

**French National report on Argo – 2008**  
**10<sup>th</sup> ARGO Steering Team meeting**  
**March 2009**  
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**1. The status of implementation (major achievements and problems in 2008)**

**- floats deployed and their performance:**

90 floats were deployed in 2008.

**- technical problems encountered and solved:**

**ARVOR**

Arvor is a new float specially dedicated to CTD measurements for Argo. This development has been achieved to facilitate deployment (smaller, lighter weight <20 kg) and to reduce manufacturing costs. Transfer of the Arvor prototype for industrialization (NKE manufacturer) has been achieved and 10 instruments were manufactured in May. Intensive tests were done during the 2nd part of the year including tests achieved in real conditions by executing whole missions in a pressure tank until 2100 dbars, tests performed in a pool and tests of Argos transmission. Two floats were also tested at sea in September in the Mediterranean Sea from Thetys ship. The floats successfully made 2 cycles each until 2000 dbars. Finally, 2 floats have been shipped to the South Indian Ocean (track09 cruise) in December to be deployed for long term at the end of February 2009. These floats will cycle every 2 days at 2000m depth.

In order to spend less time at surface for data transmission, the design of an iridium model began, using the same antenna as Provov multisensors. A smaller modem has been tested and the software development has begun. The objective is to do the first tests in spring 2009. The deployment of 2 instruments should be done in the Mediterranean Sea within the EuroArgo framework.

Reflexions on the use of Argos3 satellite transmission has begun. Few tests have been done with the new modem PMT from CLS Argos. The objective in 2009 is to implement this transmission on Arvor, as an alternate way to Iridium. An experiment at sea should be done at the end of the year.

**PROVOR multi-sensors**

- ProvovDO is a PROVOR float fitted with an Aanderaa oxygen sensor. Improvement has been done after sea experiences (WP10-Carbocean, Flops, Ovide). The optode has been moved from the bottom to the top of the float, for better operation. The software has been improved to take into account some possible negative measurements of oxygen due to perfectible factory calibration. A software bug has also been corrected to measure oxygen above 327umol/l. These corrections will be implemented in the new floats.

- The successful deployments of Provov floats equipped with Iridium transmission to transmit the large amount of data collected by additional sensors (optode + transmissiometer for a Provocarbon float and radiometer + transmissiometer + fluorimeter for a Provobio float) show the success of the first iridium communication fitted out on Provov float. In addition, the Iridium satellite downlink capability has been successfully used for the first time on a Provov float to modify its mission parameters or to recover it after short mission duration.

**- status of contributions to Argo data management:**

Coriolis continue to process French floats in RT and DM. French Coriolis data center processes data coming from 991 floats including 355 active floats in February 2009 (about half Provov , half Apex) ,

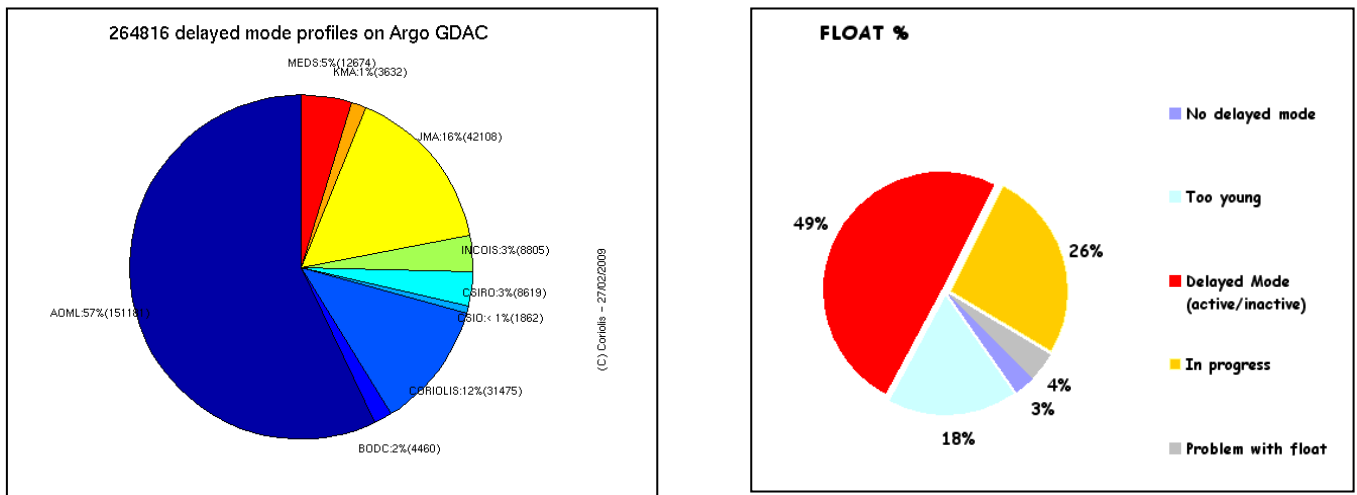
deployed by 10 countries (Chile, China, Costa Rica, France, Germany, Mexico, Netherlands, Norway, Russia, Spain and the European Union) and operated by different scientific projects (Good-Hope, Mersea, MFSTEP, Tropat, Wecon...). The detail can be found on the Coriolis web site ([http://www.coriolis.eu.org/cdc/scientific\\_projects.htm](http://www.coriolis.eu.org/cdc/scientific_projects.htm)). Data are processed and distributed according to Argo recommendations

Coriolis operates one of the GDAC in close collaboration with FNMOC/ISA. Coriolis also coordinates the North-Atlantic ARC activities and in particular the float deployment in Atlantic

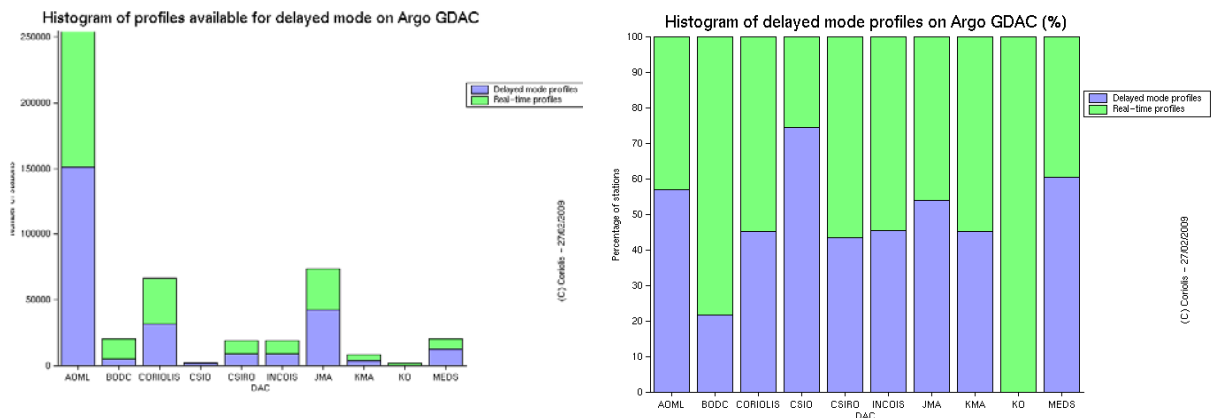
## 2. Status of delayed mode quality control process

Statistics on all delayed mode data loaded in the Coriolis database for end of February (02/27/2009) are presented on Figures 1 and 2.

Figure 1 presents the status of the Coriolis floats. 31475 delayed mode profiles are present in the Coriolis DAC that represents about 49% of the total number of profiles available. 25% 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, 26% of the floats are currently under consideration by the PIs and 7% of the floats are problematic and must be considered carefully.



**Figure 1: (Left panel) Delayed mode statistics. (Right panel) Status of the delayed mode process at the Coriolis DAC.**



**Figure 2: Histogram of profiles available for delayed-mode on Argo GDAC. (Left) Number of profiles; (Right) percentage.**

The delayed-mode quality control of Coriolis floats is done within different scientific projects. Some of them have been able to provide DM data within a reasonable time frame while other have more difficulties because of the unavailability of the PIs, because complementary studies are needed or because of the lack of data in the reference database. This is especially the case for floats in the southern ocean, although the OW method is now able to take fronts into account.

Reports on the delayed mode quality control of some floats (Ovide project for instance) are available on the following Web page: [http://www.ifremer.fr/lpo1/ovide/data/argo\\_profiling\\_floats.htm](http://www.ifremer.fr/lpo1/ovide/data/argo_profiling_floats.htm). A link to those pages and to any other reports concerning Coriolis floats will be available soon through the Coriolis web site.

### 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, France has provided a significant contribution to the growing Argo array. 420 French floats and 68 floats co-funded by European Union have been deployed in different geographic areas. The deployments meet specific French requirements but they also contribute to the global array.

Year	Man/Year	French floats
2001	3	11
2002	6	12
2003	9	7 (+4)
2004	15	34 (+20)
2005	15	85 (+18)
2006	12	89 (+11)
2007	12	65 (+15)
2008	12	32
<b>Total(2000-2008)</b>		<b>420 (+ 68)</b>
<b>2009</b>	<b>12</b>	<b>60</b>

**Tableau 1: (Man/year column) Man power dedicated to Argo for float preparation and data management activities within French Argo. (French floats column) French floats contributing to Argo deployed by year. Numbers in brackets are the additional floats co-funded by EU within the Gyroscope, MFSTEP and Mersea projects. Estimated value is given for 2009.**

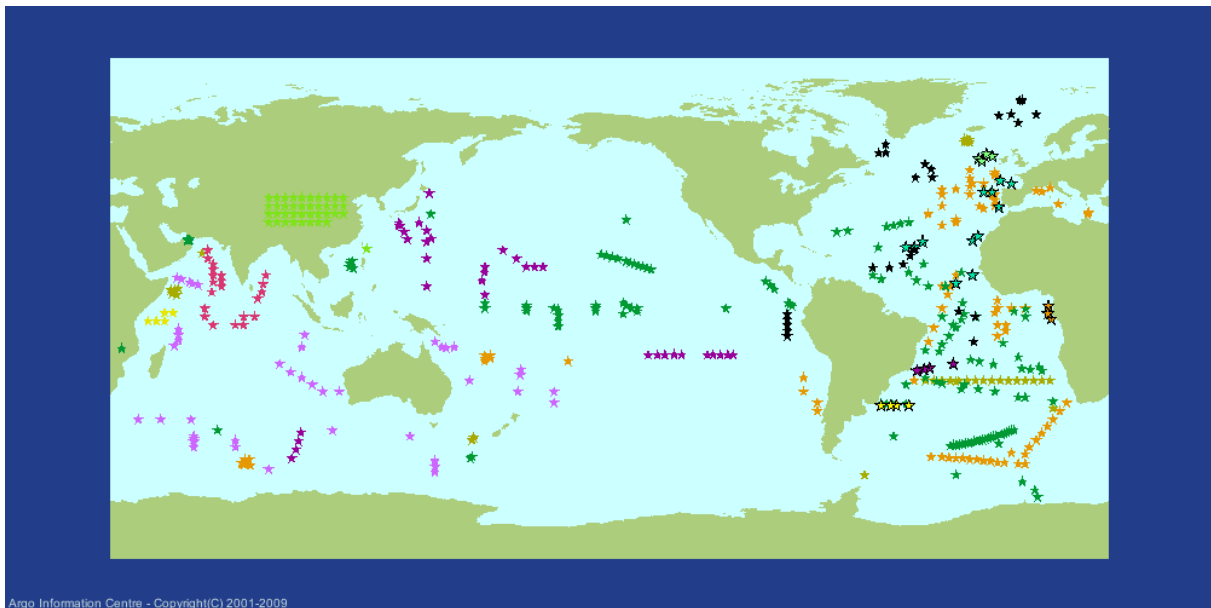
The French Argo Project is funded by the ministry of Research and by local administrations (Britanny region, Finistère department, city of Brest) mostly through Ifremer and in a lesser proportion by the ministry of Defense through SHOM. Ifremer and SHOM plan to buy between about 50 and 15 floats respectively in 2009 and beyond. As part of the Euro-Argo preparatory phase, Ifremer works with its funding ministry (mainly research ministry) to agree on a long-term funding level and commitment. Together with its European partners, Ifremer also works with the European commission to set up a long term EC funding to Argo.

In 2008, two scientists joined the Coriolis project to set up the research and development component of the project.

Overall the level of support, additional to float purchase, is as indicated in Tableau 1 (man power for float preparation and data processing).

### 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.

According to the current deployment plan, 52 floats will be deployed in 2009 in the Mediterranean Sea, in the North and South Atlantic Oceans, in the Southern Ocean and in the Pacific Ocean (Figure 3) and 13 deployments from ship of opportunity are under considerations.



**Figure 3: Deployment plan. The orange stars represent the French deployment plan for 2009.**

Coriolis will continue to run the Coriolis Dac and the European GDAC as well as coordinating the North Atlantic Arc activities. Within the Euro-Argo project development will be carried out to improve anomalies detection at GDAC both in RT and DM, to monitor in real time the behavior of the European fleet and to improve data consistency check within NA-ARC.

France also contributes to the funding of the AIC.

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

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, ...). List of scientific publications is available through the Argo web site (<http://www-argo.ucsd.edu/FrBibliography.html>) The French Argo Users' Group provides a forum for engagement between these scientists and the French Argo program.

A key aspect of the French Argo program 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. As part of the scientific announcement of opportunities mentioned previously (GMMC), PIs can be selected to deploy floats within their scientific experiments. The list of experiments during which floats were deployed are available through the Coriolis web site ([http://www.coriolis.eu.org/cdc/scientific\\_projects.htm](http://www.coriolis.eu.org/cdc/scientific_projects.htm)). Additional projects are also funded by Coriolis and Euro-Argo for data analysis.

**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.**