12th ARGO DATA MANAGEMENT MEETING

Seoul
16th November - 18th November 2011

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1. Objectives of the meeting

The 12th ADMT meeting was hosted by NMRI , Seoul, Korea and was held at the President Hotel in Seoul. It started at 9am on the 16th November and finished at 12h30 on the 18th November. 42 persons from 10 countries participated to the meeting.

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

- Review the actions decided at the 11 [th] ADMT meeting

- Review the improvements of Real-Time data flow (considering all aspects of the system from transmission from the float to arrival at GDAC and accessibility of data by users)

- Review the status of surface Pressure correction

- Review status of Delayed-Mode quality control and Progress to reduce backlog

- Review the metrics regarding Argo program to document future (and if possible past) growth and performance of the array and the data system

- Review Regional Argo Data Centre progress

- Report from the 2nd trajectory Workshop

2. Feedback from 11th AST meeting

D. Roemmich summarized the priorities of the Argo Steering Team for improving and evolving the Argo Program both in the short-term (1-2 years) and the longer-term (5-10 years). The short-term priorities are aimed toward completing the core Argo array, improving data quality, and sustaining Argo into the future. The definition of the core Argo array is being re-examined in response to recommendations from OceanObs09 for a more global Argo, including enhanced sampling in high latitude oceans, coverage in all of the deep marginal seas (e.g. Gulf of Mexico and Caribbean Sea), and improved spatial resolution in western boundary regions. The size of the Argo array and number of Argo profiles and trajectories may increase to meet the new requirements. Important activities related to data quality include correction of surface pressure drift, accurate filling of metafiles, and accurate identification of floats with uncorrectable surface pressure (truncated negative pressure drifting, TNPD). Great progress has been made on these in the past year, but the work is not yet complete. Also related to data quality, an ongoing effort to upgrade trajectory data is now focused on defining trajectory format modifications, and developing a plan for filling the modified trajectory files. In moving forward, Argo should take full advantage of the improvements made by the ANDRO project. Finally it was noted the two-way communications is now increasing rapidly in new Argo floats. Two-way communications will have profound impacts on the Argo dataset and data management that include improved data quality, increased complexity related to underway changes in float missions, and greatly increased data volume.

Long-term priorities include the implementation of a Deep Argo component and Argo's collaborative participation in the implementation of Bio-Argo. Both of these initiatives are moving ahead. For Deep Argo, capabilities of the floats and CTDs, both of which are under development, will influence the size and objectives of the array and the impacts on data management. An implementation plan for Deep Argo is needed. Bio-Argo initiatives are moving forward in several national programs. Data management including quality control is being addressed for some of the additional sensors. Other remaining issues needing attention include floats with additional sensors that drift into EEZs.

3. Feedback from Oxygen Workshop

Christine Coatanoan, on behalf of Virginie Thierry presented a feedback on the oxygen workshop that was held in Brest/France in May 2011. 44 scientists from 11 countries, involved in the measurement of oxygen concentration from profiling floats and gliders, attended this Argo-oxygen meeting.

The objectives of the meeting were:

- To discuss on how people have identified the errors in their oxygen data and the errors inherent in each sensor type and how they have corrected these errors.

- To have technical discussions on oxygen sensors (Seabird SBE43, Aanderaa optode and others available oxygen sensors) and their use in Argo floats (or gliders).

- To present scientific results derived from oxygen data measured by Argo floats (or gliders).

A short report has been presented in the last Argo newsletter (Argonautics 12). A full report will be soon available (early 2012). Presentations and reports are available on the meeting website: http://wwz.ifremer.fr/lpo/SO-Argo-France/Argo-oxygen-meeting/. A mailing-list is also available argo-oxygen@listes.ifremer.fr (contact vthierry@ifremer.fr to be included in the list).

The main requirements for an "Argo-O2" array are: errors in oxygen concentration of 1 µmol/kg or less, a long-term stability of the sensor and a fast response.

4 types of oxygen sensors are available for profiling floats:

- Electrochemical SBE43 sensor: fast and generally well calibrated but a strong drift is often observed (for more than 50% of the sensors) which is not suitable for float missions lasting several years.

- Aanderaa optode (3830 and 4330): long-term stability but slow response and measurement errors of the order of 12 µmol/kg. Most floats are equipped with this sensor and most of the discussions on those sensors are on ways to calibrate and improve their accuracy (sensor storage, self heating, etc)

- SBE optode (SBE63): fast, well calibrated and long-term stability according to the manufacturer. This sensor will be available early in 2012. Manufacturer claims have to be verified.

- Rinko sensor : little experience with this sensor

Best practices have been defined for what to do before, at and after deployment. Before deployment (for Aanderaa optode), it was decided to do multipoint calibration on individual optodes to improve sensor accuracy (target 1 µmol/kg). If not possible, do two two-point calibrations at two different temperatures (e.g. 5 and 20°C) and do an offline correction to the oxygen readings afterwards. It is also important to store optodes in the dark and wet area. At deployment, it was decided to collect concomitant Winkler oxygen samples. After deployment: in area where WO09 is good, scientists should compare the float data to the atlas in the surface layer and near 2000m (to avoid strong gradient).

Best practices have been also defined for the data management: for the transmission in general, the raw engineering data are transmitted; this allows the use of new calibration methods once the float has been deployed. For the calibration equation (Aanderaa optode), it is possible to use the CTD temperature instead of the optode temperature and employ a new calibration equation based on the physics of the oxygen-sensing process (the Stern-Volmer equation) instead of the arbitrary polynomial now used.

The conclusions of the meeting for the data management of O2 data are:

- In the near future, most floats with oxygen sensor will transmit the raw data. This allows the possibility to recompute oxygen concentration from raw data. This requires the storage of many coefficients in the netCDF files. This also requires the storage of the calibration equation in the file to know which one has been used if the equation changes.

- Floats with SBE63 sensor will probably be deployed in the coming months. DACs have to be ready to decode and process those data. PIs have to provide coefficients and calibration equations.

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 ADMT-11. At ADMT11 is has been decided to identify the high priority actions from routine and low priority ones. It doesn't seem to have been a criteria really taken by the DACS to progress on the actions as :

- High : 8 were done, 5 partially, 3 postponed and 2 not done

- Routine: 24 were done,   3 partially, 4 postponed, 3 not done

- Low 1 done

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

As a summary, the priorities on monitoring the delays, pressure correction in delayed mode processing and format correction have been effective. The priority on the implementation of DM-File checker couldn't be fulfilled due to insufficient man power at the US-GDAC and a solution must be found with the ADMT to reach this goal.

See complete status in Annex 3.

4.2.   *Argo Status and AIC development*

The Argo technical Coordinator presented the status of the Argo array. He mentioned that after a couple of years of difficulties, Argo is in better shape than ever with about 3500 active floats, including 90% meeting the core mission requirements. The 2009-2010 deficit will probably be caught up gradually over the next 2 or 3 years. He recalled the state of national contributions, as well as the anticipated gaps in the array.

He commented then on the state of the data flow, highlighting a potential lack of priority for GTS distribution (especially for Iridium floats), and the good results in the delayed mode activity with 85% of eligible files processed. Some voluntary operators were identified to process some of the "orphan floats", including in particular KESS and KORDI floats.

He presented the latest statistics on the delays. While the GTS data distribution meets operational requirements (19h in average, 90% reaching GTS within 24h of observations in October), some progress is still to be made with GDACs distribution (39h in average, 39% reaching GDACS within 24h in October). Coriolis has improved its GDAC updated procedures that lead to smaller delays (29h average in early November). The TC needs the detailed index to be implemented at US-GDAC to monitor both GDACs. As delays may come from how the DACS feed GTS and GDACS , it's also important to improve the process at each DAC.

Action (DAC managers): Each DAC to document their process for updating the GDAC and trace their delays by January 2012 and send it to Mathieu Belbeoch.

Action (AIC) : AIC to report to ADMT mailing list on these delay issues by AST13

Mathieu Belbeoch presented then the progress achieved with regard to float technology. He shown that float generations half-life has gained about 20 cycles every year since 2001. After completing the array status presentation, Mathieu Belbeoch recalled that dedicated ship time initiatives (such as the Kaharoa or the Lady Amber) will be required to maintain the global array, and that a new position will be set up at JCOMMOPS early 2012 to assist, inter-alia, program managers and PIs to find deployment opportunities, set up specific chartering arrangements.

4.3. Citation Index for Argo

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

He stressed that DOI can still be used to "point" to that fixed data set. A difference from last year is that more groups are asking the same question and this is detailed in the following article *Ball, A., Duke, M. (2011). 'Data Citation and Linking'. DCC Briefing Papers. Edinburgh: Digital Curation Centre.* http://www.dcc.ac.uk/resources/briefing-papers/introduction-curation/data-citation-and-linking

From discussion following the presentation it was clear that:

- DOIs not providing a single reference to Argo data is undesirable, if DOIs could have a hierarchy this may begin to address the issue e.g. a master identifier to reference Argo data with sub-identifiers to reference specific versions.

- DOIs would potentially meet the need of centres that download versions of the Argo data intermittently (with a final version for reanalysis before publication of results). This does not apply to all users though, especially operational users of Argo data. A single solution to citing Argo data is required.

- In the field of physical oceanography publications are not currently citing DOIs routinely and if we were to introduce DOI referencing of Argo data then significant user education is required.

- Current Argo data uses in the literature are found by simply searching the full text of publications for the word 'Argo' then filtering out the non-Argo hits which is meeting the current need with respect to identifying Argo data usage. There was a reluctance to have to search for a set of DOIs being cited in the literature.

The overall conclusion was not to pursue the use of DOIs at this time and to simply monitor on-going developments in data citation and to ensure the current data citation working groups are aware of the issues faced by producers of volatile datasets such as Argo.

Further discussion lead to the fact that DOI would be interesting on the different versions of the User Manual and QC procedures documents that are identified in the Argo data.

Action (Lesley Rickards) Request a DOI on all approved Argo User Manuals and Argo QC Manuals.

5. Real Time Data Management

1.1. GTS status

ISDM receives and decodes Argo data via GTS in TESAC format from the following bulletin headers: AMMC (CSIRO), CWOW (ISDM/MEDS), DEMS (INCOIS, since June 2011), EGRR (BODC), KWBC (AOML, US Navy, NDBC), & KARS (AOML's system at CLS America), LFPW (Coriolis + CSIO, KMA/KORDI and INCOIS sent by CLS), RJTD (JMA), RKSL (KMA). On average, 88% of Argo TESACs reach the GTS within 24 hours of the associated profile observation time. The monthly average of TESACs received in the last year was over 9100, which is equivalent to last year. As last year, there was a small amount of duplicates and partial Argo messages on the GTS. The WMO instrument type and communication system recorded in the TESACs was found to be inconsistent in a small number of messages sent by 11 floats. The DACs have received a list of these. The GTS bulletin date/time was found to be wrongly encoded in messages sent by approximately 200 floats from KARS, KWBC and RJTD, while it is suspected that the messages sent by DEMS and RKSL overestimate the bulletin time by encoding it in local time rather than UTC. The corresponding DACs have been contacted with more details.

ISDM also receives and decodes Argo data via GTS transmitted in BUFR format with the following bulletin headers: CWOW, KWBC (since October 2010), LFVW (CLS) and RJTD. BODC and Coriolis send BUFR messages under headers EGRR and LFVX, but ISDM is currently not receiving them, though they have made a request and expect to start receiving them shortly. The volume of BUFR messages is still lower than that of TESAC messages for ISDM and JMA (~80%), while it is slightly higher for KWBC. The timeliness of BUFR messages is slightly lower than that of TESACs for CWOW and KWBC, while it is higher for LFVW and RJTD. The reception of Argo BUFR messages at ISDM stopped in late January 2011 until early March 2011.

A small number of duplicates are found on the GTS. In most cases however, these appear to updates rather than exact duplicates.

At the US GDAC, BUFR float data received between 25 October and 10 November were compared with the associated netCDF. Position, time, instrument code, the CTD profile and its associated QC codes were compared.

For AOML, BODC, JMA, KMA, and ISDM (called MEDS on the GDAC), the comparisons were exceptionally clean. There were no issues at all.

For the DACs processed by CLS for insertion onto the GTS (CSIO, INCOIS, KORDI), there were instances of missing pressure levels. Often these were just one or two missing levels but in some case a significant number of consecutive pressure levels were missing (one case was noted with a 300db gap).

Follow-on discussion with Yann Bernard (CLS) identified possible causes for each case:

- Single level case: This could be caused by CLS QC rejecting a level. Rejected levels are not included in the BUFR report. This will be investigated.

- Consecutive missing levels: This is likely to be messages that were missed at the time CLS encoded the BUFR. CLS is currently waiting 12 hours for all messages to arrive. This will need to be adjusted as 300 db gaps are unacceptable.

Data could not be compared for Coriolis or CSIRO as there wasn't any BUFR available in the time window:

- For Coriolis, it is likely that the comparison window happened to coincide with an unexpected outage of their BUFR data; this will be verified.

- For CSIRO, the BUFR messages were being generated but there was a problem with insertion onto the GTS. After a computer upgrade, the BUFR file generation no longer worked though the insertion was fixed. This issue is being worked on.

5.1.   Status of anomalies at GDAC

Real Time Objective analysis (ISAS) is performed each day at the Coriolis data center on data younger than 21 days. An operator checks the profiles rejected by the analysis. If needed, a correction is done on the QC of the measurements. Then a message is sent to the DAC (generic or identified person address) for which a correction has been done and a file is made available on the ftp site: ftp://ftp.ifremer.fr/ifremer/argo/etc/ObjectiveAnalysisWarning.

The content of the message has been again explained to be sure each DAC understands the information since the GDACs do not receive corrections for some profiles. DATE_UPDATE has been added in the message as requested at the last ADMT. The locations of the profiles detected by objective analysis from last ADMT11 and an analysis done on the last month (October 2011) have been shown. For each DAC, the list of profiles detected by the analysis has been presented as well as some plots of profiles with anomalies. The conclusions are that some large anomalies are still detected and not corrected for some DACs. Only AOML and BODC have done corrections for the problems detected in October. Others DACs have confirmed that they get the message but do not have time to correct the corrections in a short time, due to more high priorities in the DAC, or less manpower to do it. The main concern of some DACs is to try to understand why such large anomalies can still go through the automatic tests without being flagged. Christine Coatanoan asks each DAC to provide feedback to Coriolis if the correction done seems incorrect, in order to change flags in its database and be homogeneous with the netCDF files on the ftp site.

5.2.   Status of anomalies detected with Altimetry

The Altimetry check has been performed every four months again this year. Automatic emails are now sent through the AIC database to the DM-operator and DAC responsible for the extracted floats. The DM-operator or DAC are asked to check their floats and to respond through the link provided in the email, so that the answer is recorded in the system. Some floats reporting very bad measurements are still in the list for more than two years and need urgent correction. The DM-operators responsible for those floats have been contacted during the meeting or will be contacted right after the meeting in order to accelerate the correction of those floats. Impact of delayed-mode adjustment on SLA/DHA consistency has been illustrated for the whole dataset and also as a function of the amplitude of pressure or salinity adjustments applied. A specific study has also been carried on the TNPD list provided by Jeff Dunn (CSIRO). The altimetry QC method has allowed the extraction of three new time series. As truncated negative pressure might be of very small amplitude (< 5dbar), the altimetry QC method is of poor help to extract those floats but it helped in extracting the biggest truncation.

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

Sam Jones reminded the group of the basis of the "jump test": Based on the assumption that when a jump occurs in salinity but not temperature (when compared to the previous profile) it's likely to be bad data. From discussion at the previous ADMT, the following thresholds were tested:

- $\Delta S > 0.15$, $\Delta T < 0.5$

- 700 : 2000dbar, below most fluctuation

The test was added to BODC real-time QC in June 2011. The test was run for approximately 6 months on a total of 2000 profiles. The test was "failed" by 5 profiles (3 due to corrupted data). With the "despiking clause" there were no false positives.

It was noted that the OA test performed at Coriolis also detected all 5 profiles. This suggests that the OA has a similar level of sensitivity to salinity drift. Since this test seems to be redundant, it was decided not to add this to the standard real-time tests.

5.4. Density Test improvement

Currently, the density inversion tests allow NO density inversions – all must be flagged as class 4. Last year we decided informally to use a threshold of 0.04. Does this work or not? Several other basic questions arose during the analysis.

- Are there Regional differences which require different threshold values in different areas? (the original question) – **NO:** There are clear regional differences but we decided these can be ignored – working with these differences would be complex and result in little improvement

- Flagging scheme? – use a relaxed threshold so we keep good data: We chose flagging less good data at the cost of passing some bad data which means more relaxed thresholds. Tighter thresholds would catch too much good data.

- Keep bi-directional test? – **YES** : This is critical to catching the actual bad point, though the cost is catching one good point for every density inversion.

- Do we need to vary our test with depth because of depth dependent differences? – **NO**: There are depth dependent differences in the occurrence of density inversions but these can be ignored unless we have compelling evidence that too many bad, deep inversions are being passed as good in real-time

- Do we need to consider instrument or vertical resolution differences? – **NO:** There are clear instrument differences probably related to sampling strategies (spot sampling, bin averaging, continuous profiling), but they are all below the proposed threshold value so can also be ignored.

- Do we need to adjust the reference level? – **YES** : It is proposed that referencing density to the observation level is more robust than referencing to some arbitrarily chosen reference level (0 or 1000db were compared). The reference level will be midway between each observation being compared.

- Do we need to revisit density inversion flags in DM – **YES** : It is clear that we need to remove the flags from the RT density inversion test before DMQC. If we don't, then we automatically reject one good point in every case and potentially lose many more real density inversions if they exceed our threshold.

- Do we need to re-run the density inversion test in DM? – **YES** : Since it was demonstrated the DQMC can introduce new density inversions, it is necessary to re-run this test after adjustment but this CANNOT be done automatically – all failures must be inspected before you decide whether to accept or reject the result.

- What threshold will we use? – **0.03** : The decision was made to apply a threshold of 0.03 to the entire profile. We will analyze this threshold in the next month or so and report whether this seems reasonable or whether we can further restrict it, perhaps to 0.02. DACS should implement the 0.03 test immediately and not wait for the analysis results.

5.5. Feedback on Provor floats that report at 2047db (Cathy Lagadec) (15mn)

The floats concerned by this problem are the Provor CTS3 and older version (CTS2, CTF2) as well as the Arvor floats fitted with Argos transmission. As of today, a very limited number of profiles (52 in the Coriolis data base) are concerned by this problem.

The problem is due to two factors. First, any pressure values greater than 2047 db are truncated to 2047 because of transmission issue (pressure is coded on 11 bits in the Argos message). Then, data (P, T, S) are transmitted in messages containing between 5 and 7 levels (for CTS2 and CTS3). The levels transmitted in one message are not continuous to avoid large hole in a profile if a message is lost (interleaving process). In a given message, either the absolute pressure is transmitted or a value relative to the previous level. So, all the pressure values coded relative to a pressure value deeper than

2047 db are bad values. Because of the interleaving process, one value might be good and the next one might be bad, etc… until the next message is sent.

Note that temperature and conductivity are not affected by this limitation and the computation of salinity is done with the real pressure value.

NKE and Ifremer are currently investigating the reasons why some floats dive deeper than 2047 db while they should not. In addition, they have modified the software to avoid coding the pressure relative to a pressure deeper than 2047db. In that case, the absolute value will be transmitted. The modified software will be integrated in the next deliveries of floats.

During the decoding process, any 2047 pressure values should be flagged to 4. In addition, DACs have to identify pressure values coded relative to a pressure value deeper than 2047 db and to assess a flag 4 to those values.

There are two questions to resolve:

- if the profiles contain 2 levels at 2047 db, shall we remove one of the two level ?

- shall we attribute a flag 4 to P only or should we attribute a flag 4 to P, T and S although T and S are correct ?

It has been note that this anomaly presently concerns 10 floats and 52 profiles

5.6. Near surface temperature data

An action from AST-12 (items 28 and 29) was to gather and analyze the available near-surface unpumped temperature (NST) data in collaboration with GHRSST. BODC has collected the data from 216 NST capable floats from UK, US, Japan, and India recorded between October 2008 and May 2011; a total of 3,007 profiles. These data were analyzed by Sarah Quinn (Reading University) in collaboration with Andrea Kaiser-Weiss (GHRSST program office) and Prof. Keith Haines.

After accounting for pressure sensor drift (required so that an accurate depth could be determined), evidence of diurnal warming was seen in 62 profiles from 26 different floats; defined as a $\Delta T > 0.5°C$ between 10m and the surface. The maximum temperature difference was 2.4°C and the diurnal mixing layer spanned between 0.1m and 8m. Various vertical diurnal structures were observed and examples were presented.

The GHRSST community (SST from Satellite) needs an independent source of global near-surface temperature observation for retrieval validation and for skin to depth models which include models of diurnal variability. This study suggests that Argo NST data can provide such data, especially when a statistically significant sample size (multiple floats in an area) is available.

Dean Roemmich pointed out that the Solo II floats perform a *pumped* temperature profile up to 1db, using 1m bins above 10m. There are 75 of these floats in the field currently. It should be investigated whether these floats provide data adequate for use by the GHRSST community. The advantage of this method is that the pump continues to be used for the samples; many people are concerned about the accuracy of measurements taken when the pump is not being run.

5.7. Argos System status and services for the Argo program Y Bernard

Y Bernard presented the Argos instruments that are currently onboard five NOAA POES and one EUMETSAT spacecrafts. In 2012, two new Argos-3 satellites will be launched: METOP-B (EUMETSAT) and SARAL (ISRO).

Concerning the Argos frequency plan, the initial frequency bandwidth and uplink modulation use by Argo floats will be preserved in the next decade with the next generation of instrument: Argos-4. 3 global stations (Fairbanks, Wallops and Svalbard) acquire the Argos global recorded telemetry at each orbit. A new Argos global station at McMurdo in Antarctica acquires METOP satellites half orbits since June 2011. The Argos real-time antennas network is still growing with more than 60 regional stations. Since January 2010, CNES and CLS have started a project to upgrade 18 R-T Argos stations

all over the world. The objectives are maintaining and optimizing in terms of performances the existing network with installation of new hardware compatible with all satellites of the Argos constellation. Furthermore a new station will be installed on Ascension Island in order to improve the delivery time in South Atlantic area

Then he presented the ARGOS services for the Argo program. The new Argos location method developed by CLS in 2010 was automatically applied on all Argo floats on the 13th of June 2011 at 12:00 UTC. The new technique continues to measure the Doppler frequency shift while introducing two significant additions: the integration of platform dynamics and the use of a Kalman filter to calculate positions. The main benefits for the Argo program are: more positions, better accuracy, and automatic correction of all unrealistic positions. Error ellipses data for all Argos locations, very useful for the Argo trajectory team, are available in different formats (XML, CSV, KML) and through different distribution tools (Argos Web, Automatic sending and Argos web services). The Argos web services is a free and operational M to M automatic distribution tool well adapted for Argo programs. Last 10 days of data (could be soon expanded) are available via a SOAP communication protocol over HTTP with all Argos parameters (error ellipses, diagnostic data...). CLS is offering real-time processing for Argo floats programs which don't have a GTS insertion point.

5.8. Presentation of NRT QC on Chlorophyll Argo data developed by LOV/France (A Poteau)

A general introduction of the BioArgo's activity in the LOV (BioArgo floats, BioArgo projects) was presented first. The NRT QC for chlorophyll_a data was explained (more in detail the range and spike test). All the NRT QC is explained in the PABIM white book (http://www.coriolis.eu.org/All-news/News/PABIM-White-BOOK). The group included recommended updates to the following Argo standard real-time tests: test 6 (global range test), test 9 (Argo spike test), test 11 (gradient test) for chlorophyll_a real time QC.

The last part was about the adjusted and two delayed mode QC. The two delay mode QC are:

- The 1st is using irradiance data. This method is described in the paper of Xing, X. and all. (2011). "Combined processing and mutual interpretation of radiometry and fluorimetry from autonomous profiling Bio-Argo Floats. The retrieval of Chlorophyll a." (http://www.obs-vlfr.fr/LOV/OMT/fichiers_PDF/Xing_et_al_JGR_11.pdf).

- The second method is using ocean color satellite data: "Towards a merged satellite and in situ fluorescence ocean chlorophyll products " by Lavigne, H. and all. (2011). (Submitted)

A final discussion question was raised regarding the relationship between the Chlorophyll working group and the ADMT. It was stated that with the above QC work and the format work to be presented later, chlorophyll-a could be added the Argo data files.

6. Pressure correction

Esmee van Wijk presented the results of the audit she did together with Jeff Dunn, Susan Wijffels to monitor progress on pressure correction.

The critical piece of metadata for determining pressure correction is the Surface Pressure Offset name ("SPO name") in the TECHNICAL_PARAMETER_NAME field. By constructing a table prescribing the relationship between this name and the type of pressure correction we can uniquely identify the required correction by reading just this one metadata field. This is desirable because it should be simple and foolproof, but also because other existing fields, such as PLATFORM_MODEL, SENSOR_MODEL, SENSOR_SERIAL_NUMBER, are poorly populated or far from standardised.

Additional information is available at:

- Latest audit: http://www.cmar.csiro.au/argo/dmqc/audits

- Audit method: http://www.cmar.csiro.au/argo/dmqc/audit_method.html

- One page "Compliance Summary" for the audit:
  http://www.cmar.csiro.au/argo/dmqc/audits_2011_11_01/summary.html

6.1. Results of the Nov 2011 Audit

The latest pressure correction audit of the global Argo dataset was conducted in Nov 2011. Overall agreement between DACs and CSIRO audit is shown below. Progress has been made but a small proportion of profiles with discrepancies remain in the global data set, these need to be checked and fixed by DACS or feedback provided to Jeff.Dunn@csiro.au to indicate that DAC correction is appropriate and the float can be removed from the list.

Surface Pressure Correction assessment

	AOML	BODC	CORIOLIS	CSIRO	GTS	JMA	MEDS	CSIO	INCOIS	KMA	KORDI	Total all DACs
RT profiles, good	26809	1193	17079	17151	0	30029	10753	0	6701	4704	0	114419
RT profiles, bad?	53	3	50	9	0	65	42	0	196	2	0	420
DM profiles, good	270198	27860	71200	31145	0	69987	15374	4274	19033	7352	0	516423
DM profiles, bad?	41	3	3634	0	0	97	3870	290	421	1227	0	9583
Ok if allowed	29221	0	0	0	0	0	0	0	0	0	0	29221

Varying pressure correction in one profile

This is an infrequent problem. PIs were contacted with details of non-constant PRES-PRES_ADJUSTED - ie the pressure correction varies throughout a profile. Some DACs have responded with feedback and fixed their profiles but other DACS have not. These cases should be examined as they indicate something has gone wrong.

Multiple SPO names

A jump in floats with multiple SPO names, especially AOML (Feed back from Claudia : these are in fact OK. Claudia had asked Jeff about this to find out more. They are from floats which report the pressure before and after reset. So, there is no need for us to change any files or add names to the spreadsheet.). Obsolete SPO names must be removed from files and only the agreed names used. If appropriate agreed names do not exist then AOML should provide a list of additional names required to be added to the list. AOML to provide feedback for legitimate cases of multiple SPO names and indicate which parameter should be used and the agreed treatment required for the correction (this can include no correction if applicable).

Missing PRES_ADJUSTED data

Refined assessment of "missing PRES_ADJUSTED". Many of these actually arise from null characters in the PRES_ADJUSTED_QC field. Where a char vector contains even one null, the Matlab str2num function returns an empty vector. Recommend that DACs trace and correct QC values which do not convert to numerals (ie only numeric values between 48 and 57 are valid.) A listing of all affected files will be provided on the CSIRO Pressure Audit web pages as soon as possible. The fillvalue (space, numeric 32) should only be found in unfilled variables, and null (numeric 0) should never be present.

Imperfect TNPD comments

Completely fixed at CSIO and BODC, progress at MEDS and KMA with new processing but a lot of old files still to be changed.

TNPD identification

Overall 10% of the global data set is affected by TNPD floats. Discrepancies in TNPD identification by DAC is shown in the table below. Approx 20,000 profiles are affected and DACs must check their individual floats.

TNPD	AOML	BODC	CORIOLIS	CSIRO	GTS	JMA	MEDS	CSIO	INCOIS	KMA	KORDI	Total all DACs
Perfect COMMENTS	33306	9430	4586	4600	0	6959	1622	1942	5837	0	0	68282
Imperfect COMMENTS	0	0	0	0	0	0	2141	0	0	1241	0	3382
COMMENTS absent	4841	944	820	230	0	9893	930	68	928	837	0	19491

6.2. Actions (all DACS):

- Each DAC nominates one or more contact persons who will deal directly with Jeff.Dunn@csiro.au in order to improve pressure correction in files and meta and tech information for pressure correction.

- All DACS to check for missing PRES_ADJUSTED or PRES_ADJUSTED_QC when PRES and PRES_QC exists and PRES_ADJUSTED_QC is not flagged as bad. DACS to also check for cases with Null values in ALL parameters. [Note from Claudia: Old R-files without pressure adjustment will have to wait for DM QC if DACs do not have the resources to reprocess them.]

- DACS to remove obsolete Surface Pressure Offset (SPO) parameter names from files and ensure that only agreed SPO names are used.

- DACS to fix floats where SPO name changes during the lifetime of the float. [Jeff indicated that AOML's files are OK.]

- DACS to check floats where multiple SPO names exist. If not legitimate, fix files. If floats reports more than one SPO name, DAC to advise on agreed SPO names and advise which parameter is to be used to correct surface pressure and the appropriate method or advise if float does not require pressure correction. [Jeff indicated that AOML's files are OK.]

- DACS to check floats where surface pressure correction varies throughout the profile and fix.

- DACS, particularly CSIO and Kordi, to check meta and technical files to ensure parameters required for surface pressure correction are available so that pressure correction can be verified during the audit.

7. ARC status

Claudia Schmid reminded the participants of the activities that are delegated to ARCs.

Essential roles:

- Regional analysis of all Argo data to assess its internal & external consistency

- Feedback to PIs about the results of the regional analysis and possible outliers

- Contribute to Reference Data Base for delayed mode quality control

- Prepare and distribute Argo data products

Optional roles:

- Coordinate Argo deployment for the region

- Develop new Q/C tests for region

- Provide delayed-mode Q/C for regions without such capabilities

- Compare Argo data to models and assimilated fields

- Provide documentation of the procedures done at the ARC

- Training, outreach, education (e.g. help end users with accessing and using the data)

She reported on the status of the action items from the most recent (2009) ARC meeting. All ARCs reported on their progress. An ARC report with details is in the appendix. Several suggested changes to the action items were approved. The updated action items are in the appendix.

7.1. Feedback From ARCs

South Atlantic ARC: Claudia presented the WWW site of the SA-ARC and in particular the part related to the buddy-check and the information provided to users.

North Atlantic ARC: Sylvie reported on the progress carried out for the North Atlantic mainly within Euro-Argo that is setting up a legal entity (ERIC) to better coordinate action in Europe both in term of deployment coordination and at sea monitoring, of communication of Argo use and training of new partners and users. She also showed a prototype of a new site and API that is under development for NA-ARC at http://www.ifremer.fr/lpo/naarc

Pacific ARC: Due to funding issues that activities has been mainly focused on maintaining and upgrading the products developed at JAMSTEC and IPRC. Leveraging Aquarius and PAC-OOS funding may provide an opportunity to develop products that are of interest to all communities.

Southern Ocean ARC: Justin mentioned that most of the man power has been dedicated to delayed mode QC and sharing regional expertise in Southern Ocean. A new WWW site will be deployed in the coming month. There is also an ongoing effort to improve the POGO cruise planning database so it can be integrated with JCOMMOPS and CCHDO tools.

Indian ARC: Hudaya explained that most of the man power has been dedicated to delayed mode QC and routine operation of the Argo processing and the product developed previously

7.2. Feedback on GODAE QC experiment

Activities linked to the GODAE QC experiment has continued at the Environmental Systems Science Centre (ESSC), Reading. Although the portal presented at ADMT11 has been mothballed the underlying database continues to be developed (including the inclusion of the Coriolis QC results). Initial results have indicated that the centers are accepting some bad data. Rejecting data considered "doubtful" been improved the forecast skill at the Australian Bureau of Meteorology.

Work is on-going to define metrics with the aim of further improving the included meteorological assimilation included in the database. Initial results highlight the strength of the Coriolis QC when compared to the operational assimilation. Detailed results from the study can be found at:

http://www.resc.rdg.ac.uk/twiki/bin/view/Resc/ArgoQualityControl

8. GDAC Services

8.1. Feedback on the actions related to GDACS

Action 9b: GDAC to perform file removal before file submission to allow quicker replacement of deleted profile

To remove files, a DAC submits a removal file containing the list of files to be removed. The removal file should be the first file to be processed by the GDAC, to avoid the deletion of a deleted file quickly resubmitted.

- Coriolis : done, 2011 Q1

- US-GDAC : done, (implemented this way initially)

Action 10: Update more often the Latest file with Rfile submitted to reduce delays. Dfile submission can be updated once a day

- Coriolis : done, hourly update

- US-GDAC : done, 2 hours updates

The objective is to reach a one hour update on both GDACs; the GDAC will then add a maximum of one hour to the availability of a file to users.

Action 11: Implement detailed index file on the US site

The detailed index could not yet be implemented on US-GDAC.

The impact is on the monitoring of Argo data flow which cannot be accurately performed on US-GDAC site. The important feature of the detailed index file is to record the initial date of availability of a profile file on the GDAC (gdac_creation_date).

Action 12: provide statistics on GDAC FTP servers analyzing the log files

This action is done in Coriolis annual report which reports a series of counts, graphics and the results of Nagios monitoring. Today, about 900 000 files are available from the Coriolis GDAC ftp server. On monthly average: 345 unique visitors, 3 981 sessions, 550 Gbytes downloaded. These counts exclude the traffic generated by crawlers and web robots such as Google or Yandex. There was a strong increase on the ftp server bandwidth during the last 3 months. This is partly explained by the daily data collection started in June by the Australian CSIRO.

DAC	metadata files	increase from last year	profile files	increase from last year	delayed mode profile files	increase from last year	trajectory files	increase from last year
AOML	3 938	14%	460 192	19%	322 179	18%	3 821	14%
BODC	348	9%	32 216	16%	30 329	14%	329	10%
Coriolis	1 327	15%	110 233	17%	82 487	28%	1 241	14%
CSIO	100	61%	5 631	32%	4 879	48%	99	60%
CSIRO	466	37%	49 248	44%	31 631	19%	460	37%
INCOIS	237	29%	28 374	15%	20 738	2%	237	29%
JMA	1 072	14%	115 274	14%	76 128	13%	1 052	29%
KMA	147	4%	13 473	18%	9 982	19%	131	7%
KORDI	119	3%	11 590	14%	0	-	119	3%
MEDS	317	6%	32 132	16%	22 300	26%	311	6%
NMDIS	15	-	658	-	0	-	15	-
Total	8 086	15%	859 021	19%	600 653	19%	7 815	18%

About 900 000 files are now available from Coriolis GDAC

ARGO GDAC FTP statistics				
month	unique visitor	number of visits	hits	bandwidth GB
10/2010	215	2 084	1 754 378	402
11/2010	192	1 687	766 873	347
12/2010	166	1 494	902 183	339
01/2011	149	1 318	1 785 207	523
02/2011	153	1 333	2 117 806	299
03/2011	338	3 420	1 439 574	263
04/2011	413	11 882	2 496 235	481
05/2011	574	10 016	2 002 734	498
06/2011	670	4 587	1 689 315	460
07/2011	509	4 247	2 597 451	649
08/2011	506	3 693	3 208 683	978
09/2011	253	2 012	1 781 930	1367
Average	**345**	**3 981**	**1 878 531**	**550**

On monthly average : 345 unique visitors, 3 981 sessions, 550 Gbytes downloaded.
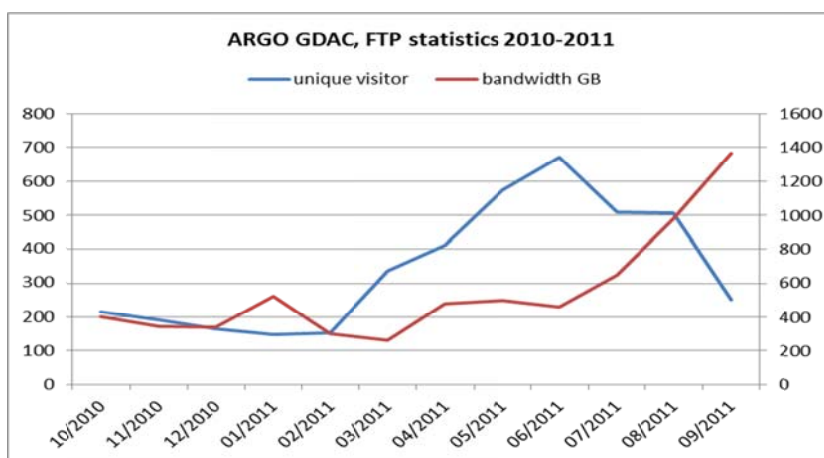
There was a strong increase on the ftp server bandwidth during the last 3 months.

Nagios FTP server monitoring

Every 5 minutes, a download test is performed. The success/failure of the test and the response time are recorded. In 2011, the ftp server was available for 99,.6% of the time. The 0.4% of failure represents 1 day, 5 hours and 45 minutes. Internet was available for 99,.685 % of the time. The 0.3% of failure represents 23 hours, 37 minutes Most of the problems occurred between May 21st and May 28th, related to electrical supply problems.

The US GDAC server is under NAGIOS server monitoring but statistics on just the GDAC usage are not currently available. Overall, server usage is tracked but this includes a great deal of other traffic in addition to the GDAC traffic so those statistics are not immediately useful. The US GDAC will see if the tracking of GDAC traffic can be improved.

Action 13: Investigate providing DAC zip files to users and receiving ZIP files from DAC

A proposal was submitted in October 2011 on www.argodatamgt.org The decision of ADMT12 meeting is to provide on a weekly basis a compressed file of the DAC and GEO directories of the GDAC ftp server. The compressed file of the DAC directory contains the data files from each DAC : metadata, trajectory, technical and profile files. The compression method is based on tar and gzip.

8.2. "What's new on GDAC"

This traditional presentation is very short this year, only 2 new topics were mentioned.

A new Chinese DAC was setup in 2011 Q2: NMDIS : National Marine Data and Information Service, Tianjin. The data from this DAC are available from Coriolis GDAC and should be available from US-GDAC in December 2011.

Since 2010 Q4, the organization of the ftp directory « latest_data » is now the same on Coriolis and US-GDAC.

8.3. Feedback on format checking operations

The enhanced file checker is not yet in operations at either GDAC. The delay is the result of a lack of man power at the US GDAC to perform the detailed analysis of the results. To allow this to proceed, the Executive agreed that the solution is to engage the DACs in the review of the format checking results. Consequently, the US GDAC will provide the DACs access to the format checking results as soon as possible – the goal is the 1st week of December 2011.

The DACs will be responsible for monitoring the results for their files and communicating problems to the US GDAC. The goal is to be able to transition the enhanced format checker to full operations by February 2011.

8.4. Connection to Ocean Data Portal

The Ocean Data Portal provides seamless access to collections and inventories of marine data from the NODCs (National Oceanographic Data Centres) of the IODE network. It allows for the discovery, evaluation (through visualization and meta data review) and access to data via web services. The system architecture uses Web-oriented information technologies to access non-homogeneous and geographically distributed marine data and information.

More on : http://www.oceandataportal.org/

On behalf of Argo data management Thierry Carval proposed to establish a link between ODP and Argo GDAC. The proposal was warmly accepted. By December, ODP may regularly harvest Argo index file to provide an access to Argo data files.

9. Trajectory from Argo Data

M. Scanderbeg and B. King reported on the Argo Trajectory Workshop 3 held the day before the ADMT meeting. At the ATW3, Michel Ollitrault reported on work done by himself and Jean-Philippe Rannou to produce the ANDRO Atlas which will be an Atlas of velocities based on Argo trajectory data. They have produced DEP files for all the Argo trajectory data through 2008 and will finish through 2009 by July 2012 when they plan to release their Atlas. The DEP files contain carefully quality controlled trajectory data compiled from the trajectory, meta, and tech files as well as from the

raw Argos hex messages. During their work, the ANDRO team discovered several anomalies at each DAC that will be communicated to the DACs for investigation. Argo hopes to build on their work to produce higher quality trajectory files and trajectory product files.

Results from implementing the real time position qc test developed at JAMSTEC at the JMA DAC for nine months were presented at the ATW3. Based on this feedback, as well as other user feedback, it was concluded that this test provides real value and the ATW3 recommends adding this test in real time for the Argo trajectory files. When a position qc flag is changed, it should be recorded in the history section.

Additionally, there was a discussion on how to fill and flag profile positions and trajectory positions in real time. It was agreed that DACs should not include interpolated position in traj files, but an interpolated position in the profile file with a qc flag of 8 was appropriate. For floats using Iridium, it is best to use the GPS position if available for both the profile position and the trajectory positions. If this is not possible, a weighted average of all Iridium fixes should be used. If the CEPradius is more than 5km, a position qc flag of 2 should be assigned. Changes need to be made to the reference tables describing positioning system and location class to reflect the Iridium fixes.

The ANDRO team had several suggestions for improving the current trajectory files which were discussed and agreed upon. The first suggestion calls for disseminating all Argos locations which may require reprocessing after late messages have arrived. Messages can be up to two days late if difficulty arises at CLS with message processing. The first and last message time should also be included in the file. If the first message also includes a position, the message should be listed first without a location and then again with a location. DACs were also asked to add all parking PTS measurements to the trajectory files even if they do not have a time associated with them.

Next, time was spent looking at how the current traj files can be improved (trajectory format 2.4) and modified slightly to help populate the proposed traj2.nc product files.   The first issue discussed was how to completely capture the cycle timing of the float. Each of the nine proposed cycle timing variables were defined and it was decided if each float type transmitted the time, if the time can be estimated in real time or delayed mode or if the time could not be estimated accurately. See the ATW3 report for more details on the four new variables and how each will be filled. A second change is to switch the CYCLE_STAGE variable to the MEASUREMENT_CODE variable. This will correspond to a slightly different figure and table of codes to describe each event in the float's cycle. It will be flexible enough to allow further information to be easily recorded in the trajectory files.

Additionally, DACs were asked to include launch position as the first position in the trajectory files. The position accuracy should be a fill value and the cycle number should be -1. The ANDRO team also requested a slightly different definition of a grounded cycle. It was discussed and agreed that the float could get grounded either when descending to the drifting pressure or when descending to the profile pressure. The grounded flag will be adjusted to allow for both situations to be indicated. It also needs to be clear which index in the N_CYCLE array corresponds to which cycle. A variable should be added to the N_CYCLE array to clarify the cycle number. It was also pointed out that the axes error ellipses from Argos would be helpful to velocity calculations. The ATC agreed work with CLS to discover the best way for Argo to obtain these ellipses.

Finally, the traj2.nc product format was introduced. The traj2.nc files will first be produced from the DEP files and later produced from the traj.nc files and some additional calculations. They will include the best possible estimates of times and locations needed to calculate velocities easily from each file. See the ATW3 report for more details. Work will continue throughout the year to modify and finalize the format of this product.

10. Format ISSUES

10.1. Status on Tech Files updates

Ann Gronell presented the status on technical file updates after the audit she made last month. There still remain many problems with the technical files but these should be relatively simple to fix. We have a list of 555 names with more to come – please ask for names (Ann.Thresher@csiro.au) now so they can be included before the next major release.

The audit found 256 names that had been used but were not 'approved'. The text list of all failures by DACc is available from Ann Gronell Thresher and will be put on the ftp server at CSIRO next week.

Errors were, in many cases, minor. Some DACS have a larger problem than others and the larger DACs had the most failures. If you review the results of the tech file audit, you will be able to suggest names that are required but not yet in the list.

Please correct your files as soon as possible – Ann is willing to test individual files if needed - you just need to send them to her, and she can run the tech audit regularly to monitor how DACS are doing.

10.2. Status on Meta-Files Update

10.2.1. Platform Name, Sensor

The Argo Technical Coordinator presented the proposals to improve the naming of float models in the Argo metadata format. He thanked the different groups and experts that provided information for his survey. The ADMT agreed on a reasonable list for the PLATFORM_MODEL attribute reference table. He made a set of suggestions to improve existing reference tables or specific attribute use. He mentioned in particular the need to handle multiple CONTROLLER_BOARD_TYPE on the same float (see PROVORBIO). He finally presented a proposal to handle unique data formats references ("CODECS"), store relative documentation on line (e.g. at the AIC), and why not share decoders on the long run. ADMT agreed on the principle and suggested to start with the ANDRO group classification and to think to send the finalized classification to manufacturers.

A few questions were asked to the ADMT to clarify the content of some attributes (related to Iridium or RAFOS).The TC will provide a summary of those proposals, reference tables, and new attributes so that the ADMT can complete and comment, targeting an update of the manual.

It was agreed that this work need to pursue jointly with the activies carried out by Esmee van Wijk and explained hereafter

10.2.2. Additional meta variables and configuration changes

A proposal for new metafile variables, standardized reference tables and updates to the manual, based on the presentation to ADMT 12 will be developed by the metafile working group and a draft circulated to the Argo data management community. New variables will describe important information to describe the floats such as; PLATFORM_TYPE, BATTERY_TYPE, CONTROLLER_BOARD_TYPE, etc. The input to existing variables will be standardized wherever possible through the development of reference tables. A new list of mandatory parameters will replace the current highly desirable list. These will be split into mandatory variables that contain critical float information and optional variables. The mandatory parameters must be filled where applicable (this is dependent on float type), where not applicable, a FillValue can be used so that files can pass through the format checker.

A proposal to store configuration variables was agreed at the meeting. This scheme has three variables;   CONFIGURATION_PARAMETER_NAME(N_CONFIGURATION_PARAMETERS), MISSION_SETTINGS(N_MISSIONS,N_CONFIGURATION_PARAMETERS)   and MISSION_COMMENT(N_MISSIONS, String256). N_CONFIGURATION_PARAMETERS = int; N_MISSIONS=<unlimited>. The mission will be linked to cycle number by a variable in the trajectory file called: CONFIGURATION_MISSION_NUMBER(N_CYCLE).

Configuration_parameter_name (N_Config_Param)	Mission_Settings (N_Missions, N_Config_Param)				
Mission_Number	0	1	2	…	…
CONFIG_PistonPositionPressureActivation_COUNT	100	100	100		
CONFIG_ParkPRessure_dBAR		1000	1500		
CONFIG_ProfilePressure_dBAR		2000	2000		
CONFIG_Direction_LOGICAL		1*	2*		
CONFIG_AscentToSurfaceTimeout_DecimalHour		3	3		
CONFIG_ParkPistonPosition_COUNT		113	75		
CONFIG_MeasureBattery_LOGICAL		0 ^	1 ^		
…					
…					

* 1 = Ascending, 2 = Descending
^ 0 = No, 1 = Yes

In this scheme strings must be converted to numerals so this will require look-up tables with measurement codes for the relevant parameters. Only a few existing parameters are affected and if new floats with new configuration parameters (as strings) are introduced then a look-up table with equivalent numeric code should be also be added.

The parameter MISSION_CONFIGURATION_COMMENT can be used to store information about the mission or whether the mission was set pre-deployment or transmitted by the float (free form field).

10.2.3. Multiple sensors and multiple axes

The implementation of multiple axis is crucial for floats with advanced features. Presently, with the existing rules, the following data cannot be distributed:

- bouncing profiles
- high resolution near-surface observations
- some oxygen profiles
- some optical profiles

Since 2011 Q3, a custom ftp directory is available for a series of floats managed by Coriolis DAC that cannot be correctly reported in the existing data format

- ftp://ftp.ifremer.fr/ifremer/argo/etc/coriolis-custom/dac/coriolis
- Description on www.argodatamgt.org

What is the effort needed to manage floats with advanced features ?

- For floats with advanced features : profile format 2.3
  Add a profile additional variable
  VERTICAL_SAMPLING_SCHEME(N_PROF, STRING256)

      o « Argo sampling »

      o « Non pump near surface sampling »

      o « Oxygen sampling »

    • For floats with no advanced features (the large majority)
     Keep using profile format 2.2; there is nothing to do.

It was agreed that DAC who were managing the first class of floats had to implement the multi-axis format. It was pointed out the GDAC needed to update the format checker to allow data provision and that is planned for February 2012.

10.2.4. Proposal for profile reduction for TESAC

Claudia Schmid presented a proposal on how to reduce the profile length of high-resolution profiles to no more then 790 levels with pressure, temperature and salinity for the purpose of submitting them to GTS as TESAC bulletins. This is necessary, because TESAC bulletins may not exceed 15,000 bytes. The proposal was accepted. This proposal will be documented and included in the Argo DAC Cookbook.

10.2.5. Improvement needed to be CF compliant Action 43, 44, 45

Background. Argo profile data were checked against the climate-forecast convention to see 1) if they were compliant, and 2) what it would take to become compliant. As background, the netCDF data model is that data sets are composed of variables that have dimensions and attributes. The CF standard provides names for the variable attributes such as units, long_name, standard_name, *etc*. Since many client tools can read netCDF data, adhering to an existing standard such as CF was thought to be desirable.

For this action, sample profile files were obtained from ftp.ifremer.fr in the directory /ifremer/argo/etc/coriolis-custom/dac/coriolis/6900631/profiles. The files were taken at random from float 6900631, and included profiles 031, 032 and 033. An on-line netCDF-CF data checker (http://titania.badc.rl.ac.uk/cgi-bin/cf-checker.pl) was run to compare these files against CF version 1.4. The resulting check produced four errors and several warnings. All four errors stemmed from "invalid units" on salinity variables. Specifically, PSAL, PSAL_ADJUSTED, and PSAL_ADJUSTED_ERROR had units of psu, while CF convention is to have no units (1e-3). Similarly, PSAL_STD had units of P.S.U. The warnings were of three types. First, the files did not have "global attributes", and thus did not have a "conventions" attribute (this identifies the file as conforming to a specific CF convention, *e.g*., CF-1.4). Second, two variables did not have units: HISTORY_PREVIOUS_VALUE and CYCLE_NUMBER. I think the issue here is that numerical variables (*e.g*., type "float") need units, while strings (*e.g*., type "char") do not. Therefore, these two variables issued warnings for missing units. The third type of warnings came from missing long_name and/or standard_name, and 18 variables were identified. Some of these were also flagged as missing units. After meeting T Carval run the CF checker on profiles from different floats and only the error on PSU was detected which temp to tell that the tested file was not processed properly.

To investigate the impact of this, different client-side software tools were tested. This consisted of simply reading in a profile and making a temperature profile. All tests were run on a MacBook Air running Mac OS-X 10.6.8 with netCDF-4. All programs were freely available, open-source packages except Matlab, which is so widely used in the science community it was also tested. These results are summarized in the table.

Conclusions. Most client tools can read the Argo format with minimal additional input. In some cases, the software is designed for geographic, lat/lon maps, and thus these programs have more problems drawing a profile. The errors and warnings issued from the CF checker do not seem problematic. It is not clear whether future efforts are warranted, at least from the perspective of client tools. Another issue not addressed here is the impact of standards on data services, *i.e.*, are the

deficiencies in the Argo data format (with respect to CF) prohibitive for delivering data via transport services (*e.g.*, OPeNDAP) or web tools (*e.g.*, LAS)? In the end, however, before these issues can be addressed, the end goal needs to be more clearly defined. For example, how do most people access Argo data? This likely depends on the user-type, for example scientific research users will likely want profiles, while more general users may prefer derived products.

Package Tested	Version	Site	Status
Matlab	R2007b R2011b	http://mathworks.com	Works; needs additional libs for older versions
GrADS *Grid Analysis and Display System*	2.0.a9	http://www.iges.org/grads/downloads.html	Works; needs additional "control file" to map to lat/lon
Ferret	6.3	http:/ferret.pmel.noaa.gov	Works
IDV *Integrated Data Viewer*	3.0	http://www.unidata.ucar.edu/software/idv/	Loads as supported format (EOC netCDF profile file)
ODV *Ocean Data Viewer*	4.4.2	http://odv.awi.de/	Works (ARGO profile file)
JOA *Java Ocean Atlas*	5.0	http://joa.ucsd.edu/	Cannot read files
Panoply	3.0.5	http://www.giss.nasa.gov/tools/panoply	Loads, lists parameters, cannot plot
R	2.13.0	http://www.r-project.org/	Works, needs ncdf library
ncBrowse	1.6.3	http://www.epic.noaa.gov/java/ncBrowse/	Works
ncview	1.93g	http://meteora.ucsd.edu/~pierce/ncview_home_page.html	Works
ODE *Ocean Data Explorer*	1_0a	http://www.nodc.noaa.gov/dsdt/tools/ODE/index.htm	Works

10.2.6. Status on Oxygen Data resubmission

At last ADMT the format to store oxygen float data was refined and all dacs handling oxygen floats had to resubmit their data. Here is the status per DAC of the resubmission.

- China: 4 floats To be resubmitted

- Coriolis: Reprocessed for all flotas except for 3 types of apex floats

- Japan: not done

- BODC no floats

- ISDM : done

- USA: done for new profiles; for historical Iridium done; for historical non-Iridium processing is ongoing

- INCOIS: right units but raw data need to be reported

- CSIRO: done

- Kordi : no floats

- KMA done

10.2.7. Proposal to store Chlorophyll data in Argo Format

A Poteau proposed to store Chlorophyll data in a parameter named CHL-A and expressed in mg/m3. The unit was discussed as in oxygen we moved from unit per volume to unit per mass. Antoine was asked to discuss with the BIO-Argo scientist to decide on this issue and then on Thierry to find the appropriate code and put it in the manual together with CF convention.

11. Delayed mode data management

11.1. Review backlog of DMQC

M. Scanderbeg presented the delayed mode quality controlled statistics for all the DACs without the equivalent floats. Most DACs are at about 80-100% done with dmoding the eligible floats. KORDI needs to begin delayed mode work and BODC has begun working with them to start this process. CSIRO will DMQC their Southern Ocean floats. Statistics were also calculated for the equivalent floats for each DAC. Only AOML, BODC, Coriolis and JMA have equivalent floats. BODC and Coriolis have dmoded most of their equivalent floats. AOML has done about 30% and JMA has done about 50%. It is agreed that these separate statistics are of value to continue monitoring.

DAC	# dmoded files > 12 mo	# files > 12 mo	% dmoded	# young D	# young R	# total D files
AOML	300485	350553	86	9088	51045	309573
BODC	25351	25692	99	2337	1593	27688
Coriolis	62708	77388	81	1782	11580	64490
CSIO	4270	4369	98	609	666	4879
CSIRO	31160	37096	84	474	11951	31634
INCOIS	20736	24797	84	0	3599	20736
JMA	60886	77656	78	2501	5880	63387
KMA	9726	11590	84	256	1678	9982
KORDI	0	10816	0.00	0	780	0
MEDS	22049	28033	79	276	3875	22325
GTS	0	2	0	0	0	0
Total	537371	647992	83	17323	92647	554694

Core ARGO on 8th November 2011

DAC	# dmoded files > 12 mo	# files > 12 mo	% dmoded	# young D	# young R	# total D files
AOML	13949	45139	31	0	5276	13949
BODC	2573	2573	100	68	4	2641
Coriolis	16150	18858	86	111	589	16261
CSIO	0	0	N/A	0	0	0
CSIRO	0	0	N/A	0	0	0
INCOIS	0	0	N/A	0	0	0

JMA	12654	24672	51	87	4736	12741
KMA	0	0	N/A	0	0	0
KORDI	0	0	N/A	0	0	0
MEDS	0	0	N/A	0	0	0
Total	45326	91242	50	266	10605	45592

Argo equivalent on 8th November

11.2. Sharing of regional expertise

This agenda item had been on-going since DMQC3 workshop with little progress and it was proposed that the item was closed which was accepted. As part of this work regional DMQC notes were produced which are used routinely at BODC (these will be added to the documentation section on the ADMT website). Very few regional expertise contributions were received in 3 years despite several attempts to solicit contributions by both Annie Wong and Justin Buck. There is an informal exchange of DMQC expertise since the current group of delayed mode operators is stable, experienced and contact each other when necessary. If and when new delayed mode operators begin work on the program then there will be a training need to be addressed at such time.

11.3. New GUI editor

Breck Owens presented a new GUI editor that is available to the community and compatible with the newest MATLAB versions.

11.4. Changes in QC manuals

The changes on QC manual are on the upgrade on the density test and add a new test on position (Jamstec QC).

12. Reference Data Base

A new reference database (2010V2) has been provided in April 2011 and an updated version in November 2011. The April version has been corrected for some duplicates, and new CTD data sets have been added to the reference database (PIRATA CTD from CCHDO, DRAKE from scientist, JVLG3 from CSIO, CTD from Coriolis center). Due to feedback from users, a new version (2011V1) has been made available the first week of November. A bug has been identified in a program converting CTD locations to mat box files. For a few cases, the CTD profile very close to the boundaries of the box was written in the neighboring box. Bad profiles observed in some box files have been also removed. A new version is expected for March 2012 (next AST) taking into account updates from NODC (from WOD2009 to August 2011), CTD sent by CCHDO (S4P), CTD sent by AWI, CTD sent by Esmee (under 4000 casts: greater than 1000m depth but mostly coastal Australian). It seems that some CTD available in CCHDO are not yet in the reference database. CCHDO will provide to Coriolis a zip file with all the CTD available for the Argo Reference database.

US-NODC supports for the Argo CTD Reference Database via quarterly updates of the World Ocean Database CTD that integrates data from multiple sources such as GTSPP near-real time and delayed-mode data and implementing procedures for automatic updates from other data centers, research institutes in the US and worldwide as well as seeking for individual updates from institutes, scientists (augmenting efforts by CCHDO) when automatic recovery is not possible

High-resolution CTD salinity profiles added to the World Ocean Database (WOD) since the release of WOD-2009 (not including data from CCHDO) are for pre-2001 period: 51905 profiles with 1098 from GTSPP, for 2001-2005 period: 32182 profiles with 8288 from GTSPP, for the 2006-2011 period: 65778 profiles, with 36574 from GTSPP.

NODC has recently acquired or is working on acquiring data sets relevant to the Argo CTD reference database:

- International Council for the Exploration of the Seas (ICES) – many European countries: working towards automated updates. Last update July, 2011

- Chilean Navy (CENDHOC)

- Water Cycle Capacity Building Workshop (Cartageña Colombia, Nov. 2011) – data managers from around South America

- New Zealand Ministry of Fisheries

- PIRATA maintenance cruise CTD data (AOML)

- TAO maintenance cruise CTD data (NDBC)

- Northeast Fisheries (NOAA-US): yearly updates

- South African Data Center (+Namibian data)

- …

M. Sik asked if it was possible to get CTD from Russia to feel some gaps.

Steve Diggs presented the CCHDO contribution to REF DB. He pointed out that there is lack of recent data in the Reference database, but there is also a lack of recent cruise that could make it difficult to get more data than the one that exists. To be in closer connection with the scientists that make the observation, CCHDO became the data manager of main CTD programs (DIME, Southern Ocean, GOSHIP…) and it should help to know what exist and get access to them.

He show that new data were available at CCHDO on the web but not integrated yet in the reference DB as no mechanism has been set up to warn Coriolis when new cruises are available. It was asked to Steve, Tim, Christine and Thierry to propose a process to ease data flow between the different institutes so that such event doesn't happen in future

He mentioned that the AIC www pages showing were CTD were made when deploying floats was very useful and that CCHDO will use it to contact PIS.

Finally he asked for the help of ADMT to identify the critical area and southern ocean and Indian ocean. Megan and Justin volunteered to work with Steve.

13. GADR

Charles Sun reminded the role of NODC in Argo as support to Reference Data Base and as managing the archiving function of the Argo program. All the operation at GADR are running smoothly and more and more users are retrieving the data from NODC. In 2012 NODC plans

- Continue GADR operations.

- Coordinate with GTSPP and WOD to resume quarterly new/updated data from CCHDO as soon as possible.

- Explore archiving the compressed version of Argo data files created by Argo French GDAC starting 2011/12

- Other topics (1h00)

14. All other business

14.1. Summary of the 12th ADMT actions

Sylvie and Mark have elaborated an action list from the ADMT12 discussions and the list was reviewed, actors and deadline identified as well as level of priority. It was agreed that to reach more linear accomplishment of the actions, quarterly phone meetings will be organized by the chairs in January, before AST13 and June involving mainly the DAC managers.

14.2. Change in co-chair

Mark Ignaszewski decided to step down as he couldn't dedicate enough man power to this activity. The ADMT team thanked him warmly for the work he did in the past year and welcomed Ann Gronell as a new co-chair for the ADMT.

14.3. Location of next meeting

ADMT13 will be held at INCOIS in India and ADMT14 at BODC in UK.

15. Annex 1 - Agenda

Wednesday 16thNovember

Feedback from 12th AST meeting : (30mn) Dean Roemmich
Feedback from Oxygen Workshop : (20mn C Coatanoan/V Thierry)
Status of Argo Program and link with Users (1h)
Status on the actions 1,2,3

- o *Review of the Action from last ADMT (S Pouliquen)15 mn*
- o *Argo Status* (M Belbéoch)
- o **Real-time Monitoring** : (M Belbeoch) Summary on major anomalies detected each month, Requested actions from . Trying to identify why some anomalies are not corrected.
- o **Citation Index for Argo Data** (L Rickards)

Real Time Data Management (3h30)
Status on the actions :18,19,20,22,23,24,25,26,27,28,37
- **GTS status**: 30mn
  - Timeliness of data delivery: Review evidence provided by the MEDS statistics on the timeliness of data delivery via GTS. (A Tran/M Ouellet)
  - BUFR Format : Status on the experimentation phase and comparison with GDAC data – Action 19 (M Ignaszewski)
- **Status of anomalies at GDAC** (C Coatanoan) 20mn
- **Status on Anomalies detected with Altimetry** (S Guinehut) 20mn
- **Feedback on test on Jump Test** (S Jones) - Action 23(15mn)
- **Feedback on density test improvement** (Ann Gronell- Cathy Lagadec) Action 24 (30mn)
- **Feedback on pb on Provor that report at 2047db** (Cathy Lagadec) (15mn)
- **Feedback on unpumped SST measurement** J Buck (15mn)
- **Argos System status and services for the Argo program** Y Bernard(15mn)
- **Presentation of NRT QC on Chlorophyll Argo data developed by LOV/France** (A Poteau) (20mn)

Thursday17thNovember

Pressure Correction (1h00)
  Status on the actions : 5.6.7.8.9
- **CSIRO audit of technical, meta data and pressure corrections** (Susan Wijffels/Jeff Dunn)

ARCs: provide an information on what done and what is planned (1h00)
- **Update on action from ARC meeting 2009** (C Schmid A Gronell)
- **Update on ARC progress** (ARCs leaders) 5mn each
- **Feedback from Godae QC experiment** (J Buck)

Coffee break
GDAC Services (1h30)
Status on the actions : 9,10,11,12,13,14,15,16,17
- **Feedback on actions related to GDAC (File Removal, faster RT update, delay monitoring)** (T Carval, M Ignaszewski) Actions 9,10,11,12,
- **What's new at Coriolis and US Gdacs** (T Carval, M Ignaszewski)
- **Status of Format Checking operations (D-Files checking)** (Mark Ignaszewski)- Action 14-16
- **Connection to Ocean Data Portal** (T Carval, M Ignaszewski)
- **New needs?**

12H30 Lunch

Trajectory from Argo data (1h00)
Status on the actions 46,47,48,49
- **Feedback on Trajectory Workshop** (M Scanderberg, B King)
- **Actions for ADMT?**

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 : 36,37,38,39,40,41,42,43,44,45,46
- **Status on Tech Files updates** (Actions 38,42) (A Gronell)
- **Status on Meta-Files Update:**
  - **How to store configuration changes** (C Schmid)
  - **Platform Name, Sensor,**(M Belbeoch) Actions 36,39
  - **Additional meta variables** (Esmee Vanwijk)
- **Multiple sensors and multiple axes (T Carval) Action 40,41**
- **Proposal for profile reduction for TESAC - (C Schmid)**
- **Improvement needed to be CF compliant** Action 43,44,45(T Carval, J Potemra)
- **Status on Oxygen Data resubmission** - Action 46 (all)
- **Proposal to store Chlorophyll data in Argo Format** (A Poteau)

Friday 18ᵗʰ November

Delayed mode data management (1h00)
Status on the actions 29.30.32
- **Review backlog of DMQC** (Susan Dean or Megan)
- **Sharing of regional expertise** (J Buck)
- **Discussions**
- **Updates to the Argo QC Manual (Annie)**

Progress on Argo Reference data base (1h00)
Status on the actions 34,35
- **Summary of the actions since ADMT-10 (**C Coatanoan)
- **CCHDO-progress** (S Diggs)
- **NODC progress** (T Boyer)

GADR (0h30)
Status on the action 50,51
- **Status of the Archiving centre** (C Sun)

Coffee break

Other topics (1h00)
- **Summary of the 12th ADMT actions (S Pouliquen M Ignaszewski) 30mn**
- **Change in co-chair**
- **Location of 13th ADMT**

16. Annex 2 - Attendant List

Salutation	First Name	Last Name	Organisation	country
Ms	Sylvie	Pouliquen	IFREMER	France
Mr	Justin	Buck	BODC	United Kingdom
Mr	Sam	Jones	BODC	United Kingdom
Ms	Claudia	Schmid	NOAA/AOML/PHOD	USA
Mr	Liu	Zenghong	Second Institute of Oceanography, State Oceanic Administration	China
Mr	Sun	Chaohui	Second Institute of Oceanography, State Oceanic Administration	China
Ms	Fengying	Ji	National Marine Data & Information Service	China
Mr	Moon-Sik	SUK	KORDI	Korea
Ms	Megan	Scanderbeg	Scripps Institution of Oceanography	USA
Ms	Mizuho	Hoshimoto	Japan Meteorological Agency	Japan
Ms	Kanako	Sato	JAMSTEC	Japan
Mr	Holger	Giese	BSH	Germany
Mr	Marek	Stawarz	BSH	Germany
Ms	Christine	COATANOAN	IFREMER	France
Ms	Catherine	Lagadec	IFREMER	France
Mr	TVS	Udaya Bhaskar	INCOIS	India
Mr	Thierry	CARVAL	IFREMER	France
Ms	Ann	Gronell (Thresher)	CSIRO Marine and Atmospheric Research	Australia
Mr	John	Gilson	Scripps Institution of Oceanography	USA
Ms	Steve	Diggs	Scripps Institution of Oceanography	USA
Mr	Dean	Roemmich	Scripps Institution of Oceanography	USA
Ms	Annie	Wong	University of Washington	USA
Mr	Giulio	Notarstefano	OGS	Italy
Mr	Antoine	Poteau	UPMC, Laboratoire d'Oceanographie de Villefranche (LOV)	France
Ms	Esmee	van Wijk	CSIRO Marine and Atmospheric Research	Australia
Mr	Yann	Bernard	CLS	France
Mr	Charles	Sun	NOAA	USA
Mr	Brian	King	National Oceanography Centre, Southampton	United Kingdom
Mr	michel	OLLITRAULT	IFREMER	France
Mr	Jean-Philippe	RANNOU	ALTRAN	France
Mr	James	Potemra	University of Hawaii	USA
Ms	Mark	Ignaszewski	FNMOC	USA
Mr	Taiyo	Kobayashi	JAMSTEC	Japan
Mr	Jan H.	Reissmann	BSH	Germany
Mr	Stephen	Piotrowicz	NOAA	USA
Mr	Mathieu	Ouellet	Integrated Science Data Management, Fisheries & Oceans Canada	Canada
Ms	Mathieu	Belbeoch	UNESCO (JCOMMOPS/AIC)	France
Mr	Breck	Owens	Woods Hole Oceanographic Institution	USA
Ms	Stephanie	Guinehut	CLS	France
Mr	Sang-Boom	Ryoo	NIMR/KMA	Korea
Mr	KiRyong	Kang	NIMR/KMA	Korea
Mr	Pil-Hun	Chang	NIMR/KMA	Korea
Mr	Boyeon	Kim	NFRDI	Korea

17. Annex 3 - ADMT11 Action List

PRIORITY: H: High R/ Routine L: Low
High : 8 done 5 **partially 3 postponed 2 not done**
Routine: 26 done   3 partially 4 postponed 1 not done
Low 1 done

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

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

	Action	Target Date	Responsibility	Priority	Status
25	all groups to begin using the proper method to calculate JULD for all real-time data	AST12	DAC	**H**	Done JMA Done at CLS since 01/2011 AOML done (to be checkedchecked for TesacTesac) ISDM Done BODC – on going planed Dec2011 Coriolis ongoing
26	Fix past data by using the reprocessed trajectory files by M Ollitrault to avoid reprocessing	ASAP	Dacs	**R**	Pending
27	Modify the decoders of the Provor and Nemo version to get rid of the unpumped salinity . The unpumped temperature will be provided in the near-surface additional profile	End 2010	UK, Japan and French Dac	**H**	Japan : done UK done UK – in progress France – in progress
28	Specify how to reduce sampling of high resolution profile to be sent in GTS in Tesac	AST12	Claudia & Dacs	**R**	Claudia sent a proposal end Feb
	Delayed-Mode QC Actions				
29	US-Argo to solve the Argo equivalent float DMQC issue	ADMT12	Steve P	**R**	Done for KESS A solution will be found for NAVO
30	DM-operator to contribute to the sharing regional expertise initiated by Justin	ADMT12	Voluntary DM Operators and Justin	**R**	Will be presented at ADMT12
32	Separated Argo from Argo.eq in DMQC monitoring	AST12	Megan	**R**	Done
	Reference Dataset Actions				
34	Improve the link between CCHDO, NODC and Coriolis by warning Coriolis when new CTD (public or restricted access) are made available	AST12	Steve, Tim and Christine	**R**	Improving even if CTD provided are still not numerous
35	CCHDO to contact BODC to use the POGO cruise data base as a source for the SEAHUNT tool developed by CCHDO to track where CTD have or will be made and inform on deployment opportunity	ADMT12	Steve and Lesley	**R**	Reported at ADMT12
	Format Actions				
36	Harmonize PLATFORM-NAME SENSOR in metadata files and AIC DB	Proposal by AST12	Mathieu with Esmee, John, Breck, Serge,Mizuho and Birgit	**R**	Discussion Started in August First draft should be available early September
37	DAC to finalize BUFR generation and distribution (Don't forget to warn Anh when transmission starts)	ADMT12	CSIRO KMA Coriolis	**R**	Coriolis done AOML Done(18 Oct2010)
38	Per each float type , explain the use of the pressure offset technical parameters and propose a user manual update	AST12	Ann; John and Sylvie	**R**	Done

	Action	Target Date	Responsibility	Priority	Status
39	Update metafile with new Phase definition and standardized name when available from action 36	ADMT12?	Dac	R	Waiting for 36
40	Thierry + DACS to provide multi-axis profile examples with the meta-files to assess the format specifications	AST12	Thierry with Claudia, Ann , Mizuho, Justin, Uday	H	Done on French GDAC in ifremer/argo/etc /coriolis-custom/dac/ for Multi-Axis example and metadata
41	Dac to update their float profiles when Specification validated	ADMT12	Dacs	R	Waiting for 40
42	Separate Config parameters from tech parameters files one on the 14B table	End 2010	Ann	R	Done
43	Thierry to circulate a proposal for CF updates and when validated update the user manual	AST12	Thierry to coordinate	R	Done on French GDAC in ifremer/argo/etc /coriolis-custom/dac/
44	GDAC update the past file to make them CF compliant	ADMT12	Thierry and Mark	R	Waiting for validation of 43 to implement update at US and Coriolis GDACs
45	Contact the CF and software providers to be sure they will be able to read this CF compliant format	ADMT12	Jim	R	Will be presented at ADMT12
46	Provide the Oxygen data in the agreed format V1.11 for new data (reprocessing is ASAP but lower priority)	ADMT12	AOML Coriolis CSIRO+INCOIS JMA ISDM	R	Coriolis : done, except bphase in apex v082807, v021208, v093008 ISDM done AOML done on new floats Old files to be reprocessed
	Trajectory				
46	Cls to send new position for test float to validation by voluntary PIS for feedback	Nov 2010	Yann and Voluntary SPIS	R	Done
47	Send message to DAC on anomalies that should be fixed	End 2010	Megan	R	Done
48	Megan propose to animate a working group to solve the unclear issues on cycle timing	Feedback ADMT12	Megan to coordinate	R	In progress
49	Mizuho will test it on JMA files if the Jamstec position-qc software is robust enough to be operated automatically and report on it	ADMT12	Mizuho	R	Will be presented at Traj workshop
	GADR				
50	Add the current user manual with the monthly archive	End 2010	Charles	R	Done since 12/2010
51	NODC to make clear that the Argo data made available through the repository is a translation of original Argo with information removed	End 2010	Charles	H	Done

	Action	Target Date	Responsibility	Priority	Status
	Recommendation to AST				
1	Make communication to scientific community that not all profilers are Argo or Argo equivalent but if they use Argo WMO number that they have obligation in terms of notification, data management notification in IOC resolution…	ASAP	AST cochairs	R	Done see AST12 report
2	Recommendation that mirrors of Argo dataset should use as highest fidelity as possible with the GDAC dataset	ASAP	AST cochairs	R	Done Posted on AST WWW site and next Argonautics issue

18. Annex 4 - ADMT12 Action List

PRIORITY: H: High R/ Routine L: Low

	Action	Target Date	Responsibility	Priority	Status
	Monitoring Actions				
1	Each DAC to document their process for updating the GDAC update and trace their delays	January 2012	Mathieu to coordinate with DAC help	R	
2	AIC to report to ADMT mailing list on these delay issues	AST13	Mathieu	R	
3	AIC Facilitate the reminder on pending issues	ADMT13	Mathieu	R	
4	Put a DOI on all approved Argo User Manual and Argo QC Manual	AST13	Lesley	R	
5	Set up "DAC Instruction/cookbook" to gather procedures to be applied by DACS	AST13	Thierry, Megan, Ann , Claudia	R	
	Pressure Corrections				
6	CSIO and KORDI to update their tech file with the agreed standard names	AST13	CSIO KORDI	H	
7	DACS/DM Operators to provide feedback to CSIRO after checking the anomalies identified from audit : • No null values, • No missing PRES_ADJUSTED or PRES_ADJUSTED_QC when PRES and PRES_QC exists and PRES_ADJUSTED_QC is not flagged as bad • SPO name should not change during the lifetime of the float • Fix cases when surface pressure correction varies throughout the profile • For legitimate multiple SPO names DAC to advise which parameter and method to use	ASAP and before AST13	All dacs	H	AOML: all issues in audit were resolved, changes were done if needed.

	Action	Target Date	Responsibility	Priority	Status
8	Each DAC to nominate one or more contact persons who will deal directly with in order to improve pressure correction in files and meta and tech information for pressure correction.	ASAP and before AST13	All dacs	R	
9	DACS to remove obsolete Surface Pressure Offset (SPO) parameter names from files and ensure that only agreed SPO names are used.	AST13	Concerned dacs	H	
	GDAC Actions				
10	ZIP files should be updated weekly and contained all index files. No need to zip Latest directory	ADMT13	Thierry and Mark	R	
11	Implement detailed index at US GDAC	AST13	Mark	H	
12	Create NMDIS DAC at US GDAC	December 1st 2011	Mark	H	
13	GDAC to consider accepting compressed files from DAcs	ADMT13	Thierry and Mark	L	
14	Provide DM-Checker Documentation and provide to DACs access to Checker results	First week December	Mark	H	
14	DACs to scan the anomalies detected on their files and provide feedback to Mark if false alarm	December January	All dacs	H	
16	Installation at Coriolis and turn to operation	February	Mark and Thierry	H	
17	Update File-Checker to allows 2.3 files including multi-axis data to be submitted	February	Mark	H	
	Real-time Actions				
18	Check Bulletin time (wrong time zone , or = bulletin time, or constant offset)	AST13	JMA, INCOIS, KMA	H	
19	Bad or changing instrument codes over a float life . DACs who have their floats listed in Mathieu talk to check	AST13	Coriolis,	R	
20	Start BUFR distribution	AST13	CSIRO	R	
21	Investigate why Coriolis BUFR are not seen	AST13	Mathieu and Mark	H	
22	Missing pressure levels in BUFR	AST13	CLS	H	
23	Update the QC manual for density test	December 2011	Annie	R	
24	DAC to update their density test	ADMT13	All DACs	R	
25	Study on how provide easier access to ellipse to DACs for new profile and history since 2008	AST13	Yann and Mathieu, Thierry	R	
26	Run GDAC /GTS comparison on quarterly basis	January	Mark & Mathieu O	R	
27	Provide monthly summary of OA anomalies to DACS	ADMT13	Christine	R	
28	DACs to implement the high resolution profile reduction to send them in TESAC on GTS (description in CookBook)	ADMT13	Concerned DACs	R	
29	Investigate the consistency of CNDC units and range and values	ADMT13	Thierry and Brian	R	
30	Finalize recommendation for bad data flagging for Provor floats that present the 2047db anomaly	ADMT13	Cathy	R	
	Delayed-Mode QC Actions				
31	US-Argo to investigate how to solve the Argo equivalent float DMQC issue on Navocean floats	ADMT13	Steve P	**R**	

	Reference Dataset Actions				
32	Put a clearer mechanism to improve link between CCHDO, NODC and Coriolis to faster data provision to ref DB . Document to b provided to ADMT chairs	AST13	Steve, Tim and Christine, thierry	H	
33	Work with Argo Delayed Mode to identify priorities	AST13	Steve, Megan and Justin	**R**	
34	CCHDO and the AIC to work on the compilation of meta data from CTD casts at float deployment locations for SEAHUNT.		Steve and Mathieu	**R**	
	Format Actions				
35	Tech file DACs to update their tech file after Ann audit	AST13	All DACs	H	AOML: done
36	All DACS to check the Configuration parameters names table available at the ADMT website and check that all parameters required for their float types exist with an appropriate definition, please provide feedback to		Esmee and Mathieu to coordinate	R	
37	CSIRO to update the user manual		Esmee with Thierry	R	
38	All DACS to implement new configuration scheme and populate the configuration parameters in the meta file. All floats must have at least one mission and the CONFIGURATION_MISSION_NUMBER parameter in the trajectory file must be populated for all cycles.		DACs	R	
39	AIC to work with ANDRO team to set up a system linking a decoder format id to its documentation on line.	ADMT13	AIC Esmee and Jean-Philippe	R	
40	Document multi-axis format in user manual	December 2011	Thierry	R	
41	Document CF Compliance in user manual	December 2011	Thierry	R	
42	DACS to implement multi-axis format to distribute their exotic floats	ADMT13 after February 2012	Concerned DACS at lists Coriois, BODC, AOML,	R	
43	Study how to add DOI in the Argo files attributes	ADMT13	Thierry make a recommendation	R	
44	Resubmit oxygen data in format agreed at ADMT11	AST13	CSIO, Coriolis to finish some APEX, AOML to finish some Argos floats, ISDM, INCOIS to add raw parameters	R	
45	Validate with BIO-Argo scientists unit and Parameter name pour Chlorophyll A	DMT13	Antoine & Thierry	R	
	Trajectory				
46	Update user manual to include all the changes decided at traj workshop	January 2012	Megan	H	
47	Document real time position QC test developed by JAMSTEC on traj files.in DC manual	December 2011	Annie & Kanato	R	
48	DACs to begin implementing real time position QC test developed by JAMSTEC on traj files. Record changes to qc flags in the history section	AST13	DACs	R	
49	DAC to calculate position according to the note XX of the DAC Instruction/cookbook	AST13	DACs	R	

50	DAC to implement traj2.3 format	ADMT13	DACS	H	
51	DACs to add parking PTS measurements even without times	ADMT13	DACs	H	
52	DACs to include all cycle numbers in the N_CYCLE array. If a cycle is missing, put in a fill value for all N_CYCLE variables	ADMT13	DACs	R	
53	DACs to disseminate all collected Argos locations. May require reprocessing after late messages have arrived. Takes up to 3hrs for one message to get through. Can take up to two days when errors occur at CLS with a small number of positions.	ADMT13	DACs	H	
54	DACs to put in first and last message time. Remember to carefully check that first and last messages are reprocessed after more times/positions come in. If first message also includes a position, include the first time and then the same first time with its position	ADMT13	DACs	H	
55	DACs to investigate anomalies/issues notified by ANDRO team and correct their decoders as necessary.	ASAP	DACs, ANDRO Team	H	
56	Work with ATC, CLS to find a way to capture and store the axes error ellipse for all positions as soon as possible.	ASAP	ATC, Y. Bernard, DACs	R	
57	DACs and float experts carefully review N_CYCLE timing table listing which floats transmit timings and which need to be estimated to ensure accuracy.	AST13	DACs, float expert, ANDRO team, M. Scanderbeg	R	
58	Ask float expert for each type to write up procedure of how to estimate the N_CYCLE timing variables and circulate this to all the DACs via M Scanderbeg and put these specification in the cookbook	AST13	Float expert, M. Scanderbeg	R	
59	Ask AST to contact APEX APF11 and SEABIRD METOCEAN NKE manufacturers to ask that these float cycle times be reported by the float	AST13	AST co-chairs, M. Scanderbeg, BSH Ifremer	R	
60	Continue developing traj2 file format.	ADMT13	B. King, M. Scanderbeg, others interested in traj2 format	R	
	Recommendations to AST				
61	To AST : how to document the different issues that happened to the Argo data into a document for user information : pressure correction, micro-leak…	AST13	AST Chairs	R	

19. Annex 5 - National Reports

Australian Argo National Data Management Report
ADMT12
Seoul, Korea – 16-18 November 2011
Ann Gronell Thresher (CSIRO)

Status of Array

Australian deployments in 2000-2011:
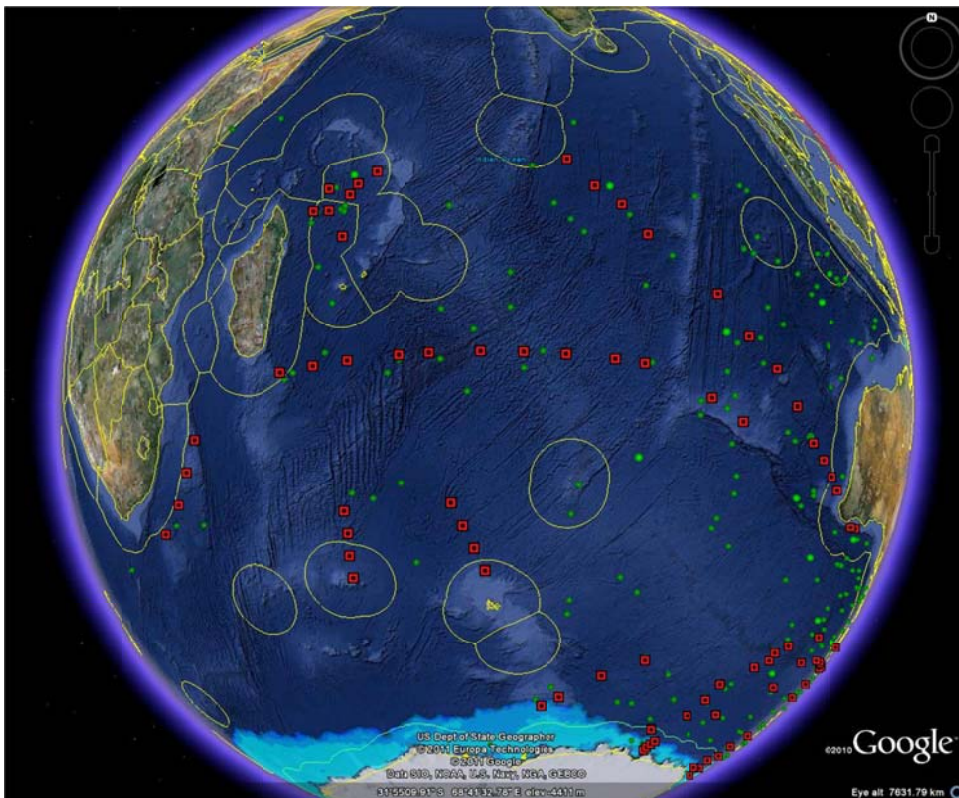
Australian Argo deployments between September 2010 and September 2011 – Indian Ocean (above), Tasman Sea, Southern Ocean and Pacific Ocean below. Red dots are new deployments, green dots are Australian floats as at 6 October 2011.
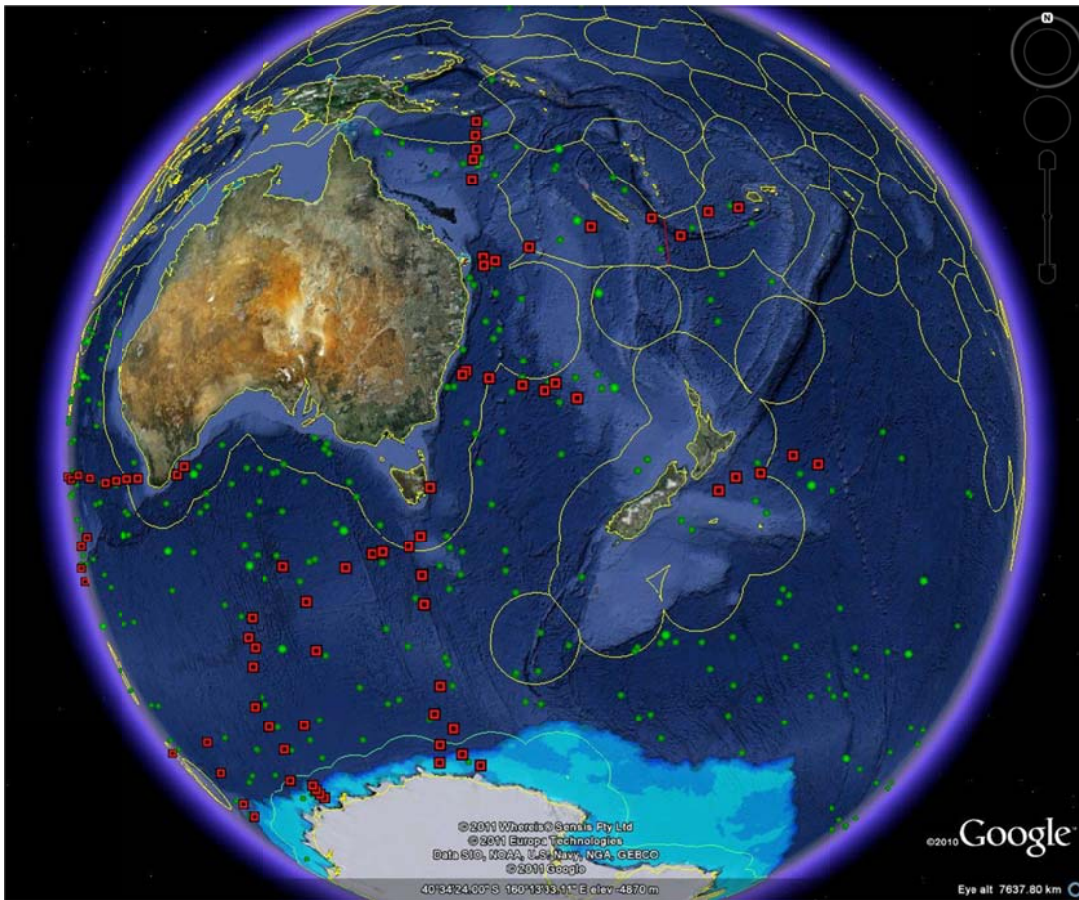
Last year was considered productive but it has been well surpassed this year. Australia has deployed 108 Argo floats since the last meeting, almost 40 more than last year. This largely clears the backlog created by the Druck microleak deployment suspension. We currently have 335 floats giving us good data from a total of 456 deployments. The better news is that we have only 30 floats still in the lab with more on ships and about to be deployed. We will be ordering a further 30 from IMOS funds, 8 from CSIRO funds and 13 from Antarctic Cooperative Research Centre funds this year. These purchases will help us to maintain float density in our region.

One major development this year was the charter of the sailing vessel *Lady Amber*. She has already deployed 36 floats and has another 25 on board for deployment in the next month. While charter costs are very reasonable, voyage lengths and area of operation are variable and weather dependent so some flexibility is needed.

Deployment plans for the floats we either have on (or about to go on) ships (cyan) or on order (pink) are shown below. We will continue to reseed the Indian Ocean and attempt to get floats into the northwest Indian Ocean when we can by working more with Navies. The Australian Navy has been very helpful, though the planning takes a long time.

Australian Deployment plans 2011-2012:
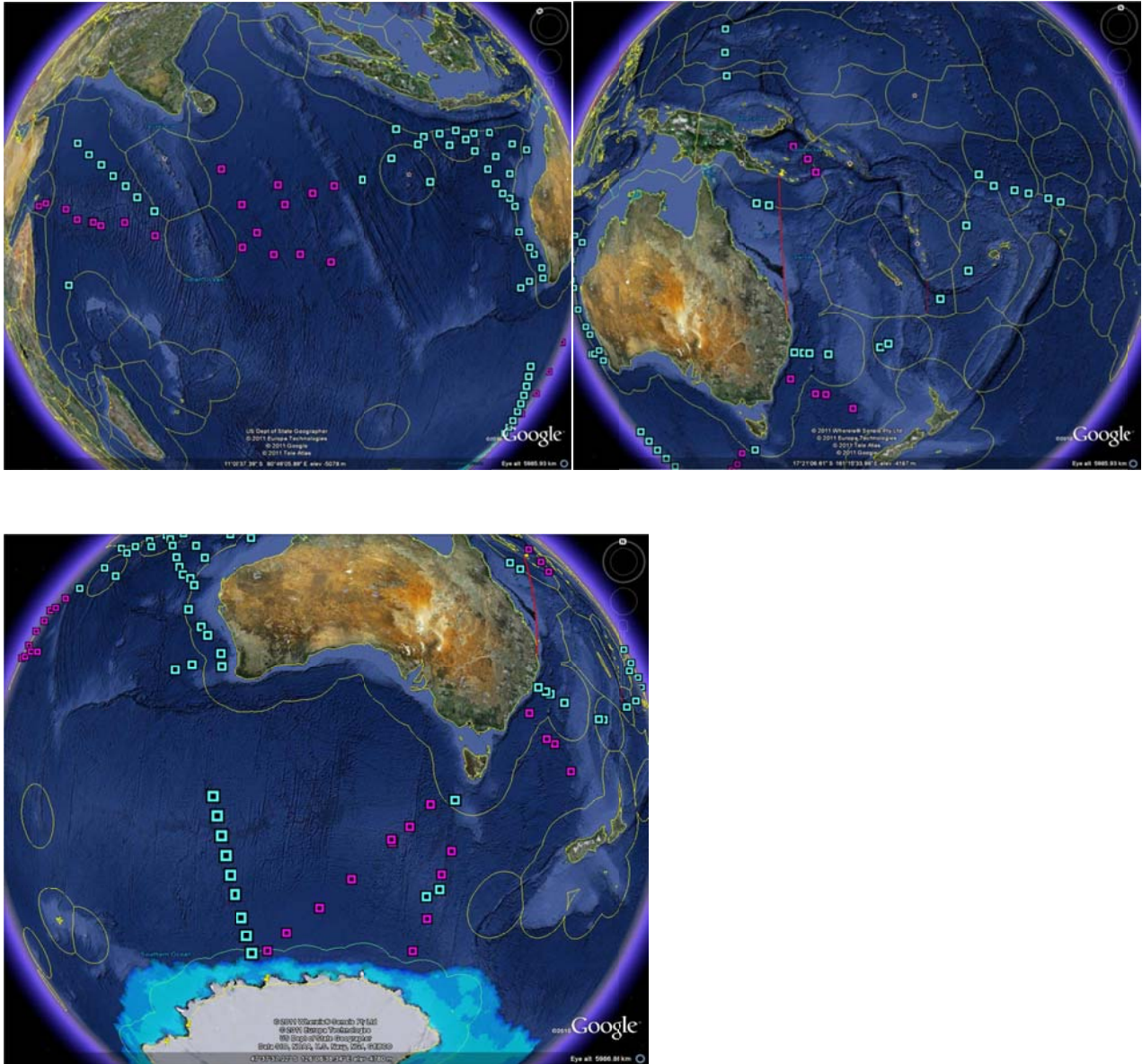
We made the decision this year to only deploy Druck pressure sensors and so some CTDs had to go back for sensor replacement. This did not delay deployments significantly. We have also made the decision to deploy only iridium-equipped floats. The increased data density and speed of communications make this system preferable for most of our deployments and maintaining an array with uniform configurations makes testing easier.

Of significance this year was the retirement of our Argo senior technician. We have replaced him and moved people around to maintain our expertise in float preparation and deployments and are very happy with our current team.

In addition, we now have floats entering the southern Atlantic Ocean – a first for us.   One has entered from the Indian Ocean, riding the Agulhas current and the other 5 have rounded Cape Horn. We have notified Argentina, as required, when these floats approached their territorial waters.

During the year, we managed to retrieve a float from Indonesia with help from a fisheries science colleague – Craig Proctor. His help was invaluable. We also now have an Argo notice in Indonesian that will be distributed by fisheries agents so hopefully we will get floats back with less trouble in the future (or they will leave them in place when they see them). We successfully collaborated with Teledyne Webb Research Corp. in retrieving a leaking Iridium float was from near the Solomon Islands. Diagnosing the source/pathway of leaks seen in some APEX/Iridium floats is the motivation for this effort (see below).

Technical Problems Encountered and Solved:
Our biggest problem this year would be apparent leaking of floats. In particular, some batches of Iridium floats seem prone to leaks, often progressing quite quickly after a period of no leaks. We have now deployed exactly 100 floats equipped with Iridium transmitters. Of the 77 deployed with more than 20 profiles, 7 have shown signs of leaking and most of these have now failed. We have set 3 of these to shallow missions to prolong their life with a hope of getting them back - one was retrieved in late October (see above).   Despite the apparent increased risk of leaks with Iridium transmitters, they allow us to return multiple park measurements as well much more highly resolved profiles with 2db resolution.

Last year, having just deployed larger numbers of Iridium equppied floats, we reported unexpectly high communications costs. Having determined the causes, we are now managing to drastically reduce these costs by reprogramming malfunctioning floats, switching to a US provider and in the future, converting to RUDICS. Both first steps have reduced our costs significantly and made the Iridium fleet more affordable. We did 'kill' one float that had communication difficulties and so was costing more than $500 a month in dropped calls. We suspect this was because of an air bladder switch failure.

We have also been having problems with the solenoid switch on the air pumps not working properly so that the valve does not shut off and does not maintain air pressure in the bladder. The problem can be identified in the lab when the bladder pressure equals the vacuum pressure. A couple of floats (5-6) have been identified with this problem during pre-deployment testing and 3 had their switches replaced in the field before they were re-loaded on a ship. Luckily, the ship had tested these floats before deployment and identified the problem. Switches on all Iridium floats in-hand were replaced with more reliable versions before deployment but we still have several in the field with clear switch failures. Though the effect on iridium floats is more severe (communications become nearly impossible), it can also affect communications for Argos floats, particularly those in the tropics.

We have had various other problems which have been caught in our lab before deployments (affecting more than 15 floats) – this is ample demonstration of the value of our thorough and cautious approach to float preparation, and a tribute to the quality of our team.

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

KORDI has begun implementing the Australian ArgoRT software package we use and has had problems with the mex-netcdf interface. We have upgraded to run on a newer version of Matlab and are continuing to diagnose and fix problems. It is not yet operational but we hope to have it done shortly.

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

Data Acquisition and delivery to the GDACs and GTS:
Data processing has basically not changed. Data is acquired from the floats within a day of delivery to either Argos or to us via Iridium. It is then processed twice – once as soon as practical, then again in 2 days to ensure we have the maximum number of reports and the best possible message. After passing through the real-time QC, all netcdf files are generated and the data is then sent via FTP to both GDACs. Our processing is mirrored at BOM so each file is delivered 4 times in total, ensuring that the GDACs have the data if either CSIRO or BOM are offline for some reason. Problems this year appear to have been minimal.

The data is also issued to the GTS via TESAC messages immediately.
BUFR messages are not currently being generated for unknown reasons, though the Bureau does now have the ability to submit this data to the GTS. As soon as the file generation issue is fixed, BUFR messages will begin appearing on the GTS.

Over the 12 months to May 2011, approximately 85-90% of all profiles were delivered to the GTS within 24 hours of the float surface time. This value is estimated from the ISDM Global Data Management Information plots, as the Bureau's internal monitoring routines have not been functional since 2008. (The ISDM plot hasn't been updated beyond May 2011 yet, so we can't give more recent data). The worst results were around January 2011 for unknown reasons. In this month, only 50% of our TESACs made it to the GTS on time. This seems to happen when we are deploying large numbers of floats and/or either Lisa Krummel (nee Cowen) or I are away for any period of time.

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

Additional Data Distribution:

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

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

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

Float Performance:

Float performance has been excellent this year with several floats exceeding 9 years of operation. We have, however, had 4 failures on deployment. Because these floats disappeared immediately, the reason for failure is unknown. Three floats have now been confirmed with the Druck microleak fault and another 9 are suspected of having microleaking pressure sensors but they are in the early stages. The suspect microleakers are all APF9 floats so we can monitor the progress of these – we also have quite a few TNDP floats (APF8s) that may eventually become obvious microleakers.

Of the 455 floats we have deployed, 101 have now been declared 'dead'. There are another 29 on the missing list but most of these are under ice. Of the dead floats, 23% ceased to operate due to natural causes when they ran down their battery packs. A further 16% died due to unknown reasons. The remainder of floats ceased to operate prematurely mainly due to environmental reasons such as grounding (21%) and loss or damage under sea ice (8%). Other contributing factors were hardware failures such as communications problems, CTD/pressure sensor damage or fault and leakage (16%); software issues such as firmware bugs (7%) or human error (e.g. turning on the float too early resulting in buoyancy problems and subsequent loss, picked up by fisherman or deployed in the plastic bag (7%).

Web Pages:

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

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

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

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

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

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

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

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

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

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

Please see Appendix A for a list of how Argo data is being used in Australia.

Delayed Mode QC (DMQC):

Australian DM Statistics (current at 16/10/2011)

D files submitted to GDAC	31632
Total R files	16475
R files eligible for DMQC	5839
Total eligible files for DMQC	37471
Total files at GDAC	48107

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

The Australian Argo array continues to grow rapidly with more than a hundred floats deployed over the past year. A total of 456 floats have been deployed since the beginning of the Argo program and of these, 335 floats are still operational and giving us good data. As at 16/10/2011, 84% of eligible profiles (those that are greater than 6 months old) have been processed in delayed mode quality control.

The re-write of the DMQC processing software is now largely complete and the integration of the SIO GIO and OW software is fully implemented. The next 12 months will see effort focusing on incorporating new formats, variables and multi-profile files into the DM process as well as trajectory files, oxygen data and delivery of Argo products.

A total of 341 floats have been assessed through the DMQC process for drift of the salinity sensor. Of these, 7 floats (2 %) returned no data from deployment and 8 floats (3 %) returned bad data for the entire record due to pressure sensor issues or other hardware problems. Of the remaining 326 assessable floats, 269 (79 %) show no salinity drift for the life of the float. A further 34 or 10% of floats show a positive salinity drift. A small number of floats (8 instruments or 2 %) are affected by a fresh offset or biofouling. Of the floats that are either salt or fresh offset, most were corrected using the OW salinity drift correction. 15 floats (5 %) suffered from TBTO fouling at the start of the record, generally only the first or second profiles but in some cases up to 7 profiles.

From a total of 190 APEX floats with APF 8 controller boards and Druck pressure sensors, 49 (26%) were truncated negative pressure drifting (TNPD). Three floats have been confirmed as Druck microleakers (5901649, 5901689, 5901704); two of these were APF9's and one TNPD APF8. The Druck pressure sensor serial numbers on all 3 confirmed DML floats were all greater than 2324175. All three of these floats showed rapid gross pressure drift (-10 db within 18 and 23 cycles for the two APF9 floats respectively) and severely anomalous TS data within 20 to 30 cycles. We suspect several more floats from our fleet will develop DML symptoms in the near term as we have a further 9 floats that are suspected microleakers but we require more time before we can confirm this.

The Argo Australia web pages have been updated recently 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, these are available at: http://www.cmar.csiro.au/argo/dmqc/html/Argo_DM.html

Appendix A.

The following table shows some of the uses to which Argo data is put within Australia.

Project Title	Institution	Principal Investigators
Australian Climate Change Science Program: Ocean Processes and Change	Department of Climate Change and Energy Efficiency, Commonwealth Scientific Industrial Research Organisation	Steve Rintoul, Susan Wijffels, Bernadette Sloyan
Australian Climate Change Science Program: Sea Level Rise	Department of Climate Change and Energy Efficiency, Commonwealth Scientific Industrial Research Organisation	John Church, Susan Wijffels
Climate Variability and Change Program	Centre for Australian Weather and Climate Research , Antarctic Climate and Ecosystems Cooperative Research Centre	Steve Rintoul
Sea Level Rise Program	Centre for Australian Weather and Climate Research , Antarctic Climate and Ecosystems Cooperative Research Centre	John Church
Ocean Control of Carbon Dioxide Oceans Change Program	Antarctic Climate and Ecosystems Cooperative Research Centre	Tom Trull
Pacific Climate Change Science Program; Oceans Component - Ocean change, variability and sea level rise	Department of Climate Change and Energy Efficiency, Commonwealth Scientific Industrial Research Organisation, Centre for Australian Weather and Climate Research , University of New South Wales	John Church, Susan Wijffels, Jaci Brown, Alexander Gupta
POAMA development: improving seasonal climate forecasting for Australia	Bureau of Meteorology	Oscar Alves, Harry Hendon
WAMSI Node 1: Southwest Australia marine ecosystem	Commonwealth Scientific Industrial Research Organisation, University of Western Australia	John Keesing, Ming Feng, D Slawinski
Modeling of source-sink relation of western rock lobster recruitment	Fisheries Research & Development Corporation	N Caputi, Ming Feng, E Weller
BlueLink II/III - ocean forecasting for Australia - Bluelink Global Program (OFAM, BRAN, OceanMaps) - Bluelink Regional Program (ROAM, CLAM)	Centre for Australian Weather and Climate Research, Bureau of Meteorology	Helen Beggs, G Brassington, D Griffin, P Oke, Eric Schulz

- Bluelink Littoral Zone Program The global and regional components use Argo explicitly. These components of Bluelink use IMOS data in different ways.		
Research program: Mechanisms and attribution of past and future ocean circulation change	ARC Centre of Excellence for Climate System Science	Professor Nathaniel Bindoff (University of Tasmania); Dr Andrew Hogg (ANU);Professor Matthew England (UNSW);Dr Dietmar Dommenget (Monash University);Professor David Karoly (University of Melbourne);Dr Peter Strutton (University of Tasmania);Dr Richard Matear (CAWCR-CSIRO);Dr Anthony Hirst (CAWCR-CSIRO);Dr Scott Power (CAWCR-BoM);Dr Stephen Griffies (Geophysical Fluid Dynamics Laboratory, USA)
ARC Future Fellowship: Southern Ocean productivity and CO2 exchange under current and future climate regimes.	University of Tasmania	Peter Strutton
Environmental factors affecting the low puerulus settlements	FRDC	Caputi and Feng,
Mixing parameters in the Southern Ocean determined by inverse methods		Andrew Meijers OCE Postdoc, co-supervised by Trevor McDougall and Bernadette Sloyan
Ocean circulation and mixing from inverse methods		Sjoerd Groeskamp, PhD student, co-supervised by Trevor McDougall and Bernadette Sloyan

Postgraduate research projects using Argo data

Degree Type	Degree Title	Student	Institution
Doctor of Philosophy (Phd)	Ocean Salinities and Changes to the Hydrological Cycle	D Abecasis	University of Tasmania, Commonwealth Scientific Industrial Research Organisation
Doctor of Philosophy (Phd)	Decadal Variability in the Indo-Pacific	Mauro Vargas	University of Tasmania, Commonwealth Scientific Industrial Research Organisation
Doctor of Philosophy (Phd)	Southern Ocean Overturning	Amelie Meyer	University of Tasmania, Commonwealth Scientific Industrial Research Organisation
Doctor of Philosophy (Phd)	Intraseasonal Variability in the Indian Ocean	K Drushka	Scripps Institution of Oceanography, Commonwealth Scientific Industrial Research Organisation
PhD	Phytoplankton Variability in the Southern Ocean South of Australia	Robert Johnson	UTas
Doctor of Philosophy (Phd)	An Operational Circulation Forecast System for Jervis Bay, NSW	Donghui Jiang	ADFA
Doctor of Philosophy (Phd)	Evaluating the Potential Economic Benefits from Regional Ocean Observing System to the Australian East Coastal Areas	Fan Zhang	ADFA
Doctor of Philosophy (PhD)	Predicting the Ocean Mesoscale Dynamics in the Australian Region	R. Woodham	UNSW at ADFA
Doctor of Philosophy (PhD)	Modelling Dynamics of the East Australian Current and The Subtropical Mode Water off East Coast of Australia	Vihang Bhatt	UNSW at ADFA
Doctor of Philosophy (Phd)	Numerical modelling of Tasman Sea eddy field	Helen Macdonald	UNSW
Doctor of Philosophy (Phd)	Argo data in the Coral Sea...	Jasmine Jaffres	JCU
Doctor of Philosophy (Phd)	The Kinematics of Ocean Salinity Changes	Veronique Lago	QMS at UTas

<p align="center">**Argo Canada National Data Management Report**</p>
<p align="center">**ADMT12**</p>
<p align="center">**Oct 27, 2011**</p>

1. Status

Data acquired from floats: We are currently tracking 143 floats. For the period 2010-09-01 to 2011-08-31, we deployed a total of 17 floats with APF9A controllers.

Data issued to GTS: All data are issued to the GTS in TESAC and BUFR format. On average, 75% of data were issued on the GTS within 24 hours in TESAC and BUFR for the 12 months period from September 2010 to August 2011.

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.

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 8850 eligible cycles (files) from 63 floats were quality-controlled or re-quality-controlled for salinity (using OW software and according to the manual) and quality-controlled for pressure (according to the manual) and sent to the GDAC from November 2010 to October 2011.

Web pages:

http://www.meds-sdmm.dfo-mpo.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 and point directly to the GDACs. 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.htm

Real-time Argo data (GTS) are also ingested, along with other data streams (PIRATA and TAO arrays, XBTs, various TESACs from CTD profiles, animal-borne sensors), in an optimally interpolated product generated at ISDM using ISAS-v4.1 analysis tool (developed at IFREMER). The fields are then used to identify, in real-time, profiles that either show suspicious deviation from climatology and/or neighbours. Those profiles are re-QCed. Some defective Argo profiles are identified this way and flagged accordingly.

Delayed Mode QC

As of October 2011, 40% of all eligible floats, active and inactive, had their profiles visually quality controlled and adjusted at least once for pressure and salinity, following the latest delayed-mode procedures. The salinity component of DMQC had been performed on 70% of eligible cycles. The visual inspection of every cycle from inactive floats who had never been inspected, or whose reviewed RAW flags had not been saved following such an inspection, is the most time consuming step in the process.

2. GDAC functions

Canada aggregates, decodes, quality controls and forwards TESAC data received from 4 different GTS nodes to the GDAC in Brest and to US-NODC three times a week.

3. Region Centre Functions

Canada has no regional centre function.

Chinese Argo National Data Management Report
ADMT-12, Korea

1. Status

From Oct. 2010 to Oct. 2011, China deployed 42 Argo floats in the Northwestern Pacific Ocean, 3 of them failed to transmit t measurements or work normally. Of these active floats, 10 are ARVOR, 4 are PROVORs and the remaining are APEX floats. Until now, China has deployed 124 Argo floats, of these floats 72 are still working. We have 11 APEX iridium floats working in the ocean including 2 Oxygen floats, and the remaining floats including 2 Oxygen floats transmitted data using Argos satellites.

China received Argos messages from72 floats and produced 1800 profiles through Oct. 2010- Oct. 2011. After RT QC, all the data except ARVOR floats' have been delivered to GDACs and put into the dictionaries named 'nmdis' and 'csio'. Besides this, Coriolis DAC has helped us to decode Argos messages from 10 new ARVOR floats and put R-files into 'csio' directory since Sep., 2011. All measurements from iridium APEX floats were delivered to our ftp server by CLS America, after that we decoded the high resolution CTD measurements and submitted R-files into GDACs. With CLS's help, all the China Argo data are distributed through GTS.

In July of 2011, China updated our Delayed Mode QC software, and submitted 4355 D-files into GDACs which accounts for about 90% of the submitted profiles.

China provides access to the global Argo profiles data, meta data, trajectory data and deployment information from the daily updatedArgo Database. The users are able to access to the data conveniently on the website including netCDF raw data, near real-time data, meta data, trajectory data, delayed-mode data and download Argo data via FTP. In order to expand the usage of Argo data, China has set up an Argo trajectory data quality control system, which can eliminate abnormal location data. Based on J.J. Parker method, China also provides the global monthly averaged surface current and mid depth current

maps derived from good Argo trajectory data. Besides these, many products of Argo data, such as waterfall maps, Argo trajectory maps are also provided. All products and China Argo Project related information are distributed on the websites: http://www.argo.gov.cn and http://www.argo.org.cn.   Global Argo data can be downloaded from ftp sites ftp.argo.gov.cn and ftp.argo.org.cn/pub/ARGO/global/.

Argo data has been widely used in operational models, ocean data assimilation in China. National Marine Data & Information Service produced a 23-year regional reanalysis product (CORA) of temperature, salinity and currents for the China coastal waters and adjacent seas using SSHA and various temperature, salinity profiles including Argo data. The products can be downloaded freely from the web site: http://www.cora.net.cn. Argo data has also been used in an ocean reanalysis system for the joining area of Asia and Indian-Pacific ocean at Institute of Atmospheric Physics, Chinese Academy of Sciences. Additionally, some Argo gridded temperature and salinity fields of global ocean or Pacific ocean have been produced which can be accessed at China Argo Real-time data centre's website. Argo data is widely used in scientific applications involving ocean water mass, ocean circulation, ocean responses to the tropical cyclones and variations in ocean heat content.

2. Delayed Mode QC

In July of 2011, China started to implement surface pressure correction in DMQC. After surface pressure correction, CTM correction and OW were applied. At the same time, 27 TNPD APEX floats' <PARAM>_ADJUSTED_QC, <PARAM>_ADJUS-TED _ ERROR were corrected. One difficulty during DMQC is lack of historical CTD data in marginal seas where some floats drifted into. The large variability of salinity in Kuroshio is another difficulty we encountered. Due to lack of manpower, we expect to finish DMQC work for all the active floats in half a year.

Argo data management report 2011
Coriolis DAC & GDAC

Data Assembly Centre and Global Data Assembly Centre
Annual report September 2010 - October 2011
Version 1.0
November 7th, 2011
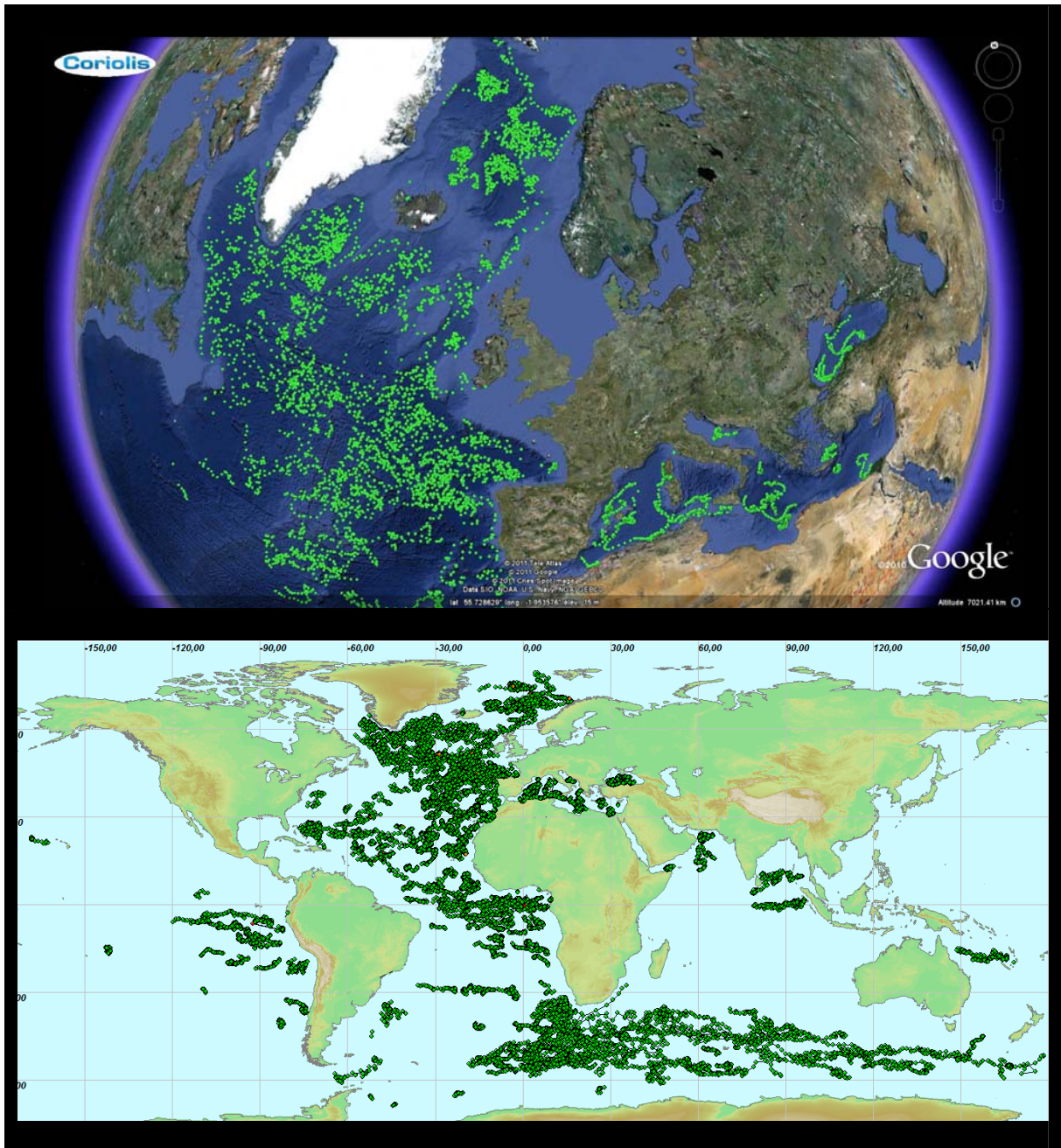
Maps of the 15 590 profiles from 502 floats managed by Coriolis DAC this current year.

Status

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

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

This report covers the activity of Coriolis data centre for a one year period from September 1st 2010 to September 30th 2011.

Data acquired from floats

These last 12 months[1], a total of 15 590 profiles from 502 floats where collected, controlled and distributed.

The 502 floats managed during that period had 36 versions of data format:

- APEX: 22 versions
- NEMO: 2 versions
- PROVOR-Arvor: 12 versions
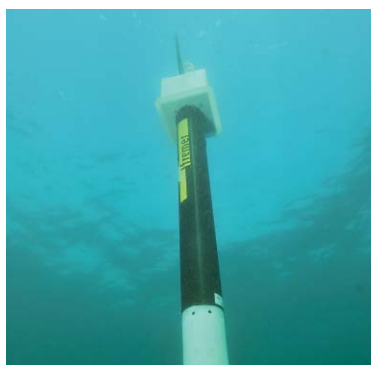
Arvor: a new type of float with Argos 3 telecommunication.
In 2011, among 36 versions of floats, a new type of Arvor float with Argos3 telecommunication was processed. Its high speed data transmission allows short surface times, interesting for deployments in marginal seas such as Adriatic.

This new autonomous oceanographic profiling float has the same main characteristics and metrology than Provor. Lighter, cheaper, it is devoted to temperature and salinity measurements for Argo applications.
Its design has been performed by IFREMER and it is manufactured by NKE.
Arvor float can perform more than 200 cycles from 2000 meters depth to the surface (CTD pump in continuous mode).
It is deployable by only one person, with wireless connectivity using Bluetooth.

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[1] From September 2010 to October 2011

Argo data management   Coriolis DAC & GDAC report 2011

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.
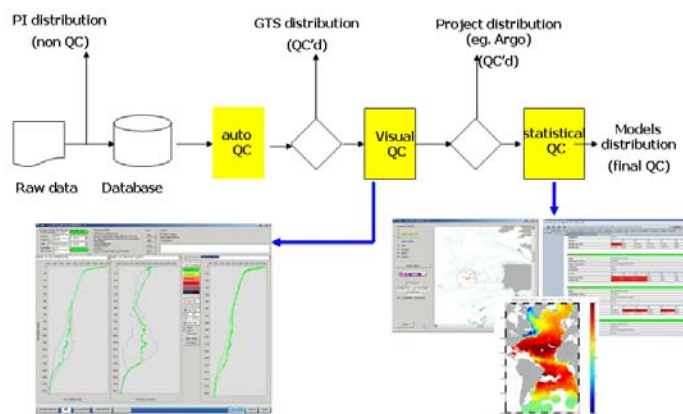
CORIOLIS DAC: Argo data flow

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.

Data issued for delayed QC

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

Delayed mode data sent to GDACs

An Argo delayed mode profile contains a calibrated salinity profile (psal_adjusted parameter).
A total of 18 112 new delayed mode profiles where sent to GDACs this year.
The number of delayed mode profiles increased by 28%.
A total of 82 113 delayed 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
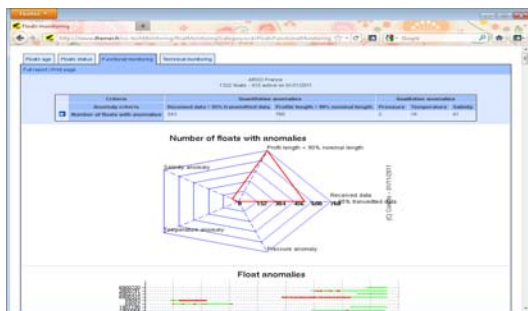
Example 1: technical monitoring of Argo-France floats
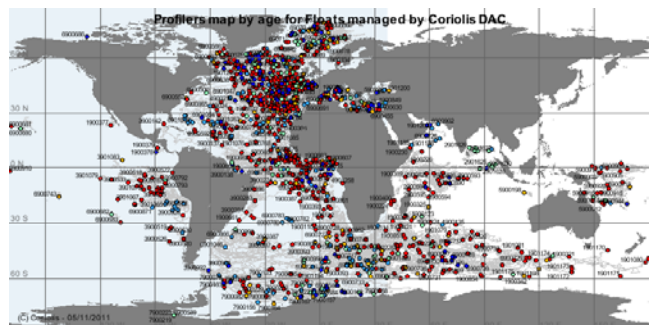
Example 2: age map of floats managed by Coriolis DAC.

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.

Argo data management   Coriolis DAC & GDAC report 2011

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

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

Argo projects: this year, Coriolis data centre performed float data management for 30 Argo scientific projects and 41 PIs (Principal Investigators).

List of Principal Investigators in 2011	
Alain SERPETTE	Jianqing Zhou
Andreas STERL	Jose Luis PELEGRI
Antoine POTEAU	Juergen FISCHER
B. Klein	Juliet HERMES
Bernard BOURLES	K.P. Koltermann
Bert RUDELS	Kjell Arne MORK
Birgit KLEIN	Louis PRIEUR
C. PROVOST et N. BARRE	Olaf KLATT
C.Maes	PASCUAL Ananda
Christine COATANOAN	Pierre Marie POULAIN
Detlef QUADFASEL	Rena CZESCHEL
Osvaldo ULLOA	Sabrina SPEICH et Michel ARHAN
Fabien ROQUET	Serge LE RESTE
Frederic VIVIER	Sunke Schmidtko
Gerard ELDIN	VELEZ BELCHI Pedro Joaquin
Gerasimos KORRES	Violeta SLABAKOVA
Gilles Reverdin	Virginie THIERRY
Gregorio PARRILLA	Xavier ANDRE
Holger GIESE	Xavier CARTON
Isabelle TAUPIER-LEPAGE	Yves GOURIOU
Jens SCHIMANSKI	

List of 2011 scientific projects		
ARGO SPAIN	CONGAS	IFM2
ARGO_AWI	CORIOLIS	MEDARGO
ARGO_BUL	CORIOLIS_OVIDE	MEDARGO_IT
ARGO_CHILE	Coriolis	MFSTEP
ARGO_FIN	DAP	OVIDE
ARGO_NORWA	EGYPT	PROSAT
ARGO_SPAIN	FLOPS	SHOM
ASA	GOODHOPE	TRACK
BIOArgo	IFM	TRACK2010
BSH	IFM-GEOMAR	WEN

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).
This year, 9 394 new oxygen profiles from 255 floats were distributed.
A total of 44 128 oxygen profiles from 379 floats were distributed since 2004.
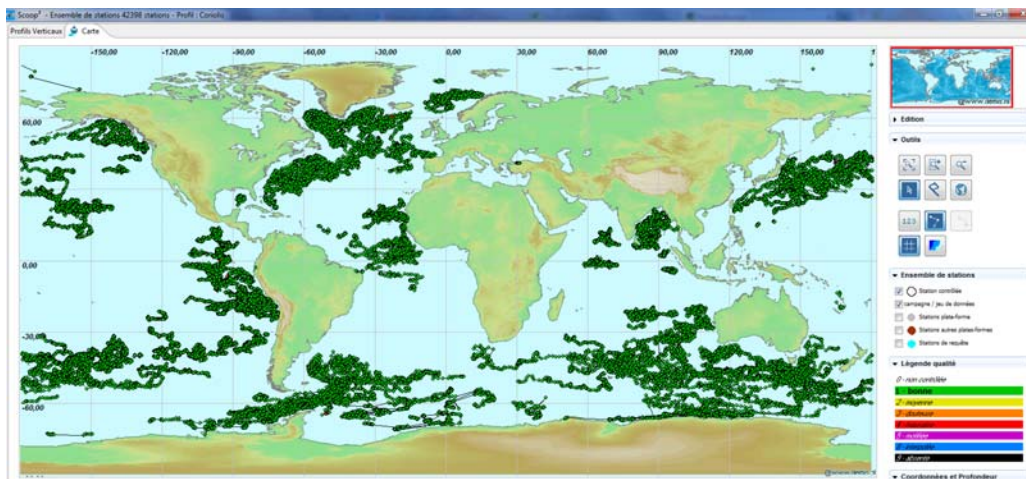
Oxygen profiles collected by all Argo partners since 2004.

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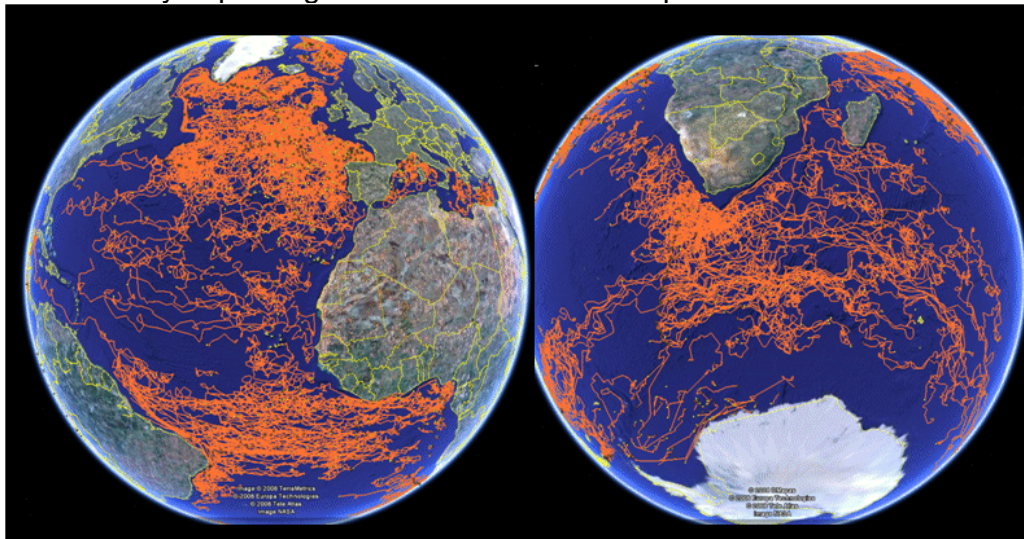
Argo trajectories from Coriolis DAC are carefully scrutinized to produce the "Andro" atlas of deep ocean currents.

Delayed Mode QC

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

At the Coriolis data centre, we process the delayed mode quality control following four steps. Before running the OW method, we check carefully the metadata files, the pressure offset, the quality control done in real time and we compare with neighbor profiles to check if a drift or offset could be easily detected. As last 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 have largely improved the amount of delayed mode profiles.

For a few projects, there are still no identified operators to do DMQC, for instance the first run has been done by students which have now left institutes or are not available to carry on with this work. For floats which are German floats (AWI), we found a new operator to run the DMQC. Nevertheless we have made progress with BSH and some floats have been processed in DMQC or are in progress (we are finalizing delayed mode QC for some floats). Only a few projects are still waiting for PI's answers.
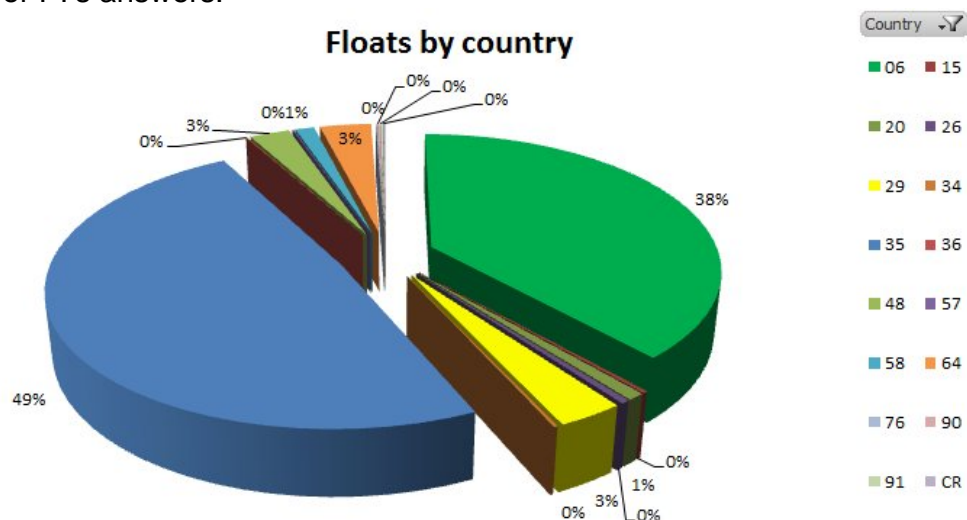
Pourcent of floats by country in the Coriolis DAC.
Codes for the countries: 06 : Germany - 15 : Bulgaria - 20 : Chili – 26 : Denmark – 29 : Spain – 34 : Finland - 35 : France – 36 : Greece - 48 : Italy – 57 : Mexico - 58 : Norway – 64 : Netherlands – 90 : Russia – CR : Costa Rica

Argo data management   Coriolis DAC & GDAC report 2011

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

During the last year, 18112 new delayed mode profiles where produced and validated by PIs. A total of 82113 delayed mode profiles where produced and validated since 2005.

Evolution of the DM profiles' submission versus dates
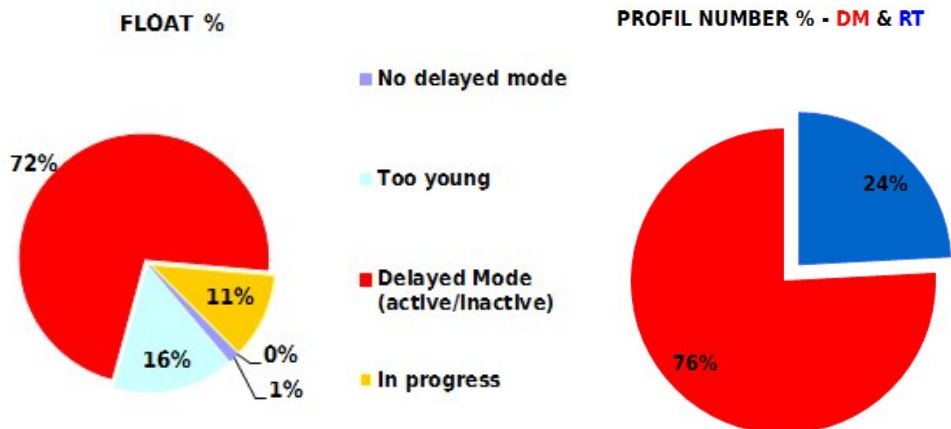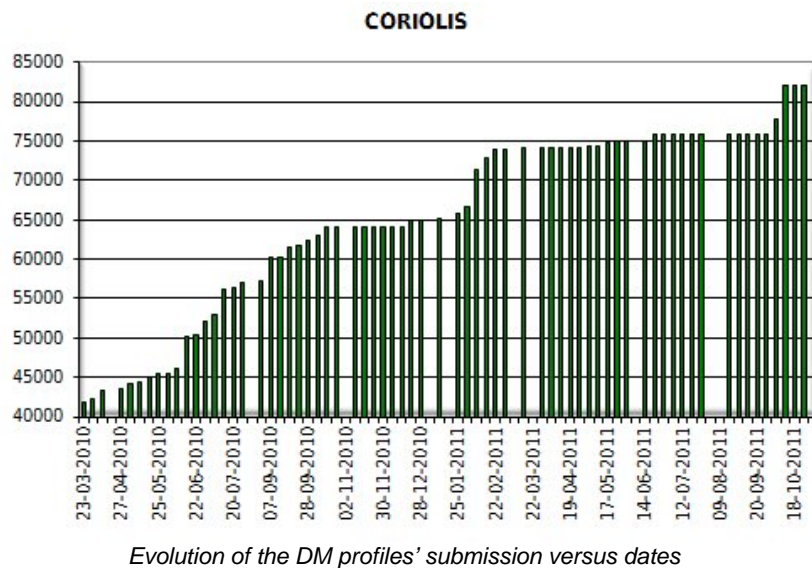
Status of the floats processed by Coriolis DAC. Left: in terms of float percent and right: in terms of profile percent (DM : delayed mode – RT : real time).

The status of the quality control done on the Coriolis floats is presented in the following plot. For the two last years (2010-2011), most of the floats are still too young (code 1) to be performed in delayed mode. The codes 2 and 3 show the delayed mode profiles for respectively active and dead floats.
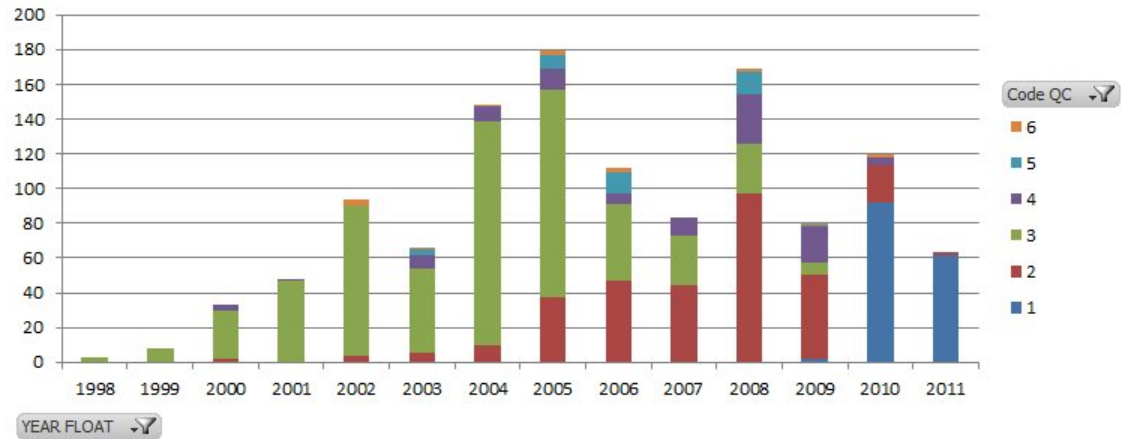
Status of the quality control done on profiles sorted by launch's year, code 1: young float, code 2: active float, DM done, code 3 : dead float, DM done; code 4 : DM in progress, code 5 : waiting for DM, code 6 : problems with float.

Reference database

The version CTD_for_DMQC_2010V2 is available since April 2011. A new version CTD_for_DMQC_2011V2 is on line since October 2011. This last database takes into account feedbacks from users about duplicate or invalid pair, and bug in position of some stations in not appropriate boxes. A next version will be available for February 2012, some new CTD provided by the updates of WOD2009 will be integrated as well as new CTD provided by PIs (CSIRO, few CTD from CCHDO).
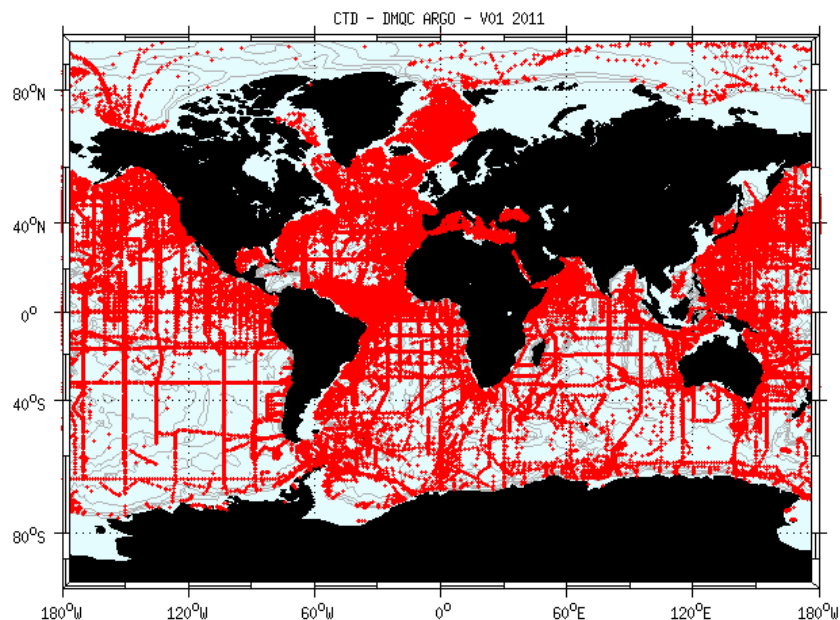
Example of delayed mode activity

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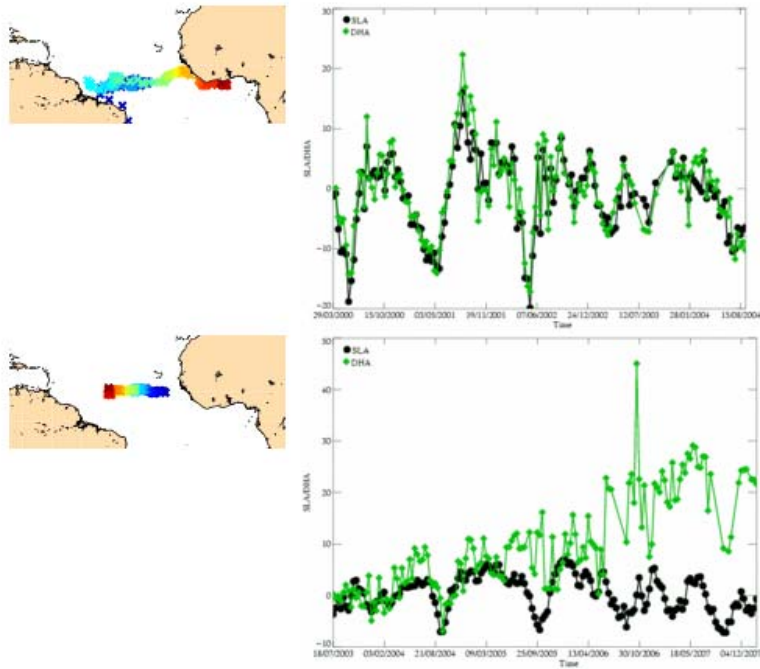
GDAC Functions

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

National centres reporting to you
Currently, 11 national DACs submit regularly data to the French GDAC.
A new Chinese DAC was setup in 2011 : NMDIS : National Marine Data and Information Service, Tianjin.

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 November 3rd, the following files were available from the GDAC FTP site.

DAC	metadata files	increase from last year	profile files	increase from last year	delayed mode profile files	increase from last year	trajectory files	increase from last year
AOML	3 938	14%	460 192	19%	322 179	18%	3 821	14%
BODC	348	9%	32 216	16%	30 329	14%	329	10%
Coriolis	1 327	15%	110 233	17%	82 487	28%	1 241	14%
CSIO	100	61%	5 631	32%	4 879	48%	99	60%
CSIRO	466	37%	49 248	44%	31 631	19%	460	37%
INCOIS	237	29%	28 374	15%	20 738	2%	237	29%
JMA	1 072	14%	115 274	14%	76 128	13%	1 052	29%
KMA	147	4%	13 473	18%	9 982	19%	131	7%
KORDI	119	3%	11 590	14%	0	-	119	3%
MEDS	317	6%	32 132	16%	22 300	26%	311	6%
NMDIS	15	-	658	-	0	-	15	-
Total	8 086	15%	859 021	19%	600 653	19%	7 815	18%

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

There is a monthly average of 345 unique visitors, performing 3 981 sessions and downloading 550 gigabytes.
There is a strong increase on the ftp server bandwidth during the last 3 months.

ARGO GDAC FTP statistics		number of visits	hits	bandwidth GB
month	unique visitor			
10/2010	215	2 084	1 754 378	402
11/2010	192	1 687	766 873	347
12/2010	166	1 494	902 183	339
01/2011	149	1 318	1 785 207	523
02/2011	153	1 333	2 117 806	299
03/2011	338	3 420	1 439 574	263
04/2011	413	11 882	2 496 235	481
05/2011	574	10 016	2 002 734	498
06/2011	670	4 587	1 689 315	460
07/2011	509	4 247	2 597 451	649
08/2011	506	3 693	3 208 683	978
09/2011	253	2 012	1 781 930	1367
Average	**345**	**3 981**	**1 878 531**	**550**

ARGO GDAC, FTP statistics 2010-2011

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

ARGO GDAC web statistics					
month	unique visitor	visits	pages	hits2	bandwidth MO
10/2010	384	820	2 533	11 069	283
11/2010	354	655	2 483	10 490	209
12/2010	330	652	2 795	10 158	503
01/2011	336	601	2 271	8 938	254
02/2011	745	992	2 273	8 518	231
03/2011	602	866	3 486	12 959	293
04/2011	330	594	5 838	13 047	216
05/2011	325	526	5 844	11 705	276
06/2011	398	627	5 519	10 932	199
07/2011	371	664	5 622	10 711	146
08/2011	379	764	6 348	12 910	258
09/2011	516	939	6 527	15 117	289
Average	**423**	**725**	**4 295**	**11 380**	**263**
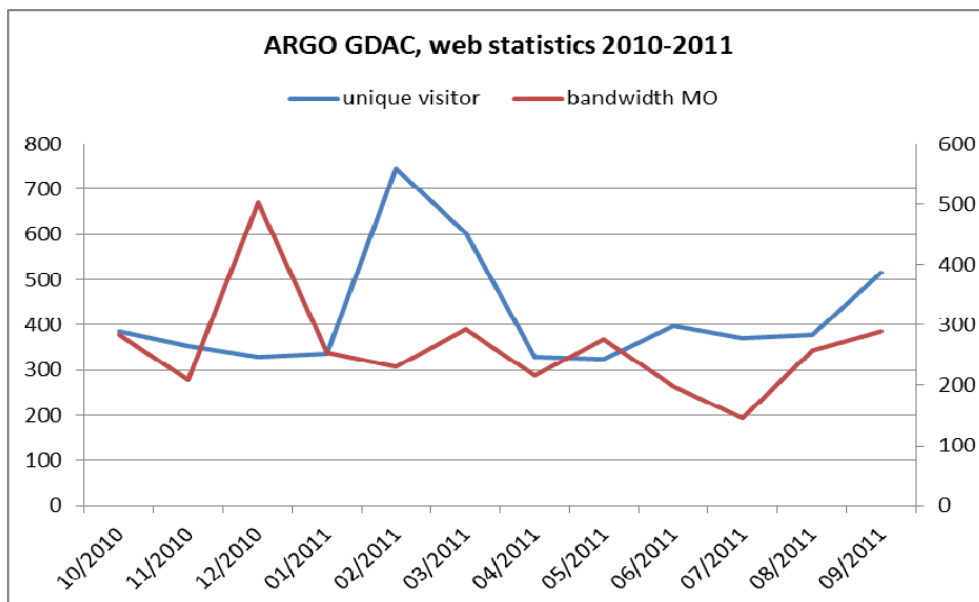
Data synchronization
The synchronization with US-Godae server is performed once a day.
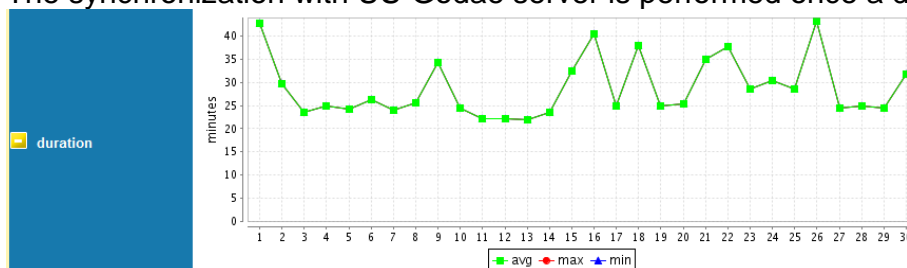
Example of synchronization monitoring: duration of the process in June 2010

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.
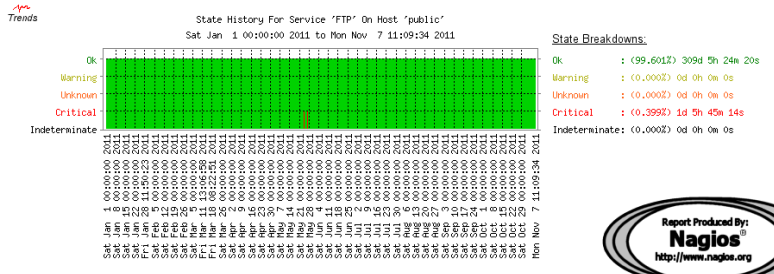
Nagios monitoring: between January and November 2011

The ftp server was **available for 99,6%** of the time.

The 0.4% of failure represents **1 day, 5 hours and 45 minutes**.

Most of the problems occurred between May 21st and May 28th, related to electrical supply problems.
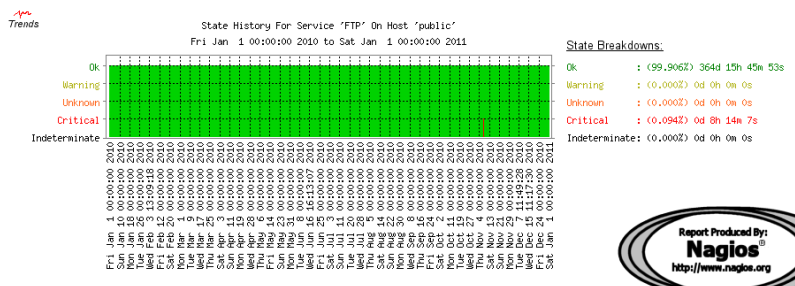
Nagios monitoring: between January and December 2010

The ftp server was **available for 99,9%** of the time.

The 0.4% of failure represents **8 hours and 14 minutes**.

Most of the problems occurred in November 2010, also related to electrical supply problem.
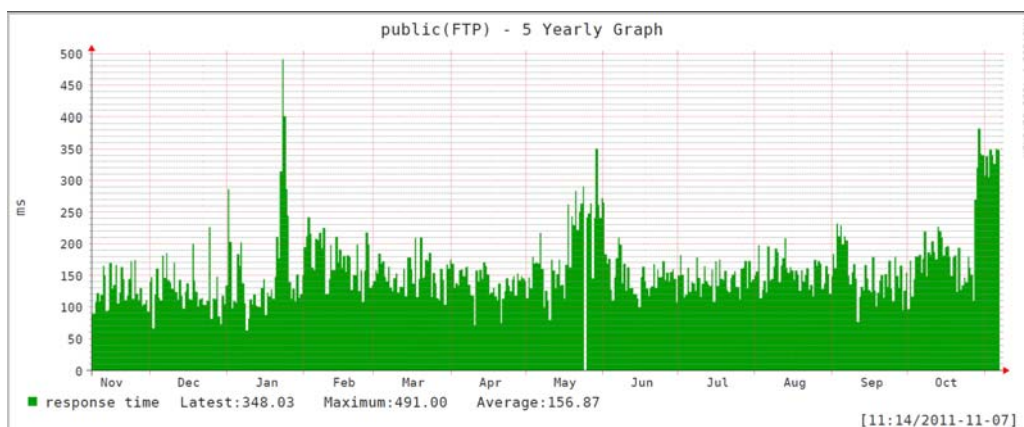
Nagios monitoring: duration of a test file download

Since October 2011, the ftp server is under pressure, the response time increased twofold. This recent problem should be fixed with a new ftp server.

Argo data management   Coriolis DAC & GDAC report 2011

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 1181 entries (November 3rd 2011), compared to 1229 entries one year ago.

Statistics of Argo data usage: Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …
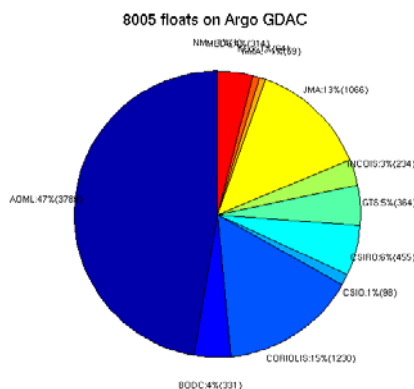
Argo GDAC : floats distribution per DAC in October 2011
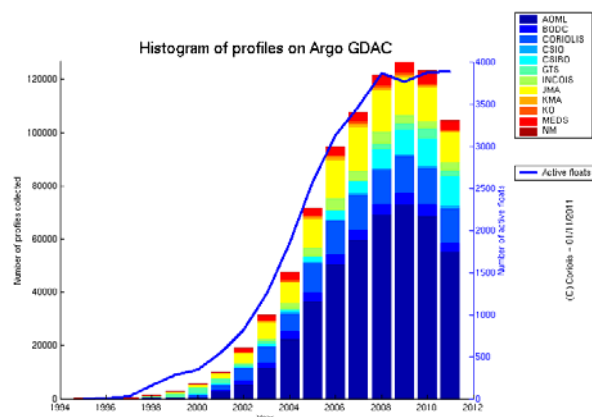
Argo GDAC : profiles distribution per DAC in October 2011[2]
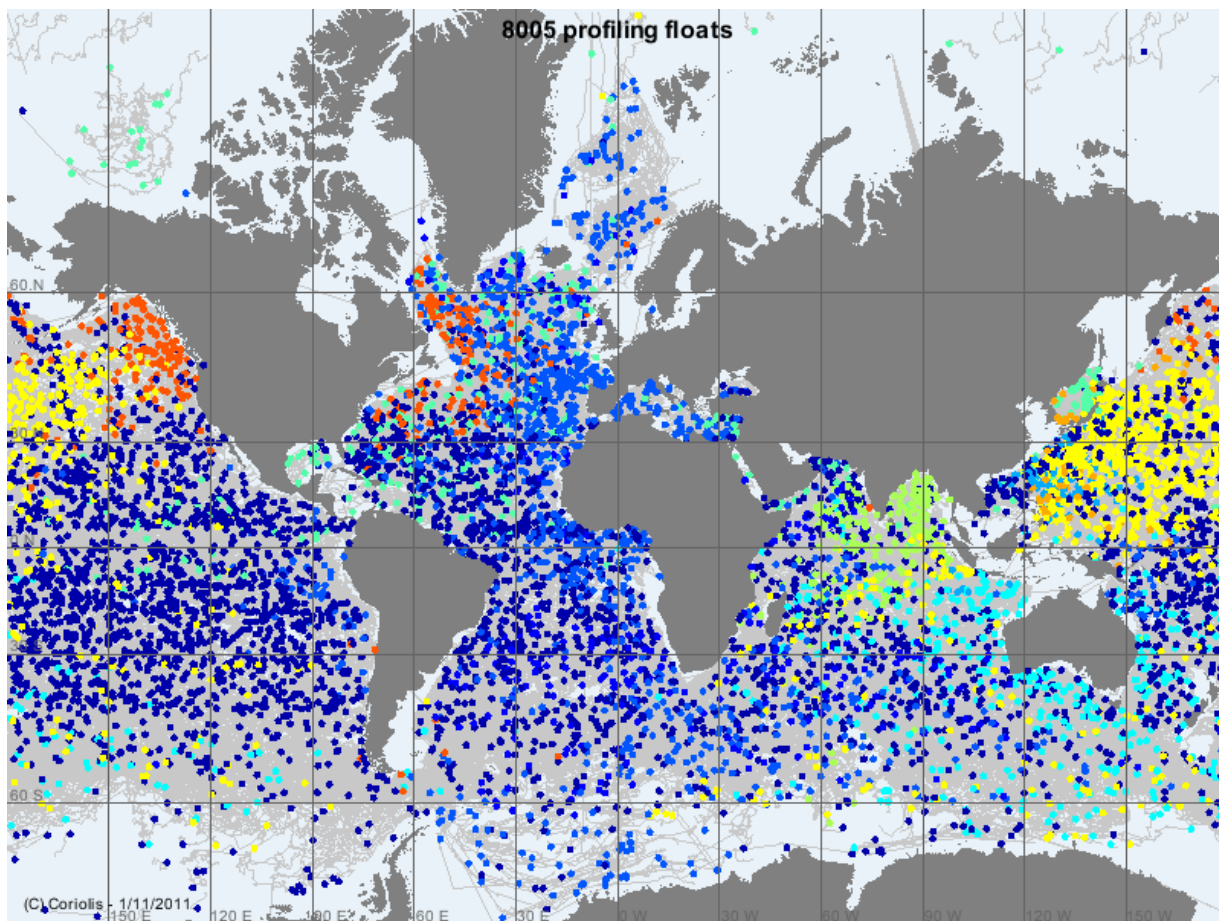
Argo floats available from GDAC in October 2010
(This map includes active and old floats)

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[2] Warning: the blue line displays the total number of active floats during a year. This total is different than the floats active at a particular day.
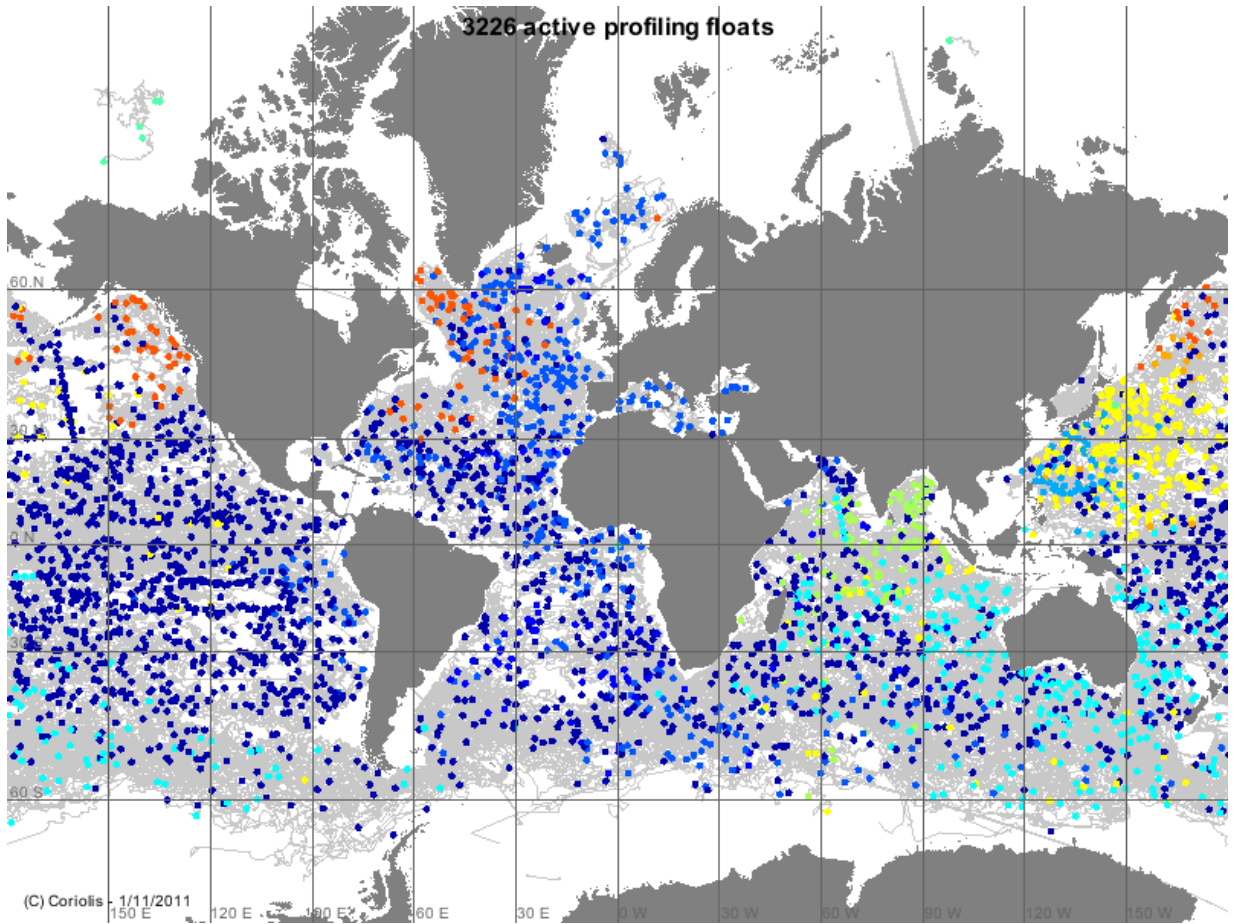
Active Argo profiling floats available from GDAC in October 2011
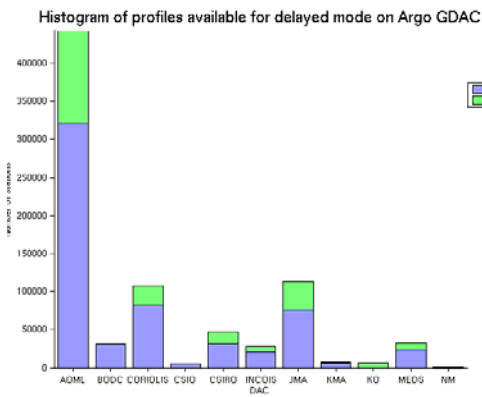
Argo GDAC : delayed-mode profiles available for delayed-mode in October 2011
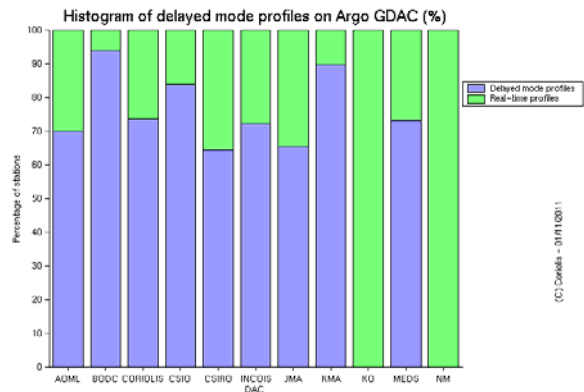
Argo GDAC : delayed-mode profiles distribution % per DAC in October 2011

Argo data management   Coriolis DAC & GDAC report 2011

596464 delayed mode profiles on Argo GDAC
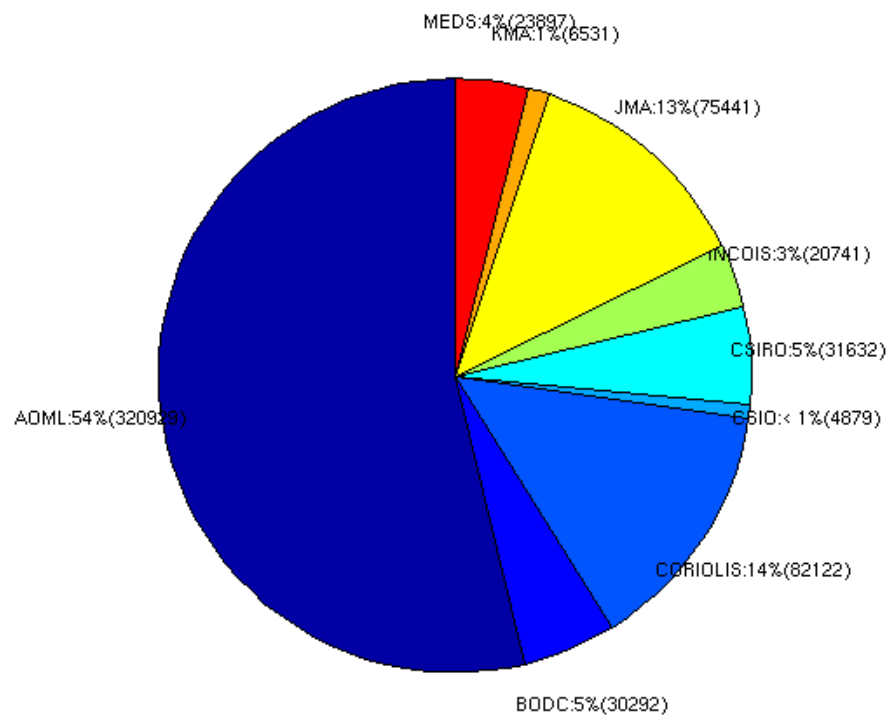
Argo profiling floats with delayed-mode profiles available from GDAC in October 2011

Regional Centre Functions

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

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

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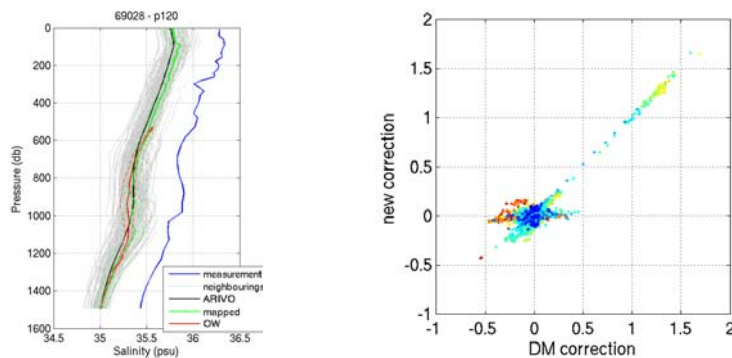
A comparison between real-time, delayed-mode and "newly" adjusted salinity profiles was performed on 200 north Atlantic floats (17 000 profiles)

Survey on density anomalies
A survey is underway to improve the efficiency of density quality control tests.

CLS Argo Data Management 2011 Report

Yann Bernard (CLS)

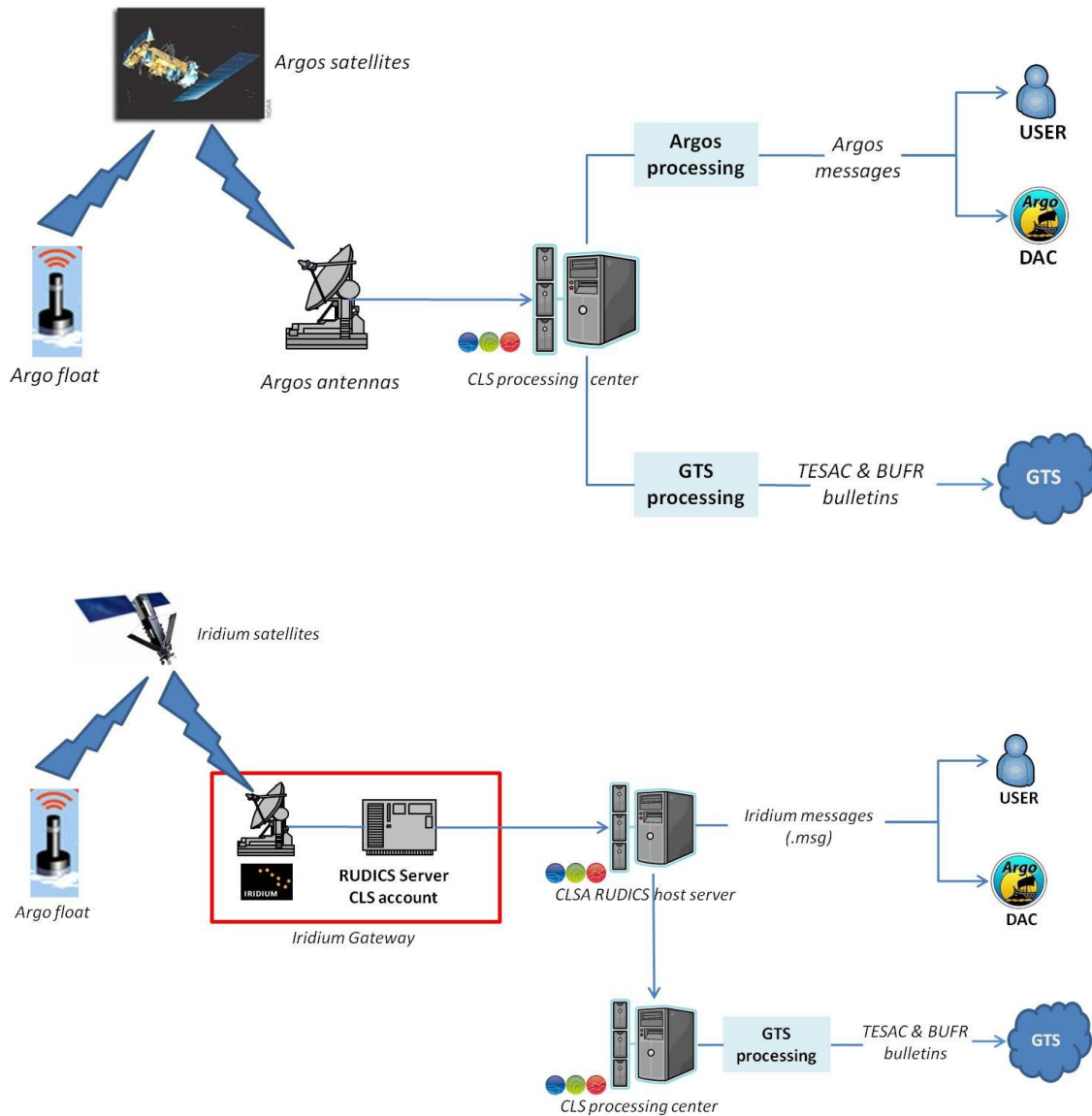**CLS** 8-10 Rue Hermès - Parc Technologique du Canal - 31520 Ramonville St-Agne - FRANCE

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 September 2011 CLS processed in real-time 127 Argo floats (117 with Argos and 10 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.
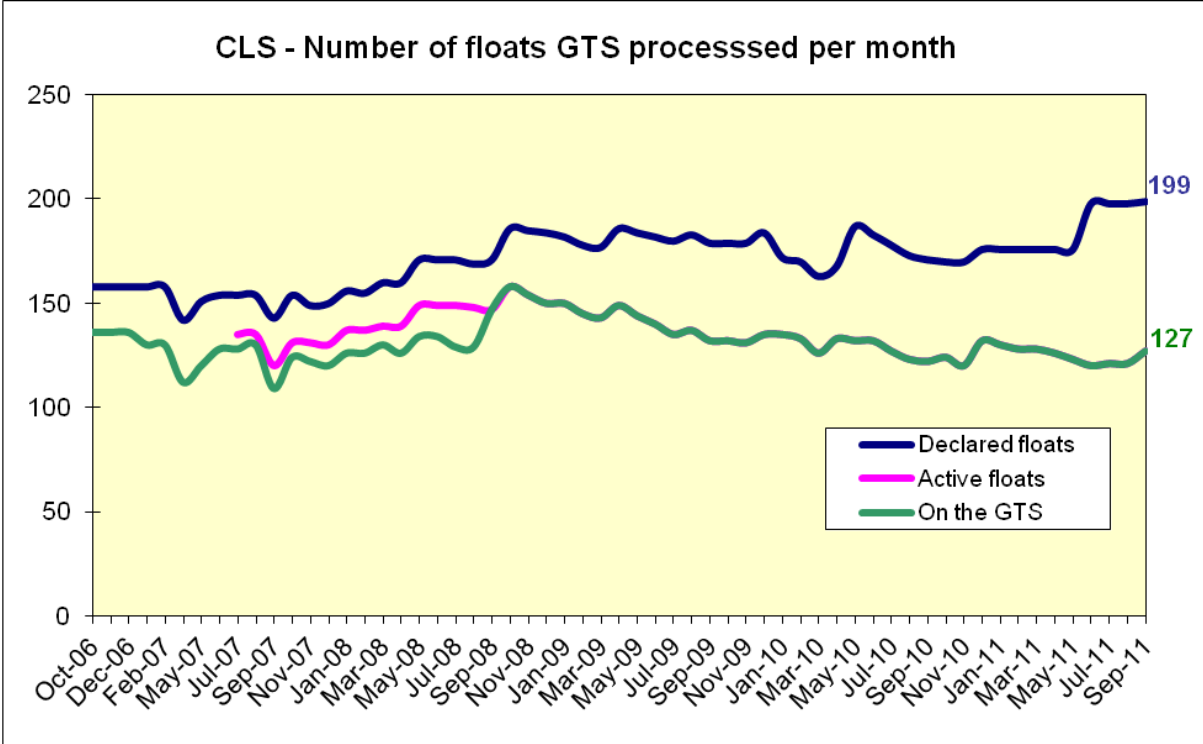
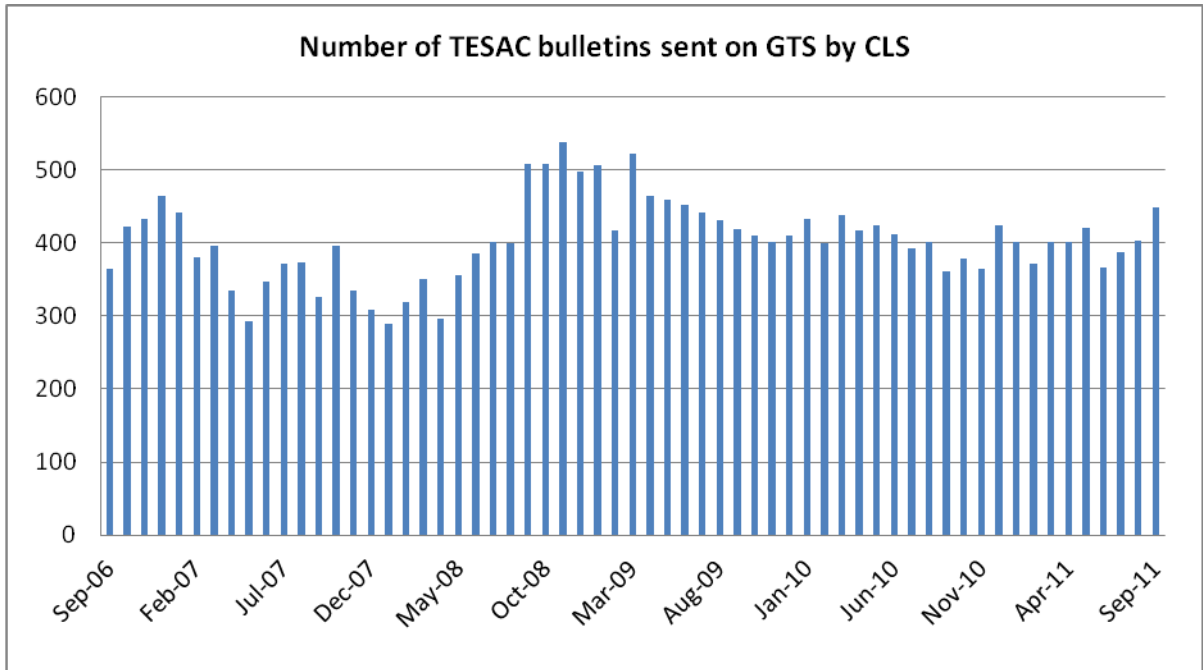# 2. STATUS OF THE CLS DAC IN SEPTEMBER 2011

- **Data acquired from floats :**
  - o 199 floats were declared in the CLS GTS database
  - o 127 floats disseminated data profiles on GTS
  - o 53 floats are inactive (no more transmission) or grey listed (failing status)
  - o 19 floats are not yet deployed
  - o 449 profiles from CLS were sent on GTS in September 2011

- **Description of the 199 floats :** CLS processed in real time floats for Argo program which are not hosted by a national DAC:
  - o 87 INCOIS floats (India)
  - o 76 SOA floats (China)
  - o 36 KORDI floats (Korea)

All these floats are Webb Apex floats with 16 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. 449 profiles were relayed onto GTS between September 2010 and September 2011 (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:
  - o Argos transmissions in the last month are checked for all floats,
  - o GTS disseminations in the last month are checked for all floats,
  - o New floats to be set up for GTS are implemented in CLS GTS data base at each beginning of month with a list (table 10: "Floats to be set up for GTS") provided by JCOMMOPS (M. Belbeoch) in the Argo Information Centre Monthly Report.
  - o Active floats to be grey listed are removed from the CLS GTS database at each beginning of month with a list (table 15: "Active floats Grey list") provided by JCOMMOPS (M. Belbeoch) in the Argo Information Centre Monthly Report.

Status of CLS Argo GTS processing

Number of profiles sent on the GTS by CLS per month

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

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

- **Date time of GTS bulletins**: CLS has implemented in 2011 the proper method to calculate JULD. This method for computing the date-time of one profile is set up on all floats processed by CLS in real-time since January 2011 (ADMT 11, action item 25).

- **Surface pressure correction**: CLS has implemented in July 2011 the surface pressure correction for Apex floats concerned and processed in real-time by CLS, 97 floats were concerned in July 2011.

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

Number of Argo floats processed per day
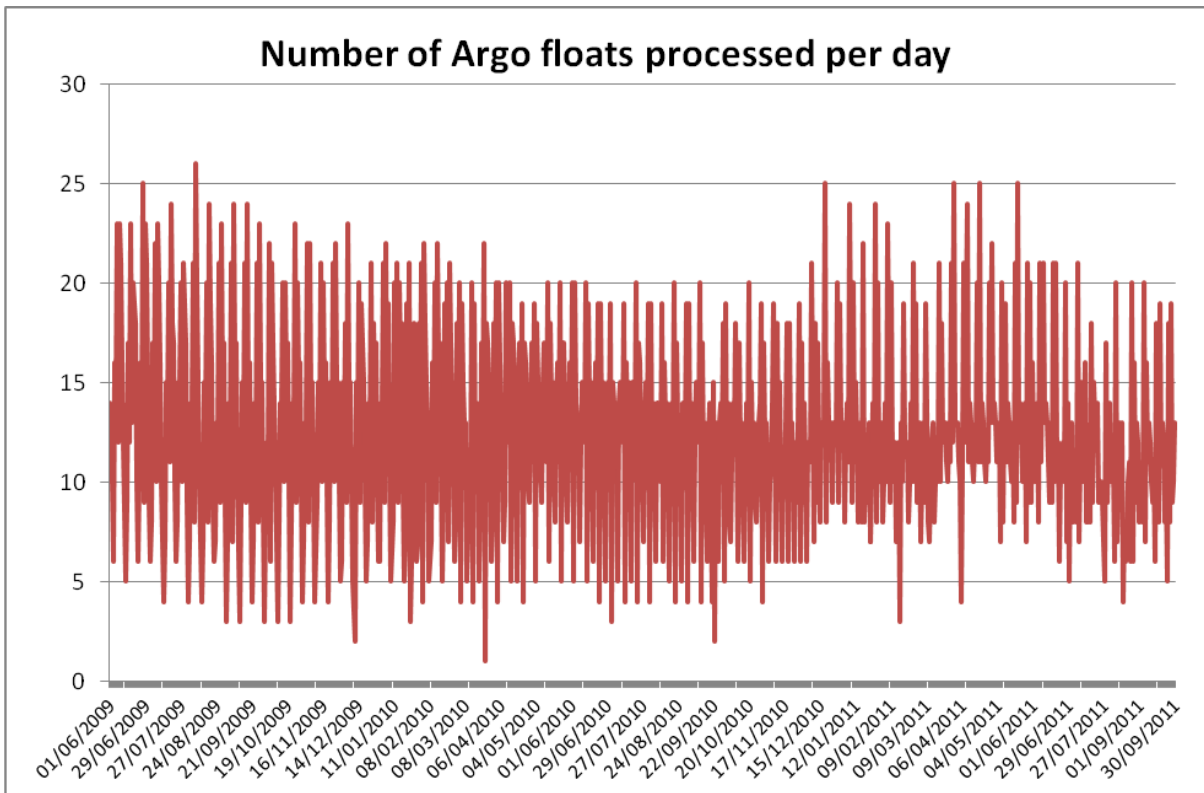
Daily average TESAC delivery time (in min) on GTS
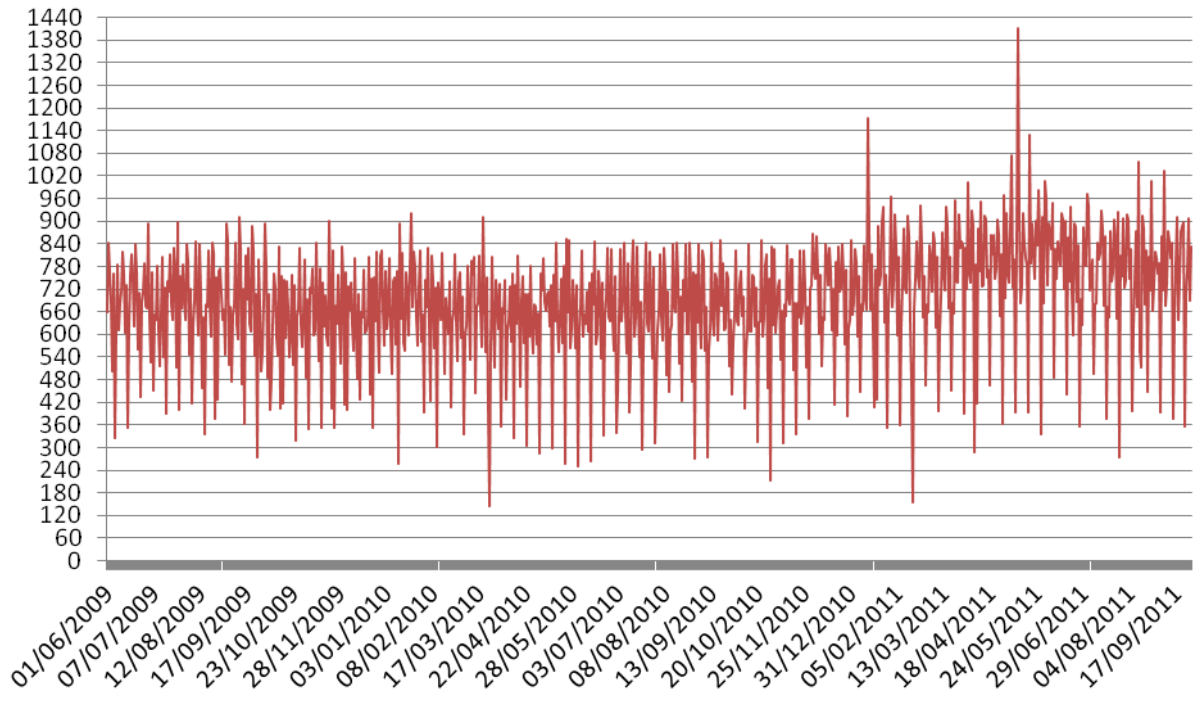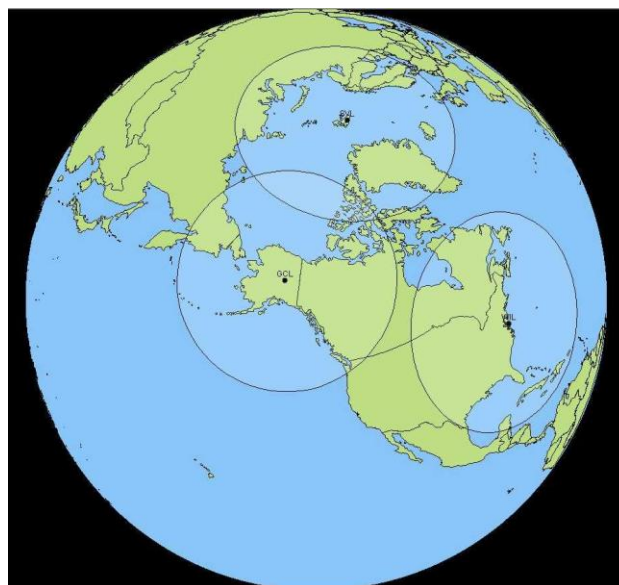
3. ARGOS SYSTEM STATUS

3.1. SPACE SEGMENT

Argos instruments are onboard five NOAA POES and one EUMETSAT spacecrafts. Next launches of satellites with Argos instrument:

- METOP-B (EUMETSAT) with an Argos-3 instrument in 2012
- SARAL (ISRO) with an Argos-3 instrument in 2012
- METOP-C (EUMETSAT) with an Argos-4 instrument in 2017

The joint U.S. civilian-military NPOESS satellite program has been cancelled. The civilian side is being replaced by the NOAA "Joint Polar Satellite System" (JPSS). NOAA is investigating the use of other platforms to carry these systems.

3.2. GROUND SEGMENT

Global antennas network: The two NOAA global stations of Fairbanks and Wallops acquire the Argos global recorded telemetry transmitted by the 5 NOAA POES satellites. The Eumetsat global receiving station of Svalbard acquires the Argos global recorded telemetry transmitted by Metop-A as well as the two daily blind orbits of N18 and N19.

North hemisphere Argos global antennas network

A new Argos global station at McMurdo in Antarctica (1/2 orbits) only for METOP-A is operational since 08/06/2011. Timeliness for the provision of METOP-A data collected out of HRPT coverage to users has improved from 115 to 65 minutes.
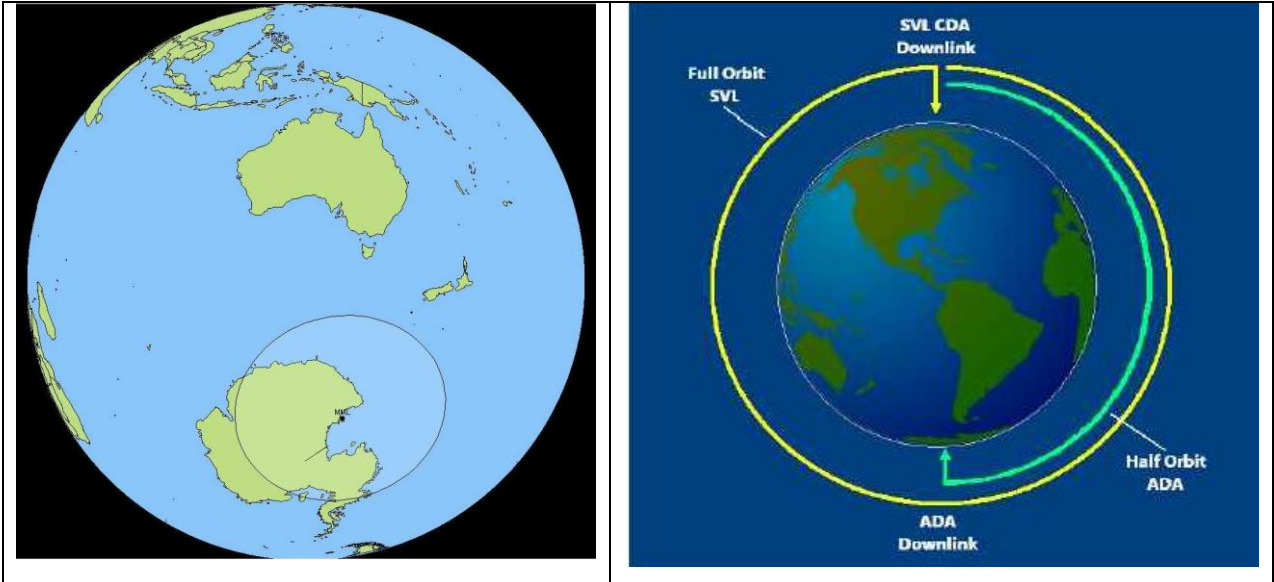
METOP-A Mc Murdo Global antennas coverage and principle

View of Mc Murdo site in Antarctica

Real time antenna network: The Argos real-time network is still growing. Improvements are focused on redundancy locations and coverage extension. Today, both Toulouse and Landover processing centres receive Argos near real-time data from an average of 60 stations located all over the world.

Argos Regional antennas network in 2011

CLS is still focusing on the project of upgrading and optimizing in terms of performances this real-time receiving stations network. Since January 2010, 7 new real-time stations have been added to the Argos HRPT global network with 4 thanks to the Eumetsat EARS network extension.
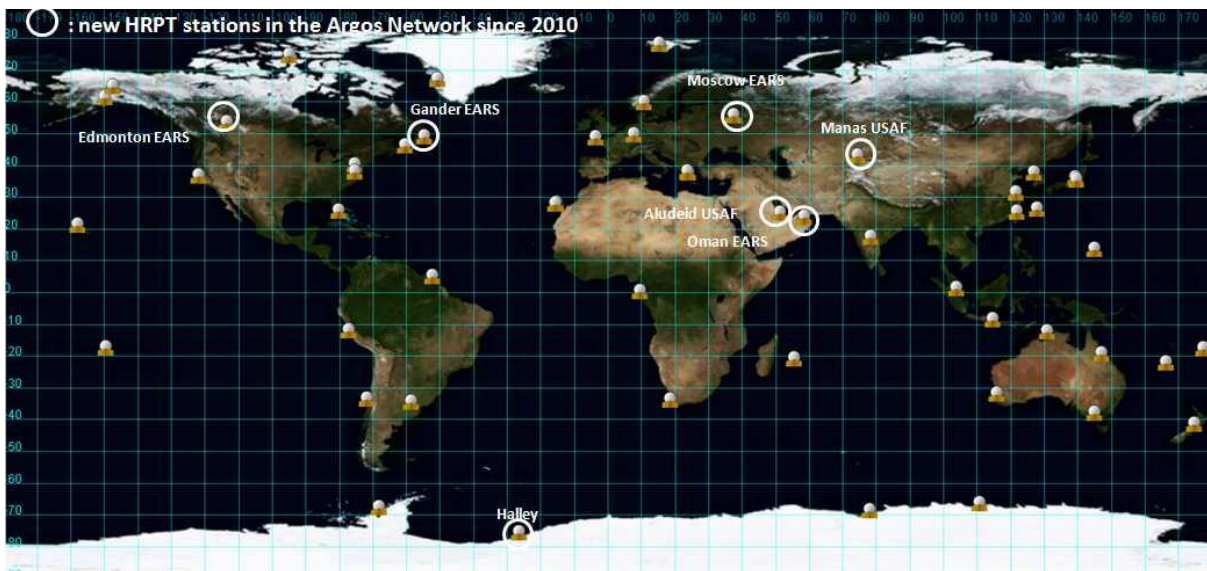
New Argos regional stations in 2010

Argos location: CLS has developed in 2010 a new location processing algorithm for Argos. The new technique continues to measure the Doppler frequency shift while introducing two significant additions: the integration of platform dynamics and the use of a Kalman filter to calculate positions.

This new processing technique makes it possible to distribute up to 40% more positions and to improve accuracy by up to 65% while providing error estimates for each position, regardless of the number of messages received. These improvements are particularly significant for applications like animal tracking, where relatively few messages are received with each satellite pass.

Here below are the main benefits of the new Argos location method for the Argo program:

• More positions,
• Better accuracy,
• And automatic correction or elimination of all unrealistic positions.

For the validation on Argo floats, in cooperation with the Argo Technical Coordinator (JCOMMOPS) CLS has reprocessed all Argos locations with the new method for a representative sample of Argo floats since January 2008 and compare results obtained with the previous method. List of Argo floats included in the validation sample is detailed here below:

Argos ID	WMO ID	Model	Organization	Comments	Area
5558	Q6900612	Provor	UK		Arctic
6109	Q6900603	Provor	UK		N Atlantic
22847	Q6900235	Provor	Coriolis		E Atlantic
25184	Q5900387	Apex	JAMSTEC		Pacific
26575	Q7900014	Apex	AWI	Ice float	Antarctica
27284	Q1900230	Apex	IFM GEOMAR	beached in Somalia	W Indian
27922	Q3900233	Apex	PMEL		E Eq. Pacific
29812	Q2900439	Apex	KMA	Noisy area	Japan sea
30491	Q5900440	Solo	SCRIPPS		W Eq. Pacific
30712	Q6900543	Nemo	BSH		Atlantic
35504	Q6900453	Apex	MEDARGO		Med. Sea
36733	Q1900054	Apex	UW	Old float still active	S Indian
53211	Q5901134	Apex	CSIRO		S Pacific
57076	Q4900630	Apex	WHOI		N Pacific
59022	Q3900548	Apex	PMEL	Pick-up by a boat + travels in plane	S Pacific
63660	Q1900605	Provor	Coriolis	Noisy area	Med. Sea
67212	Q4900473	Apex	UW	Ice float	Antarctica

The comparison of both methods shows that:

- Trajectories computed with both methods are very similar.

- Some bad positions (call mirror positions) are filtered with the Kalman filtering method:
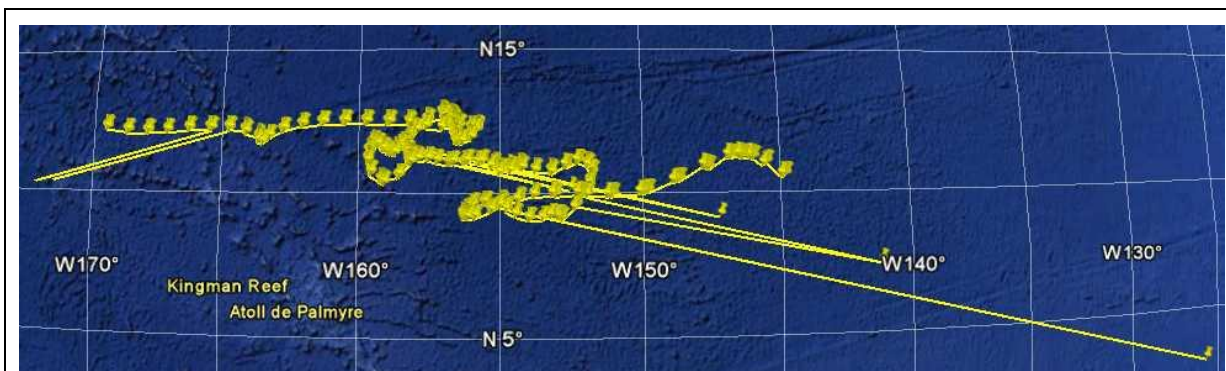
Float ID30491 (WMO Q5900440) Argos track computed with Least Square algorithm
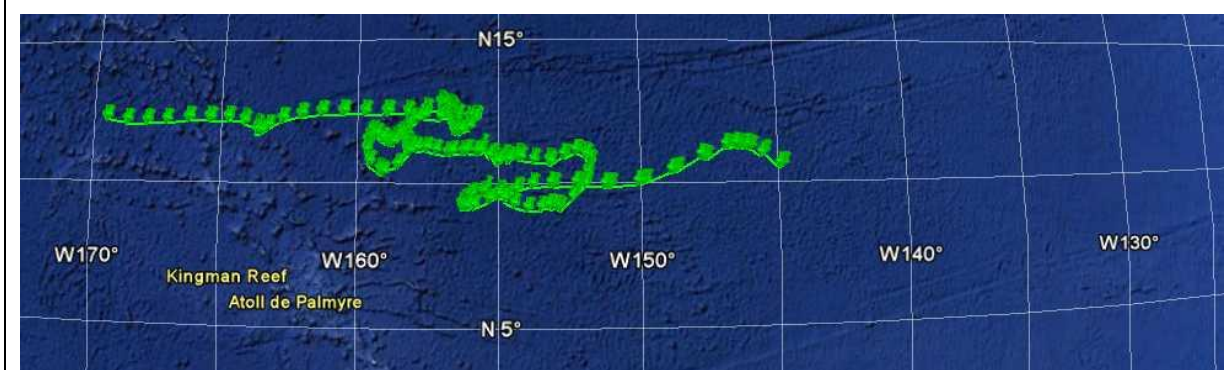
Float ID30491 (WMO Q5900440) Argos track computed with Kalman filtering algorithm

Mirror location has been cancelled with Kalman filtering method

- More positions are computed with the new method, + 7.7% in average: they are from positions that had been filtered with the least squares before and now quality control tests succeed.

- Improvements on the accuracy of Argos positions with more class 3 locations, + 138.1 % in average

Argos ID	WMO ID	Δ Class 3 (%)	Δ Class 2 (%)	Δ Class 1 (%)	Δ all classes (%)
5558	Q6900612	118.88	-30.23	-49.55	5.39
6109	Q6900603	165.04	-25.57	-39.83	6.8
22847	Q6900235	146.88	-12.12	-33.33	6
25184	Q5900387	106.26	-31.16	-26.96	10.01
26575	Q7900014	50	-27.01	-45.45	6.59
27284	Q1900230	18.06	-15.94	-48	1.73
27922	Q3900233	180.68	-26.62	-35.37	5.96
29812	Q2900439	97.54	-15.04	-39.74	7.16
30491	Q5900440	145.99	-29.07	-24.53	8.86
30712	Q6900543	142.11	37.14	-29.88	9.59
35504	Q6900453	69.83	-30.14	-32.11	6.88

36733	Q1900054	284	-7.05	-38.98	7.51
53211	Q5901134	252.78	-18.26	-24.04	10.97
57076	Q4900630	181	9.2	-37.15	8.53
59022	Q3900548	90.64	-25.63	-27.59	7.94
63660	Q1900605	103.51	-2.93	-27.37	11.79
67212	Q4900473	194.68	-12.96	-36.22	9.65
	Average	**138.11**	**-15.49**	**-35.06**	**7.73**

Variation in % of Argos positions numbers by location class [Kalman (new) - Least Square (old)]

According to these results the Argo Steering Team decided at the AST-12 meeting in Buenos Aires, Argentina to switch all Argo floats to this new method so that datasets are improved homogeneously. The panel agreed on early June 2011 for the switch date and invited trajectory experts to explore further the new method before the deadline. The new Argos location method, using Kalman filtering, was automatically applied on all Argo floats on the 13th of June 2011 at 12:00 UTC. The positions are distributed in the same format via the usual Argos data distribution channel. As the new algorithm permanently replaces the preceding one in the real-time Argos processing system, the location data from the old processing method are not still available.

A scientific paper on the Argos location calculation using the Kalman filtering method as FAQ and user manual are available on line at http://www.argos-system.org/web/en/68-location-algorithm.php.

Argos Data distribution by web service: all Argos data, including diagnostics data, are now available via a web service. This new service allows all Argo programs to get their data from the CLS database, via an XML request, in CSV format, XML format and in KML format (Google Earth format). This Machine to Machine distribution data tool is free of charge and specifications can be asked to the Argos user office (useroffice@cls.fr). The protocol used to communicate between the Argos processing center and the user is based on SOAP (Simple Object Access Protocol) over HTTP. The SOAP protocol allows exchanging data in XML format. This is an RPC (remote access protocol) object oriented in XML. The SOAP protocol can be used over HTTP, HTTPS, and SMTP….
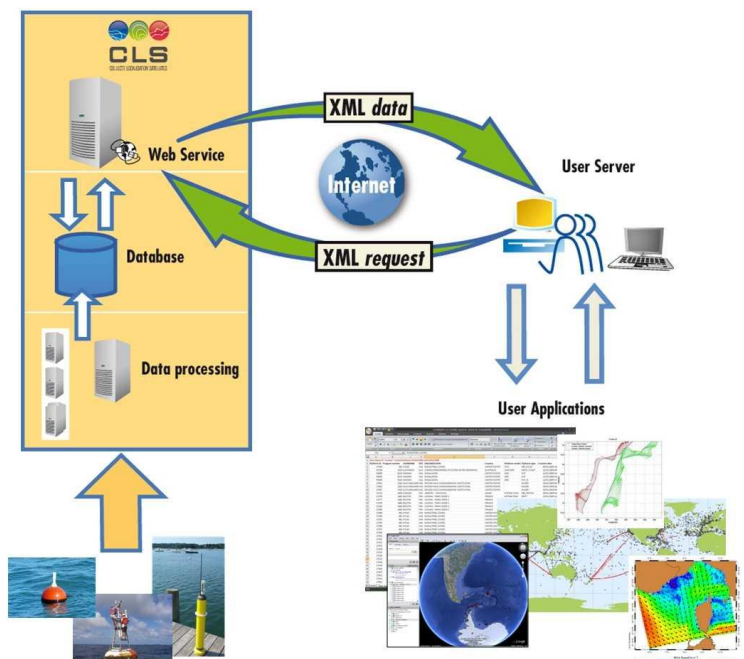
Argos web service scheme

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

4. CLS IRIDIUM DATA SERVICES

In 2010 CLS started to provide Iridium data (Short Burst and Dial Up Data). Thanks to a VAR (Value Added Reseller) agreement with Iridium, CLS is an Iridium data provider for Argo. It's already the case for several Argo programs as SOA (China) OGS (Italy) and INCOIS (India) and IMR (Norway).

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

Argo Germany National Data Management Report 2011
November 2011

1. Status

Data required from floats.

Most of the floats deployed by Germany are operated by BSH but additional funding has been acquired by various research institutes. From October 2010 to November 2011 84 floats have been deployed: 54 by BSH and 30 by other German institutes. Most of the floats have been deployed in the North Atlantic. The deployments in the Southern Ocean have started in 2010 and were continuing in 2011. Germany is active not only in the Atlantic: 8 floats have been deployed by IfM-GEOMAR in the tropical Pacific. Currently 186 floats are active. Most of them 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.
There are currently no major technical problems
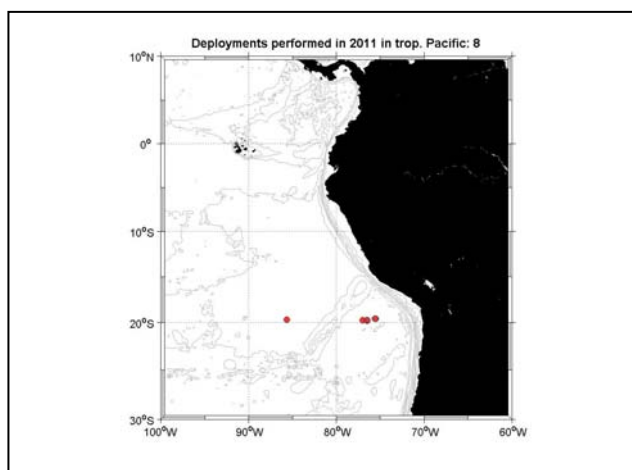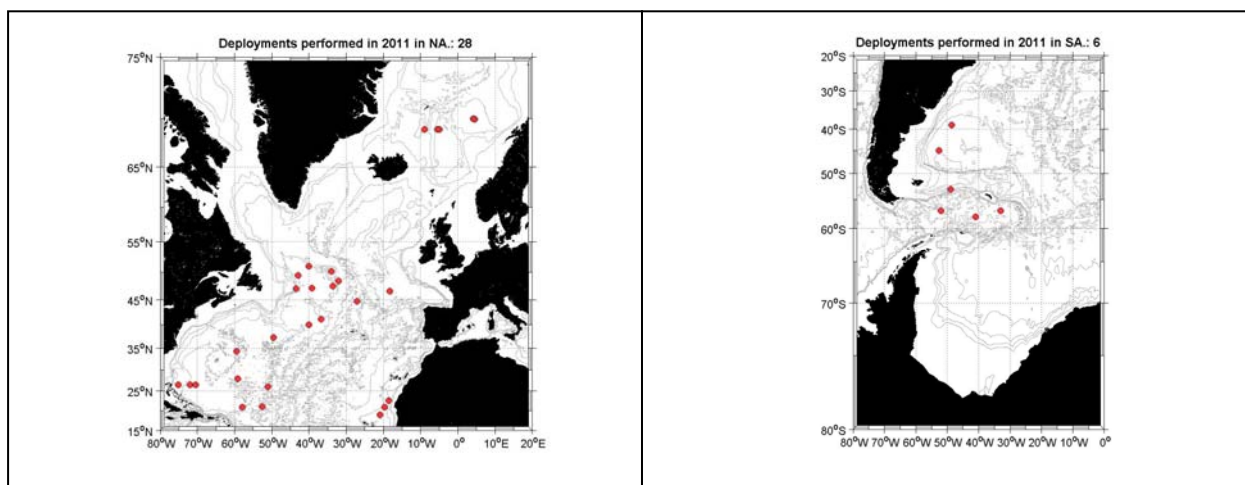
Deployment plan for 2012

The deployment plans for 2012 will comprise 30 floats from BSH (additional floats will be stored in our storage facility) and 30 floats from AWI, which will be deployed in the Southern Ocean and in the Weddell Sea in the Antarctic summer season 2012/2013. 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 map with deployment positions in the southern Atlantic in January 2012 is given below. Other positions have not been determined yet.

Deployments planned in January 2012 in Southern Ocean: 7
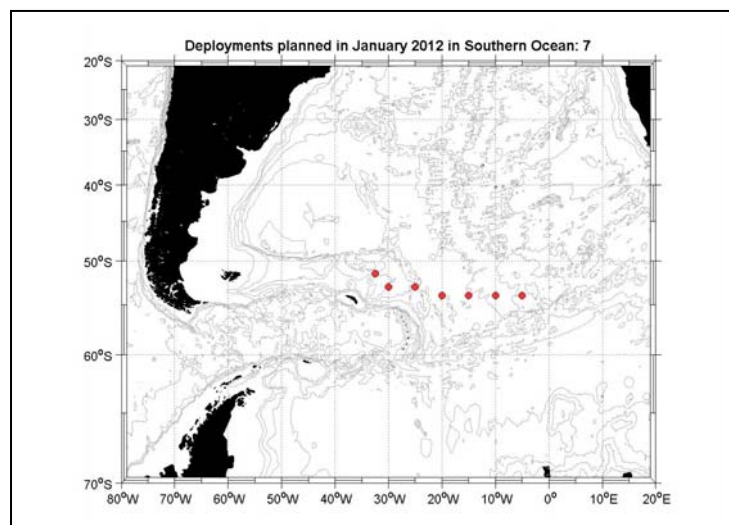
Data issued to GTS

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

Data issued to CGACs 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, 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.

Surface pressure correction

The pressure corrections for all German floats, including floats deployed by the Alfred-Wegner Institute in the Southern Ocean, and for all adopted floats have been performed by BSH, and now have been completed.

Delayed data send to GDACs

All delayed mode profiles have been sent to GDACs. The percentage of DM profiles with respect to the total number of profiles is about 86%.

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

No statistics of Argo data usage are currently 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 (time series, climate indices) for interpretation of local changes and to provide data for research applications. German Argo is planning to host an annual user workshop where research applications can be presented and requests for operational products can be specified.

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 (2010) – India

1. Status

- **Data acquired from floats**

  India has deployed 45 new floats (including 15 Iridium and 10 PROVOR CTS-3 from NKE) between October 2010 and October 2011 in the Indian Ocean taking its tally to 239 floats so far. Out of these 108 floats are active. All the active floats data are processed and sent to GDAC.

- **Data issued to GTS**

  We have initiated submission on a trial basis through the RTH New Delhi. How ever up on our request CLS ARGOS is still continuing to send Indian floats data in TESAC format to GTS.

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

  All the active floats (108) 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 75% of the eligible profiles for DMQC are generated and uploaded to GDAC. Lack of manpower is hindering rapid progress in generating DMQC profiles.

- **Web pages**

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

- **Trajectory**

  1. A total of **222 trajectory** netcdf files were processed and uploaded to the GDAC. The process of generation of trajectory netcdf files undergoes quality checks like position, time, cycle number, etc., and corresponding quality status is assigned to each parameter. Finally a visual check is performed to verify that there are no missing cycles without cycle numbers and to check the surface time intervals.
  2. **17 (PROVOR) floats** are not eligible for the processing of the trajectory data files in current processing procedure and a new method has to be adopted.

- **Statistics of Argo data usage**

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

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

Page	Hits	Visitors
Argo Web-GIS	2735	1071
Data download	10351	567
Live Access Server	1273	639
Argo products	927	379

- **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 2010 being updated. This DVD consists of ~ 1,40,000 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 100 DVDs were supplied to various users from institutions and universities.
  3. Updation to Mixed Layer Climatology based purely on Argo observation is near completion. All the profiles from 2009 – 2011 are used for generating this. This is being done for NODPAC of 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 75% 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 31 Oct, 2011 is shown below.

Active Float Density as on 31 Oct 2011
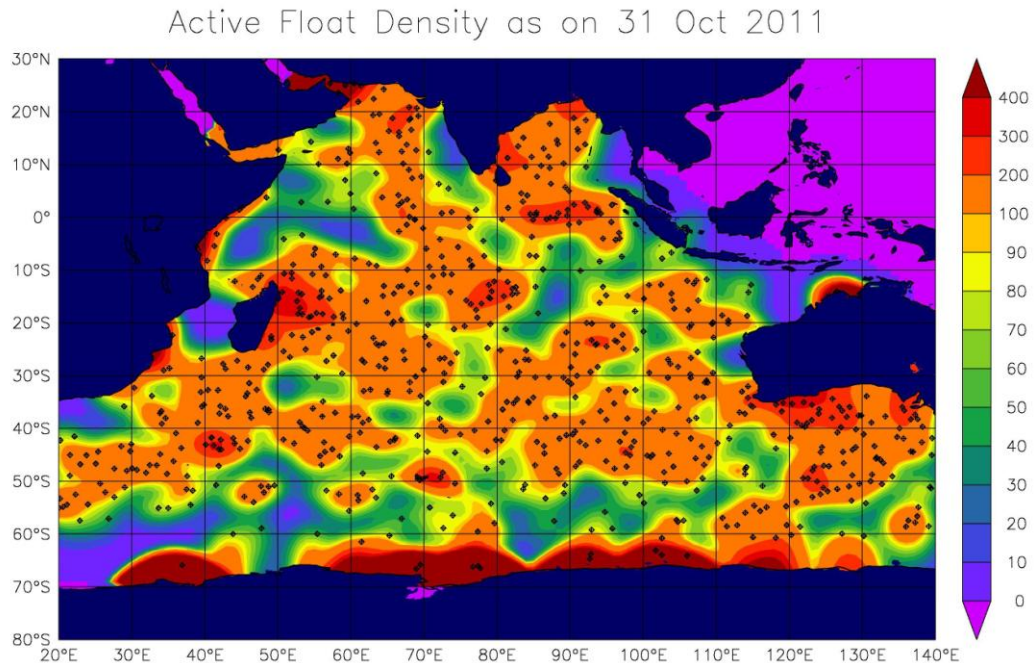
Publications:

1. Annapurnaiah, K., T. V. S. U. Bhaskar, and T. M. B. Nair, 2011: Validation of mixed layer depth derived using satellite data and wave model with in-situ observations. *International Journal of Oceans and Oceanography*, 5, 23-34.
2. Geetha, G., T. V. S. U. Bhaskar, and E. P. R. Rao, 2011: Argo data and products of Indian Ocean for low bandwidth users. *International Journal of Oceans and Oceanography*, 5, 1-8.
3. Girishkumar, M. S., M. Ravichandran, M. J. McPhaden, and R. R. Rao, 2011: Intraseasonal variability in barrier layer thickness in the south central Bay of Bengal. *J. Geophys. Res.*, 116, C03009.
4. Ravichandran, M., 2011: In-Situ Ocean Observing System. *Operational Oceanography in the 21st Century*, A. Schiller and G. Brassington, Eds., Springer Netherlands, 55-90.

Argo National Data Management Report – Italy (2011)

1. Status

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

- **Data acquired from floats:** 122 floats were deployed in the Mediterranean and in Black Sea between 2000 and 2011 (Figure 1); 15 floats in 2011 (Figure 7).
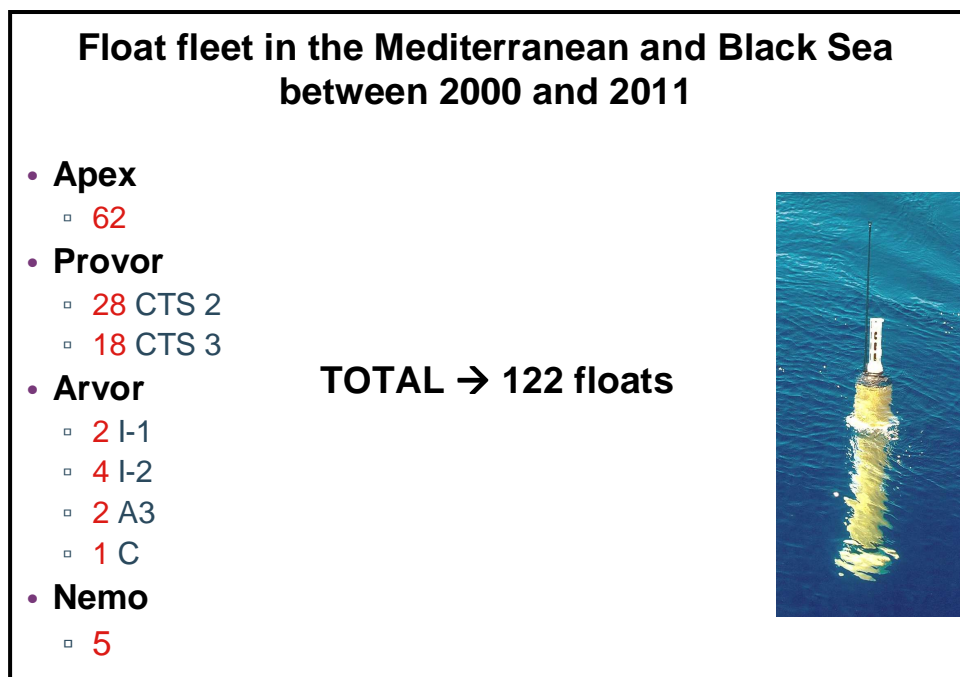
Figure 1. Floats deployed in the Mediterranean and Black Sea between 2000 and 2011.

- **Web pages:** The MedArgo web page (http://nettuno.ogs.trieste.it/sire/medargo/) has been maintained and tables and graphics are updated in near real time. The floats deployed during 2011 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 10 November 2011 (updated daily).
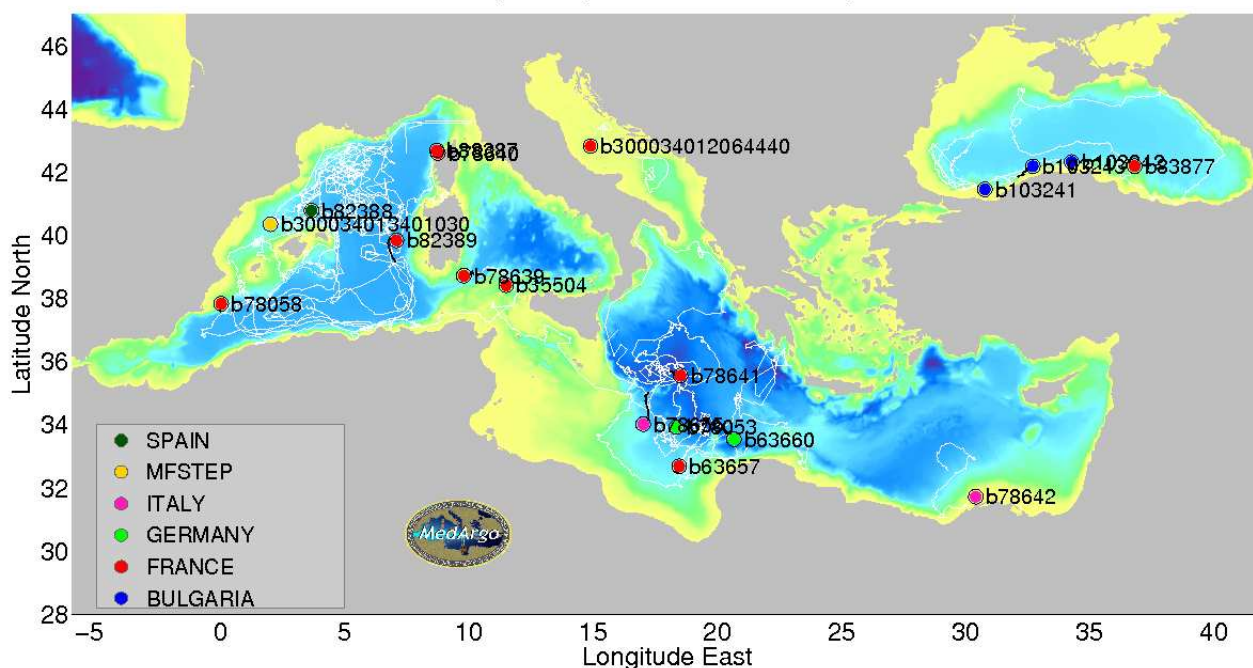
Figure 3. MedArgo float positions and tracks (September 2011). The monthly tracks are in black while the entire float trajectories are in white.

- **Statistics of Argo data usage:** (operational models, scientific applications, number of National Pis…):
    - a. The MedArgo data are routinely assimilated in numerical forecasting models (MFS)

b. The Argo data in the Mediterranean have been used to study the thermohaline variability in Mediterranean sub-basins, work which can be considered as a consistency test of the data in the areas considered. Ten years of Argo data combined with historical data collected mainly by ships are currently used to study temperature and salinity trends in the Ionian Sea.

- **Products generated from Argo data:**
    a. Daily maps of float positions (Figure 2)
    b. Monthly maps of active float positions and track (Figure 4)
    c. Float data are assimilated in numerical forecasting models by INGV (MFS); daily and weekly maps of Mediterranean ocean forecasting system are produced (Figure 5
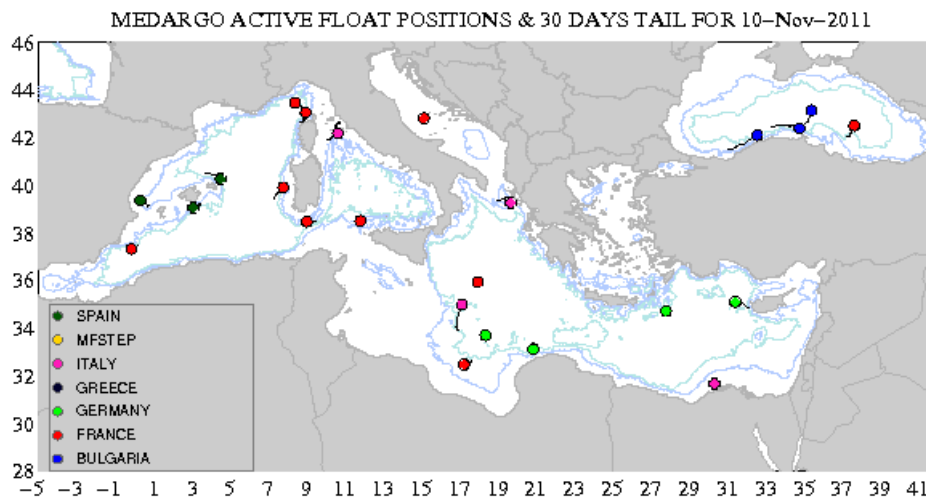
Figure 4. Monthly map of MedArgo active float positions and tracks.
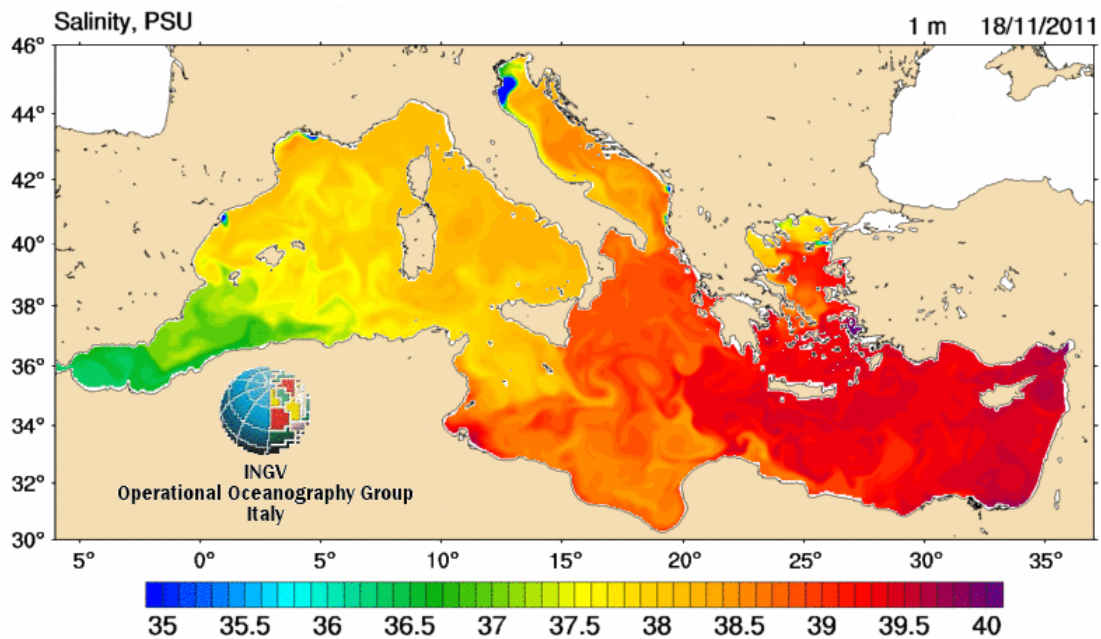
Figure 5. Daily mean forecasting model of salinity (1 meter deep).

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.)

OGS has continued to carry out the DMQC for the Argo data in the Mediterranean. Before the application of the DMQC, selected float profiles are qualitatively compared (in time and space) with the historical data (see example in Figure 6). 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. In particular, for the Apex floats equipped with previous versions of Apf-9 controller the method was applied and 5 floats were classified as Truncated Negative Pressure Drift (TNPD).
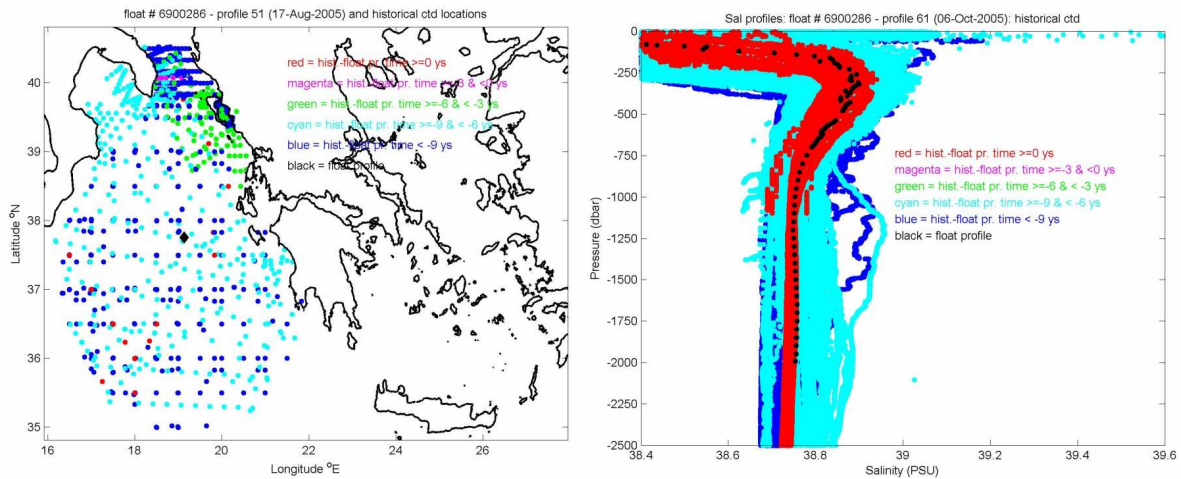
Figure 6. Location of selected float profiles and historical CTD data (left panels) and the respective salinity profiles (right panels). The float profile is depicted in black while other colours represent the reference profiles.

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.

The DMQC method has been applied to about 60% of the floats which died between 2000 and 2010 in the Mediterranean Sea: they were quality controlled in delayed-mode for salinity, temperature and surface pressure and the respective D-files were sent to GDAC (not all but about 37% of the D files have been already sent to the GDAC). 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

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

MedArgo is the Argo centre for the Mediterranean and the Black Sea. It is a component of the North Atlantic Argo regional centre. OGS, in 2011, has continued and extended the float coordination activities. In particular, several collaborations with Bulgaria, France, Spain, Greece, Germany have been set up in order to establish the planning and the deployment coordination of floats; moreover, as part of these collaborations the float data are transferred in near real time to MedArgo. Thanks to these collaborations, 15 new floats were deployed in the Mediterranean Sea during 2011 (Figure 7).
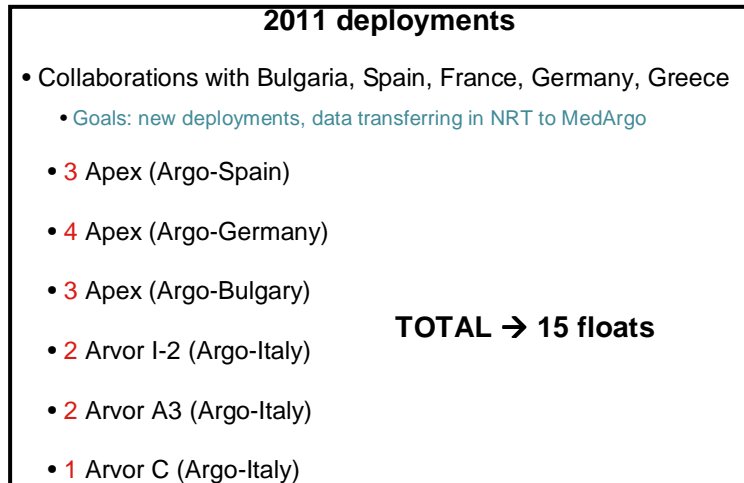
Figure 7. 2011 float deployments in the Mediterranean Sea

Two Arvor-A3 floats were deployed in the Ionian Sea and Levantine basin in February 2011 and one Arvor-C has been operating for 10 days close to the Tuscany coast, in the Tyrrhenian Sea (the length of the cycle was set to 3 hours and the profiles were about 400 meters deep).

There are 19 active Argo floats in the Mediterranean Sea and 4 in the Black Sea as of 10 November 2011.

Italy has 3 floats active in the Mediterranean Sea; other 12 Arvor-Argos and some Iridium equipped units will be soon deployed.

Argo National Data Management Report of Japan, 2011

1. Status

The Japan DAC, the Japan Meteorological Agency (JMA), has processed data from 1068 Argo and Argo-equivalent floats including 274 active floats as of October 20, 2011. There are ten Japanese PIs who agreed to provide data to the international Argo data management. The Okinawa Institute of Science and Technology deployed an Iridium float in July 2011 for the first time. The DAC is acquiring ARGOS messages from CLS and getting Iridium messages via e-mail in real-time, thanks to the understanding and the cooperation of PIs. Almost all profiles from those floats are transmitted to GDACs in netCDF format and issued to GTS using TESAC and BUFR code after real-time QC on an operational basis.

The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) has done the Delayed Mode QC for all Japanese floats. JAMSTEC acquired a total of 13,806 profiles as the ARGOS messages via CLS and the Iridium messages via e-mail and dial-up access for delayed QC from October 13th, 2010 to October 25th, 2011. JAMSTEC sent 11,950 delayed profile files (D-files) to GDACs through the Japan DAC, JMA, during the period. Submission of delayed profile files were slowed down during the last year because we had to bring our servers down due to power supply shortage caused by the Great East Japan Earthquake and also breakdown of the severs. Since the sever operation has been almost recovered, 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 messages, and status of the Japanese floats.

Delayed mode Database (Argo JAMSTEC)

http://www.jamstec.go.jp/ARGO/argo_web/argo/index_e.html

JAMSTEC's website shows mainly Japanese float list, trajectory map, profile chart, and QCed float data. Moreover, the position and trajectory maps of all floats of the world as well as Japanese floats by using Google Map. Brief profile figures of the selected floats are also shown. This site also shows global maps based on objective analysis (temperature, salinity, potential density, dynamic height, geostrophic current, mixed layer depth, etc.).

Statistics of Argo data usage:

Operational models of JMA

MOVE/MRI.COM-G (Multivariate Ocean Variation Estimation System/ Meteorological Research Institute Community Ocean Model - Global)

JMA has been operating the MOVE/MRI.COM-G for the monitoring of El Niño and the Southern Oscillation (ENSO) and for initialization of the seasonal prediction model (JMA/MRI-CGCM). The MOVE/MRI.COM-G consists of an ocean general circulation model (OGCM) and an objective analysis scheme.
Visit
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/move_mricom_doc.html
for more information.

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

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

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

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

Other operational models

JCOPE2 (Japan Coastal Ocean Predictability Experiment)

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

FRA-JCOPE

FRA-JCOPE is the model based on JCOPE which had been operated by Fisheries Research Agency (FRA) by March 2011. FRA-JCOPE is now inactive.

FRA-JCOPE2

FRA-JCOPE2 is the reanalysis data created by assimilating most available observation data into the JCOPE2 ocean forecast system. The horizontal

high resolution is 1/12 deg, in order to describe the oceanic variability associated with the Kuroshio-Kuroshio Extension, the Oyashio, and the mesoscale eddies from January 1993 to December 2009. Collaboration with Japanese Fishery Research Agency (FRA) has allowed us to assimilated huge amount of in-situ data around Japan. FRA-JCOPE2 reanalysis data are available. The website, http://www.jamstec.go.jp/frcgc/jcope/vwp/, provides information about downloading and interactively visualizing the reanalysis data for users.

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.

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 September 2011. 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.

MILA GPV (MIxed Layer data set of Argo, Grid Point Value)

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

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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.

Scientific Applications of Argo data:

Typhoon observation

JMA deployed three Iridium profiling floats targeting typhoon observation in June 2011. The floats observed daily thermohaline responses to repeated passages of Typhoons Ma-on and Muifa around 20°- 24°N, 137°E in 2011. A paper has been submitted to Geophysical Research Letters;

Wada, A., K. Sato and T. Uehara: The thermohaline responses to Typhoons Ma-on and Muifa in 2011 observed by three Iridium profiling floats. *J. Geophys. Res. Lett*. (Under Review)

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 75,377 profiles to GDACs as of October 25th, 2011.

The procedure of DMQC in JAMSTEC is as follows.

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

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

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

3. GDAC Functions

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

4. Regional Centre Functions

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JAMSTEC operates PARC in cooperation with IPRC and CSIRO and has extended the responsible region into the whole Pacific including the Southern Ocean by request of AST-9 (Action item 9) since April 2008.

JAMSTEC is providing the float monitoring information in the Pacific region (e.g., float activity watch, QC status, anomaly from objective analysis, diagnosis plot for sensor correction, etc.), reference data set for DMQC (SeHyD and IOHB), the link to the CTD data disclosure site of Japanese PIs, some documents, and some QC tools on the following web pages (http://www.jamstec.go.jp/ARGORC/). JAMSTEC will plan to upgrade of the site which provides the float monitoring information.

Argo National Data Management Report of Korea
The 12th Argo Data Management Team Meeting

1. Status
- Data acquired from floats
  Deployment of Korea Argo floats

Year	Organization	Number of deployed Argo floats				Total
		East Sea	Northwest Pacific	Antarctic Ocean	subtotal	
2001	KMA	3	7	-	10	18
	KORDI	5	1	2	8	
2002	KMA	5	10	-	15	25
	KORDI	6	-	4	10	
2003	KMA	5	10	-	15	33
	KORDI	8		10	18	
2004	KMA	5	10	-	15	38
	KORDI	13	-	10	23	
2005	KMA	5	10	-	15	33
	KORDI	10	-	8	18	
2006	KMA	5	10	-	15	33
	KORDI	13	-	5	18	
2007	KMA	-	-	-	-	9
	KORDI	9	-	-	9	
2008	KMA	5	10	-	15	29
	KORDI	11	-	3	14	
2009	KMA	5	7	-	12	17
	KORDI	5	-	-	5	
2010	KMA	8	4	-	-	12
	KORDI	-	-	-	-	
2011	KMA	8	6	-	-	14
	KORDI	-	-	-	-	
Total	KMA	134	85	42	**138**	261
	KORDI				**123**	

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

   KMA has deployed 14 Argo floats in the East Sea and northwest Pacific Ocean in July 2011.
   Currently, about 53 floats of KMA are active.

- Data issued to GTS
  KMA produced BUFR formatted data, but it should be de-corded and checked. KMA will finish confirmation of BUFR format data at the end of this year, and will distribute via GTS in early 2012.

- Data issued to GDACs after real-time QC

  During Nov. 2010 - Oct. 2011, 1,987 R-files of KMA are sent to GDAC.

  KMA data from 2001 to 2009 were included in ANDRO. This is done by Michel Ollitrault and Jean-Philip Rannou.

  KMA is working on the correction of JULD. KMA will finish this at the end of this year.

- Delayed data sent to GDACs

  NFRDI/KODC executed new delayed-mode QC for 7,369 profiles from 82 floats (~66 % of total profiles). All QC procedures for salinity, temperature, and pressure were performed as suggested by the latest Argo quality control manual.

  Newly quality-controlled R-files are 3,845 profiles.

- Web pages

  The KMA has operated and upgraded Argo web page, which consists of RTQC data linked to KMA (http://argo.metri.re.kr). In 2010, KMA added contents on the temperature variation in the East Sea to its web site. Currently, the contents are being updated in four times per year.

  The KODC has operated webpages for distribtuion of delayed mode Argo data and oceanographic information system for pelagic fishery based on Argo data (http://kodc.nfrdi.re.kr). KORDI has also operated Argo webpage (http://argo.kordi.re.kr).

- Statistics of Argo data usage

  National PIs are Dr. Sang-Boom Ryoo from KMA and Dr. Moon-Sik SUK from KORDI.

  Many scientists have applied the Argo data to the researches and operational oceanography. For example, data assimilation, circulation of the East/Japan Sea, and operation of oceanographic information system for pelagic fishery.

- Products generated from Argo data

  Since 2001, Korea has deployed 126 Argo floats in the East Sea. Now, Argo data is the most important hydrographic data in this region. KMA carried out observing system experiment using its regional circulation model to see the impacts of Argo data on the model performance in this semi-closed sea. The results were presented in two domestic workshops in this year. KMA will submit the result to a journal this year.

  Using Regionally Adapted QC (RAQC; developed by KMA) and the 2D-OI method (Hadfield et al., 2005, JGR), KMA generated monthly temperature fields for the North Pacific Ocean from 2004.1 to 2010.12. KMA apply the products to investigate long-term variation of isothermal layer thickness. KMA has the plan to generate global temperature fields in the next year, using the same methods, and to distribute the result via web site.

UK Argo National Data Management Report 2011

1. Status

- *Data acquired from floats* - Data from all UK floats are received at BODC by automatic download from the CLS database every 12 hours. Since October 2010 the UK has deployed 26 floats all with near surface firmware and a further 2 floats donated to and deployed by Mauritius. BODC also took on 3 Argo Ireland deployments including 2 NKE ARVOR floats. The aim was to setup floats for distribution of data to GTS and GDACs within a week of deployment. BODC also handled on-going data collection from floats from Ireland, Mauritius and Saudi Arabia.
- *Data issued to GTS* - Data from all UK floats are sent to the GTS every 12 hours. Almost 100% of TESACs messages are available within 24h. Disruptions happened due to email server failures and server problems. BUFR message distribution has been setup and is operational with checks on the BUFR messages ongoing at the UK Met Office.
- *Data issued to GDACs after real-time QC* - All UK data received at BODC are passed through the agreed real-time quality control tests 1 hour after the data arrives at BODC. All data that have been processed at BODC are queued for transfer to both GDACs which occurs twice a day. Any file that fails to be transferred is queued for the next transfer attempt.
- *Data issued for delayed QC* – All delayed QC on BODC hosted floats is done within BODC.
- *Delayed data sent to GDACs* – The OW software is being used at BODC with latest reference data available from Coriolis. 99% of UK float profiles eligible for delayed mode QC have been processed and submitted to the GDACs in D-mode.
- *Web pages* - BODC hosts the main data information and access pages for the UK. These pages include a list of the current status of all UK floats deployed, automatic request system for all UK float data, links to both GDACs and other Argo related sites and an interactive map giving information on last known positions, deployment positions and direct links to profile plots of the last profile reported by every float. Other information about Argo is also available. A UK Argo web-site to be hosted at BODC, the aim is in development together the existing UK pages and make information on UK Argo more accessible to the Argo community, both within the UK and further afield.
- *Statistics of Argo data usage*: In addition to GDACs, BODC hosted Argo data are also available from the UK Argo Data Centre web-site via an interactive map interface. In addition the technical files are updated once a week and these files are used by CSIRO Marine to populate the technical web-site. The variable names in the technical files have been updated to the latest agreed variable name specification in September 2011. Under plans to develop a UK Argo web-site to be hosted at BODC, technical data will be included on UK Argo pages. During the last year, UK metadata, trajectory and profile files have been provided to users through BODC website. The site has handled 37 requests, made by 20 enquirers from 6 countries. Under the Euro-Argo project (Euro-Argo preparatory phase finished in early 2010) the usage of Argo by the UK Argo community was investigated and the following summarises the findings:

Operational and scientific use of Argo data at the Met Office

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

Scientific use of the data within NERC and the academic community

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

- *Products generated from Argo data* - Data from all Argo floats are assimilated in to the Forecasting Ocean Assimilation Model (FOAM) run at the Met Office.
- *Iridium present/future activities* (not applicable at this time, potential for proposals for the UK to acquire such floats in future through Euro-Argo E-AIMS proposal)
- *Unpumped Near Surface Temperature (NST) data from APEX floats evalulation.* An MSc student at Reading University (Sarah Quinn supervised by Andrea Kaiser-Weiss and Jon Turton) conducted an evaluation of NST data for use in determining the temperature structure of the top 10 m of the water column. Results are to be presented at ADMT12.

2. Delayed Mode QC

The DMQC system at BODC is operational using OW software and the CTD_for_DMQC_2010V2 and ARGO_for_DMQC_2011V02 reference datasets. Reference data are updated when new versions are available.

During the summer of 2011 the DMQC progress by BODC was maintained.
As of October 2011 99% of eligible BODC profiles are submitted to GDACs in delayed mode.

Delayed mode activities include the following improvements to the BODC data system and D-mode data files:

- The resolution of any format errors identified by John Gilson's format checker. A format checker has not currently been implemented at the DAC level meaning a few profiles that fail the checks get to GDACs.
- Resolution of issues in BODC technical files identified by Jeff Dunns (CSIRO) audit of pressure corrections applied to Argo profiles.
- The flagging of data for APEX TNPD issues is complete.
- Continued use of notes for the historic "sharing of regional DMQC expertise" ADMT action item. No further contributions were received by other delayed mode operators in the year since ADMT11.
- Cell thermal lag corrections are not applied by BODC yet.
- Updates to technical files for issues identified by Ann Threshers CSIRO technical file audit.
- Sourcing of East Sea/Sea of Japan reference data for KORDI from NFRDI (Korean oceanic data center) to help them setup software for DMQC.

3. GDAC Functions

Section not applicable to BODC.

4. Regional Centre Functions

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

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

Re-establishing a link to submit profiles to CCDHO has been slow with differing data centre ideologies between the USA and the UK slowing the process. As a first step BODC will submit approximately 20 cruises of applicable data it holds to CCDHO with the access restriction of 'for Argo project use'. The goal is for these to filter through to the Argo delayed-mode QC reference data.. It is hoped ease this restriction in due course. The routine submission of CTD profiles to

CCHDO when they are banked at BODC is the eventual goal, more negotiation is required before this is possible though.

The GODAE QC experiment initially reported on in 2010 has continued at ESSC, Reading. The initial portal presented at ADMT11 mothballed with the underlying Quality Control (QC) Database at ESSC Reading expanded (longer time series and addition of Coriolis QC) and maintained for further analyses. ESSC efforts involve 3 people:

- Marc Stinger performed initial analysis for database.
- Alastair Gemmell started to define metrics to evaluate the different QC systems.
- Robin Wedd is based at ESSC until summer 2012 and will be continuing the analysis.

The work is documented and accessible on their wiki pages:
http://www.resc.rdg.ac.uk/twiki/bin/view/Resc/ArgoQualityControl

Partnership for Observation of the Global Oceans (POGO) work has increased with development of routines to automate the collection and submission of cruise plans to POGO. Work is close to operational for the US University-National Oceanographic Laboratory System (UNOLS) managed ships. The intention is for this information to be of assistance in Argo deployment planning.

Argo National Data Management Report of United States

September 25, 2010 to October 25, 2011

1. Real-time DAC at NOAA/AOML

- **Deployments and status of floats:**

a) 371 floats were deployed in September 25, 2010 - October 25, 2011 by the US Argo partners.

Of those:
- 342 are reporting as of October 25, 2011.
- 29 had not been reporting for more than 30 days as of October 25, 2011 (this number includes very recent deployments for which addition to the processing stream is pending).

b) 3,820 floats were deployed from1997 to October 25, 2011.

Of those:
- 105 failed on launch (this number includes very recent deployments for which addition to the processing stream is pending).
- 1,701 are reporting as of October 25, 2011.
- 2,014 are not reporting for more than 30 days as of October 25, 2011 (this number includes very recent deployments for which addition to the processing stream is pending).

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

73,236   from September 25, 2010 to October 25, 2011

471,142   from 1997 to October 25, 2011

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

During the reporting period, *72,308* real-time technical files and *72,308* trajectories files, as well as 369 new meta files have been issued to both GDACs.

- **Profiles distributed via GTS:**

During the reporting period, Service Argos and AOML distributed 58,968 profiles via GTS. About 86% (93%) of the profiles were available in less than 24 (36) hours. About 4% of the profiles were not available within 72 hours. These are from Iridium floats that were under ice or from newly deployed floats.

- **Operational web pages:**

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

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

plots one can follow the links to "deployment maps", "performance plots" or "float array". "performance plots" provides access to all figures by float ID. The other two are maps with a hot spot for each float that links to the trajectory and section plots.

- **Some tasks accomplished during the reporting year**

  - Decoding of Iridium floats from PMEL and University of Washington. Verification of Oxygen coefficients for all Oxygen floats. Reprocessing of all Oxygen and non-Oxygen floats.
  - Development of new algorithm to calculate start of transmission for APEX floats.
  - Development of treatment of mission configuration parameters for Iridium floats.
  - Development of the gross pressure quality control test.
  - Improvement in the ghost transmission detection on decoding time for APEX floats.
  - Improvements to decoders, including noticeable reduction in execution time.
  - Improvements to the generation of technical parameters.
  - Addition of a figure to our web site to monitor the time it takes us to submit a profile to the GDAC (updated monthly).
    http://www.aoml.noaa.gov/phod/argo/opr/technical_users.php?entry=time2gdac_graphic_w
  - Implementation of a system for detecting duplicate profiles at the GDACs based on the detailed index file from IFREMER to accelarate their removal. This eliminated the need to wait for AIC reports that list them.
  - Updating the quality control flags of profiles based on the Objective Analysis from Coriolis. The updated files are resubmitted to the GDACs on a weekly basis.

2. Delayed mode QC

Scripps Group:

Scripps Institution of Oceanography (SIO) has evaluated, as part of delayed-mode quality control (DMQC), a total of 94,558 Argo stations (profiles). This is an increase of approximately 15,452 stations (429 float years) since the previous United States Argo National Data Management Report (October, 2010). At present, 99.3% of the SIO stations which are eligible for DMQC processing 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 stations from Argo New Zealand floats for which SIO performs DMQC.

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

The DMQC procedures for SOLO/SOLOII floats mentioned in past reports were continued into 2011. Updates to the Argo Climatological Dataset for OW salinity calibration were created quarterly throughout the year.

2011 was a transition year between the SIO Instrument Development Group (IDG) SOLO and the newly developed IDG SOLO-II. Fewer SOLO were deployed this calendar year than SOLO-II. The transition will be complete soon with the last deployment of an SIO SOLO expected to occur in early 2012. The transition to the SOLO-II has introduced slightly modified DMQC procedures due to the switch to the Iridium data collection

system, GPS positioning system, different rise rate, and greater vertical resolution in the ascending profile. However the core DMQC procedures remain unchanged with the SOLOII. While the currently active fleet of SOLOII is young, 6 floats have passed through DMQC in whole or in part.

University of Washington Group:

As of September 2011, University of Washington had submitted 115,010 delayed-mode files (D-files) to the GDACs via AOML. These comprised of:

- 103,146 D-files belonging to University of Washington (UW), representing 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.

During 2010-2011, UW performed delayed-mode processing for all the UH KESS floats in an effort to clear up some of the backlog from Argo-equivalent floats held at AOML. This is a collaborative effort between Drs. Bo Qiu and Shuiming Chen from UH, and Annie Wong from UW.

After the conclusion of ADMT-11 in Hamburg in October 2010, all APEX floats from UW and UH that used the old Apf-8 controller were checked for Truncated Negative Pressure Drift (TNPD). TNPD data were labelled with the agreed qc flag, error bar, and character string detailed in the Argo QC Manual V2.6.

Delayed-mode evaluation of conductivity sensor drift was done by using the statistical comparison method of OW (2009), in conjunction with the CTD reference database CTD_for_DMQC_2010v2, issued by Coriolis in April 2011. Visual comparison with nearby good Argo data was employed to complement the statistical method of OW. Results from Stephanie Guinehut's altimetry test were also taken into account as part of the delayed-mode evaluation process.

PMEL group:

As of 26 October 2011, PMEL had a total of 39,724 D-files at the GDAC. Of these, 39,711 were more than one year old - 73% of the total of 53,939 PMEL profiles that were older than one year at that time. At the time that last year's report was written, PMEL had a total of 37,267 D-files at the GDAC. Of these 36,481 were more than one year old - 90% of the total of 40,526 PMEL profiles that were older than one year at that time. This year we have fallen behind on our DMQC profile count, partly because a longer than expected cruise and various IPCC tasks and meetings have delayed our roughly annual DMQC revisit for our floats by a few months. We should be able to clear this backlog in the coming months.

The PMEL float DMQC procedure currently consists of the following steps: We perform an automated correction, with visual check, of reported pressure drifts and correction for the effect of these pressure drifts on salinity, as well as an automated correction of conductivity cell thermal lag errors following Johnson et al. (2007). We do visual inspection and modification of quality control flags for adjusted pressure, temperature, and

salinity using the SIO GUI. As of this summer, we now overwrite the raw Param_QC flags during this step as required. We use OW Version 1.1 with SeHyD_090408 as a historical database for recently deployed floats and adjust run parameters to get appropriate recommended salinity adjustments. We accept or reject the OW recommendations on the basis of comparison with nearly historical and Argo float profiles using the SIO GUI. We are continuing use of WJO Version2.0 instead of OW Version1.1 with most floats that began DMQC using the former system. We will have to modify our routines to accommodate the growing number of PMEL Iridium floats with 2-dbar vertical resolution.

We have gone through all PMEL floats to identify and categorize runs of TNPD profiles for affected floats as well as suspected or confirmed microleakers. We have flagged and greylisted all suspected or confirmed microleakers as appropriate. This year we have redone the flagging and added scientific comments as required for TNPD floats. The effort required to completing these tasks also contributed to the backlog of profiles awaiting DMQC.

WHOI group:

As of October 31, 2011, Woods Hole has submitted 68,484 delayed-mode profiles to the GDAC. Of the target group of profiles older than 12 months, 67,943 delayed-mode profiles have been submitted representing 81% of the total of this group.

We have also developed a new Matlab-based Graphical-User-Interface which utilizes the updated version of the Matlab NetCDF interface.

3. Argo Regional Center at NOAA/AOML

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

Data consistency check is being performed for the SAARC. The automatization of the software is close to completion. The results for 873 floats with any profiles in the SAARC region are currently being evaluated prior to being released to the community. This includes 246 floats that have new delayed-mode profiles, but does not include 159 floats that could not be analyzed for various reasons (examples: only 1 profile is available; the profile data are flagged as bad). Results are presented on the web and can be accessed from the SAARC page, in the sidebar under Quality Control. The results from the current analysis should be posted by mid-November 2011.

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

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

Products web pages:

http://www.aoml.noaa.gov/phod/sardac/products/index.php currently shows four types of products that are derived from hydrographic profiles collected by Argo floats and other instruments:

- Properties of the mixed layer (thickness, temperature and heat storage rate) as monthly fields.
- Zonal sections of temperature, salinity and dynamic height across the Atlantic as semi-annual and annual means. These are at 14 latitudes between 20N and 45S, and cover 4 degrees of latitude.
- Meridional sections of temperature, salinity and dyamic height across the Atlantic as semi-annual and annual means. These are at 3 longitudes, 22.5W, 27.5W and 32.5W, and cover 5 degrees of longitude.
- Maps of altimetry and geostrophic currents.

20. Annex 6 - ARC reports

ARC action items - status

essential roles:
• regional analysis of all Argo data to assess its internal & external consistency
• feedback to PIs about the results of the regional analysis and possible outliers
• contribute to Reference Data Base for delayed mode quality control
• Prepare and distribute Argo data products
optional roles:
• Coordinate Argo deployment for the region
• Develop new Q/C tests for region
• Provide delayed-mode Q/C for regions without such capabilities
• Compare Argo data to models and assimilated fields
• Provide documentation of the procedures done at the ARC
• Training, outreach, education (e.g. help end users with accessing and using the data)

Item: The "essential" and "optional" tasks of regional centres were reviewed, and it was agreed that these are still appropriate.
Each ARC to specify

#	Action	Status
1	**optional and essential roles**	
1a	who is responsible for each role	Done by all (NAARC, PARC, SAARC, SOARC)
1b	what resources are required for each role	Done by all
1c	time-line and/or plan for each role	Plans updated by all if needed
2	add links to AIC on regional centre pages	NAARC: done PARC: done SOARC: done SAARC: done
5	**Listing of products**	
5a	Update excel spread sheet of products	Discontinue (replaced by 5b)
5b	Listing of available products on web page maintained by AST (Megan)	Ongoing effort for each ARC
5c	Provide uniform language for gridded data sets, e.g., "optimal interpolation" versus "objective analysis"	No progress.
6	Lot's of discussion on Argo products and product development. Do we want to include at some level, s/w support (e.g., providing input on things like ferret, JOA, etc.)?	No action taken. This will be removed in future versions because no resources available for such actions.
7	How to coordinate product development? Referencing originator, regional/global, documentation, etc.	No coordinated action taken. PARC: on case by case basis.

8	need to define precisely what we mean by Argo data products	AST: Argo products must be gridded in some way.
9	Communication and coordination between ARCs, product developers and DMQC operators.	NAARC: Activities have been carried out within Euro-Argo between NA-ARC and SO-ARC PARC: No progress. SOARC: No news. SAARC: Participate in DM QC workshops if possible.
10	communication with CCHDO: ARCs should try to provide points of contact to Steve Diggs and CCHDO for planned/performed cruises. There is a large need for communication between those organizing cruises and his program that will archive CTD data.	NAARC: Request sent to EuroArgo community regularly PARC: No progress SOARC: Continuing effort SAARC: No news
11	share scripts that display data/products (netcdf/kml/gis translations)	NAARC: No action taken PARC: No progress SOARC: No BODC developments SAARC: So far only within the scope of Nigeria training
12	communication with PIs, e.g. regarding problems found when qc'ing data (either through product development or otherwise). It was recommended that this be done via the AIC (i.e., send this back to Mathieu)	NAARC: Done by M Ollitrault with the ANDRO Atlas Development and by C Coatanoan with Objective Analysis Alert system PARC: We have been reporting problems back to AIC. SOARC: BODC have reported issues when identified in the central index files from the GDACs, e.g. suspicious positions and times. SAARC: Work in progress to report QC results via AIC. Developing the last stage of the QC is a primary focus.
13	continue education, outreach activities (e.g. deployment and data acquisition training for African Nations)	NAARC: Done via Euro-Argo PARC: Ongoing effort SOARC: No developments from BODC. But the UK participates in EuroArgo. EuroArgo has produced educational outreach materials that are currently hosted on the NOC website. SAARC: Continuing effort – previously held workshop in Nigeria; capacity building workshop in Indonesia. Collaboration with Ghana (deployments).
14	need to promote Argo, demonstrate value of the program to regional communities/countries; do this through	NAARC: Done at European level within Euro-Argo. Will Continue in the SIDERI EU project. PARC: Ongoing effort

	ARCs	SOARC: No developments from BODC. But the UK participates in EuroArgo. EuroArgo has produced educational outreach materials that are currently hosted on the NOC website. SAARC: Collaboration with various nations around the SA-ARC region.
15	continue improvement of Argo Marine Atlas; perhaps use ARCs as method for distribution/user feedback	No actions. The Atlas continues to be updated. This will be removed from future versions of the ARC action list.
16	AST to display list of data viewers	No news from ARCs. This will be changed to "ARCs are encouraged to let AST know if they have a data viewer that can be shared." in future versions.
17	**Deployment planning**	
17a	Deployment planning	NAARC: Ongoing. PARC: No progress SOARC: No BODC developments SAARC: Ongoing.
17b	Provide maps of float location, age, data quality (float quality) for deployment planning	NAARC: A MATLAB tool has been developed can be provided for test by Birgit. Plan to provide such maps on the web. PARC: JAMSTEC has been doing this. SOARC: An interactive map of the southern ocean is maintained on the BODC pages. SAARC: A MATLAB tool has been developed at AOML. Planning to display them on the web.
17c	Work on logistics (e.g., how to share information on potential deployment opportunities (AIC, BODC, JAMSTEC, AOML, Coriolis))	Done by AIC. AIC receives information from SAARC, SOARC (BODC), NAARC. Also efforts by Steve Diggs.
18	the next meeting will involve DMQC operators, perhaps devoting the majority of the meeting to developing collaboration between these two groups (reference data sets, procedures, experiences, etc.)	Was targeted to 2010 ADMT meeting. Was done by all ARCs This will be changed to "Encourage ARCs to send representatives to DM QC meetings if possible" in future versions.

NA–ARC action items

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

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

	contact person	resources	plan
essential roles:			
• regional analysis of all Argo data to assess its internal & external consistency	C Coatanoan	A scientist and an operator at GDAC	Daily warning
	C Cabanes	A data manager and a scientist	Yearly update
• feedback to PIs about the results of the regional analysis and possible outliers	C Coatanoan	A data manager and an operator	Daily via automatic email
• contribute to Reference Data Base for delayed mode quality control	C Coatanoan with Euro-Argo		Periodic query within euro-Argo community
• Prepare and distribute Argo data products	V Thierry with Argo-France		
optional roles:			
• Coordinate Argo deployment for the region	N Lebreton		
• Develop new Q/C tests for region	V Thierry with Argo-France and Euro-Argo		
• Provide delayed-mode Q/C for regions without such capabilities	C Coatanoan B Klein PM Poulain J Buck		
• Compare Argo data to models and assimilated fields	J Buck		
• Provide documentation of the procedures done at the ARC	C Coatanoan and C Cabanes and Virginie Thierry		Early 2012

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

The NA-ARC www site has been enriched with new information and data mining www site (http://www.ifremer.fr/lpo/naarc/#)has been developed that :

- provides an interactive user interface for Argo data mining,

- simplifies access to information about all, or a subset of, profiles,

- centralizes as much as possible information provided by other services.

It also develops new services such as

- statistics (number of profiles/floats, distribution per data mode, DAC, over time, etc...),

- descriptive information about profiles (issue, figure, map, etc...),

- scripts to download netcdf profiles directly from GDAC ftp servers

Topic: add links to AIC on regional centre pages

Done.

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

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

No action taken

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

No action taken

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

Shouldn't this come from AST?

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

Nothing will be done without some leadership. Activities have been carried out within Euro-Argo between NA-ARC and SO-ARC

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

Request sent to EuroArgo community regularly

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

No action taken

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

Done by M Ollitrault with the ANDRO Atlas Development and by C Coatanoan with Objective Analysis Alert system

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

Done via Euro-Argo
http://www.euro-argo.eu/news_and_events/news_and_events_2009/euro_argo_educational_web_site

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

Done at European level within Euro-Argo. Will Continue in the SIDERI EU project

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

No action taken

Topic: AST to display list of data viewers

AST not ARC action

Topic: Deployment planning

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

A MATLAB tool has been developed within EURO-Argo by BSH and can be provided for test by Birgit. The new NA-ARC WWW site plan to provide such maps

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

Action taken by AIC

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

It's the case for the NA-ARC

ARC action items

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

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

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

Topic: add links to AIC on regional centre pages

Done (had been there)

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

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

We are just continuing to update products already on the list.
JAMSTEC has new products, will update Scripps
Mixed layer product (T, s, rho, MLD monthly mean, horizontal gridded to 1 degree) to be released soon (end of 2010)

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

No news

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

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

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

No progress.

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

No progress.

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

Not sure if this has been done.

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

No progress.

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

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

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

JAMSTEC introduces and educates high school students on the deployment, analysis and utility of

Argo floats. JAMSTEC visited some elementary school to educate the aim and role of the Argo program. After explanation, elementary students wrote messages on the Argo floats. These Argo floats with messages of elementary students have already deployed. We are providing status information of these Argo floats on our web site in real time.

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

Some training in American Affiliated territories in the Pacific (data acquisition, promoting the Scripps atlas); some work by JAMSTEC (see above)

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

No progress.

Topic: AST to display list of data viewers

Unknown.

Topic: Deployment planning

No progress

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

JAMSTEC has been doing this

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

No progress.

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

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

Updated PARC participant list:
Mizuho Hashimoto (JMA, RT)
Kanako Sato (JAMSTEC, DM)
Fengying Ji (NMDIS, RT+DM)
Liu Zenghong (SOA)

Shaohua Lin (NMDIS)
Pil-Hun Chang (NIMR/KMA, RT)
Joon-Soo Lee (NFRDI, DM)
Ann Thresher (CSIRO)
Jim Potemra (UH)

JMA = Japan Meteorological Agency
NMDIS = National Marine & Data Information Service
SOA = Second Institute of Oceanography
NIMR = National Institute of Meteorological Research
NFRDI = National Fisheries Research and Development Institute
CSIRO = Commonwealth Scientific and Industrial Research Organization
UH = University of Hawaii

SA–ARC action items

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

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

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

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

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

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

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

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

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

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

Steve Diggs and CCHDO for planned/performed cruises. There is a large need for communication between those organizing cruises and his program that will archive CTD data.
No news

Topic: share scripts that display data/products (netcdf/kml/gis translations)
Only within the scope of Nigeria training

Topic: communication with PIs, e.g. regarding problems found when qc'ing data (either through product development or otherwise). It was recommended that this be done via the AIC (i.e., send this back to Mathieu)
Work in progress to report QC results via AIC. Developing the last stage of the QC is a primary focus.

Topic: continue education, outreach activities (e.g. deployment and data acquisition training for African Nations)
Continuing effort – previously held workshop in Nigeria; capacity building workshop in Indonesia. Collaboration with Ghana (deployments).

Topic: need to promote Argo, demonstrate value of the program to regional communities/countries; do this through ARCs
Collaboration with various nations around the SA-ARC region.

Topic: continue improvement of Argo Marine Atlas; perhaps use ARCs as method for distribution/user feedback
No news

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

Topic: Deployment planning
Ongoing.

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

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

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

SO–ARC action items

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

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

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

	contact person	Resources	plan
essential roles:			
• regional analysis of all Argo data to assess its internal & external consistency	Lesley Rickards/Justin Buck	Limited MyOcean funding	No plans at present
• feedback to PIs about the results of the regional analysis and possible outliers	Lesley Rickards/Justin Buck	Limited MyOcean funding	No plans at present
• contribute to Reference Data Base for delayed mode quality control	Lesley Rickards/BODC Argo	Limited MyOcean funding	On-going, differing data access ideologies to resolve.
	Brian King	NERC projects	End of cruise CTD data goes directly to CCHDO.
• Prepare and distribute Argo data products	Lesley Rickards/BODC Argo	MyOcean/NERC Argo funding	Ongoing, FOAM images being updated at present
optional roles:			
• Coordinate Argo deployment for the region	??	MyOcean?	Difficult because UK deployments are not orchestrated within BODC.

			Increase in POGO activity at BODC which will assist in deployment planning.
• Develop new Q/C tests for region	BODC Argo	BODC NERC core funding	Jump test investigation reported at ADMT10, Progress and evaluation presented at ADMT11 and AMDT12
• Provide delayed-mode Q/C for regions without such capabilities	Justin Buck	EuroArgo/NERC core funding	On-going, BODC provide DMQC for Argo Ireland, Mauritius, and Saudi Arabia
• Compare Argo data to models and assimilated fields	Justin Buck	MyOcean	Ongoing at ESSC Reading, Assessment of operational QC vs. Argo QC. Further results expected summer 2012.
• Provide documentation of the procedures done at the ARC	Lesley Rickards/Justin Buck	NERC Core funding	It is hoped to address this during the creation of a UK Argo web site. Initially with DMQC documentation.

Topic: add links to AIC on regional centre pages

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

Topic: listing of products:
- update gridded products web catalogue maintained by Megan
- find new/better product descriptors/qualifiers for products table

- Provide uniform language for gridded data sets, e.g., "optimal interpolation" versus "objective analysis"
- completion of table; maybe merge with the catalogue maintained by Megan?

no BODC developments.

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

no BODC developments.

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

No BODC developments.

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

No BODC developments.

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

Since presentation at ADMT on the sharing of regional expertise no further inputs received?

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

NOC cruises regularly submit data to CCHDO at the end of the cruise, Brian King is the contact. BODC will be submitting historic data that we hold that falls outside the data Brian King is organizing. A list of potential cruises has been passed to Steve Diggs. Differing ideologies on data availability and reporting of metric slowing progress, it is hoped to resolve these in the coming year. Data supplied to CCHDO for 'Argo use only' as an interim solution.

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

No BODC developments.

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

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

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

African Nations)

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

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

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

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

n/a to BODC.

Topic: AST to display list of data viewers

n/a to BODC.

Topic: Deployment planning

No BODC developments.

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

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

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

The UK use deployment opportunities where applicable e.g. UK deployments on USS Samuel Roberts in the Arabian Sea/Somali basin jointly with CSIRO.

POGO activities are expanding at BODC, the aim is to link this with work by Mathieu Belbeoch at the AIC to increase number opportunities for deployment.

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

It is encouraged that ARC representatives participate in the DM QC meeting. BODC ARC representatives are the same people as delayed mode and real time operators.