

ARGO France
Report for the ARGO Steering Team meeting
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1. The status of implementation (major achievements and problems in 2006)

- floats deployed and their performance:

77 floats were deployed in 2006 early 2007, 2 Provor beached in the Mediterranean Sea, and one Apex failed after one cycle. The performance of the present Provor-CTS3 is very good and no failure occurred in 2006 both during the acceptance tests and at sea.



In yellow the position of the floats deployed by France in 2006

- technical problems encountered and solved:

No technical problems were encountered in 2006. Special study, in collaboration with CLS-ARGOS, has been conducted to adjust time at the surface because transmissions are not easy in Mediterranean Sea. In most of the cases 100% of the data are transmitted at shore for the Provor floats.

- status of contributions to Argo data management:

French Coriolis data center process data coming from 680 floats including 351 active floats in October 2006 (half Provor , half Apex) , deployed by 13 countries (Chile, Costa Rica, Denmark, France, Germany, Italy, Mexico, Netherland, Norway, Russia, Spain), Operated by 35 scientific projects (Good-Hope, Mersea, MFSTEP, Tropat, Wecon...) The detail can be found in the 7th ADMT report. Data are processed and distributed according to Argo recommendations

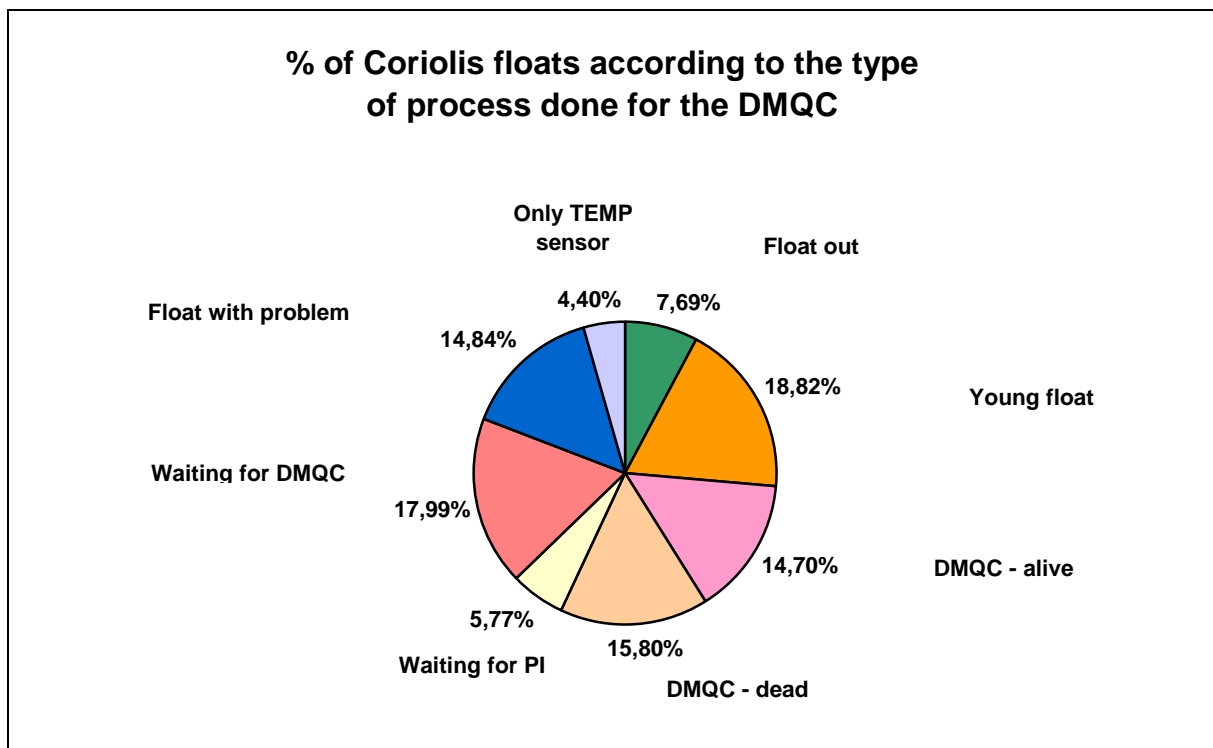
France also operates the European GDAC in collaboration with its USA counterpart FNMOC.

France also coordinates the activities of the North Atlantic ARC. The main activities are related to the reference data base as well as for data consistency in North Atlantic.

2. Status of delayed mode quality control process

- fraction of accumulated profiles processed:

The figure presents the status of the Coriolis floats. About 1/3 of the floats have been processed, while 1/3 of the floats cannot be processed for various reasons (only temperature sensor, float too young, etc..). Among the remaining floats that must be controlled in delayed mode, the Coriolis data center is waiting for the response of the PI for 15% of them, 47% of the floats have not been considered yet and 38% of the floats are problematic and must be considered carefully.



- prospects for getting process up-to-date:

Each profiling floats deployed as part of the French Argo program has a PI in charge of the delayed mode processing. PIs are strongly encouraged by the Coriolis datacenter to validate the data as soon as possible. Coriolis provides a support to the PI to help use the recommended method (BS in 2006 and now OW).

- problems being encountered with DMQC:

One problem encountered with the DMQC process is that the statistical method used to identify and correct salinity drift and bias is not yet stabilized. Following the recommendation of the 1st DMQC workshop, we have done some adaptation to the Boehme and Send (2005) method and now we are testing and shifting to the new merged method (Owens and Wong). Also, the method needed some adaptation in some regions due to the presence of fronts or because of the lack of reference data (eastern Tropical Atlantic or Antarctic for instance). In addition, different scientific teams are in charge of the DMQC. So, the observed delay is partly due to the PI because they commit to validate the data but not necessarily to do it within 1 year after the measurements.

3. Present level of and future prospects for national funding for Argo including a summary of the level of human resources devoted to Argo.

Since 2000, more than 300 French floats have been deployed in a number of different geographic areas, where deployments have focused on meeting specific French requirements, while also contributing to the global array. The French contribution is comparable to that from other developed countries and has provided a significant contribution to the growing Argo array.

<i>Year</i>	<i>French floats</i>
2000	11
2001	12
2002	7(+4)
2003	34(+20)
2004	85 (+18)
2005	89(+11)
2006	65(+15)
2007	65

Table 1. Numbers of French floats contributing to Argo deployed by year, figures in brackets are the additional floats co-funded by EU within the Gyroscope, MFSTEP and Mersea projects. Estimated figures are given for 2007.

The interests of France are global but with special interests in the Atlantic, Indian and Southern Oceans. We first started in the North Atlantic and gradually moved to the south while the network was dense enough in this area. French Argo has also deployed floats in sparsely populated regions (e.g. South Indian Ocean, South Atlantic and Southern Ocean),

The French Argo Project has been funded by the ministry of Research (mostly through Ifremer) and in a lesser proportion by the ministry of Defense (through SHOM). Overall the level of support, additional to float purchase, has been as indicated in the table below (man power for float preparation and data processing).

<i>Year</i>	<i>Man/Year</i>
2001	3
2002	6
2003	9
2004	15
2005	15
2006	12

Table 2. Man power dedicated to Argo for Float preparation and Data management activities within French Argo.

France plans to contribute to the Argo global array at the level of about 80 floats per year with funding from Ifremer (about 50 floats/year) and SHOM (about 10 floats/year) and some direct EC funding. The expectation is that about 30% of the French contribution could come on the longer run from direct European funding. As part of the Euro-Argo preparatory phase, Ifremer will work with its funding ministry (mainly research ministry) to agree on a long-term funding level and commitment. Together with its European partners, Ifremer will also work with the European commission to set up a long term EC funding to Argo.

4. Summary of deployment plans (level of commitment, areas of float deployment) and other commitments to Argo (data management) for the upcoming year and beyond where possible.

In 2007 we will deploy floats in the Southern Ocean (between Africa and Antarctic) , in the Drake passage, in Mediterranean Sea, in Pacific near Chile, in Tropical Atlantic near Canary Islands and also planned some opportunity deployment in North Atlantic to reseed it if necessary.

Coriolis will continue to run the Coriolis Dac and the European GDAC as well as coordinating the North Atlantic Arc activities.

5. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centers.

A key aspect of the French Argo programme is to develop the capabilities to fully exploit all Argo data for operational forecasting as well as research applications. Therefore Coriolis has developed together with MERCATOR (The French operational oceanography forecast centre) a strong connection with the French research community via the Mercator-Coriolis Mission Group (GMMC). It consists of about one hundred researchers (with some turnover each year) following a scientific announcement of opportunities and call for tender. Its task is to support the Mercator and Coriolis scientific activities and to participate in product validation.

Operational ocean forecasting. All Argo data (alongside with other in-situ and remotely sensed ocean data) are routinely assimilated into the MERCATOR operational ocean forecasting system run by the MERCATOR-Ocean structure. Assessments have clearly demonstrated the positive impact of Argo data on ocean analyses and predictions

Ocean science. Argo data are being used by many researchers in France to improve the understanding of ocean properties (e.g. circulation, heat storage and budget, and mixing), climate monitoring and on how they are applied in ocean models (e.g. improved salinity assimilation, ...). The French Argo Users' Group provides a forum for engagement between these scientists and the French Argo programme.

As part of the scientific announcement of opportunities mentioned previously (GMMC), PIs can be selected to deploy floats within their scientific experiments. Here is the list of the experiments during which floats were deployed. Most of those projects rely strongly on Argo data.

- **OVIDE and North Atlantic variability** (H. Mercier, V. Thierry, T. Huck, P. Lherminier, B. Ferron): This project focuses on the variability of the thermohaline circulation (THC) on seasonal and interannual time scales, on water mass analysis and census and on heat balance estimates. It includes a 4-D VAR inversion to reconstruct optimum circulation. The project includes a high resolution CTD section from Iberia to Greenland every two years, useful for delayed mode QC.
- **EGEE** (B. Bourles): This project focuses on the variability in the Gulf of Guinea and Eastern tropical Atlantic. It is an ocean (and large scale air sea interaction) contribution to the AMMA program (African Monsoon Multidisciplinary Analysis).
- **Flostral** (R. Morrow): This project focuses on the mode water (SAMW and AAIW) in the SW Indian and Austral Ocean, on the thermocline and on its role in setting up the deeper T-S variations.
- **GoodHope** (S. Speich, M. Arhan): This project studies transfers between Indian and Atlantic oceans (water masses, heat, fresh water), relationship to global THC and regional air-sea interactions.
- **Cirene** (J. Vialard): This project focuses on seasonal to inter-annual variability of the thermohaline circulation in the Tropical Indian Ocean.
- **Frontalis** (T. Delcroix): This work studies the warm pool and salt barrier variability and their relationship with ENSO.
- **EGYPT-MC** (I. Taupier-Letage): This project focuses on the general circulation and small-scale turbulence in the eastern Mediterranean Sea.
- **CONGAS** (A. Serpette): This project aims at studying ocean dynamics along the continental slope in the Bay of Biscay.
- **FLOPS** (G. Eldin, A. Chaigneau): This project aims at studying the vertical water mass structure in the eastern Pacific, the oxygen subsurface minimum observed near the Peru-Chile coastline and the meso-scale structures observed in the current along this coastline. Floats deployed as part of this program are equipped with oxygen sensors.
- **CANOA-ARGO** (J. L. Pelegrì): This study focuses on the spatial and temporal distribution of water masses in the Canary Basin. The project includes hydrographic cruises, moorings and surface drifters.
- **PROBIO** (H. Claustre): This project consists in implementing optical sensors in profiling floats and to test them various area of the world ocean.
- **DRAKE** (C. Provost): This project aims at studying the cold route of the thermohaline circulation and its variability. It focuses on three main objectives: investigate the variability of the Malvinas current transport, the transformation of the intermediate water masses in the Argentinean basin and the variability of the Antarctic Circumpolar Current at the Drake Passage.

In addition to those projects, some scientists have included Argo data for their research (without deploying any floats). Those works concern for instance an estimate of the mean circulation at 1000m depth in the equatorial Atlantic Ocean (M. Ollitrault) or the use of optimal interpolation of temperature and salinity to describe and quantify seasonal and interannual variability of the ocean (mean state, heat and salt content, etc).

6. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo. These might include tasks performed by the AIC, the coordination of activities at an international level and the performance of the Argo data system. If you have specific comments, please include them in your national report.

The problem encountered recently with the SOLO FSI floats raises the following problem: who is the person to contact to notify suspicious data that have a QC flag set to 1 or 2. Is it the PI of the float, the corresponding ARC, the DAC in charge of the float, or someone else? It is important that someone is in charge of collecting information on anomalous data detected by users, to at least forward the information to the appropriate persons, or better to synthesize the information and to be available to detect, as early as possible, generic problems on some types of floats.

As more and more floats are equipped with oxygen sensors, it is important to perform tests in real time to discard erroneous data. What are the tests (at least the basic ones: O2 greater than 0, ..) that can be implemented in the data center ? What about delayed mode quality control ?