

# Report on the Italian Argo Program for 2011

## 1. The status of implementation (major achievements and problems in 2011).

### - floats deployed and their performance:

In total, four Italian floats were deployed in the Mediterranean in 2011 (see Table 1 for details). These floats were Arvor instruments designed by Ifremer and manufactured by NKE (France), two with Iridium and two with Argos-3. They have a parking depth at 350 dbars and profiling depths alternating at 700 and 2000 dbars. The two floats with Argos-3 were deployed and operated in collaboration with Ifremer as a contribution to the technical development activities of the EC FP7 Euro-Argo PP project. They have 3-day cycles. The two floats with Iridium were operated in collaboration with the “Gruppo Nazionale di Oceanografia Operativa (GNOO)”. They have 5-day cycles. Three of the four floats are still working as of 8 February 2012.

| Model    | WMO                     | Argos/IMEI | Deploy date GMT   | Lat   | Lon   | Cycles | Last data GMT     | Lat   | Lon   | Status |
|----------|-------------------------|------------|-------------------|-------|-------|--------|-------------------|-------|-------|--------|
| Arvor-a3 | <a href="#">6900947</a> | 82388      | 23-Feb-2011 13:08 | 32.54 | 29.3  | 124    | 26-Jan-2012 12:13 | 31.93 | 32.18 | A      |
| Arvor-a3 | <a href="#">6900952</a> | 82389      | 20-Feb-2011 15:32 | 35.91 | 16.01 | 117    | 06-Feb-2012 05:23 | 33.11 | 17.99 | A      |
| Arvor-I  | <a href="#">6900903</a> | 3000       | 24-Apr-2011 13:15 | 38.5  | 18.42 | 57     | 05-Feb-2012 05:50 | 0     | 0     | A      |
| Arvor-I  | <a href="#">6901038</a> | 1030       | 11-Oct-2011 14:22 | 42.21 | 10.8  | 1      | 13-Oct-2011 03:04 | 0     | 0     | D      |

*Table 1. Status information for the 4 Italian floats deployed in 2011.*

### - technical problems encountered and solved

Unfortunately one unit failed after only a few cycles (WMO 6901038). The reasons were investigated in collaboration with NKE. No conclusion could be reached to explain this failure. Note that this instrument has been deployed in coastal areas already twice in 2010. Although it was refurbished at NKE the deployment in 2011 was its third release at sea.

The cycling capabilities and the transmission efficiency of the two floats with Argos-3 have been assessed by Ifremer.

- It appears that all the data were not transmitted during the passage of the satellite carrying Argos-3 and that Argos-2 transmissions were used, resulting in more time spent at the sea surface.
- Data are missing partially for the deep profiles (2000 dbars). This problem was caused by a decoding error at the Coriolis Data Center. Any data at depth greater than 700 dbars was flagged at false because alternate pressure programming had not been taken into account. The float profiles at 2000 dbars every 2 cycles, so the data between 2000 and 700 dbars do not appear on the Coriolis website. As of today the metadata of the Coriolis database have been corrected.
- Some profiles could not be decoded because of errors in technical messages. These messages contain important information to process the data (offset of pressure sensor, significant dates, etc...). Some Argos messages had no Argos localisation. Seven profiles were affected by this problem for float 6900947 float and 27 for float 6900952.

- A new Arvor float with Argos-3 is planned to be deployed and tested in the Mediterranean in 2012 as part of the NAOS project. This float is equipped with a new version of the modem and new firmware capabilities that should lead to better transmission performance.

- status of contributions to Argo data management (including status of pressure corrections, technical files, etc)

The data management for the Italian float was done by the Coriolis GDAC. Metadata and data are available through the Coriolis web site in near real-time.

- status of delayed mode quality control process

Delayed mode quality control (DMQC) of the data provided by the Italian floats has not been done yet. OGS will perform this activity in 2012 as part of the EC FP7 Sideri and MyOcean-2 projects. Note that OGS has performed the DMQC on many floats operated in the Mediterranean and Black seas by other countries. The temperature and salinity data of 57 floats (over a total of 122 floats) have been quality controlled following the standard Argo procedure, covering the period 2001-2010.

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

The Italian Ministry of Research has provided funding to buy about 30 floats in 2012 and 30 floats in 2013, including 10 instruments with biogeochemical sensors. In addition, the Italian human resources devoted to Argo-Italy per year amounts to about 54 and 72 man-months for technical, administrative and scientific personnel involved in the project, in 2012 and 2013, respectively. It is expected that the Italian Ministry of Research will continue to provide funding at about the same level in order to sustain the Italian contribution to Argo beyond 2013 as member of the Euro-Argo Research Infrastructure Consortium. In addition to the Italian national funding, OGS has funding from the EC FP7 Perseus project, to buy two floats with biogeochemical sensors.

## **3. Summary of deployment plans (level of commitment, areas of float Deployment, low or high resolution profiles) and other commitments to Argo (data management) for the upcoming year and beyond where possible.**

The Italian deployment plans are detailed in Table 2. The main areas of interest are the Mediterranean and Black seas, the tropical Atlantic and Southern Ocean.

OGS is committed to carry out DMQC on all the Argo floats of the Mediterranean and Black seas as part of the SIDERI and MyOcean-2 projects over the next two years.

| Year | Floats with T/S |                                  | Floats with biogeochemical sensors |               | Total |
|------|-----------------|----------------------------------|------------------------------------|---------------|-------|
|      | Quantity        | Area                             | Quantity                           | Area          |       |
| 2012 | 10              | Mediterranean                    |                                    |               | 16    |
|      | 4               | Black Sea                        |                                    |               |       |
|      | 2               | NE tropical Atlantic off Senegal |                                    |               |       |
| 2013 | 10              | Mediterranean                    | 5                                  | Mediterranean | 22    |
|      | 2               | Black Sea                        |                                    |               |       |
|      | 2               | NE tropical Atlantic off Senegal |                                    |               |       |
|      | 3               | Southern Ocean                   |                                    |               |       |
| 2014 | 10              | Mediterranean                    | 5                                  | Mediterranean | 22    |
|      | 2               | Black Sea                        |                                    |               |       |
|      | 2               | NE tropical Atlantic off Senegal |                                    |               |       |
|      | 3               | Southern Ocean                   |                                    |               |       |

*Table 2. Italian deployment plans for 2012-2014.*

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

##### Operational ocean forecasting.

All Argo temperature and salinity data in the Mediterranean (alongside with other in-situ and remotely sensed data) are routinely assimilated into the Mediterranean Forecasting System (MFS) operational forecasting system run by GNOO. Assessments have clearly demonstrated the positive impact of Argo data on ocean analyses and predictions. In particular, studies on the optimization of float sampling and cycling characteristics for the Mediterranean have been performed, as well as the development of methodology for the assimilation of Argo float sub-surface velocities into numerical models.

##### Ocean science.

Argo data are being used by several researchers in Italy to improve the understanding of marine properties (e.g. circulation, heat storage and budget, and mixing), climate monitoring and on how they are applied in ocean models, with particular focus to the Mediterranean Sea.

The website for the Italian contribution to Argo (Argo-Italy) is under construction. The link to the Mediterranean & Black Sea Argo Centre (MedArgo) is <http://nettuno.ogs.trieste.it/sire/medargo/>

#### **5. Issues that your country wishes to be considered and resolved by the AST.**

Since 2003, a Mediterranean Argo Regional Centre (MedArgo) was created at OGS in order to coordinate Argo float operations in the Mediterranean and Black seas and to partially process their data and post graphical products on the web in near real time (NRT). MedArgo has developed further as part of the EC FP7 EuroArgo PP and the MyOcean projects, with the consolidation and improvement of Mediterranean in-situ data services required by regional data assimilation systems and applications. MedArgo is part of the Italian GNOO and of the Mediterranean Operational Oceanography Network (MOON). DMQC activities for Mediterranean and Black Sea Argo data are carried out in the framework of MedArgo using procedures tailored for the Mediterranean and Black seas. As of now, MedArgo is a non-official component of the North Atlantic Argo Regional

Centre. Given the specificity of the Argo float operations and of the Argo data in the Mediterranean and Black seas and the increase of the Argo fleet in these seas, it is asked to the AST that MedArgo be recognized as a official Argo Regional Centre (ARC) for the Mediterranean and Black seas.

#### **6. Number of CTD cruise data added to the Argo reference database by Italian PIs in 2011.**

The following three Italian CTD cruise data were added to the MedArgo reference database:

- SINAPSI (CTD data from 1997 to 2002)
- METEOR/URANIA 1999 (CTD data in 1999)
- TRANSMED (CTD data in 2007)

They will be soon transferred to the Argo reference database.

#### **7. Italian contribution to Argo bibliography in 2011.**

Jenny A. U. Nilsson, Srdjan Dobricic, Nadia Pinardi, Vincent Taillandier, Pierre-Marie Poulain (2011) On the assessment of Argo float trajectory assimilation in the Mediterranean Forecasting System. Ocean Dynamics DOI 10.1007/s10236-011-0437-0.