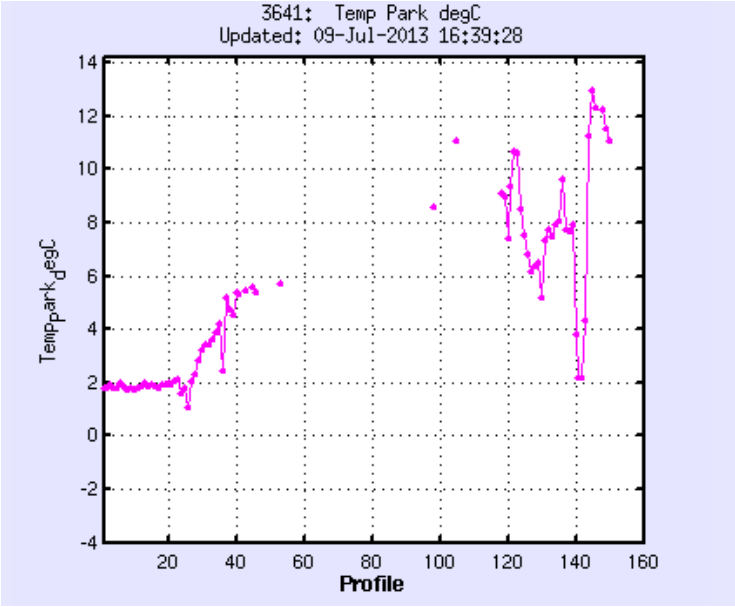
4). The technical data shows that the Park Pressure returned by the float also gives unrealistic readings after profile 23.



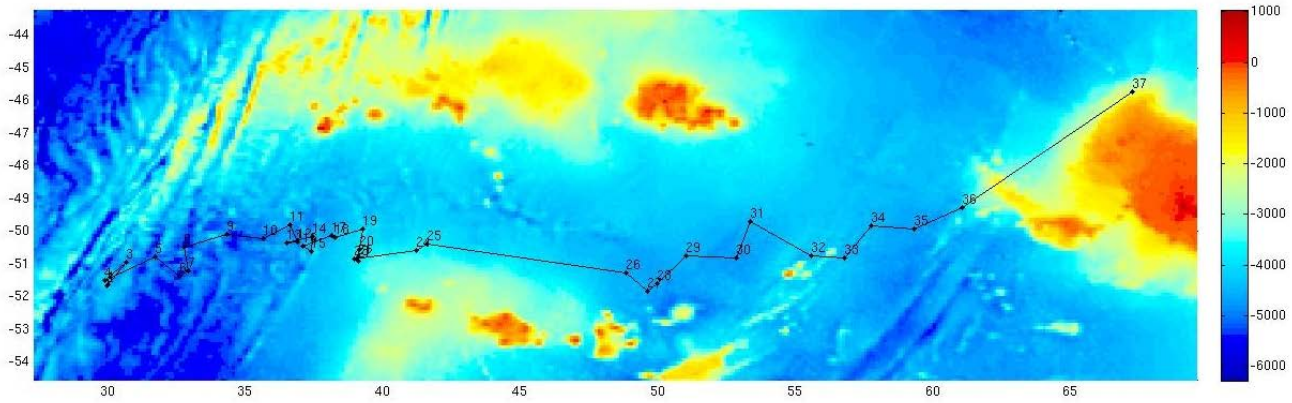
5). The Piston Position Profile Counts plot shows a characteristic upward linear trend. After shorting the float receives faulty pressure readings (usually around 3000 db) and the float thinks it is too deep so it starts adjusting its piston position by one count every profile, trying to move shallower.



Plot 6: Temp at Park. Eventually the float reaches the surface, where it starts to measure much warmer (and possibly erroneous) temperatures.



Plot 7: location plot. Once the float is at the surface it starts to drift much further between profiles than earlier on in the float trajectory.



Appendix A.

A full and up-to-date list of Australian users for Argo data can be found at http://imos.org.au/imospublications.html

A large number of Australian PhD students are using Argo data and it is an integral part of many collaborative research projects which rely on our outputs. Please see the IMOS web site for more details.

Argo Canada National Data Management Report

ADMT14

Oct 12- 18, 2013

1. Status

Data acquired from floats: We are currently tracking 113 floats. Of these, 30 might be in trouble or might have failed to report within the last 6 months. Since ADMT 13, we deployed 33 floats from METOCEAN which report on Iridium satellite. Currently, we acquired Argo messages from Argos (through CLS) and Iridium (SBD packets through Joubeh, Rudics through CLS).

Data issued to GTS: All data are issued to the GTS in TESAC and BUFR format. On average, 70% and 57% of data were issued on the GTS within 24 hours in TESAC and BUFR since January 2013, respectively. For this period, the fluctuation in the timeliness of Argo data on the GTS are due to severs were down at ISDM, problem with telnet to CLS, and generation of BUFR messages are from the NETCDF files which are produced after the TESAC message were created.

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 additional 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 longer time. After some program modifications and optimization, the time delay between the GTS data and the data sent to GDACs has now been reduced to 2 hours.

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

Delayed data sent to GDACs: A total of about 1042 eligible files from 7 floats were quality-controlled or re-quality controlled for salinity (following OW software) and pressure (delayed mode method according to the manual) and sent to the GDAC since October 2012.

Web pages:

http://isdm.gc.ca/isdm-gdsi/argo/index-eng.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 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/science/oceans/Argo/Argo-LineP-eng.html

2. Delayed Mode QC

As of October 2013, 19% of all eligible floats, active and inactive, had their profiles QCed visually and adjusted for pressure and salinity according to the latest delayed-mode procedures at least once. 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: visually inspecting every cycle from inactive floats which were never inspected or whose reviewed RAW flags had not been updated when they were visually inspected (pre 2009) and competing reprocessing actions triggered by the objective analysis, format and pressure correction audits.

3. GDAC functions

Canada forwards TESAC data to the GDAC in Brest and NODC three times a week. Canada also monitors the timeliness of Argo data on the GTS in BUFR and TESAC format

4. Region Centre Functions

Canada has no regional centre function.

Chinese Argo National Data Management Report

ADMT-14, 14-18 October, UK

1. Status

1.1 Data acquired from floats

From November 2012 to September 2013, China acquired data from 94 floats, including 8 Arvor, 13 PROVOR, and 73 APEX floats. Of these 73 APEX floats, 26 are Iridium floats (including two O2 floats) and the remaining are standard APEX floats (including two O2 floats). These floats were deployed by three PIs from the Second Institute of Oceanography, East China Sea Branch, SOA and the South China Sea Institute Oceanology, Chinese Academy of Sciences (SCSIO). There are 78 floats still active as of October 5, 2013.

1.2 Data issued to GTS

CLS still helps us distribute Argo profiles on GTS.

1.3 Data issued to GDACs after real-time QC

From the last ADMT, China submitted 3,607 R-files to GDACs after real-time QC. China hasn't submitted any real-time adjusted data to GDACs until now. But we are now writing codes to fulfill this action. We estimate we can submit real-time adjusted data at the end of this year.

1.4 Data issued for delayed QC

In this October, China submitted 5,107 D-files to GDACs. A total number of 11,673 D-files have been submitted from the beginning of China Argo.

1.5 Web pages

Two web pages are maintained by the National Marine Data and Information Service (NMDIS), and the Second Institute of Oceanography, SOA (CSIO), respectively. NMDIS supervised the China Argo Data Centre (http://www.argo.gov.cn), who is responsible for processing data from the floats deployed by East China Sea Branch. CSIO supervised the China Argo Real-time Data Centre (http://www.argo.org.cn), who is responsible for processing Argo data from the floats deployed by CSIO and SCSIO. Both web pages provide the access to the float data, meta data, trajectory and their related plots.

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

Argo data has been widely used in operational models and scientific applications. More and more students use Argo data in their thesis of M.D. or Ph.D. For example, Argo data has been used in National Climate Centre's BCC-GODAS operational assimilation system, and their dataset has been distributed at IRI/LDEO Climate Data

Library. At NMDIS, they developed a 23-year regional reanalysis product (CORA) of TS and currents for the China coastal waters and adjacent seas. Argo data has become the main source of in-situ data in their system. The National Marine Environmental Forecasting Centre (NMEFC) developed reanalysis product of monthly temperature and salinity fields in tropical Pacific ocean with a spatial resolution of 2º×1º, and 13 levels between 0-630 meters.

At CSIO, Argo near-surface temperature data are used to validate TMI and AMSR-E SST over the global oceans. The comparison of HY-2 SST with Argo NST is ongoing. Iridium floats deployed in the northwestern Pacific ocean were used to monitor the upper ocean responses to the TCs in recent years.

1.7 Products generated from Argo data

Argo trajectory data quality control system has been set up at NMDIS, which can eliminate abnormal location data. Based on J.J. Parker method, the global monthly averaged surface current and mid depth current maps derived from good Argo trajectory data are also provided by NMDIS, which can be download from www.argo.gov.cn

At CSIO, a global monthly TS gridded product was developed based on Argo data, with the horizontal resolution of 1º×1º and period of January 2004-December 2012.

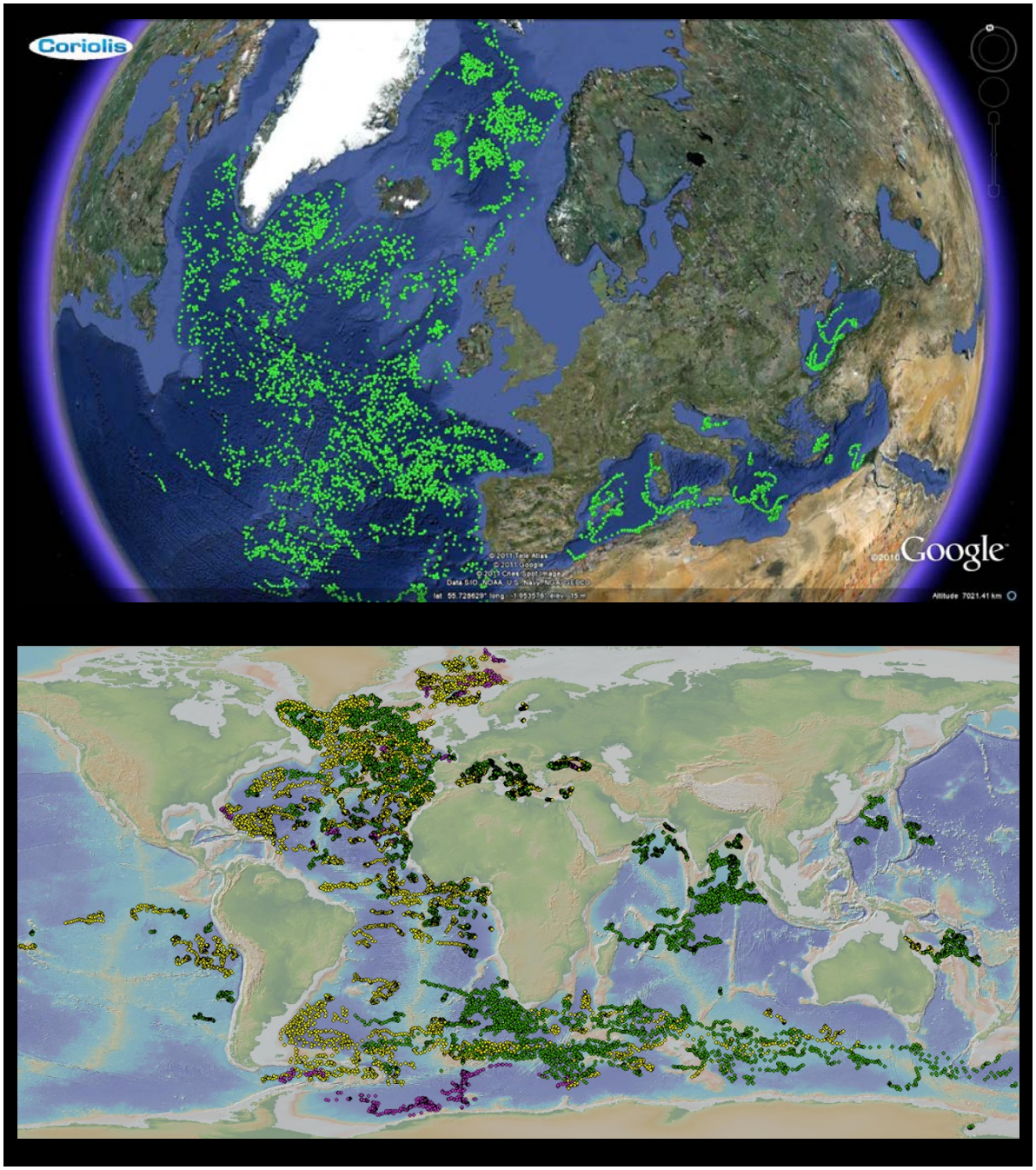
2. Delayed Mode QC

(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 .)

The DMQC operator of China carries out DMQC for all Argo data generally once per year. The surface pressure, CTM and OW corrections have been applied in our DMQC system. The lack of historical CTD data in the western boundary current region (e.g. Kuroshio) is the largest difficulty we encountered when we carry out DMQC.

Argo data management report 2013
Coriolis DAC & GDAC

Data Assembly Centre and Global Data Assembly Centre
Annual report October 2012 - September 2013
Version 1.02
October 9th, 2013



DAC status

(Please report the progress made towards completing the following tasks and if not yet complete, estimate when you expect them to be complete)

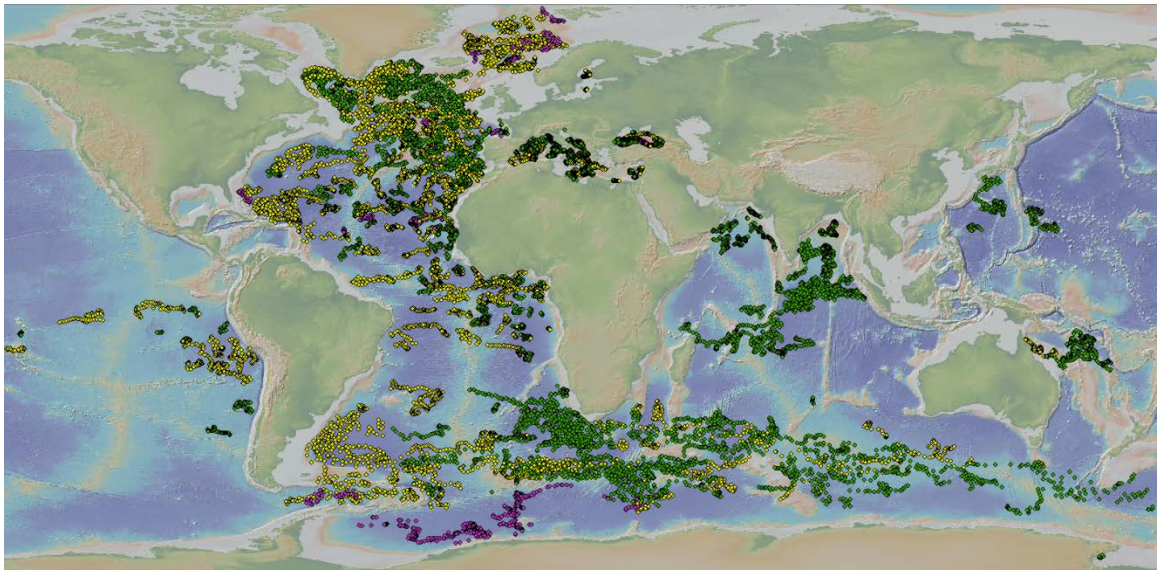
- Data acquired from floats
- Data issued to GTS
- Data issued to GDACs after real-time QC
- Data issued for delayed QC
- Delayed data sent to GDACs
- Web pages
- Statistics of Argo data usage (operational models, scientific applications, number of National PIs…)
- Products generated from Argo data …

This report covers the activity of Coriolis data centre for a one year period from October 1st 2012 to September 30th 2013.

Data acquired from floats

These last 12 month, a total of 21954 profiles from 657 floats was collected, controlled and distributed. The 1592 floats managed during that period had 42 versions of data format:

- APEX 21 versions 314 floats
- NEMO 5 versions 62 floats
- NOVA 1 version 2 floats
- PROVOR 15 versions 279 floats



Map of the 21 954 profiles from 657 floats managed by Coriolis DAC this current year
Apex Nemo Nova Provor

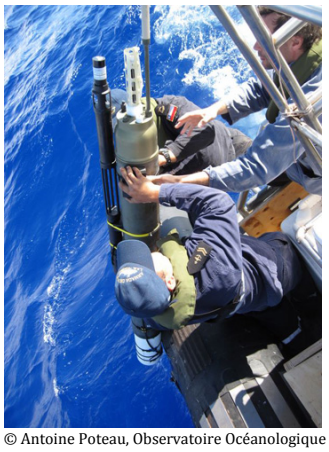
Bio-geo-chemical sensors on Provor floats

In addition to these 657 floats, we are developing a new data processing chain based on Matlab to manage data and metadata from Provor-Remocean floats. These are advanced type of floats performing bio-geo-chemical measurements. They are available in real-time from:

- ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/probio-draft/

There data files should appear on Argo GDAC after Liverpool data management meeting after agreement on the new features needed for these "bio-floats":

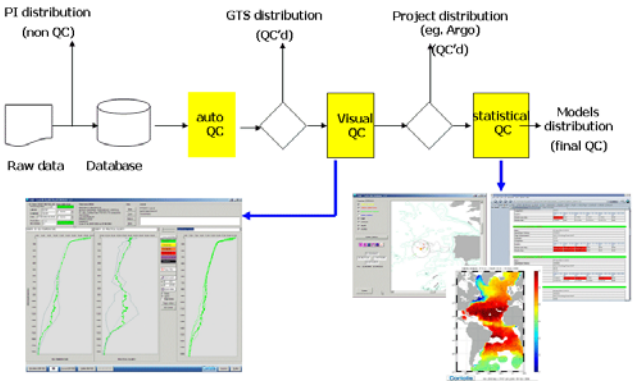
- New parameters : chlorophyll, turbidity, CDOM, back-scattering, UV, nitrate, bisulfide, pH, radiance, irradiance, PAR;
- New behaviour of the floats : multiple profiles performed during a single cycle



Deployment of a bio-argo Provor float in "desertic" waters, therefore very blue around Easter island

Data issued to GTS

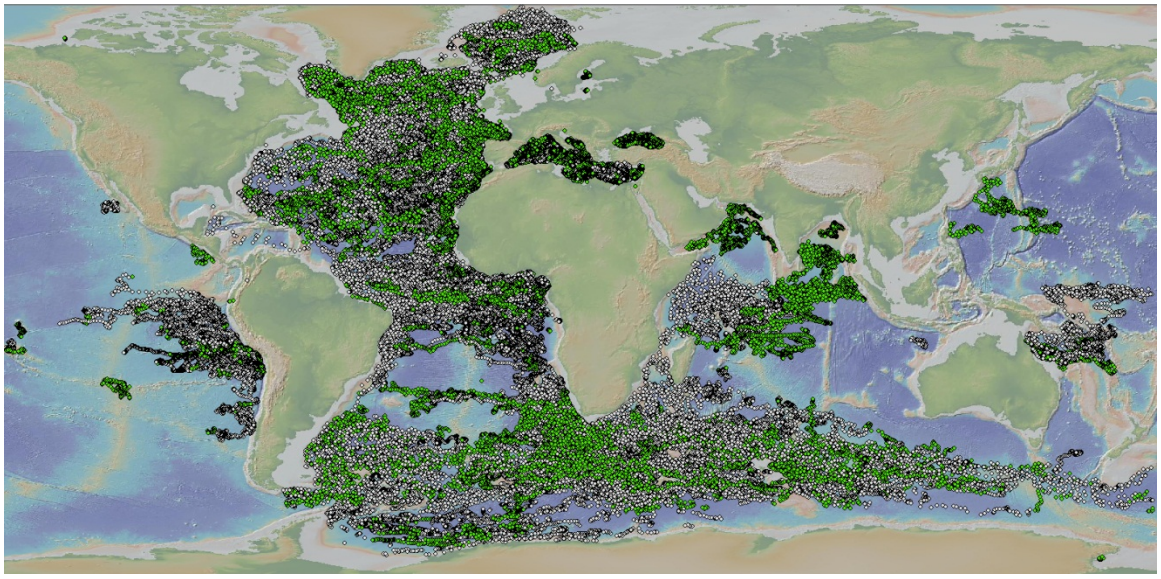
All profiles processed by Coriolis are distributed on the GTS by way of Meteo-France. This operation is automatically performed. After applying the automatic Argo QC procedure, the Argo profiles are inserted on the GTS every 2 hours. Argo profiles are inserted on the GTS 365 days per year, 24 hours a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



CORIOLIS DAC: Argo data flow

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.



Map of real-time profiles (Argo NetCDF V3.0) and delayed mode profiles (Argo NetCDF V2.4)
Real time : green dots, delayed mode : grey dots

Real time profiles are available in Argo NetCDF V3.0, delayed mode profiles are still in Argo NetCDF V2.4 format.

Transition to Argo profile NetCDF format V3.0

Since May 17th 2013, the new profile files from Coriolis DAC are distributed in Argo NetCDF version 3.0.

On October 7th 2013, all the existing real-time profile files from Coriolis DAC where transformed into version 3.0 files (43 964 files resubmitted).

To convert the remaining delayed-mode profile files to version 3.0, a patch is under development.

In version 3, profile files report a vertical sampling scheme. On October 2013, Coriolis data files reported 14 different vertical sampling schemes.

Vertical sampling scheme	Nb profiles
Near-surface sampling: average, unpumped [1 Hz sampling with 2 dbar bin averages]	200
Near-surface sampling: average, unpumped [1 Hz sampling with 2 dbar bin averages]	112
Near-surface sampling: discrete, pumped []	1
Near-surface sampling: discrete, unpumped [6 Hz sampling]	1
Primary sampling: averaged []	18583
Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 15, 2 decibars from 15 to 6, 1 decibars from 6 to surface]	229
Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 200, 10 decibars from 200 to 10, 1 decibars from 10 to surface]	2043
Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 200, 10 decibars from 200 to 20, 1 decibars from 20 to surface]	69

Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 200, 5 decibars from 200 to 100, 1 decibars from 100 to surface]	109
Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 200, 5 decibars from 200 to 20, 1 decibars from 20 to surface]	32
Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 300, 10 decibars from 300 to 20, 1 decibars from 20 to surface]	34
Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 500, 10 decibars from 500 to 10, 1 decibars from 10 to surface]	287
Primary sampling: discrete []	18825
Secondary sampling: averaged []	53
Total number of profiles	**40578**

Data issued for delayed mode QC

Delayed mode profiles

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.

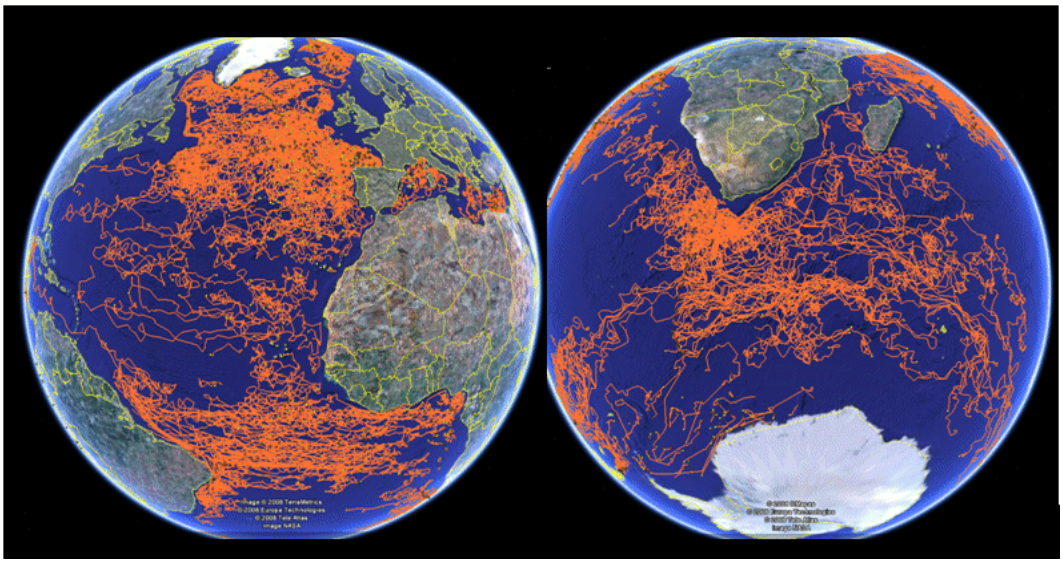
Transition to Argo trajectories delayed mode NetCDF format V3.0

An important activity was performed to extract delayed mode NetCDF V3 trajectory files from the Andro atlas of deep ocean currents. These trajectory file are proposed to Argo DACs.
They are available from:

- ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/argo-andro-data/

The Andro trajectory TRAJ3 files are available for most of the DACs. Each DAC may decide to use these files to provide delayed mode trajectory on GDAC.

Coriolis DAC intends to use these files as its delayed mode trajectories; after Liverpool ADMT14 meeting.



Argo trajectories from Coriolis DAC are carefully scrutinized to produce the “Andro” atlas of deep ocean currents.

Delayed mode data sent to GDACs

An Argo delayed mode profile contains a calibrated salinity profile (psal_adjusted parameter).

A total of 13769 new delayed mode profiles where sent to GDACs this year. The number of delayed mode profiles increased by 15%. A total of 105 171 delayed mode profiles where sent to GDACs since 2005.

Web pages

The web site of the French DAC is available at:

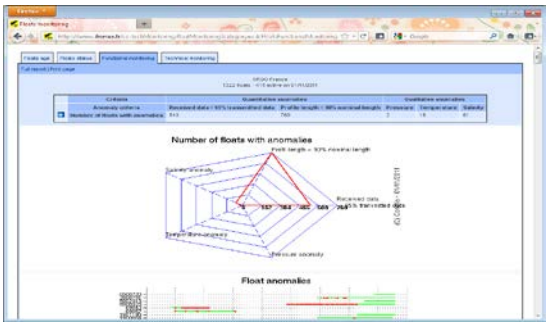
- http://www.coriolis.eu.org/Observing-the-ocean/Observing-system-networks/Argo

It provides:

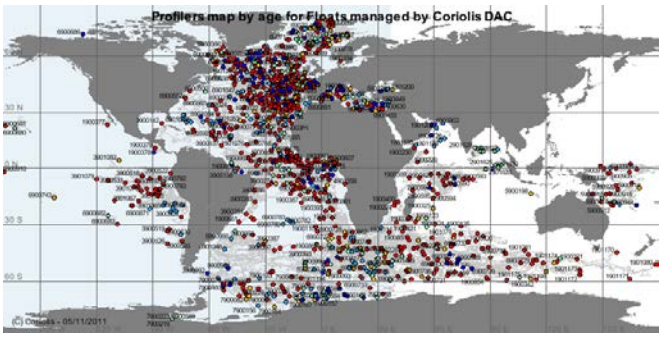
- Individual float description and status (meta-data, geographic map, graphics : section, overlaid, waterfall, t/s charts)
- Individual float data (profiles, trajectories)
- FTP access
- Data selection tool
- Global geographic maps, GoogleEarth maps
- Weekly North Atlantic analyses (combines Argo data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

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

- http://www.coriolis.eu.org/Observing-the-ocean/Observing-system-networks/Argo/Support-to-Data-Mgt/At-sea-monitoring



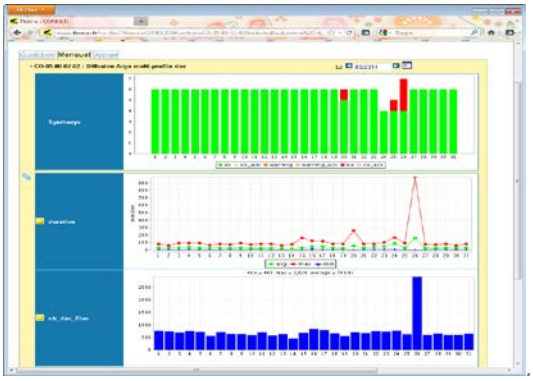
Example 1: technical monitoring of Argo-France floats



Example 2: age map of floats managed by Coriolis DAC.

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

Example 1: distribution activity on 03/11/2011. An operator has to perform a diagnostic on anomalies of Argo data distribution (red smileys). A series of small data base incidents explains the unusual situation.



Example 2: data distribution to GDAC activity in March 2011. On 26th, a bigger than usual data distribution delayed the update of DAC files.

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 model)
- 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 48 PIs (Principal Investigators).

List of Coriolis scientific PIs and project names

Principal Investigator	nb floats
Alain SERPETTE	2
Alban LAZAR	5
Andreas STERL	39
Antoine POTEAU	2
Bernard BOURLES	11
Bert RUDELS	8
Bettina FACH	2
Birgit KLEIN	61
Bernard BOURLES	19
C. PROVOST et N. BARRE	3
Cecile CABANES	8
Christine COATANOAN	51
Christophe MAES	13
Detlef QUADFASEL	3
E. STANEV	1
Fabien DURANT	4
Fabrizio D'ORTENZIO	1
Jordi FONT	1
Frederic VIVIER	3
Gerard ELDIN	6
Gerd ROHARDT	42
Gilles REVERDIN	1
Holger GIESE	110
Isabelle TAUPIER-LEPAGE	2

Principal Investigator	nb floats
Jose Luis PELEGRI	4
Juliet HERMES	1
Kjell Arne MORK	3
Klaus-Peter KOLTERMANN	3
Laurent BEGUERY	2
Laurent COPPOLA	4
Louis PRIEUR	2
Olaf KLATT	1
Pascual ANANDA	2
Pedro Joaquin VELEZ BELCHI	32
Pierre Marie POULAIN	29
Rena CZESCHEL	8
Sabrina SPEICH	47
Sabrina SPEICH et Michel ARHAN	38
Serge LE RESTE	1
Stephane BLAIN	5
Sunke SCHMIDTKO	9
Tero PUROKOSKI	2
Violeta SLABAKOVA	4
Virginie THIERRY	43
Waldemar WALCZOWSKI	1
Xavier ANDRE	10
Xavier CARTON	5
Yves GOURIOU	1

Project	nb floats
ARGO SPAIN	35
ARGO_BUL	4
ARGO_FIN	7
ARGO_FINLAND	3
ARGO_ITALY	20
ARGO_LEBANON	1
ARGOMED	49
ARGO_NORWA	3
ARGO_POLAND	1
ASA	1
AWI	44
BSH	174
CONGAS	2
CORIOLIS	131
CORIOLIS_OVIDE	9
CORIOLIS_UPSEN	3
DAP	39
DEKOSIM	2

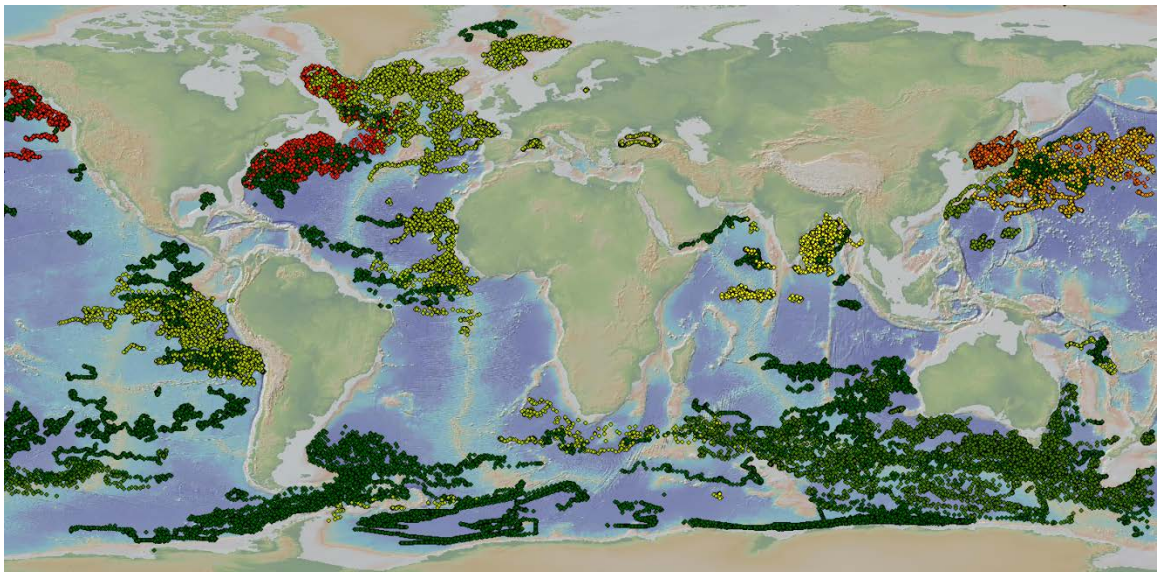
Project	nb floats
EGYPT	2
euroargo	1
FLOPS	6
GOODHOPE	85
HYMEX	4
IFM	8
IFM-GEOMAR	9
MEDARGO_IT	5
NAOS	26
OVIDE	21
PIRATA	6
PROSAT	2
RemOcean	1
SHOM	10
SOCIB	1
SRI_LANKA	4
TRACK2010	3
WEN	3

Products generated from Argo data …

Distribution of Argo oxygen observations to EU former 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).
More on http://www.coriolis.eu.org/Data-Services-Products/View-Download/Argo-floats-interoperability-services

This year, 12157 new oxygen profiles from 240 floats were distributed.
A total of 67610 oxygen profiles from 532 floats were distributed since 2004.

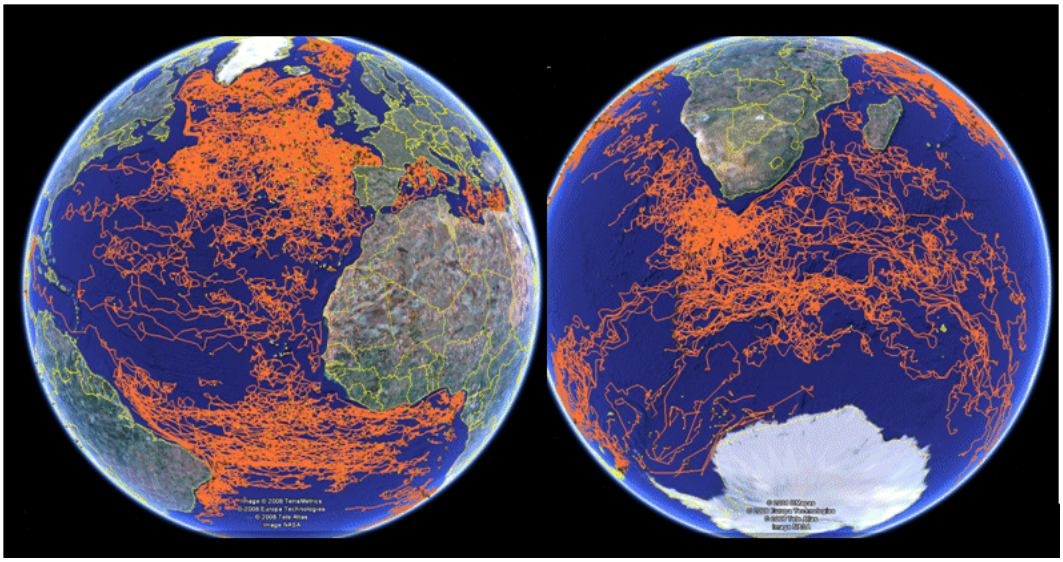


Oxygen profiles collected by all Argo partners since 2004.

Sub-surface currents Atlas

Based on Argo trajectory data, Michel Ollitrault and the Ifremer team are continuously improving the "Andro" atlas of deep ocean currents.

A work is underway to extract delayed mode NetCDF V3 trajectory files from Andro data files. These trajectory file will be proposed to Argo DACs.



Argo trajectories from Coriolis DAC are carefully scrutinized to produce the "Andro" atlas of deep ocean currents.

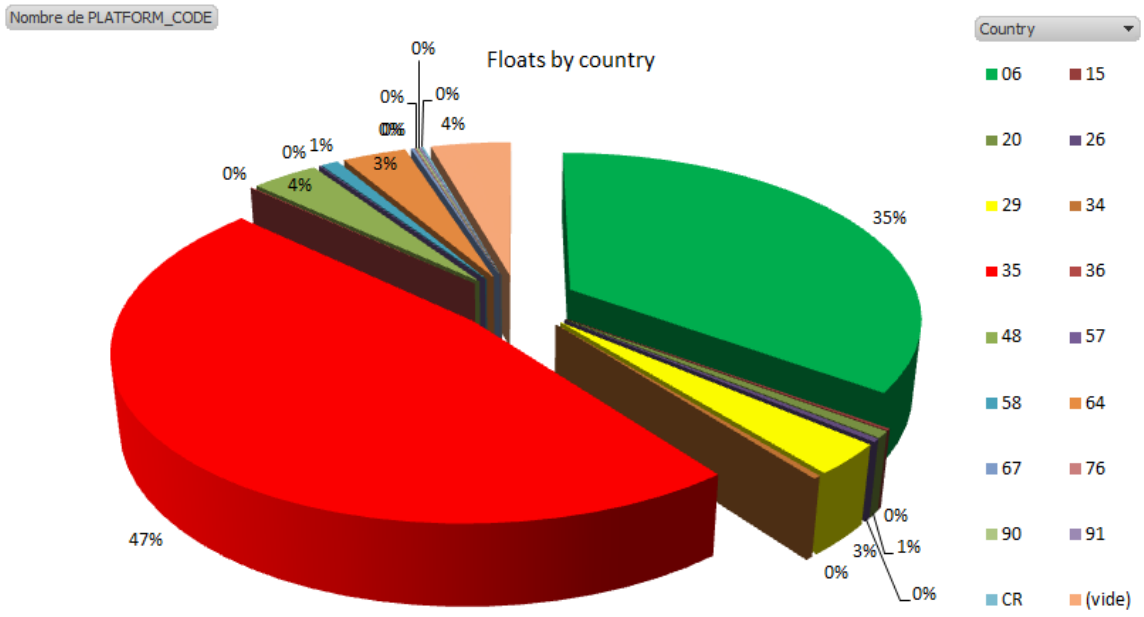
Delayed Mode QC

(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 neighbor profiles to check if a drift or offset could be easily detected. As each year, we have worked on this way with PIs to strengthen the delayed mode quality control.

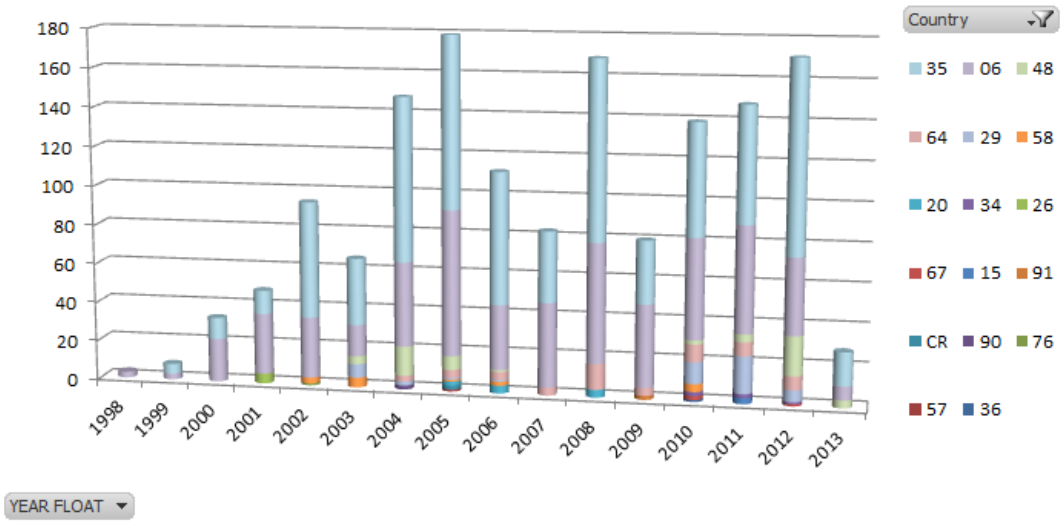
Some floats have been deployed from some projects, meaning a lot of PIs and a lot of time for explaining the DM procedure to all of them. A few PIs are totally able to work on DMQC following the four steps but this is not the case for most of them. Since the unavailability of the PIs leads to work by 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 largely improve 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. We have made progress with BSH (Marek Stawarz) 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.



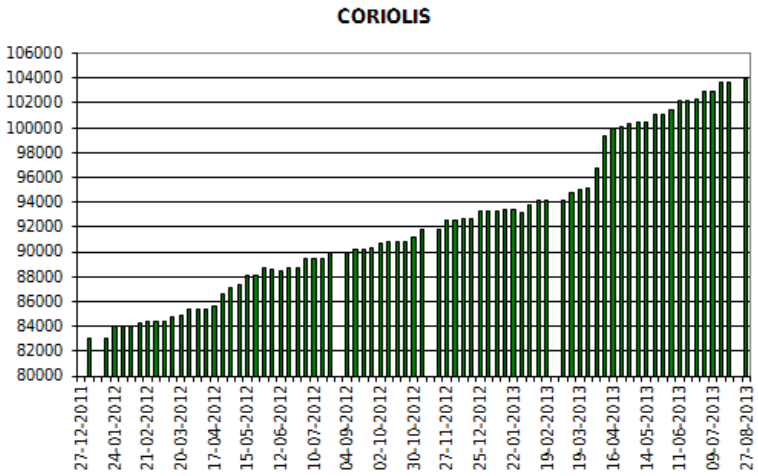
Percentage of floats by country in the Coriolis DAC.

Codes for the countries: 06 : Germany - 15 : Bulgaria - 20 : Chili – 26 : Denmark – 29 : Spain – 34 : Finland - 35 : France – 36 : Greece - 48 : Italy – 57 : Mexico - 58 : Norway – 64 : Netherlands – 90 : Russia – CR : Costa Rica

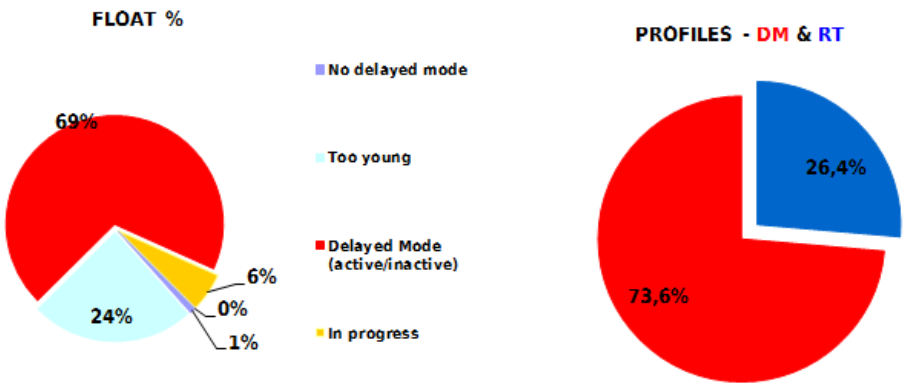


Percentage of floats by country and by launch's year in the Coriolis DAC

During the last year, 13162 new delayed mode profiles where produced and validated by PIs. A total of 104924 delayed mode profiles where produced and validated since 2005.

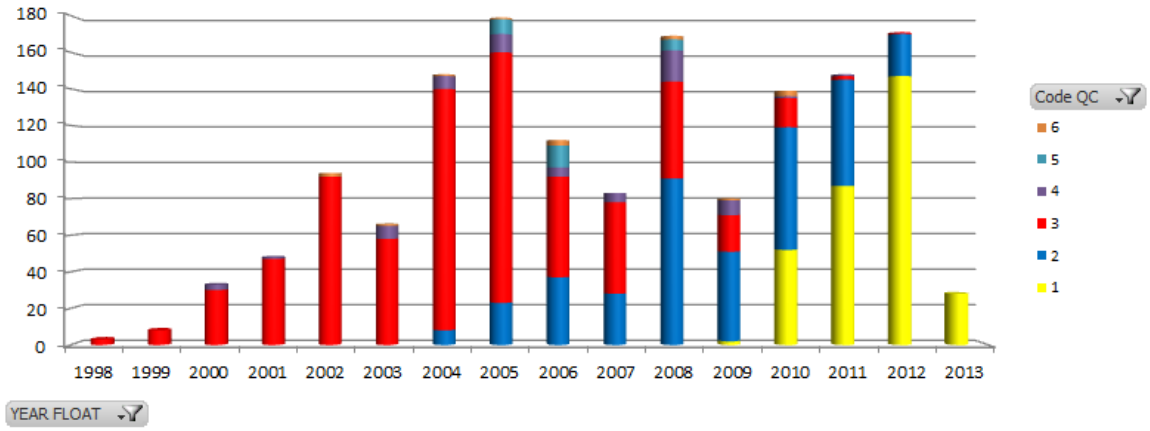


Evolution of the DM profiles' submission versus dates



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).

The status of the quality control done on the Coriolis floats is presented in the following plot. For the two last years (2012-2013), most of the floats are still too young (code 1) to be performed in delayed mode. For the year 2011, we are working on the DMQC of those floats, which should be available for the end of this year. The codes 2 and 3 show the delayed mode profiles for respectively active and dead floats.



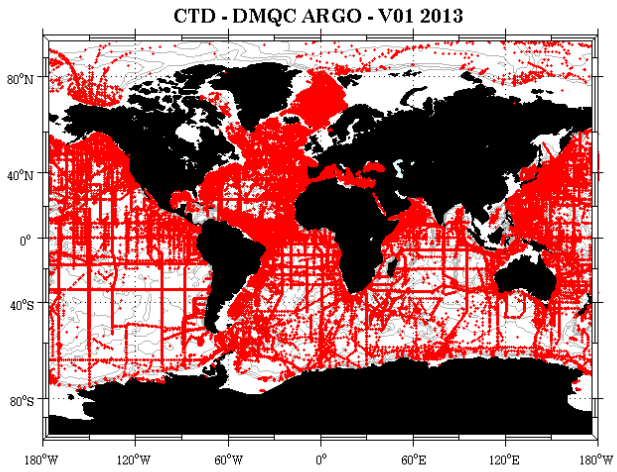
Status of the quality control done on profiles sorted by launch's year, code 1: young float, code 2: active float, DM done, code 3 : dead float, DM done; code 4 : DM in progress, code 5 : waiting for DM, code 6 : problems with float.

Reference database

The version CTD_for_DMQC_2012V02 is available since November 2012. A new version CTD_for_DMQC_2013V01 has been provided in March 2013.

The November's version takes into account new CTD provided by the updates of WOD2009 and by the CCHDO as well as feedbacks from users on quality of some profiles. The last version has been updated from some bad dates introduced in November's version. A new version is in progress and will integrate last updates of WOD2009 and will take into account best quality control on data (based on analysis of deep water).

This version is provided on the ftp site in smaller tar balls, one by wmo box area (1-3-5-7): for instance, CTD_for_DMQC_2013V01_1.tar.gz for all boxes starting with wmo 1, then we will have 4 tar files.



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 centres reporting to you

Currently, 11 national DACs submit regularly data to Coriolis GDAC.

The additional GTS DAC contains all the vertical profiles from floats that are not managed 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 8th, the following files were available from the GDAC FTP site.

DAC	metadata files 2013	metadata files 2012	increase from last year	profile files 2013	profile files 2012	increase from last year2	delayed mode profile files 2013	delayed mode profile files 2012	increase from last year3	trajectory files 2013	trajectory files 2012	increase from last year4
AOML	4 750	4 366	9%	611 161	535 645	14%	445 834	398 027	12%	4 617	4 236	9%
BODC	435	402	8%	42 136	37 274	13%	31 221	30 329	3%	415	383	8%
Coriolis	1 693	1 466	15%	145 718	127 401	14%	104 902	90 715	16%	1 579	1 382	14%
CSIO	140	127	10%	11 623	8 388	39%	9 201	5 879	57%	137	124	10%
CSIRO	596	533	12%	79 427	65 215	22%	37 324	35 006	7%	566	527	7%
INCOIS	302	274	10%	37 007	33 006	12%	26 409	21 061	25%	299	272	10%
JMA	1 229	1 144	7%	138 226	128 402	8%	85 536	83 666	2%	1 215	1 131	7%
KMA	168	161	4%	18 358	15 904	15%	13 970	9 982	40%	160	145	10%
KORDI	119	119	0%	14 849	14 142	5%	0	0	-	119	119	0%
MEDS	368	344	7%	37 911	35 639	6%	23 449	23 261	1%	362	336	8%
NMDIS	19	19	0%	1 622	1 193	36%	0	0	-	19	19	0%
Total	**9 819**	**8 955**	**10%**	**1 138 038**	**1 002 209**	**14%**	**777 846**	**697 926**	**11%**	**9 488**	**8 674**	**9%**

Operations of the ftp server

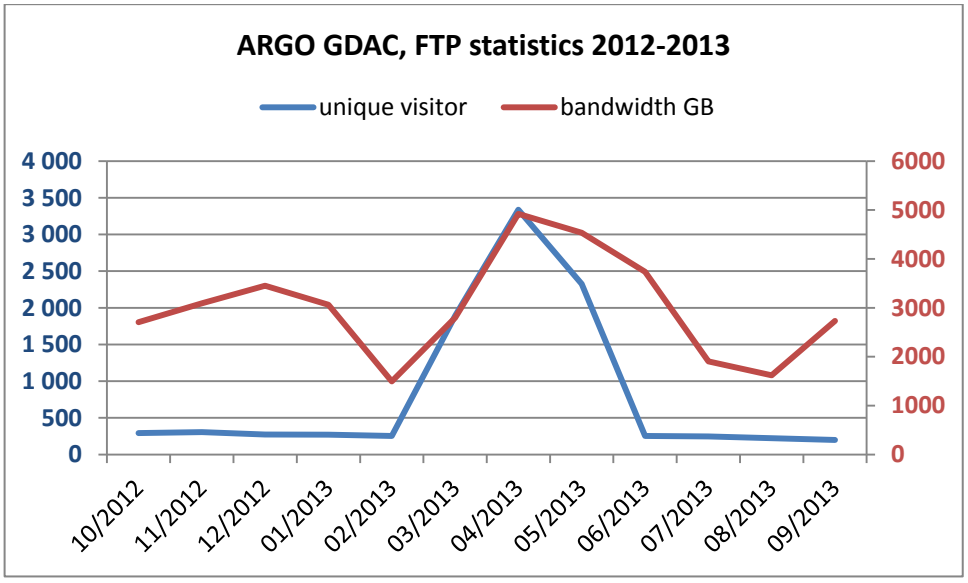
- Meta-data, profile, trajectory and technical data files are automatically collected from the national DACs ;
- Index files of meta-data, profile and trajectory are daily updated ;
- GDAC ftp address: *ftp://ftp.ifremer.fr/ifremer/argo*

Statistics on the Argo GDAC FTP server: ftp://ftp.ifremer.fr/ifremer/argo

There is a monthly average of 823 unique visitors, performing 3397 sessions and downloading 3 gigabytes of data files.

The graphics show a steep increase of activity on GDAC FTP in March, April and May 2013. There is no clear explanation yet for that increase.

ARGO GDAC FTP statistics				
month	**unique visitor**	**number of visits**	**hits**	**bandwidth GB**
10/2012	292	2 761	3 083 439	2706
11/2012	306	2 707	4 594 609	3093
12/2012	274	2 653	2 742 010	3453
01/2013	270	2 854	4 607 398	3063
02/2013	253	2 946	2 325 789	1496
03/2013	1 891	4 756	4 134 792	2799
04/2013	3 338	6 091	7 801 722	4921
05/2013	2 326	5 159	2 384 811	4534
06/2013	253	2 708	1 956 305	3735
07/2013	248	2 832	1 818 624	1904
08/2013	222	2 699	3 141 159	1621
09/2013	198	2 594	3 090 460	2733
Average	**823**	**3 397**	**3 473 427**	**3 005**

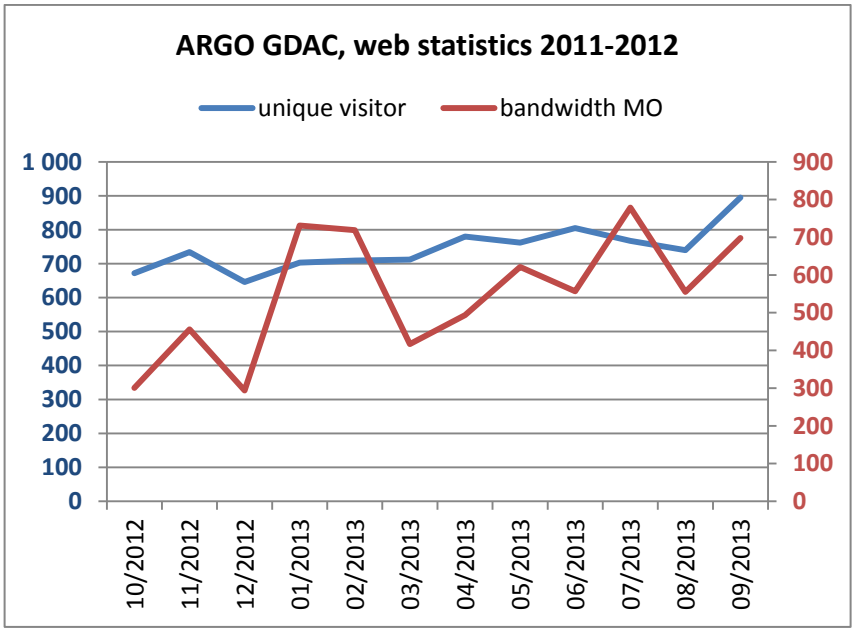


Statistics on the Argo data management web site: http://www.argodatamgt.org

There is a monthly average of 744 unique visitors, performing 1367 visits and downloading 552 megabytes.

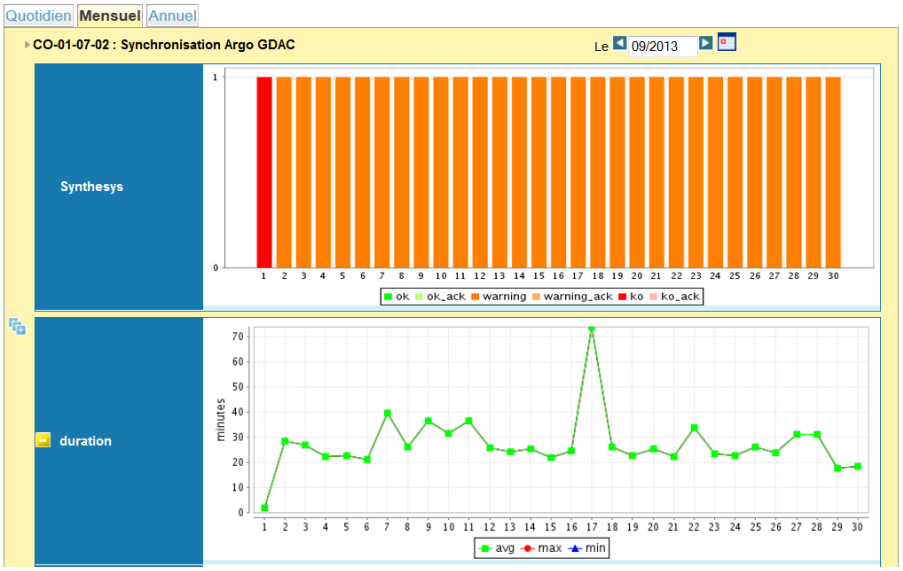
The graphics show a stable but increasing number of unique visitors.

ARGO GDAC web statistics				
month	unique visitor	visits	pages	bandwidth MO
10/2012	672	1 186	2 547	300
11/2012	734	1 442	3 163	456
12/2012	646	1 247	2 493	294
01/2013	703	1 352	4 486	731
02/2013	709	1 290	4 153	719
03/2013	712	1 314	2 925	417
04/2013	780	1 372	4 053	494
05/2013	762	1 518	3 807	621
06/2013	805	1 546	3 506	557
07/2013	767	1 417	3 250	779
08/2013	740	1 204	2 617	555
09/2013	895	1 515	3 377	698
Average	**744**	**1 367**	**3 365**	**552**



Data synchronization

The synchronization with US-Godae server is performed once a day at 01:55Z.



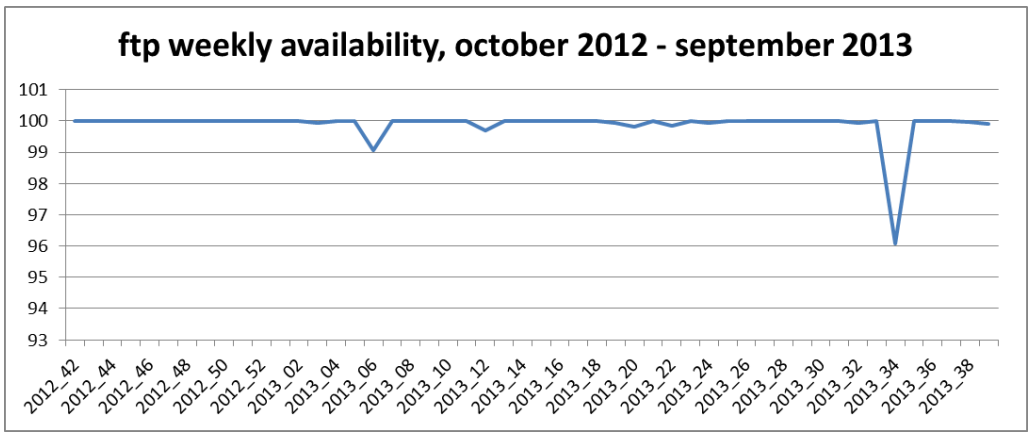
The synchronization dashboard in September 2013: the synchronization time takes on average 30 minutes
Red bar : on September 1st Coriolis GDAC could not access USGADC index file needed for synchronization
Orange bars : a series of 98 files have incorrect update dates; they cannot be synchronized, an action is opened with the DAC to fix that problem.

FTP server monitoring

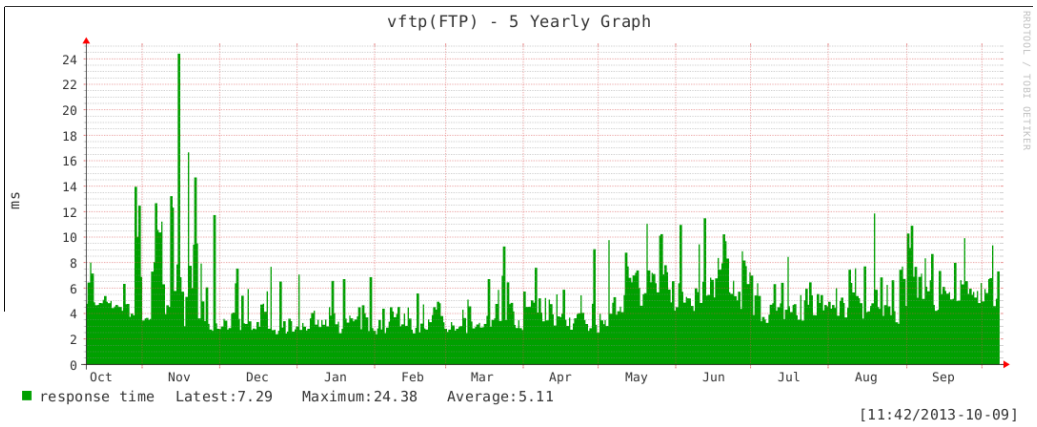
The Argo GDAC ftp server is actively monitored by a Nagios agent (see http://en.wikipedia.org/wiki/Nagios).

Every 5 minutes, a download test is performed. The success/failure of the test and the response time are recorded. The FTP server is a virtual server on a linux cluster. We did not face any electrical power supply problem (usually the main cause of service failure).

The ftp server was **available for 99.992 %** of the time (compared to 99.98% last year)
The 0.008% of failure represents **31 minutes of interruption** (compared to 1 hour 53 minutes last year).
The main problem occurred on week 34, in August 2013. The ftp server failed down, but was reactivated on another node of the cluster.



Nagios ftp monitoring: between October 2012 and September 2013



Nagios monitoring: duration of a test file download from October 2012 to September 2013

The file transfer time was punctually longer for some hours in November 2012.

Grey list

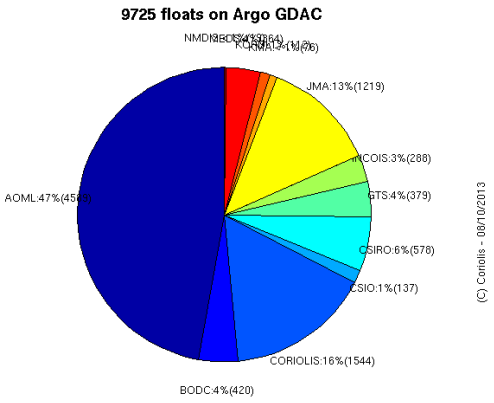
According to the project requirements Coriolis GDAC hosts a grey list of the floats which are automatically flagged before any automatic or visual quality control.

The greylist has 1139 entries (October 8th 2013), compared to 1384 entries one year ago.

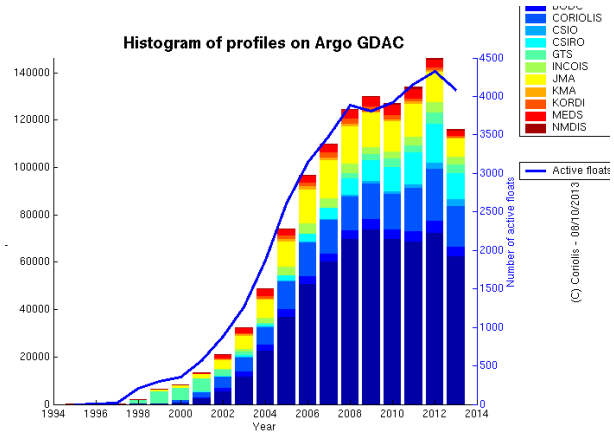
DAC	nb floats in greylist
AOML	888
BODC	51
China	8
Coriolis	25
INCOIS	1
JMA	139
KMA	9
KORDI	9
MEDS	9
Total	**1139**

Statistics on GDAC content

The following graphics display the distribution of data available from GDAC, per float or DACs. These statistics are weekly updated on : http://www.argodatamgt.org/Monitoring-at-GDAC

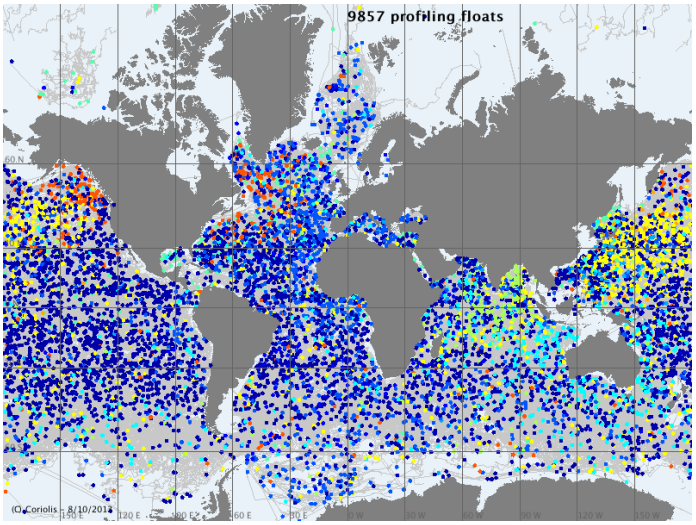


Argo GDAC : floats distribution per DAC in October 2013

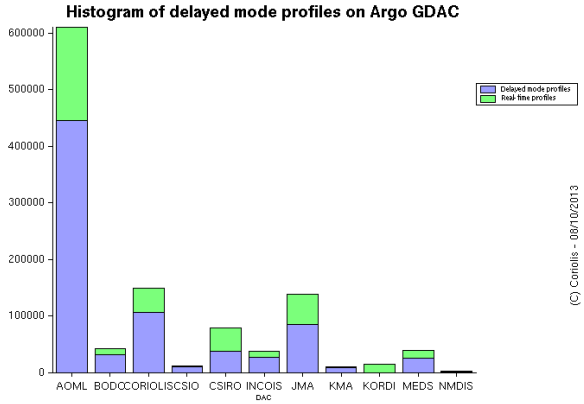


Argo GDAC : profiles distribution per DAC in October 2013[1]

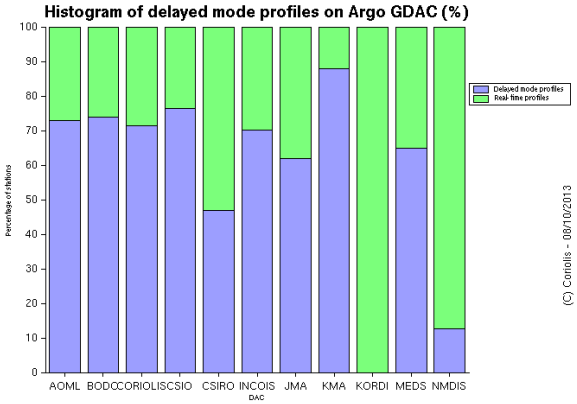
[1] Warning: the blue line displays the total number of active floats during a year. This total is different than the floats active at a particular day.



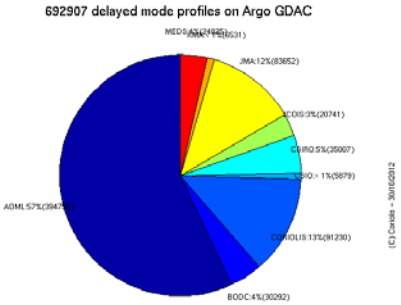
Argo floats available from GDAC in October 2013



Delayed-mode profiles available in October 2013



Delayed-mode profiles % per DAC in October 2013



Argo profiling floats with delayed-mode profiles available from GDAC in October 2012

Regional Centre Functions

(If your centre operates a regional centre, report the functions performed, and in planning)

I) Re-check of delayed mode corrections in the North Atlantic

We have investigated the performance of the OW method (Owens Wong, 2009) in the North-Atlantic, North of 30°N. We have first looked at all the floats already processed in delayed mode and selected those with no salinity bias or drift according to the PI's decision. We have then used this subset of 416 unbiased floats to test the OW method in the North Atlantic region.

One would expect that the corrections proposed by OW for these floats would be distributed around zero. However this is not the case, when the CTD reference database and classical configuration parameters for the North Atlantic are used for the calibration. We have checked that these results were not strongly related to the choice of configuration parameters and θ levels. Instead, the systematically negative or positive corrections proposed by the OW method (see Figure 1A) are mainly explained by a large decadal/ interannual variability that is not well described in the CTD reference database.

We have then slightly modified the OW method in order to better take into account this large decadal/ interannual variability. Particularly, we have added a Gaussian decay with a time scale of 2 yr when computing the covariance matrix that is used to estimate the large scale field at the float profile position. Thus it is given greater weight to contemporaneous reference data. The original OW method takes into account the temporal variability but only when the small scale field is estimated and the large scale field is assumed to be constant. We have also modified the way the error on the best linear piecewise fit is computed. Indeed, errors on the fit are more realistic when a lateral covariance of mapped errors is taken into account.

The modified OW method was run for the subset of unbiased floats with a time scale of 2 years. The corrections proposed are less systematically biased (Figure 1B) although in some regions it may have been necessary to modify the configuration parameters (i.e. chosen θ levels) to obtain corrections closer to zero.

Most of the offset proposed by the method are now close to zero within the error bar, which is much more consistent with the PI's decision for these floats.

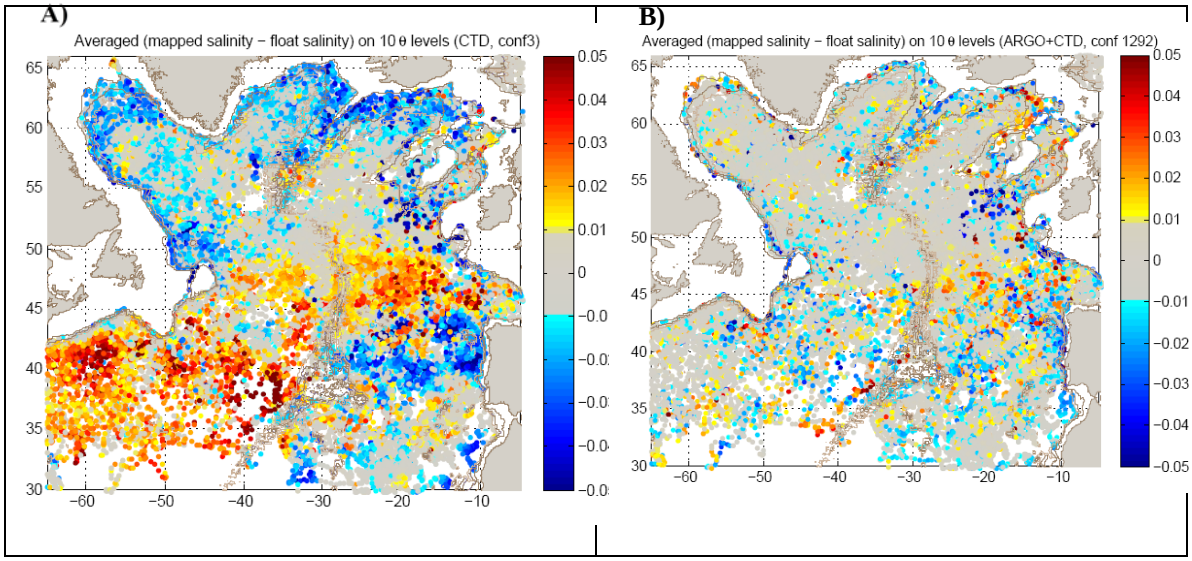


Figure 1: Corrections proposed by the OW method for all floats for which no salinity correction was judged necessary by the PIs. A) CTD reference database is used for calibration. B) Argo and CTD reference databases are used for calibration and a Gaussian decay with a time scale of 2 yr is added when the large scale field is estimated.

Finally, we have checked again the correction for the 186 floats corrected in delayed mode for a salinity offset or drift. Among these floats, we have found 34 floats for which we think it is necessary to revise the DM correction. 7 floats have been checked again by the PI, the correction has been modified and transmitted to the DAC. 15 floats have been checked again by the PI, the correction has been modified but not yet transmitted to the DAC. The others floats have not been checked again yet. The full list of these floats can be found on the SO-ARGO website.

II) Services to explore the Argo dataset in the North Atlantic

In 2012, the North Atlantic Argo Regional Center (NA-ARC) developed and deployed two new services to explore and ease data mining of the Argo dataset.

Those new services are: a web service (REST web API) and a website that allows to access, explore and select data from the Argo array in the North Atlantic (North of 20S). Those services aim to: (i) simplify access to information about all or a selection of Argo profiles, (ii) provide a single entry point to as much as possible information provided by other sources (metadata mashup) and (iii) provide an interactive user interface for data mining/visualisation and to help engage with the data.

The web API is the programmatic access point to the NA-ARC knowledge database. It formalizes and enforces information interoperability between NA-ARC and other data providers. The website (Figure 1) complements the web API to provide an interactive user interface to the service. Example of services: statistics (number of profiles/floats, quality index, spatio/temporal coverage, technical parameters), profiles descriptions (issues, figures, maps), scripts to download data source files from the ftp GDAC servers.

Those new services are available at the following url:

- Website: http://www.ifremer.fr/lpo/naarc
- Web API: http://api.ifremer.fr/naarc/v1/

Argo Data Management Team 2013
CLS Report

Yann Bernard (CLS)

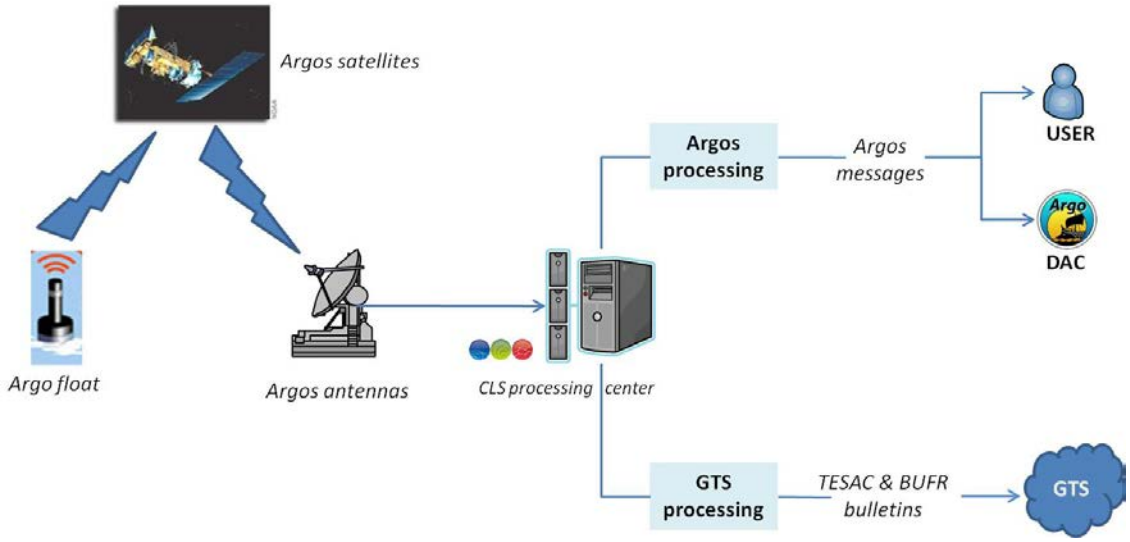
CLS 8-10 Rue Hermès - Parc Technologique du Canal - 31520 Ramonville St-Agne - FRANCE

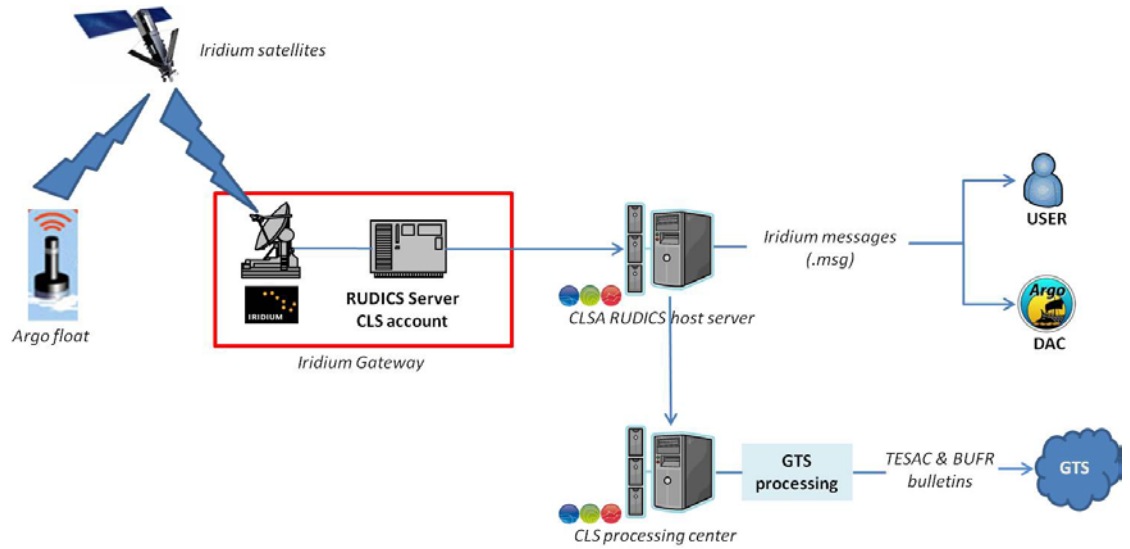
Telephone 05 61 39 47 00 Fax 05 61 75 10 14

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 August 2013 CLS processed in real-time 99 Argo floats (76 with Argos and 23 with Iridium satellite system) for the GTS distribution. 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). Figures below summarize the Argo data flow since their transmission by the float until their dissemination on the GTS with Argos and Iridium satellite systems.





2. STATUS OF THE CLS DAC IN AUGUST 2013

- **Data acquired from floats :**
    - 130 floats were declared in the CLS GTS database
    - 99 floats disseminated data profiles on GTS
    - 31 floats are inactive (no more transmission*) or grey listed (failing status)
    - 403 profiles from CLS were sent on GTS in August 2013

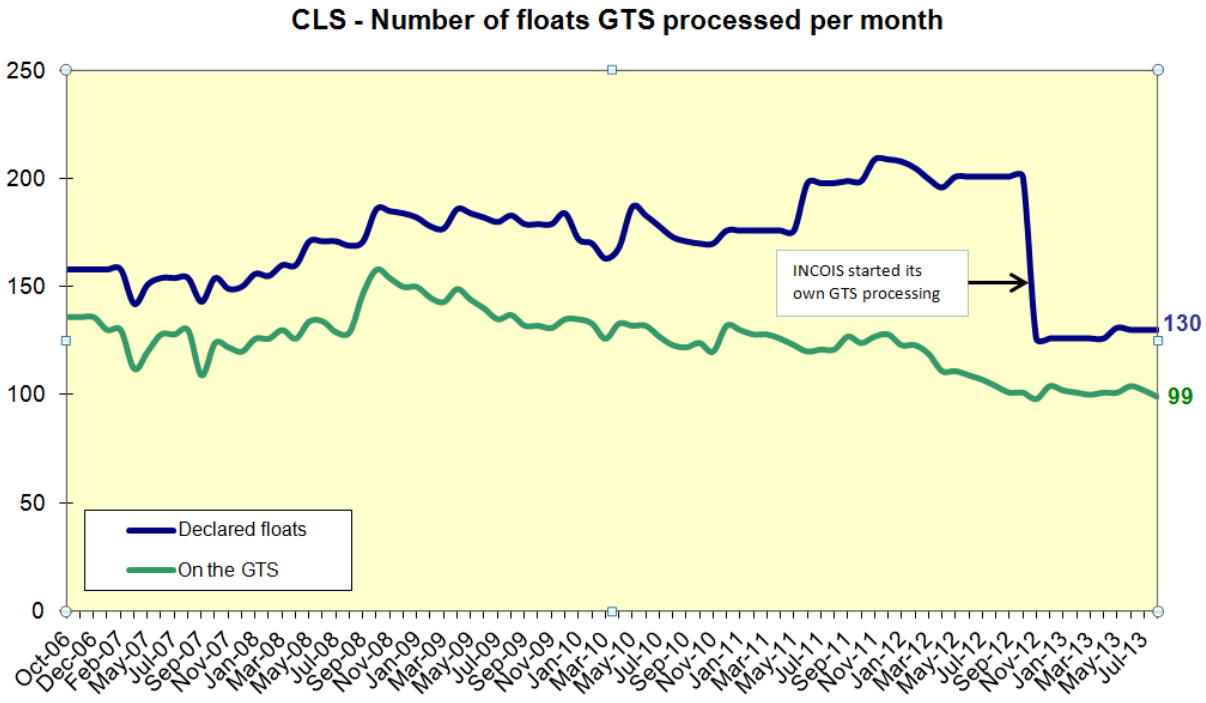
**A float stays 3 years in the CLS GTS database without transmission before to be removed definitely.*

- **Description of the 130 floats :** CLS processed in real time floats for Argo program which are not hosted by a national DAC:
    - 98 SOA floats (China)
    - 32 KORDI floats (Korea)

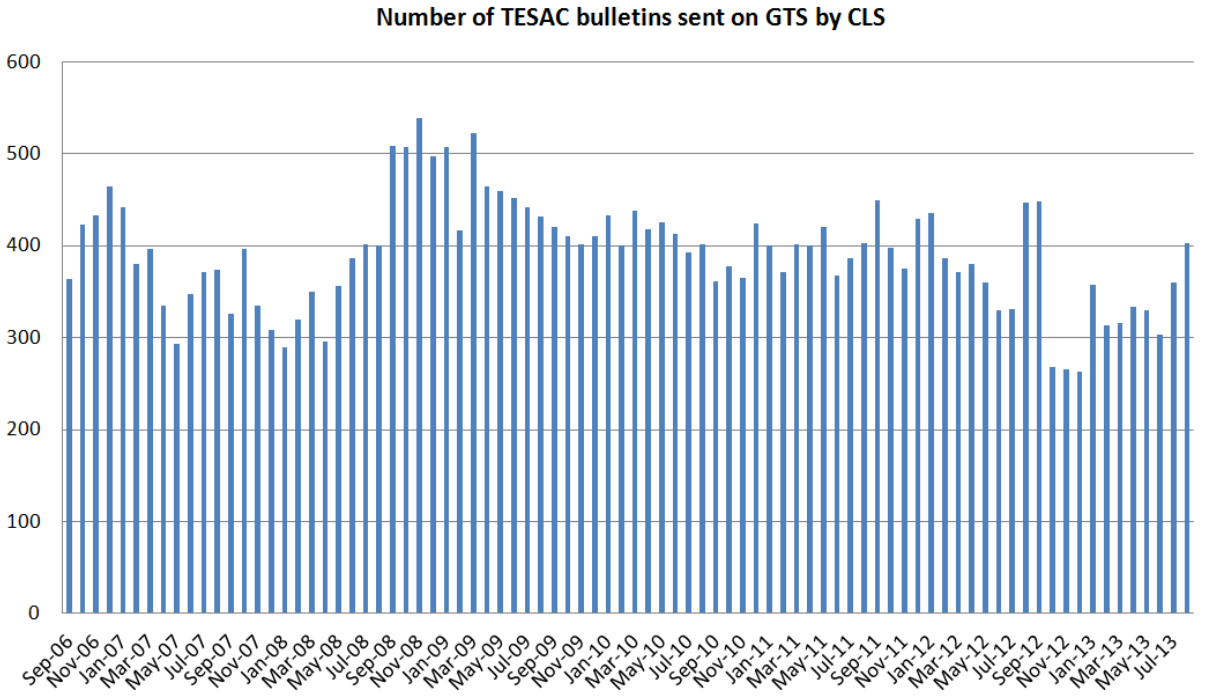
All these floats are Teledyne Webb Research Apex floats with 10 different data formats.

- **Data issued to GTS:** All data processed by CLS are distributed on the GTS by way of Meteo-France (GTS header LFVW) or by the National Weather Service (GTS header KARS) when the French center is in backup. This operation is automatically performed and GTS bulletins are sent to Meteo-France every 2 minutes. Before the encoding in TESAC and BUFR 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. 3 960 profiles were relayed onto GTS from September 1st, 2012 to August 31th, 2013 (source: 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:
    - Argos transmissions in the last month are checked for all floats,
    - GTS disseminations in the last month are checked for all floats,
    - 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.
    - 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 (in TESAC and BUFR) on the GTS by CLS per month

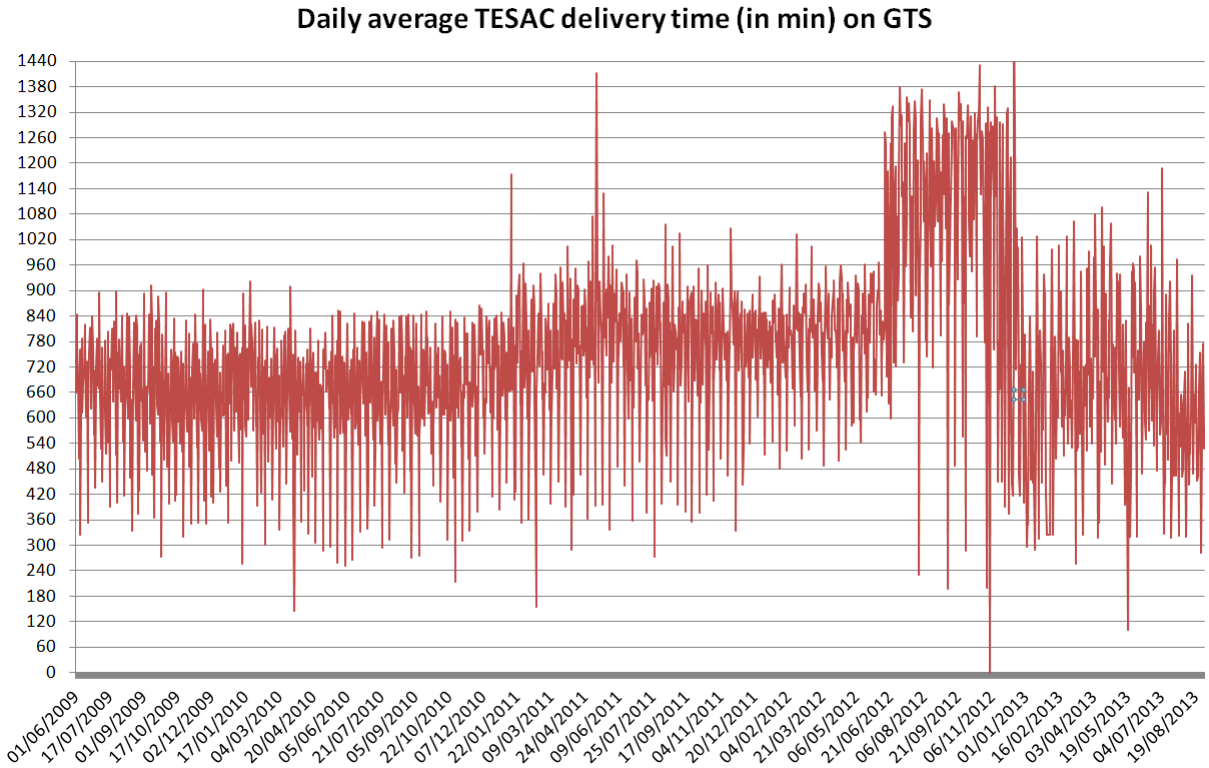
- **Web pages**: All GTS observations (profiles for Argo) are available on https://argos-system.cls.fr/cwi/Logon.do. It consists of a user access to his observation data.

- **BUFR format**: BUFR bulletins are produced in addition of TESAC bulletins for all floats GTS processed by CLS (header: IOPX92 LFVW) since August 2009.

- **Missing pressure levels in BUFR:** In order to decrease the number of missing levels in BUFR bulletins**,** a SQL patch will be applied end of June 2012 to extend the BUFR bulletin construction period to 20 hours.

- **INCOIS floats**: Upon INCOIS request CLS has stopped the GTS processing for all Indian Argo floats on the October 16th, 2012 at 11H UTC. GTS processing for INCOIS floats is now performed by INCOIS in Hyderabad and displayed on the GTS via New Delhi.

- **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 shown in the graph below. We can see the extension of the bulletin construction period to 20 hours in June 2012. The decrease of the average GTS delivery time end of 2012 is due to the stop processing of Argos INCOIS floats and the increasing number of SOA Iridium floats.



3. ARGOS SYSTEM STATUS

3.1. SPACE SEGMENT

2012 - 2013 has been successful for the ARGOS Constellation. On September 17, 2012, METOP-B, the second European satellite on a polar orbit was successfully launched with an ARGOS-3 payload. Then, on February 18, 2013, onboard the PSLV (Polar Satellite Launch Vehicle) Indian rocket, the SARAL satellite, equipped with ARGOS-3 was successfully launched into orbit.

METOP-B launched by Soyuz (left) and SARAL launched by PSLV-C20 (right)

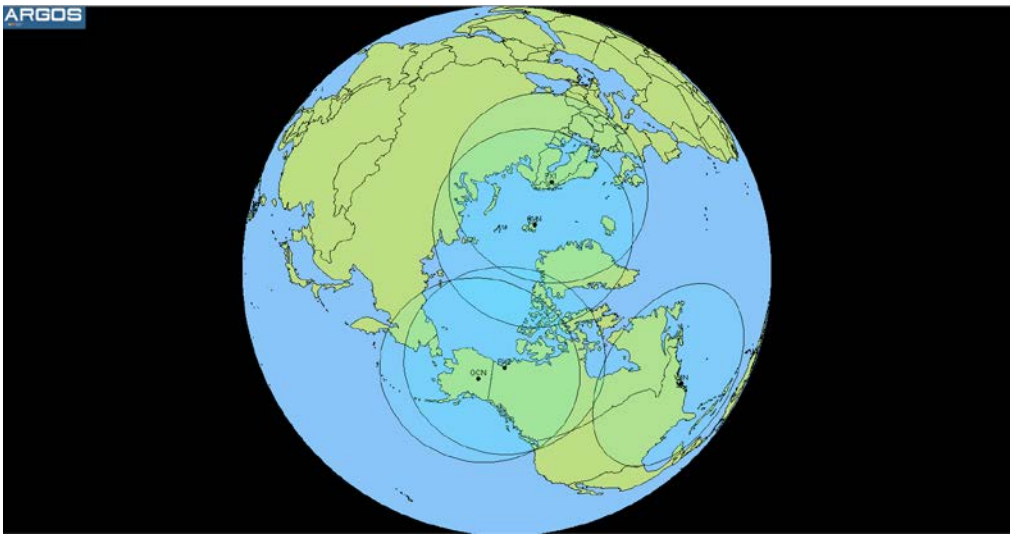
Current operational status of the Argos constellation:

Satellites	Launch date	Instrument	High Data rate and Downlink capabilities
SARAL	25 February 2013	Argos-3	X
METOP-B (MB)	17 September 2012	Argos-3	
NOAA-N' (NP)	6 February 2009	Argos-3	
METOP-A (MA)	19 October 2006	Argos-3	X
NOAA-18 (NN)	20 May 2005	Argos-2	
NOAA-16 (NL)	21 September 2000	Argos-2	
NOAA-15 (NK)	13 May 1998	Argos-2	

3.2. GROUND SEGMENT

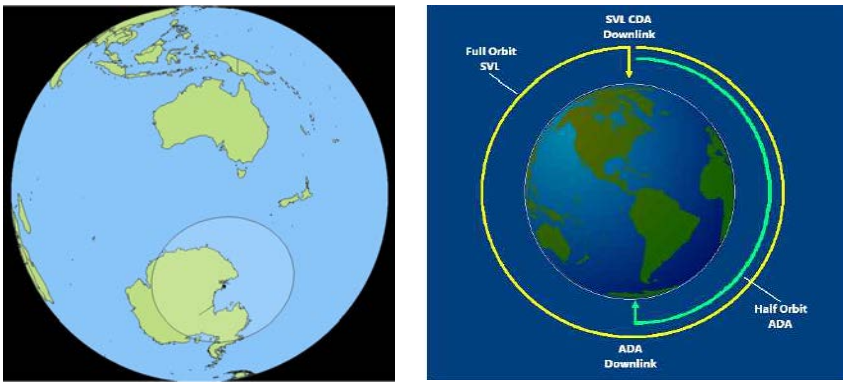
Global antennas network: The Argos global antennas network is composed by seven stations:

- The two NOAA global stations of Fairbanks and Wallops acquire the global recorded telemetry transmitted by N15, N16, N18 and N19.
- The EUMETSAT global receiving station of Svalbard acquires the global recorded telemetry transmitted by Metop-A and Metop-B as well as the 2 daily blind orbits of N19 for NOAA stations.
- The NOAA Svalbard antenna that delivers NOAA 15/16/18 blind orbits for Fairbanks and Wallops when not in conflict with NOAA-19.
- Inuvik (Canada) and Kiruna (Sweden) stations for SARAL operated by EUMETSAT.



The Argos Global antenna network (without McMurdo)

- Data recovery from MetOp-B will occur at Svalbard and McMurdo (ADA). Timeliness benefit of McMurdo data recovery is for MetOp-B only. MetOp-A data will continue to NOAA on a best effort basis and without the timeliness benefits of half orbit dumps at McMurdo.



METOP-B Mc Murdo Global antennas coverage and principle

Real time antenna network: Improvements are still focused on redundancy locations and coverage extension. Today, both Toulouse and Lanham processing centers receive Argos real-time data from 68 stations located all over the world.

In 2012, CLS has continued the Real-Time Antenna Upgrade Project that consists of upgrading selected antennas in order to be compatible with NOAA, METOP and SARAL. This project also aims to optimize in terms of performance the real-time receiving stations network.

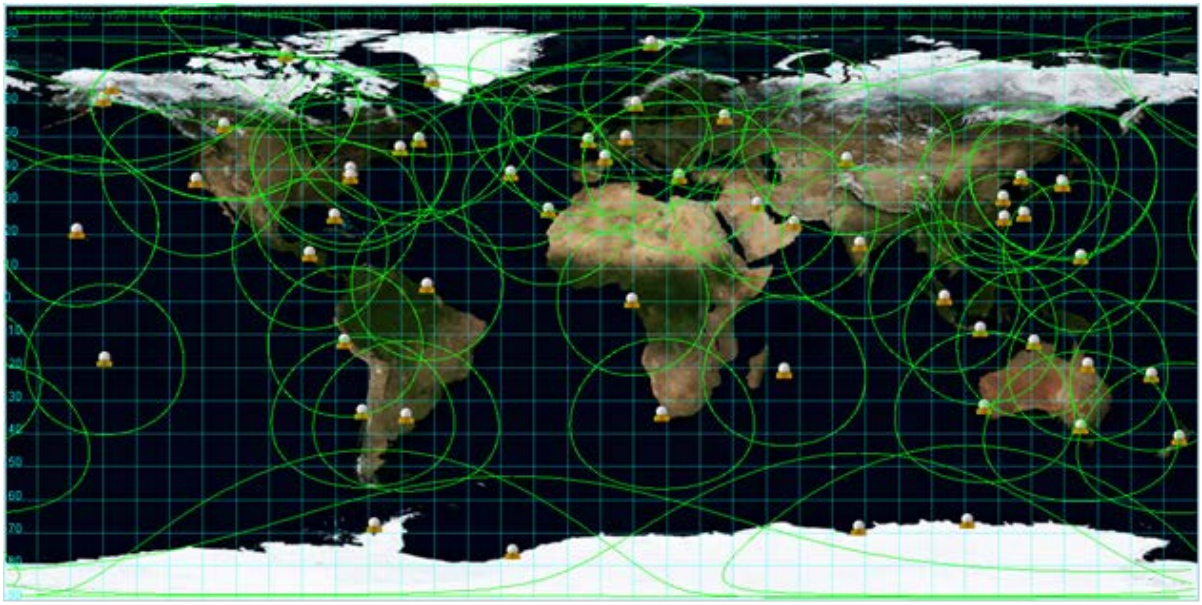
In 2012-2013, the real-time network is quite steady with 2 new ground stations added:

- Ali al Salem in Kuwait operated by US Air Force
- Soto Cano in Honduras also operated by US Air Force

These both new stations acquire real-time datasets from all NOAA satellites.

Today, the real-time Argos ground station network consists of about 65 antennas. If all of them are capable of receiving NOAA POES satellites data, only 19 receives METOP satellites data and, for the moment, 7 out of these 19 receives also SARAL data.

Here below are displayed the Argos HRPT coverage world map and the list of the 68 operational stations part of the Argos real-time antennas network in 2013.



May 2013 Argos Real-time network coverage map

Processing centers: The two global processing centers in Toulouse and Lanham were nominal over 2012 and first semester of 2013. Redundancy is used at least once a month (Up to two times on one month). Redundancy means all Argos users rerouted to CLS or CLSA during an anomaly on the nominal global processing center.

In October 2012, to face the increase of its activities, CLS has built a new building which includes a new control room and a new data center as well.

Personnel, IT infrastructure and all operations staff moved in September/October 2012 into the new facility. All Operations staff was mobilized in order to satisfy all Customer services and minimized the operations' impacts. This moving has been transparent for the Argos users.

CLS Toulouse new building

Toulouse new Control Room

In 2011, https architecture in CLS France was updated and CLS America firewalls were replaced to get the same hardware and software version as CLS France. CLS also initiated a rebuilt of ARGOS application servers, in order to prepare the next decade. This process started on the development configuration in CLS France. The application server is now based on CentOS Linux release 6.0, 64 bits (rather than RedHat, 32bits).

In 2012, these changes on operating systems have been propagated up to the operational configurations, both in CLS America and CLS France datacenters. In order to address the increase of

quantity of data to be processed (due to the launch of METOP-B and SARAL spacecraft), space disk have been increased and few processing servers have been added. The databases backup mechanism has been optimized and updated.

Each global processing center is autonomous and can work alone. In normal mode, both processing centers receive, process and distribute Argos data to:

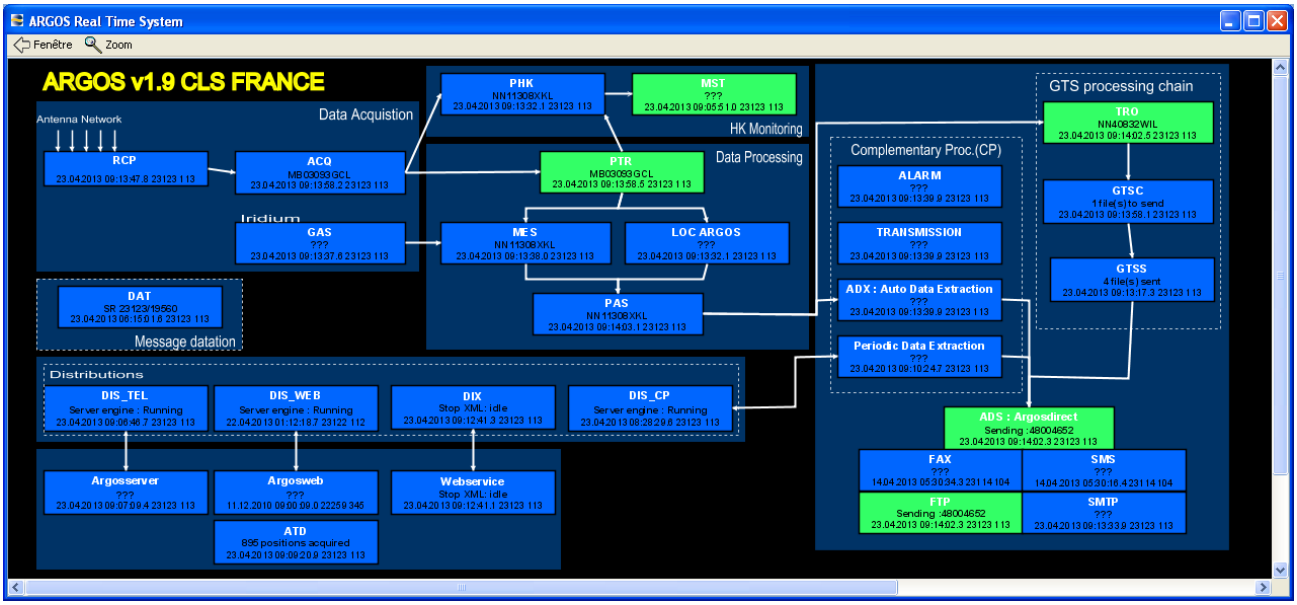
- North American users for CLS America
- Users of the rest of the world for CLS France

In case of problem with one of the two centers, the other one stays alive and is capable of receiving, processing and distributing Argos data to ALL users. The switch to the remaining alive center is completely transparent for the users. It means that the users continue to receive or to access to their data, without changing anything on their side, as if nothing has happened.

The CLS Argos processing chain: Composed of different software modules, the processing chain is in charge of receiving and processing the Argos data issued from the satellites and acquired by the global and real-time ground stations networks.

Argos data are processed in terms of collect and location, and stored into a database.

The processing chain is also in charge of distributing the data by ADS (Automatic Distribution System) or allowing users to access to their data using Telnet, ArgosWeb or the web services.

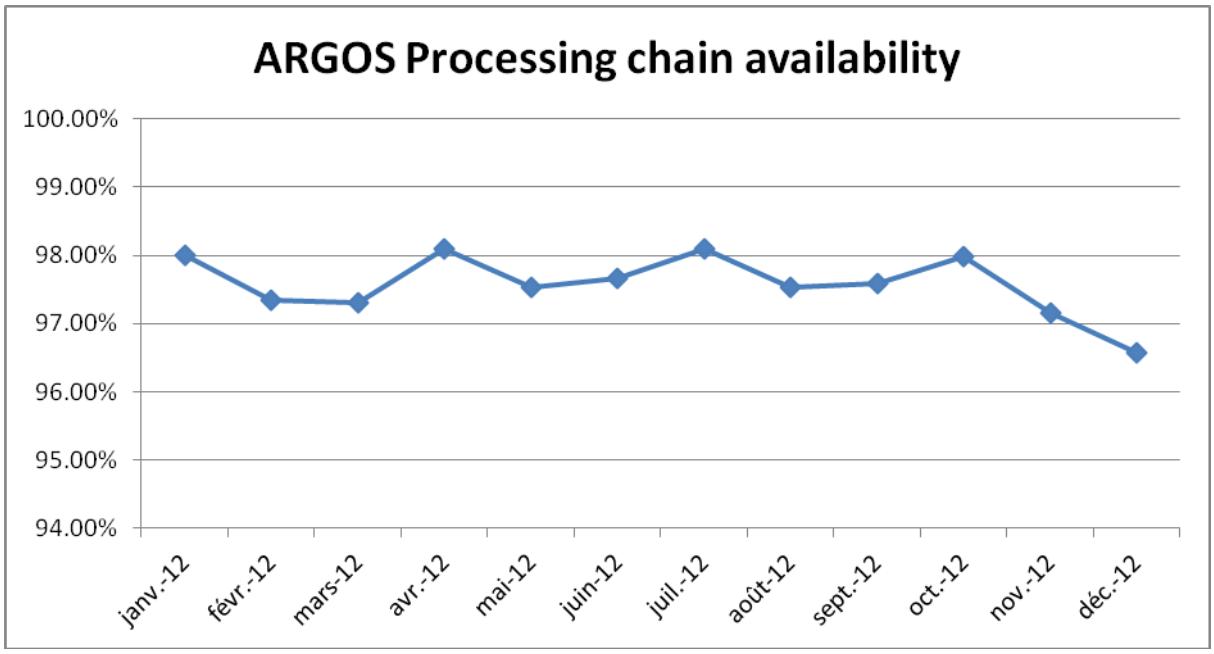


Synoptic of the CLS Argos processing chain

In order to monitor the Argos processing centers, statistics are produced in real-time:

- on the availability of Argos data distribution tools,
- on the data delivery time for sample platforms,
- on Argos location delivery time for sample platforms,
- and on the percentage of data available in less than one hour.

In 2012, the processing performance indicator was 97,57%. This indicator corresponds to the percentage of real time datasets processed in less than 10 minutes (Between Pre-Processing component PTR and PAS component in charge of inserting data in database for user requesting). This number doesn't include periods when French site was in backup mode on the US site.

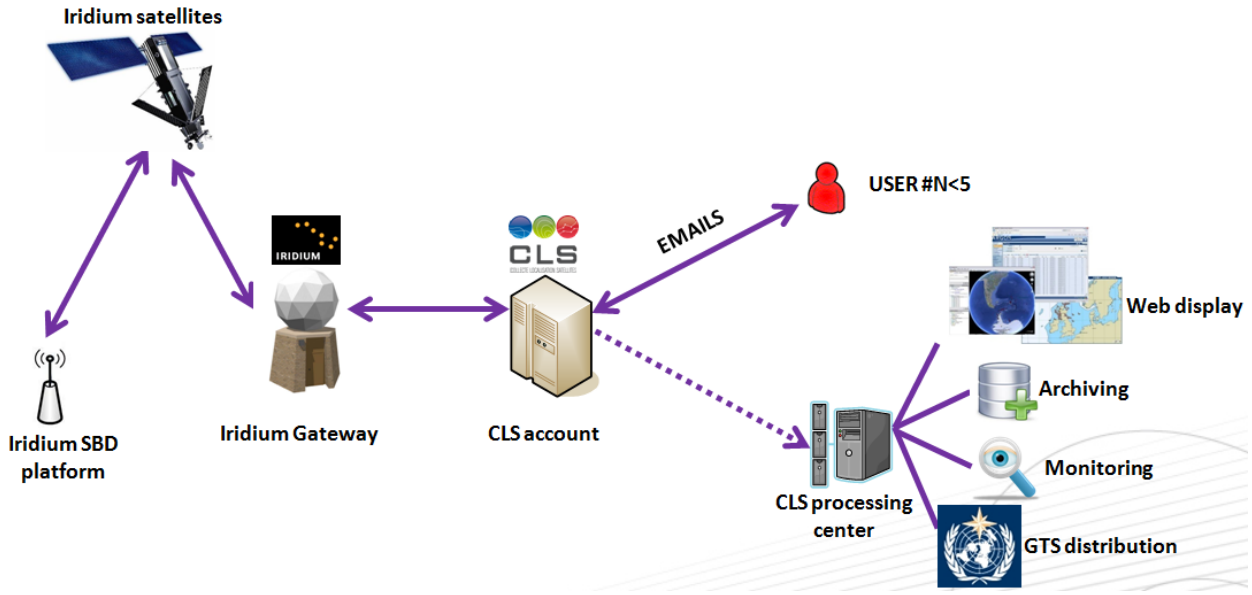


Argos Processing SLA follow up in 2012

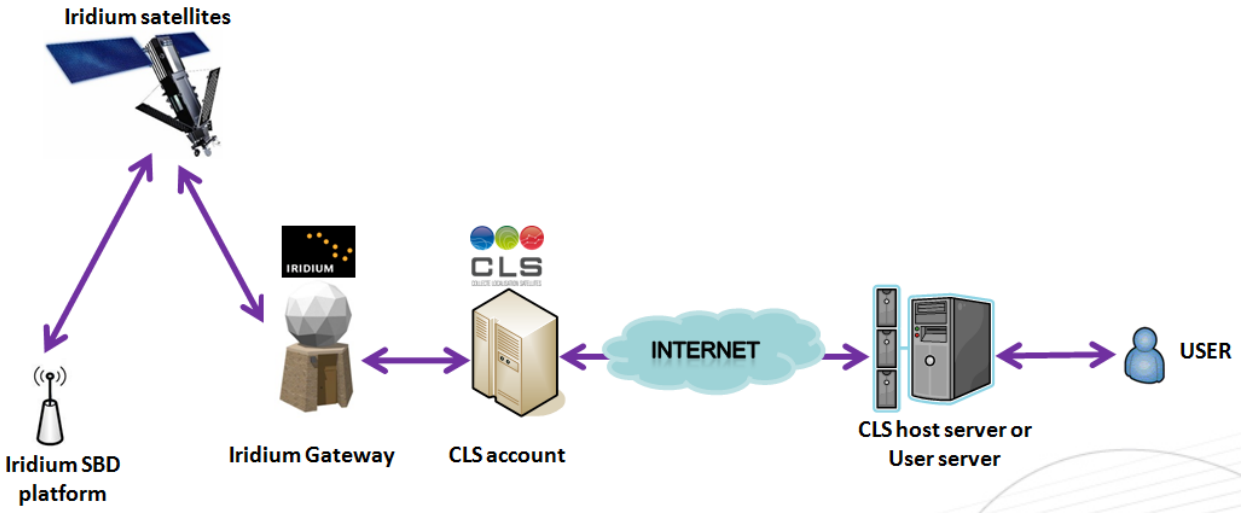
4. CLS IRIDIUM DATA SERVICES

CLS, exclusive operator of the Argos system since 1986 now also provides dedicated Iridium data services to ocean platforms (profiling floats, gliders, drifting buoys…) since 2007. 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 in France, UK, Germany, Italy, Norway, Spain, Bulgaria, Turkey, China, India, South Africa, and soon Japan.

CLS is providing all Iridium services (RUDICS, CSD and SBD) for all type of floats from all manufacturers. Thanks to a long-standing partnership with main floats manufacturers (Teledyne, NKE, Optimare, SeaBird, Metocean…) Iridium services activation and transmission tests could be performed easily.



The Iridium SBD communication service at CLS



The Iridium RUDICS communication service at CLS

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

Argo Germany National Data Management Report 2013
September 2013

1. Status

Data acquired from floats.

Most of the floats deployed by Germany are operated by BSH but additional funding has been acquired by various research institutes. From November 2012 to September 2013, Germany deployed 71 floats: 30 floats were deployed by BSH, mostly in the North Atlantic including the Nordic Seas, and 41 floats were deployed by AWI in the Atlantic Sector of the Southern Ocean and in the Weddell Sea in December 2012 and January 2013 during Polarstern cruises ANT-XXIX/2 and ANT-XXIX/3. Currently (September 25, 2013) 179 German floats are active. The total number of German floats deployed within the Argo program increased to 589 and the total number of received profiles is 41216. Most of the German floats 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. 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.
Since 2012 BSH used also NOVA (New generation Oceanographic Variable-buoyancy Autonomous) profiling floats from MetOcean in Canada (two floats have been deployed in the western part of the North Atlantic in July 2012). The NOVA floats are equipped with Iridium satellite telemetry, which allows for quicker, bi-directional, and more cost effective data transmissions. Both floats work reliable and provide high quality profiles.

There are currently no major technical problems

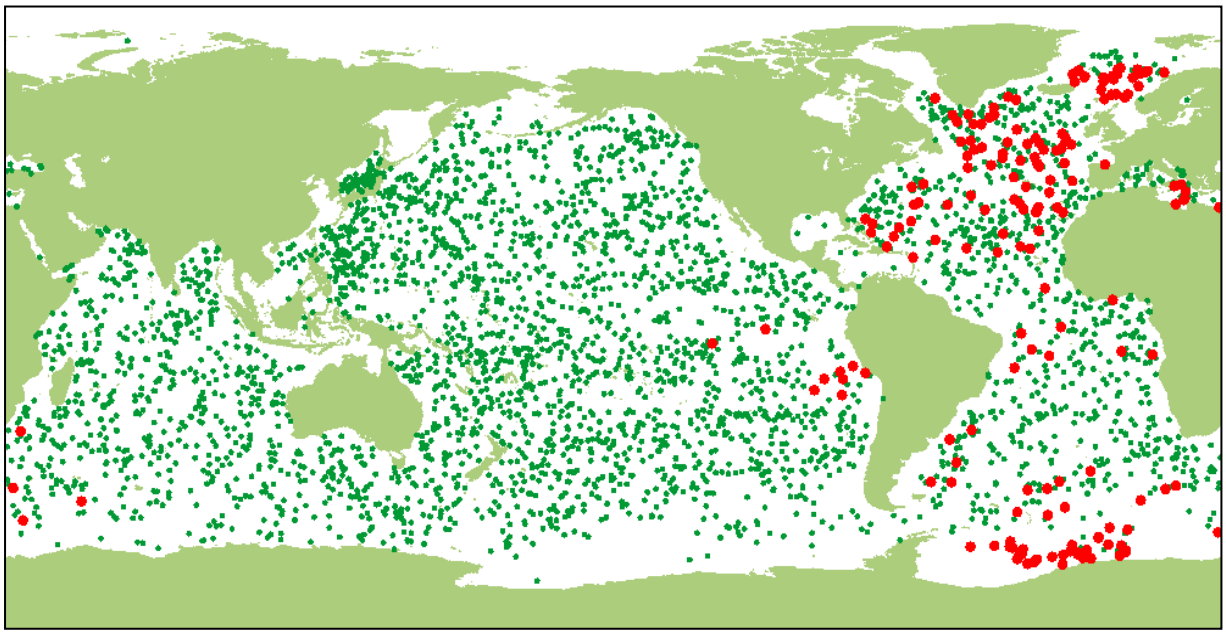


Fig. 1: Locations of active German floats (red) with active international floats (green) (Argo Information Centre, September 2013).

One of the floats (WMO-ID 6901084) deployed in the Mediterranean in 2012 has beached or it was picked up in shallow water close to Beirut. After the beaching was detected, the float was found in the harbour of Beirut. It was recovered by the Lebanese colleagues and was, after successful test of sensors, re-deployed with the support of the Italian colleagues in August 2013 as an Argo Lebanon float with a new WMO-ID 6900895 south-east of Beirut. The float works reliable and has provided, up to now (September 25, 2013), 5 profiles. The redeployment of this float is an example of very successful cross-border collaboration within the Argo community.

Deployment plan for 2014

The deployment plans for 2014 will comprise 35-40 (the exact number depends on price developments) floats from BSH in the Atlantic, 7 floats from GEOMAR in the eastern subtropical Pacific and an unknown number of floats from AWI, which will be deployed in the Southern Ocean and in the Weddell Sea in the Antarctic summer season 2013/2014. About 7 BSH floats will be equipped with Oxygen sensors financed by GEOMAR. The deployment 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 and will focus on data sparse regions, specifically in the Southern Ocean, the western North Atlantic, the Nordic Seas and the Mediterranean. The exactly deployment positions have not been determined yet.

Data issued to GTS

The profiles for all German floats are processed by Coriolis and are distributed on the GTS by way of Meteo-France.

Data issued to GDACs after real-time QC

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.

Data issued for delayed QC

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, such as national Argo programs from the Netherlands, Denmark, Norway, Finland and Poland. 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. The DMQC process is well underway and no major delays have been encountered

Delayed data send to GDACs

All delayed mode profiles have been sent to GDACs. The total number of received profiles (all German floats) is 41220 (AIC, September 26, 2013), the number of DM profiles is 39417. The percentage of DM profiles with respect to the total number of profiles is about 95%.

Web pages

BSH is maintaining the Argo Germany Web site. The URL for the Argo Germany is:

http://www.german-argo.de/

It provides information about the international Argo Program, German contribution to Argo, Argo array status, data access and deployment plans. It also provides links to the original sources of information.

Statistics of Argo data usage

Currently no statistics of Argo data usage are available.

Products generated from Argo data

A key aspect of the German Argo program is to develop a data base for climate analysis from Argo data, to provide operational products for interpretation of local changes and to provide data for research applications.

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.

Germany contributes to the NARC and contributes recent CTD data to the Argo climatology.

Argo National Data Management Report (2013)
India

1. Status

- **Data acquired from floats**
  India has deployed 28 new floats (including 20 AROVORs and Bio-Argo PRVORs from NKE) between November 2012 and September 2013 in the Indian Ocean taking its tally to 303 floats so far. Out of these 110 floats are active. All the active floats data are processed and sent to GDAC.

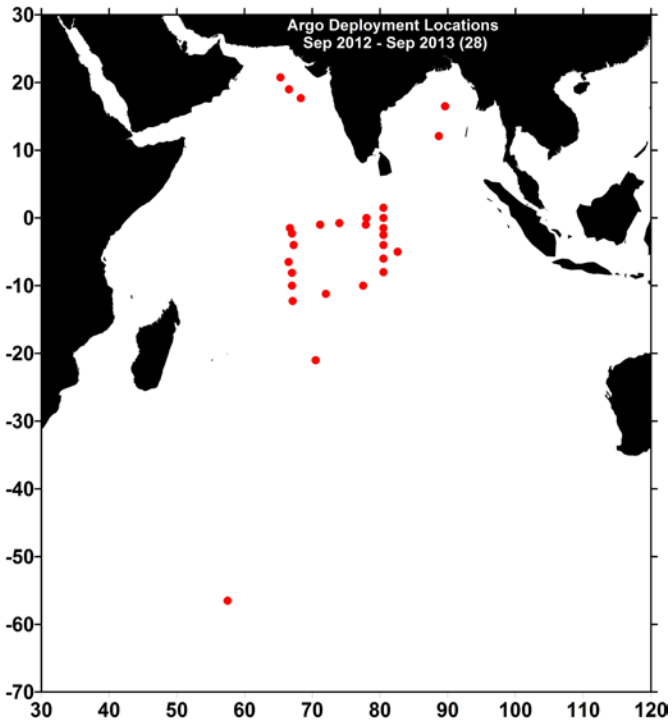


Fig. Location of Argo floats deployed by India

- **Data issued to GTS**
  All the active floats data is being distributed via RTH New Delhi. However there seems to be a problem in these messages being received by some centres. BUFR transmission will start once this issue is resolved.

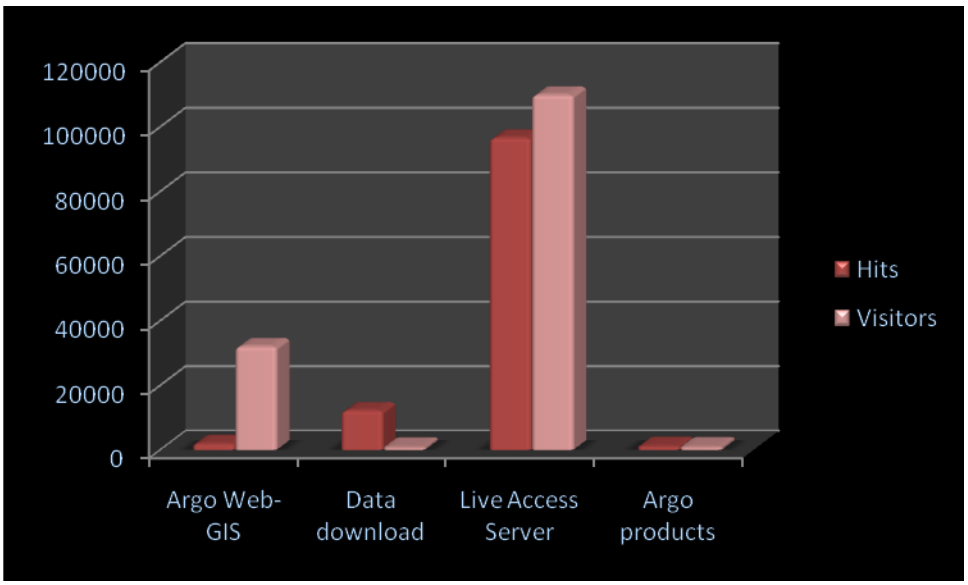
- **Data issued to GDACs after real-time QC**
  All the active floats (110) data are subject to real time quality control and are being successfully uploaded to GDAC. RT s/w obtained in collaboration with CSIRO is extensively used for the same. The support of CSIRO in term of the Real Time S/W is highly acknowledged.

- **Data issued for delayed QC**
  In total 71% of the eligible profiles for DMQC are generated and uploaded to GDAC.

- **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**
  A total of **303 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.

- **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.



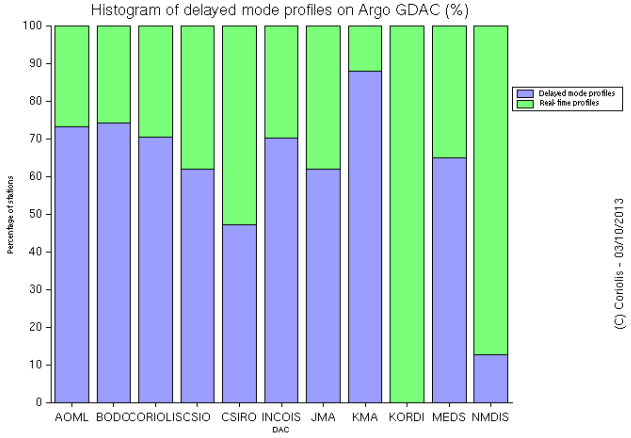
INCOIS Argo web page statistics (for the past one year) are as shown below

Page	Hits	Visitors
Argo Web-GIS	1901	32011
Data download	12168	915
Live Access Server	96547	109875
Argo products	1199	1029

- **Products generated from Argo data**
    1. Value added products obtained from Argo data are continued. The methodology for generating the gridded product is changed to variational analysis method. 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 with data corresponding to 2012 being updated. This DVD consists of ~ 2,00,000 profiles and products based on the Argo T/S. A GUI is provided for user to have easy access to the data. As many as 250 DVDs were supplied to various users from institutions and universities.
    3. Updation to Mixed Layer Climatology based purely on Argo observation is completed. All the profiles from 2001 – 2012 are used for generating this. This is done for 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 viz., model outputs, new wind products (ASCAT), fluxes are made available. We plan to add more and more products as per the request received from the users in 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 being put to use successfully. 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 71% 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

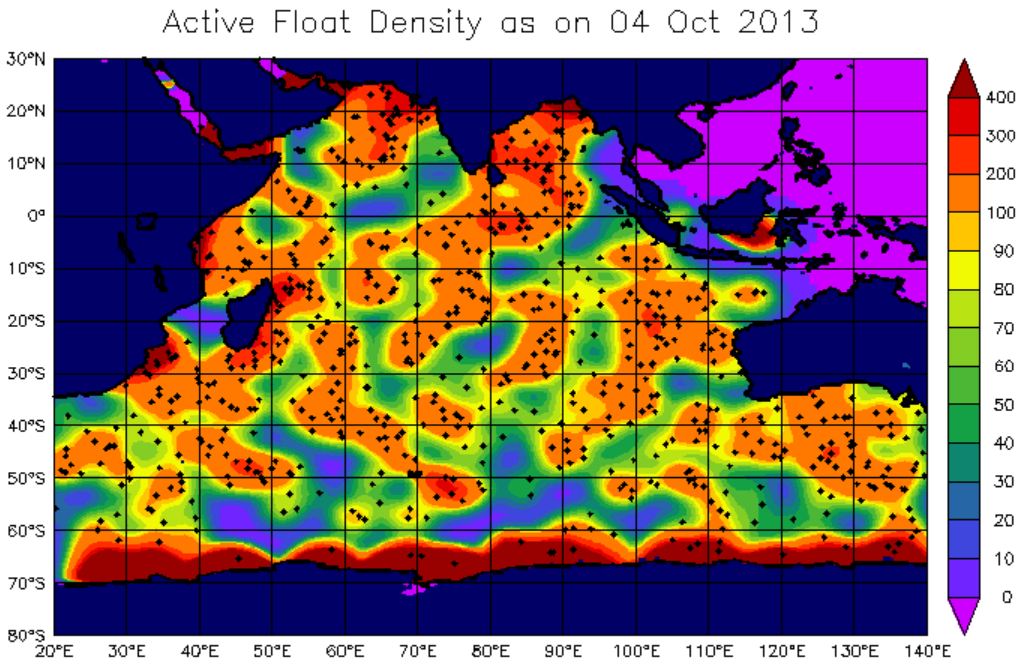
- Acquisition of Argo data from GDAC corresponding to floats other than deployed by India and made them available on INCOIS web site.
- Delayed Mode Quality Control
  (Refer 2.0 above)
- Data from the Indian Ocean regions are gridded into 1x1 box for monthly and 10 days and monthly intervals. These gridded 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, AMSRE and Wind from ASCAT, Chla from MODIS and OCM-2 are also made available on daily and monthly basis.
- Data Sets (CTD, XBT, Subsurface Moorings) 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 30 Sep, 2013 is shown below.



Publications:

INCOIS is actively involved in utilization of Argo data in various studies pertaining to Indian Ocean. Also INCOIS is encouraging utilization of Argo data by various universities by funding them. Some of the publications resulted from Argo data are given below:

1. A note of three way quality control of Argo temperature and salinity profiles - A semi automated approach at INCOIS, International Journal of Earth Science and Engineering, Vol 5(6), pp 1510 - 1514, 2013.
2. Bhaskar, T. V. S. U., C. Jayaram, and E. P. Rama Rao, 2013: Comparison between Argo-derived sea surface temperature and microwave sea surface temperature in tropical Indian Ocean. *Remote Sensing Letters*, **4,** 141-150, http://dx.doi.org/10.1080/2150704X.2012.711955.

3. Girishkumar, M. S., M. Ravichandran, and M. J. McPhaden, 2013: Temperature inversions and their influence on the mixed layer heat budget during the winters of 2006–2007 and 2007–2008 in the Bay of Bengal. *Journal of Geophysical Research: Oceans*, **118,** 2426-2437, http://dx.doi.org/10.1002/jgrc.20192.
4. Ravichandran, M., D. Behringer, S. Sivareddy, M. S. Girishkumar, N. Chacko, and R. Harikumar, 2013: Evaluation of the Global Ocean Data Assimilation System at INCOIS: The Tropical Indian Ocean. *Ocean Modelling*, **69,** 123-135, http://www.sciencedirect.com/science/article/pii/S1463500313000796.
5. Bhaskar, T. V. S. U., D. Swain, and M. Ravichandran, 2012: Determination of Sonic Layer Depth from XBT Profiles and Climatological Salinities in the Arabian Sea. *International Journal of Earth Sciences and Engineering*, **5,** 35-43.

Argo National Data Management Report – Italy (2013)

1. Status

- **<u>Data acquired from floats</u>:** 197 floats were deployed in the Mediterranean and in Black Sea between 2000 and 2013; 25 floats were deployed in 2013 (with the contribution of 8 countries) in crucial areas in order to try to maintain the spatial coverage as much homogeneous as possible. The temporal and spatial distribution in the sub-basins of the Mediterranean Sea and in the Black Sea is depicted in Figure 1. More than 50 floats per months (that is about 40% larger with respect to the conservative minimal density recommended in EuroArgo PP and with respect to the global Argo density).

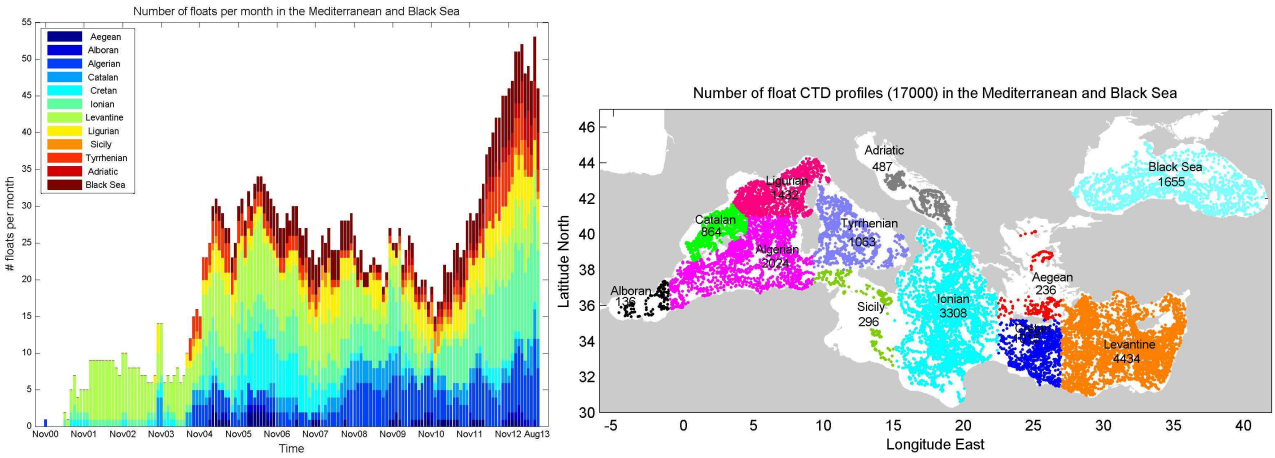


Figure 1. Temporal (left panel) and spatial (right panel) distribution of floats deployed in the Mediterranean and Black Sea between 2000 and 2013.

- **<u>Web pages</u>:**

The MedArgo web page (http://nettuno.ogs.trieste.it/sire/medargo/active/index.php) has been maintained and tables and graphics are updated in near real time. The floats deployed during 2013 are added to the web page as soon as the technical information are available. The float positions are plotted daily (Figure 2); the monthly and the whole trajectories are also provided (Figure 3). Links with the GDAC center (Coriolis) are also available for downloading both the real-time and delayed-mode float profiles.

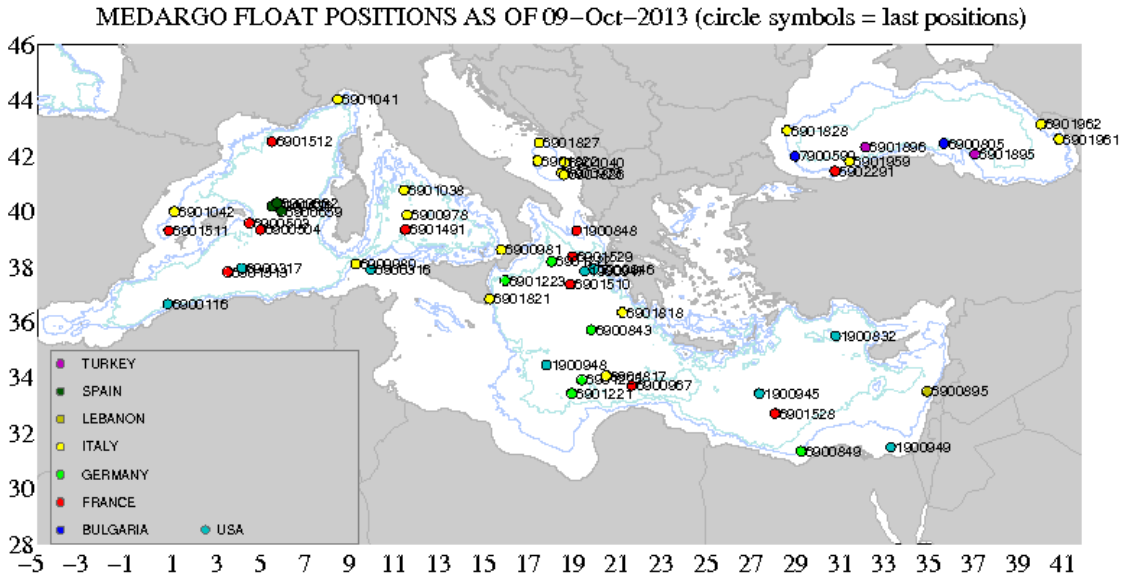


Figure 2. MedArgo float positions as of 09 October 2013 (updated daily).

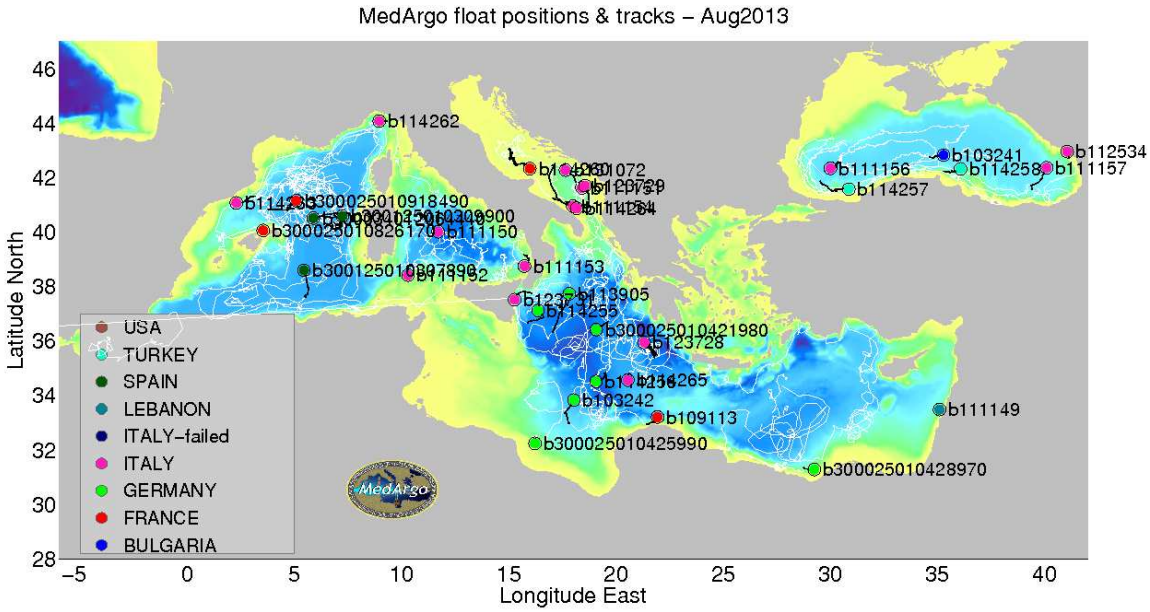


Figure 3. MedArgo float positions and tracks (August 2013). The monthly tracks are in black while the entire float trajectories are in white.

- **<u>Statistics of Argo data usage</u>:** (operational models, scientific applications, number of National Pis…):

  a. A re-qualified in situ data set during the years 2004-2012 was used to analyze interannual variations of Mediterranean Regional Ocean Indicators (ROIs) associated to ocean heat content (OHC), ocean freshwater content (OFC) and steric sea level (SSL) at an annual basis and for the upper 700 m depth of the water column. The dataset was built combining the temperature

and salinity profiles from Argo floats, and from data collected by recent scientific cruises and historical data belongings to several Mediterranean oceanographic campaigns. (von Schuckmann et al., work in progress, Figure 4).

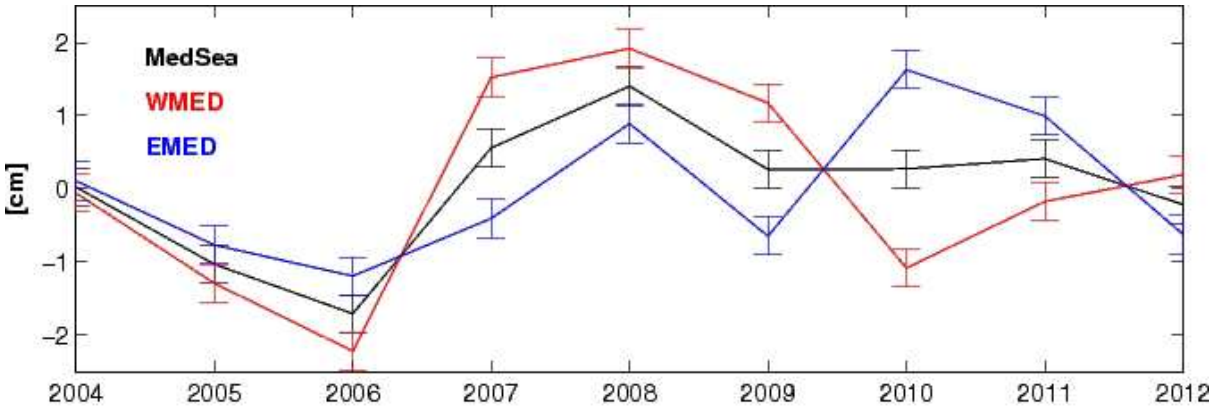


Figure 4. Steric sea level and its error bars using a simple box averaging method adopted to the Mediterranean basin (see text for more details) of the 0-700m depth layer for the MedSea (black), the WMED (red) and the EMED basin (blue).

b. CTD profiles obtained from freely-drifting profiling floats were used to analyze the drastic thermohaline changes which occurred in the deep layer (>1000m depth) of the Southern Adriatic Pit after the arrival of the dense water formed on the northern Adriatic shelf (Figure 5).

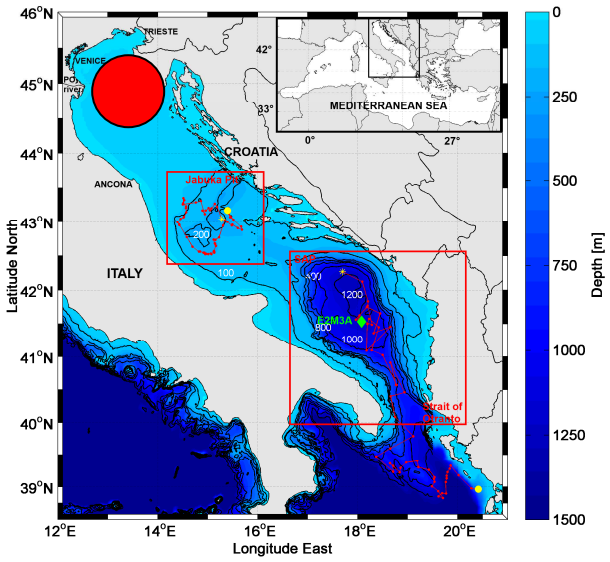


Figure 5. Bathymetry of the Adriatic Sea: the Middle (Pomo or Jabuka, pit) and the Southern Adriatic pit (SAP) areas are highlighted by red squares. Red points and lines indicate the float stations and trajectories. The first float profile location and end-point are marked by yellow star and circle, respectively. The position of the E2M3A observatory (mooring) is indicated in green. Red circle indicate the North Adriatic Dense Water (NAdDW) formation sites (Bensi et al, work in progress).

c. The MedArgo data are routinely assimilated in numerical forecasting models (MFS) (Figure 6).

- **<u>Products generated from Argo data</u>:**
  a. Daily maps of float positions (Figure 2)
  b. Monthly maps of float positions and track (Figure 3)
  c. Float data are assimilated in numerical forecasting models by INGV (MFS); daily and weekly maps of Mediterranean ocean forecasting system are produced (Figure 6).

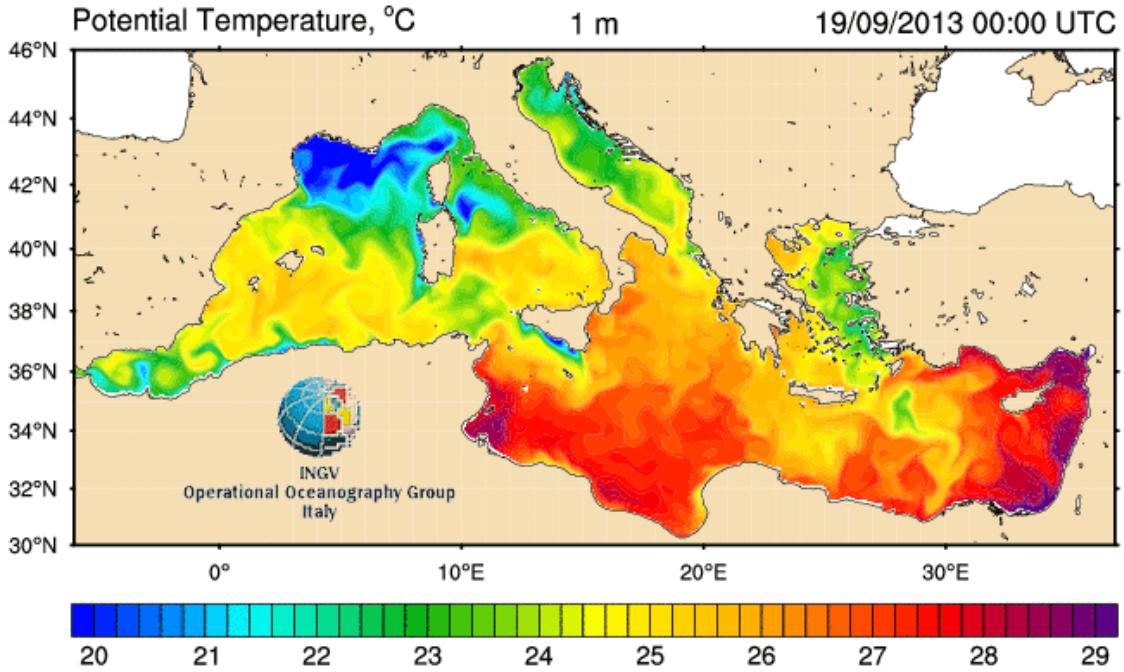


Figure 6. Daily mean forecasting model of potential temperature (1 meter deep).

2. Delayed Mode QC

OGS has continued to carry out the DMQC for the Argo data in the Mediterranean. Any possible surface pressure offsets were examined using the Metadata and Technical data files; different procedures were applied to correct this pressure offset depending on the float type, following the standard method proposed by the Argo community.

The OW method, which is based on tight θ-S relation for calibration, sometimes turned out to be problematic for the Mediterranean Sea. The main reason is that the portion of the water column in the Mediterranean Sea that has a uniform θ-S relationship is

mostly at pressure larger than 700 dbar. Unfortunately, most of the profiles up to 2010 only extend to 700 dbar and they are not deep enough to be useful. The result is that the ten “best” θ levels used for the calibration are spread only through the water column between about 350 and 850 meters. Thus, the OW method can give an estimate, but these estimates will have quite large uncertainties, so large that they could be useless for quality control. Hence, we always use the OW method in conjunction with other ways to conduct the quality control analysis, including the following procedures:

1. Looking at the float salinity mean profile (and the associated standard deviation) gives an indication of the natural variability of salinity in the area considered (Figure 7). An indication of the good quality of the float data and the exclusion of any large sensor errors are given when the variability of the float salinity data is reasonably inside the mean climatological value ±1 standard deviation (green lines in Figure 7).

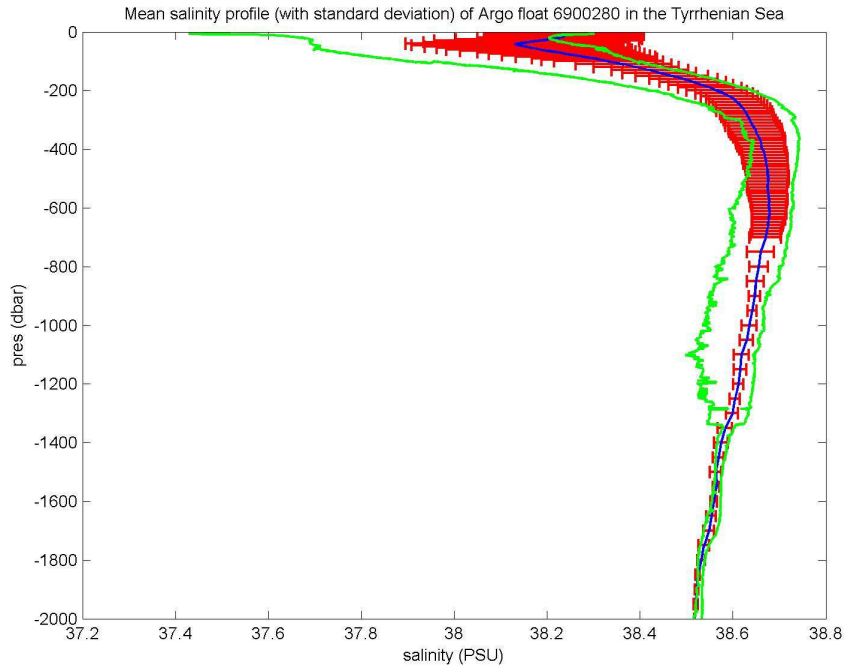


Figure 7. Mean salinity profile (blue line) of the 6900280 Argo float data with standard deviation (red bars). The climatology ±1 standard deviation is shown in green.

2. Comparison with the closest (in time and space) historical profiles (Figure 8).

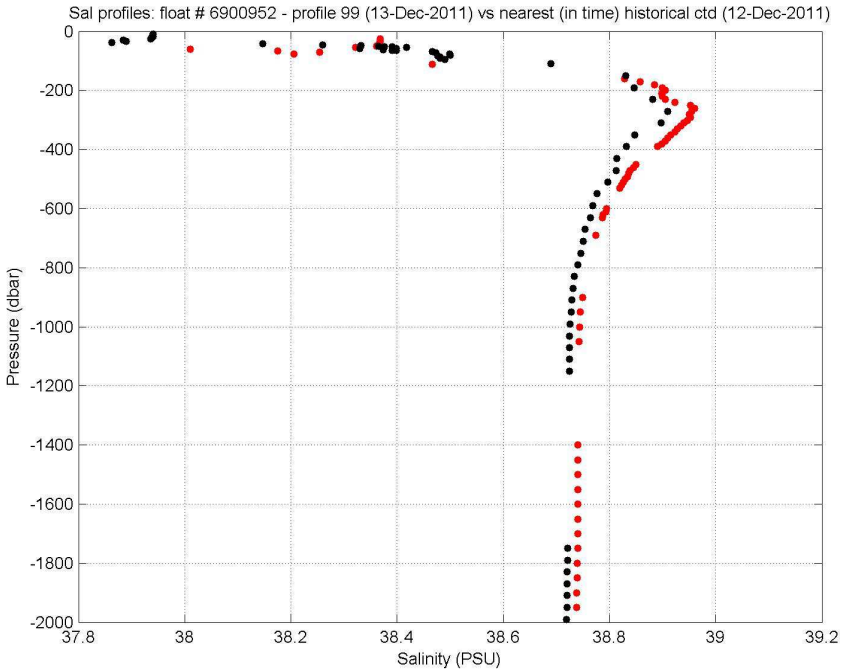


Figure 8. The float profile (black dots) are compare to the nearest in time reference profile (red dots).

3. Analysis of the deeper (> 700 dbar) profiles, where the water column exhibits a uniform θ-S relationship: the θ-S curves of these deeper profiles are usually very tight and the spread of salinity gives an indication of the potential conductivity sensor drift, that is quite easily detectable by a systematic full vertical shift in the θ-S measurements (Figure 9). The comparison of the θ-S curves of the float and the reference data gives information about the potential sensor calibration offset: in case the salinity difference between the two curves is larger than the variability of the reference dataset, this difference could represent the calibration offset (Figure 10).

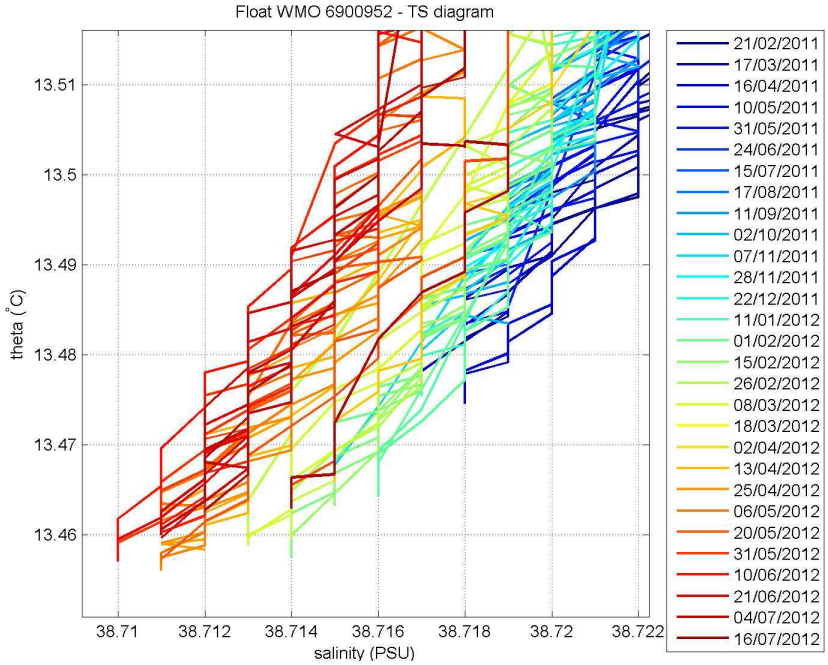


Figure 9. Float salinity profiles in the most uniform part of the θ-S curve.

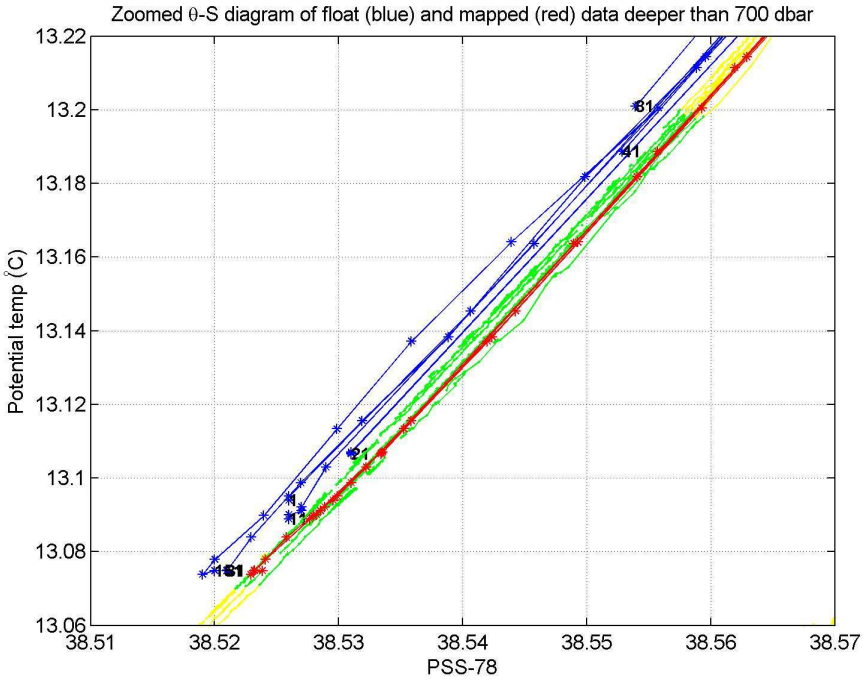


Figure 10. Zoomed θ-S profiles diagram (data deeper than 700 dbar) for Argo float 6900281. The float profiles are represented as blue lines, the mapped field in red and the reference data in yellow. Profile numbers are also reported in black. The comparison analyses was performed in the θ-S range defined by the green lines.

4. Comparison of the θ-S curve of the analyzed float to the θ-S diagram of other floats (Figure 11) which performed a similar trajectory, which are already checked in delayed-

mode and which have been deployed quite close in time and position. The salinity difference between the two θ-S curves gives indication about the potential offset of the conductivity sensor. In the example reported in Figure 11, a negative offset of the conductivity sensor is found for float WMO 6900952: as a result a delayed mode correction for salinity is deemed necessary.

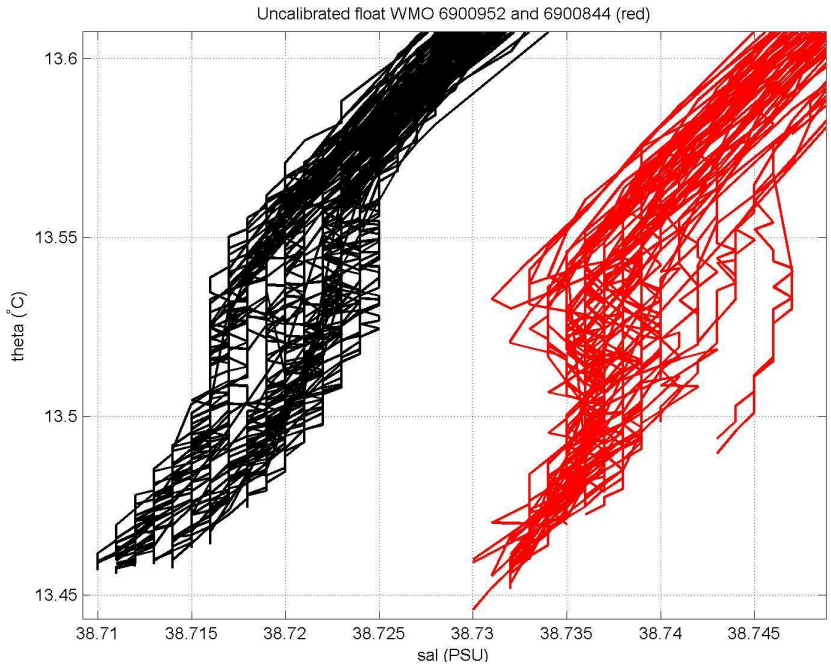


Figure 11. Float 6900952 and 6900844 salinity profiles in the most uniform part of the θ-S curve.

Additional historical reference data for the Mediterranean have been recently uploaded and transformed in the correct format to be used by the DMQC procedure; moreover, some Argo reference data have been also added (Figure 12).

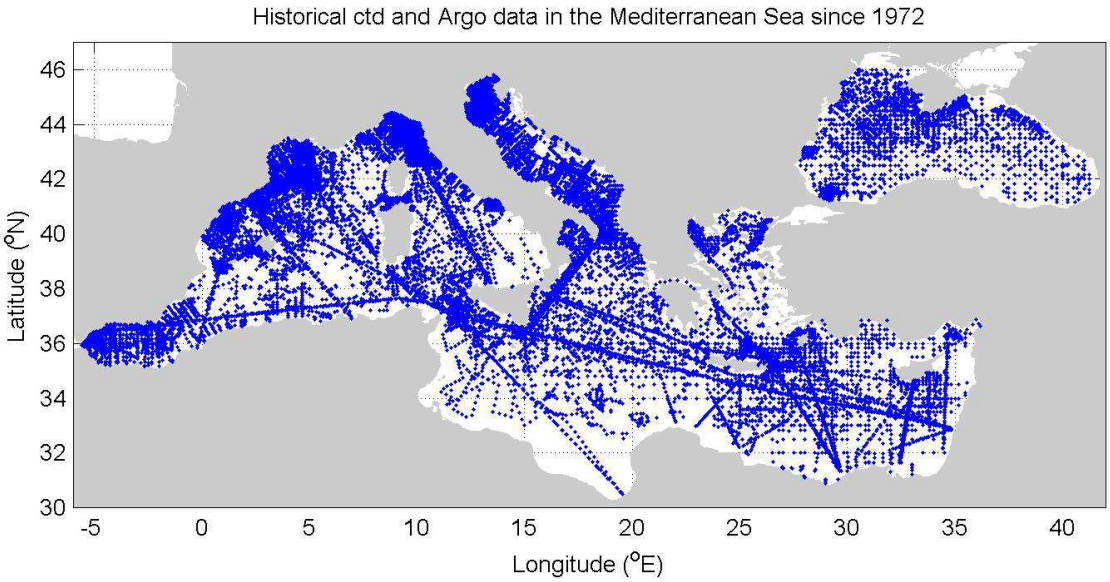


Figure 12. Location of the historical CTD and Argo data, spanning from 1972 to 2013, used in the DMQC.

The DMQC method has been applied to about 95% of the floats which died between 2000 and 2013 in the Mediterranean Sea: they were quality controlled in delayed-mode for salinity, temperature and surface pressure and the respective D-files will be sent to GDAC before the end of the year. So far, the majority of the DM checked floats, whose D files were sent to the GDAC, can be considered as well calibrated. The DMQC report of each float can be downloaded by the MedArgo web page (http://nettuno.ogs.trieste.it/sire/medargo/all/table_out_all.php).

3. Regional Centre Functions

MedArgo is the Argo Regional Centre for the Mediterranean and the Black Sea. OGS, who coordinates the MedArgo activities, established several collaborations with European countries (Bulgaria, France, Spain, Greece, Germany, Turkey and Lebanon) in order to set the planning and the deployment coordination of floats; future collaborations will be extended also to Ukraine and Romania in 2014 for operations in the Black Sea. Moreover, as part of these cooperations the float data are transferred in near real time to MedArgo and 25 new floats have been deployed in the Mediterranean and Black Sea during 2013 (Figure 13).

Figure 13. 2013 float deployments in the Mediterranean Sea

There are 43 active Argo floats in the Mediterranean Sea and 9 in the Black Sea as of October 2013.

About 45 floats (more than 10 floats equipped with biogeochemical sensors) will be deployed by the end of 2013 and in 2014 (Figure 14): 30 in the Mediterranean Sea and 15 in the Black Sea, including the contributions of many countries.

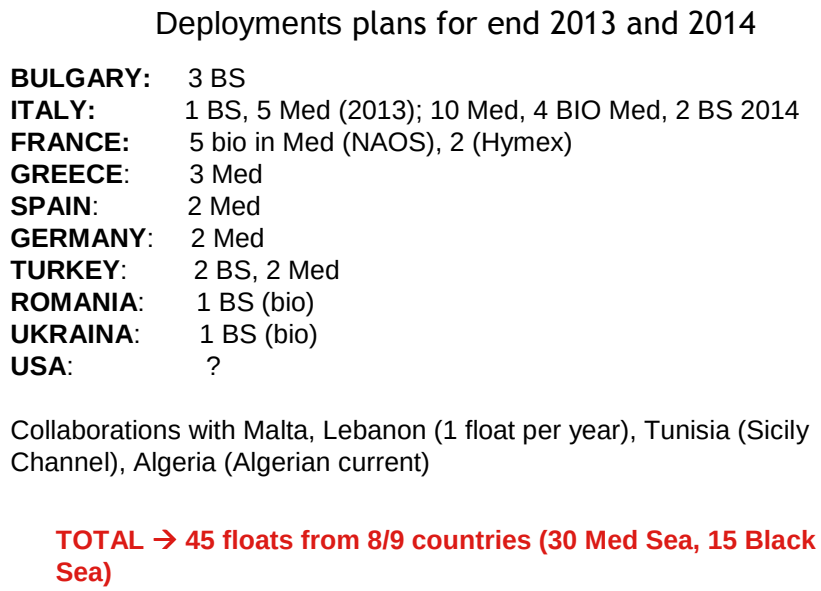


Figure 14. Deployments plans for 2014.

Argo National Data Management Report of Japan, 2013

1. Status

The Japan DAC, the Japan Meteorological Agency (JMA), has processed data from 1226 Japanese Argo and Argo-equivalent floats including 215 active floats as of September 25th, 2013. There are ten 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 the netCDF format and issued to GTS using TESAC and BUFR codes after real-time QC on an operational basis.

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 10,273 profiles via CLS and the Iridium messages via e-mail and dial-up access for delayed QC from October 14th, 2012 to October 9th, 2013. JAMSTEC sent 7,474 delayed profile files (D-files) to GDACs through the Japan DAC, JMA, during the period. Submission of delayed profile files was slowed down during the last year because we have been upgrading our analysis system since the fall 2011. Since the new analysis system will be completed by the next spring, we are trying to get the submission rate normal.

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 and BUFR 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.
For details please visit:
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/move_mricom_doc.html

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.
For detail please visit:
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/jmamri_cgcm_doc.html

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 are 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 is shown in
http://www.jamstec.go.jp/frcgc/jcope/htdocs/e/home.html.

FRA-JCOPE2

FRA-JCOPE2 is the reanalysis data created by assimilating most of available observation data into the JCOPE2 ocean forecast system. The high horizontal resolution of 1/12 deg. is used 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 openly available. The website, http://www.jamstec.go.jp/frcgc/jcope/vwp/, provides information about downloading and interactively visualizing the reanalysis data for users.

FRA-ROMS

FRA-ROMS is the nowcast and forecast system for the Western North Pacific Ocean developed by Fisheries Research Agency (FRA) based on the Regional Ocean Modeling System (ROMS). FRA started the operation in May 2012. The forecast oceanographic fields are provided every week on the website http://fm.dc.affrc.go.jp/fra-roms/index.html/.

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 mooring 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.
We have produced the new data set, which is produced through a 10-day global ocean analysis by optimal interpolation based on Argo, TRITON and available CTD data in the near future.

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

JAMSTEC has produced a data set of gridded mixed layer depth with its related parameters, named MILA GPV. This consists of 10-day and monthly average data and monthly climatology data in the global ocean

using Argo temperature and salinity profiles. This data set is opened to the public on the Argo JAMSTEC web site, http://www.jamstec.go.jp/ARGO/argo_web/MILAGPV/index_e.html.

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 89,489 profiles to GDACs as of October 9th, 2013.
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 procedure describe above.

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 release ascii files of temperature and salinity profile data of Argo which are

converted from the netcdf profile files. JAMSTEC also plan to release Argo temperature and salinity profile data put through more advanced automatic checks than real-time quality controls. Both two types of data, which have been required by many researchers, are useful for analyses using variable software. These data also expect to increase users of Argo data in not only ocean/atmosphere scientists but also any other fields. Moreover, JAMSTEC is going to release parts of the Argo Climatology for use in OW salinity calibration software released by CCHDO, which are divided into marginal seas and open ocean in Pacific. This is useful for the delayed mode operators of Pacific Argo PIs to make better Argo Climatology for the OW without contaminating any CCHDO data in the other basins.

Argo National Data Management Report 2013 – UK 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 management work at BODC has been funded from a combination of core 'National Capability' and Oceans 2025 thematic programme by the Natural Environment Research Council. This is complimented with funding from the European Union (EU). The EU Euro Argo funding has several projects:

- Strengthening the International Dimension of the Euro Argo Research Infrastructure (SIDERI) which has been funding trajectory, near-surface temperature and will cover delayed mode processing cookbook activities in the coming year.
- Argo Improvements for the GMES Marine Service (E-AIMS) where funding will commence next year. This has an emphasis on biogeochemical sensors and new communications systems.

Data acquired from floats

Data from all UK floats are received at BODC by automatic download from the CLS database every 12 hours. Table 1 summarises the deployments and data received according to float form. BODC endeavors to set up floats for distribution of data to GTS and GDACS within a week of deployment. BODC also handles data from Irish, Mauritian and Portuguese floats. There are currently 156 active floats being processed by BODC. This figure includes 13 floats with Iridium communications and 85 floats with near surface firmware.

Table 1: A summary of float deployments and data acquired from floats managed by BODC in the year preceding 18th October 2013 according to float type and Country.

Float Type	Deployment by country			Number of profiles
	UK	Mauritius	Portugal	
APEX APF9a				311
APEX APF9a - ice detection	7			430
APEX APF9a – near surface temperature	14	2		2708
APEX APF7a/APF8a				1100
APEX APF7a/APF8a – ice detection				144
APEX APF9i – ice detection				321
APEX APF9i – biogeochemical sensors				145
NKE ARVOR			1	165
Totals				5323

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 24 hours. Occasional disruptions occurred due to email server failures and server problems.
Delays in production and transmission of BUFR format messages identified by Anh Tran (MEDS) are being investigated and with the aim of a resolution by the end of 2013.

Data issued to GDACs after real-time QC

All UK data received at BODC are passed through the agreed real-time quality control tests within one hour of the data arriving 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 (CTD climatology and Argo profile climatology for guidance). 83.1% of UK floats profiles eligible for delayed mode QC have been processed ad 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 deployed UK floats, automatic request system for 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 each float's most recent profile reported. There is also information on the history of Argo and how float technology has been and continues to be developed. There are also pages promoting knowledge transfer and the use of Argo-generated data for education, operational analysis and research.

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

In addition to the GDACs, BODC data are also made available through the UK Argo Data Centre website via an interactive map interface. During the last year, UK Argo metadata, trajectory and profile files have been provided to users through the BODC website. BODC has handled 51 requests made by 14 users from over 6 countries.

Products generated from Argo data …

No data products generated by BODC

2. Delayed Mode QC

Delayed mode QC is on-going. Additional pressure from IT issues and Bio-Argo floats has slowed the process. Once the E-AIMS floats are setup delayed mode QC will become the priority.

BODC contributed to the hosting of the 5th DMQC workshop as part of the ADMT14 meetings.

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)

Section not applicable to the UK.

4. Regional Centre Functions

(If your centre operates a regional centre, report the functions performed, and in planning)

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.

A submission of reference data to CCHDO of CTD data that has recently changed its status to public is on-going.

Partnership for Observation of the Global Oceans (POGO) work has continued with development of routines to automate the collection and submission of cruise plans to POGO. This effort has been enhanced in Europe due to the EU-funded EUROFLEETS project. The SIDERI project is also looking to use POGO to collect research vessel itineraries for the purpose of cruise planning. This is semi-automatic for the US University-National Oceanographic Laboratory System (UNOLS) managed ships whilst the data are publicly accessible.

US NATIONAL DATA MANAGEMENT REPORT

October 2012-October 2013

14th ADMT MEETING, LIVERPOOL, UK

STATUS

US Argo Data Assembly Center at AOML

The US Argo Data Assembly Center (DAC) at AOML is responsible for the processing of Argo data obtained from all floats deployed by US institutions. As of Oct 8th 2013, the US Argo DAC has 1922 active floats, meaning that these floats have transmitted data at least once during the last 30 days.

The US Argo DAC reduced the time elapsed between acquisition of Argo profiles and the real distribution of profiles by implementing a new processing schedule that performs the real-time data processing twice a day, rather than once a day. This change includes transmissions of data to both Global Data Assembly Centers (GDAC) in NETCDF format and to GTS in the TESAC and BUFR formats.

During the time period analyzed for this report were submitted 68,066 files to GTS in TESAC format, 68% of these files reached the GTS in the first 24 hours and 95% in less than 48 hours.

During the reporting period 272,557 NETCDF files were transmitted to GDACs, about 83% of them in less than 24 hours. Performance statistics of our data transmissions to GTS and GDACs are available online at:

http://www.aoml.noaa.gov/phod/argo/opr/

US institutions deployed 465 Argo floats all over the World. Up to date maps with the deployment positions can be found online at:

ww.aoml.noaa.gov/phod/argo/opr/php_forms/deployment_maps.php. These maps link to data collected by the floats.

The US Argo DAC has continued its involvement in deployment planning, finding ships of opportunity and providing ship riders for selected cruises.

Software Development at the US Argo DAC

Three new Argos decoders and one new Iridium decoder have been developed and implemented during the reporting period. A new software package for the decoding of Iridium floats using Rudics has been developed to increase the adaptability to changes in the data format, thus reducing the adaptation needed to accommodate changes in the types and combination of sensors on a new float type. This package is, for example, used for a float with three oxygen sensors.

Some parts of the currently operational QC programs were converted from Fortran 77 to Fortran 90, to take advantage of the enhanced power and flexibility of the latter. The subroutine performing QC Test 14, the density inversion check, was updated to implement a new method approved in the current QC Manual.

Improvement to the existing program that determines the salinity correction derived in the DM quality control (QC) and apply it to already existing profiles that are younger than the most recent D-file were also implemented to increase its efficiency.

The transition to the NETCDF format version 3.0 is used to consolidate various components of the processing system into one software package that is being written in Fortran 90. It will apply the real-time adjustments of pressure and salinity as needed, perform the real-time QC tests, generate the NETCDF files and create the TEASAC bulletins. New programming techniques are being used to simplify adaptations to future modifications in float formats.

The processing system was migrated to a new server with a faster processor and more storage capacity which enabled the US Argo DAC to double the daily data acquisition and processing. This migration required changes of many programs to adapt them to the newer operating system.

The US Argo DAC is maintaining a website that provides documentation and information about the operations:
http://www.aoml.noaa.gov/phod/argo/index.php

DELAYED MODE QC:

After Delay mode quality control AOML receives the Argo profiles from US delayed-mode operators and verifies their contents to ensure soundness of the files. Recently we started accepting these files in the new Argo NETCDF format version 3.0.

Each US Argo institution has provided information on their delayed-mode processing which was added to this report.

University of Washington

As of October 2013, University of Washington had submitted 155,764 delayed-mode files (D-files) to the GDACs via AOML. These were comprised of:

- 143,900 D-files belonging to University of Washington (UW), representing about 90% of UW profiles older than 12 months.
- 11,864 D-files belonging to the KESS project from University of Hawaii (UH), representing 100% of all UH KESS profiles.

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 issued by Coriolis. Visual comparison with nearby good Argo data was used to complement the statistical method of OW. Results from Stephanie Guinehut's altimetry test were also taken into account. Many APEX floats with the old Apf-8 controller were still active, thus their data continued to need checking for Truncated Negative Pressure Drift (TNPD).

Wood Hole Oceanographic Institute

In the period October 1, 2012 to September 30th 2012, 108 WHOI Argo floats were deployed from 10 separate vessels including the R/V Ronald Brown, R/V Endeavor, R/V Pelican, S.A. Agulhas II, F.R.S Algoa, M/Y Alucia, M/V Explorer, M/V Maersk Visb, JPO Pisces and Lady Amber.

During this period, 380 unique WHOI floats reported a total of 10152 profiles of temperature and salinity.

As of October 4, 2013, Woods Hole has submitted 89,901 delayed-mode profiles. Of the target group of profiles older than 12 months, approximately 16,000 profiles still require DMQC attention.

Scripps Institution of Oceanography

Scripps Institution of Oceanography (SIO) has evaluated, as part of delayed-mode quality control (DMQC), a total of 125,294 Argo stations (profiles). This is an increase of approximately 14,494 stations (397 float years) since the previous United States Argo National Data Management Report (October, 2012). At present, 98.5% of the DMQC eligible, SIO stations have been completed. Here we define a station as being DMQC eligible if it was sampled more than 12 months ago. The above numbers include all SIO performed delayed-mode stations, including SIO floats, all Argo New Zealand floats, and 26 Argo-Equivalent floats provided to Argo by Dan Rudnick as part of the Origins of the Kuroshio and Mindanao Current project.

SIO expects to be able to continue to maintain a high DMQC completion percentage during the coming year and will continue to revisit the profile data from most floats every 6 months. The standard DMQC procedures for SOLO/SOLOII profile data were continued in 2013. The Argo Program agreed upon a transition between the V2.2 NETCDF format and the V3.0 NETCDF format, comprising modifications to the profile, trajectory and meta files. SIO has developed procedures in order to manipulate and produce V3.0 DMQC data files.

During the year, significant effort was expended in the DMQC of the trajectory data from 640 inactive SIO Argos SOLO floats (deployment years span 2000-2011). This most notably includes the estimation of float cycle timing, including float arrival and departure from the surface, and the full quality control of all Argos position data. The DMQC trajectory data from these floats are ready to be made public when the GDAC accepts the V3.0 trajectory file NETCDF format. However some of this effort is already available as improved time of surfacing (JULD of

profile) estimates were recorded in the recent resubmission of 77,119 DMQC V3.0 profile NETCDF files. DMQC on additional Argos SOLO trajectory data will be ongoing as the floats cease sending new data.

Scripps has actively participated in forwarding Argo Program priorities during the year. Most notably by Megan Scanderbeg in co-developing and documenting the Version 3.0 trajectory file. SIO continues to update quarterly both the Argo Climatological Dataset for OW salinity calibration and a census of format errors identified in delayed-mode NETCDF profile files.

The transition to the IDG[1] SOLOII / MRV S2A float utilizing the Iridium transmission system from the IDG SOLO float utilizing the ARGOS transmission system has been completed. The final SOLO float (upgraded to the SOLOII firmware and using the Iridium transmission system) was deployed February 13th, 2013. As mentioned in the 2012 report, the final ARGOS equipped SIO SOLO float was deployed in March 2012. Currently 39% of the SIO float array and 42% of SIO DMQC floats are Iridium SOLOII/S2A/SOLO floats.

Scripps continues to work with float developers (IDG, MRV) to add capabilities to the SOLOII/S2A float type. Additions this year include an ice detection algorithm and the ability to modify data resolution post launch. It is hoped that an active relationship will result in the return of data able to minimize later DMQC tasks, and maximize the usability of the data in real-time. The same goal has led SIO to retain data decoding control for all SIO Iridium float data.

Finally, SIO Argo and IDG deployed a prototype Deep SOLO float during 2013, which successfully measured over 70 profiles to 4000dbar before being recovered for analysis. Initial DMQC was applied to this float, however final DMQC is likely to wait till the Argo Program coalesces around a preferred procedure.

South Atlantic Argo Regional Center at AOML

Currently no funding is available for the final stage of the delayed-mode quality control. Activities related to float deployments are continued in close collaboration with WHOI.