

Report on the Italian Argo Program for 2012

1. The status of implementation (major achievements and problems in 2012).

- floats deployed and their performance:

In total, 19 Italian floats were deployed in 2012 (see Tables 1 to 3 for details). These floats were Arvor designs manufactured by NKE (France), some with Iridium (Arvor-I) and others with Argos telemetry (Arvor-L). In the Mediterranean, 13 units were deployed (Table 1) but unfortunately two of them (WMO 6901039 and 6901820) never transmitted data after deployment, despite normal and positive test and deployment procedures. Except for these 2 floats, all the other instruments are still operating at the end of February 2013. They have a parking depth at 350 dbars and profiling depths alternating at 700 and 2000 dbars. They all have cycles of 5 days, except WMO 6901044 which is cycling at daily intervals in the Malta Channel. Most floats were deployed from research vessels of opportunity (R/V Nase More, Pourquoi Pas, Urania, Explora) with the help of colleagues from Croatian, France, Italian, Cyprus and Malta.

<u>Model</u>	<u>WMO</u>	<u>Deploy Date</u>	<u>Lat</u>	<u>Lon</u>	<u>Cycles</u>	<u>Last Date</u>	<u>Lat</u>	<u>Lon</u>	<u>Status</u>
Arvor-L	6901039	18-Feb-2012 12:00	42.25	17.75	0	18-Feb-2012 00:00	0	0	D
Arvor-L	6900979	10-Mar-2012 20:18	38.98	18.31	71	25-Feb-2013 12:29	38.23	18.57	A
Arvor-L	6900980	13-Mar-2012 18:17	40	12.66	70	26-Feb-2013 07:46	38.79	10.39	A
Arvor-L	6900978	16-Mar-2012 11:41	39.4	14.01	73	26-Feb-2013 07:45	39.39	11.68	A
Arvor-L	6900981	17-Mar-2012 03:09	40.76	10.9	69	22-Feb-2013 13:02	39.15	16.01	A
Arvor-L	6901040	29-Mar-2012 15:51	42.22	17.72	66	24-Feb-2013 12:54	42.18	16.97	A
Arvor I - 2	6901041	03-Aug-2012 02:30	41.17	11.75	41	26-Feb-2013 00:16	42.02	10.52	A
Arvor I - 2	6901042	04-Aug-2012 01:25	43.02	9.08	39	22-Feb-2013 00:19	43.96	8.57	A
Arvor I - 2	6901043	18-Sep-2012 15:29	33.58	31.98	31	22-Feb-2013 00:28	32.58	33.79	A
Arvor I - 2	6901817	11-Nov-2012 13:23	34.96	22.64	23	26-Feb-2013 00:09	34.61	21.52	A
Arvor I - 2	6901820	14-Nov-2012 11:22	38.65	17.25	0	14-Nov-2012 11:32	36.36	14.3	D
Arvor I - 2	6901818	19-Nov-2012 05:34	35.9	22.91	19	24-Feb-2013 00:11	34.94	21.87	A
Arvor I - 2	6901044	14-Dec-2012 16:40	36.29	14.3	70	26-Feb-2013 00:13	0	0	A

Table 1. Status information for the 13 Italian floats deployed in the Mediterranean Sea during 2012.

Four Italian floats were deployed in the Black Sea in 2012 (Table 2) with the help of Bulgarian colleagues. They were released in the southwestern Black Sea from R/V Akademik. One of them (WMO 6901960) stranded on the Bulgarian coast after 26 cycles. It was recovered, refurbished and is now ready to be re-deployed. The other floats are still collecting data as of the end of February 2013. All floats have a parking depth at 200 dbars and execute alternating CTD profiles from 700 and 1500 dbars. The cycling period is 5 days.

<u>Model</u>	<u>WMO</u>	<u>Deploy Date</u>	<u>Lat</u>	<u>Lon</u>	<u>Cycles</u>	<u>Last Date</u>	<u>Lat</u>	<u>Lon</u>	<u>Status</u>
Arvor-L	6901959	08-Jun-2012 09:36	43.47	30.09	53	25-Feb-2013 12:28	43.31	33.44	A
Arvor-L	6901960	09-Jun-2012 08:03	43.17	29.66	26	22-Oct-2012 19:37	42.3	27.79	D
Arvor-L	6901962	17-Aug-2012 01:50	43.42	30.17	39	25-Feb-2013 12:29	41.34	38.15	A
Arvor-L	6901961	06-Nov-2012 18:07	43.15	30.77	22	21-Feb-2013 13:14	41.59	31.14	A

Table 2. Status information for the 4 Italian floats deployed in the Black Sea during 2012.

Two Italian floats were deployed in the northeastern tropical Atlantic Ocean off Senegal in 2012 (Table 3) with the help of French and Senegalese colleagues onboard R/V Le Suroit. Unfortunately, float WMO 6900983 was incorrectly turned on and was deployed in “end of mission” mode. It stayed at surface and was eventually lost. The other float (WMO 6900982) executed successfully 6 cycles before stranding and being picked up on the Senegalese coast. The float was recovered and shipped back to NKE for repair and refurbishing. These floats were programmed as follows: 10-day cycles, parking at 1000 dbars and maximal profiling depth of 1500 dbars.

<u>Model</u>	<u>WMO</u>	<u>Deploy Date</u>	<u>Lat</u>	<u>Lon</u>	<u>Cycles</u>	<u>Last Date</u>	<u>Lat</u>	<u>Lon</u>	<u>Status</u>
Arvor-L	6900982	08-Mar-2012 01:04	14.86	-17.62	6	19-Apr-2012 14:17	14.68	342.53	D
Arvor-L	6900983	11-Mar-2012 08:30	14.34	-17.66	0	11-Mar-2012 08:30	0	0	D

Table 3. Status information for the 2 Italian floats deployed off West Africa during 2012.

- technical problems encountered and solved

As stated above, two floats failed upon deployment in the Mediterranean despite the fact that the pre-deployment tests were positive and deployment procedures were standard and normal. The reasons for these failures are still unknown. They will be investigated in collaboration with the manufacturer NKE.

- 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 2013 as part of the EC FP7 Sideri and MyOcean-2 projects. Note that OGS is responsible for the DMQC of all the floats operated in the Mediterranean and Black seas. The temperature and salinity data of 87 floats (over a total of 175 floats) have been quality controlled following the standard Argo procedure, covering the period 2000-2012.

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 50 floats in 2013, including about 10 instruments with biogeochemical sensors. In addition, the Italian human resources devoted to Argo-Italy per year amounts to about 50 man-months for technical, administrative and scientific personnel involved in the project in 2013. It is expected that the same level will be maintained in 2014. The Italian Ministry of Research is committed to provide funding 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, SIDERI and E-AIMS projects, for multiple activities (technical development, data management, capacity building and training, EuroArgo strategy, etc.) related to Argo.

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 4. The main areas of interest are the Mediterranean and Black seas and the Southern Ocean.

Year	Floats with T/S		Floats with biogeochemical sensors		Total
	Quantity	Area	Quantity	Area	
2013	10	Mediterranean	2	Mediterranean	16
	1	Black Sea			
	3	Southern Ocean			
2014	10	Mediterranean	3	Mediterranean	20
	2	Black Sea			
	5	Southern Ocean			
2015	10	Mediterranean	2	Mediterranean	20
	3	Black Sea			
	5	Southern Ocean			

Table 4. Italian deployment plans for 2013-2015.

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

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

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 the Italian Gruppo Nazionale di Oceanografia Operativa (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.

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

N/A

6. Number of CTD cruise data added to the Argo reference database by Italian PIs in 2012.

N/A

7. Italian contribution to Argo bibliography in 2012.

Buongiorno Nardelli, B., S. Guinehut, A. Pascual, Y. Drillet, S. Ruiz, and S. Mulet, 2012: Towards high resolution mapping of 3-D mesoscale dynamics from observations. *Ocean Science*, **8**, 885-901, <http://www.ocean-sci.net/8/885/2012/>

Dobricic, S., C. Dufau, P. Oddo, N. Pinardi, I. Pujol, and M. H. Rio, 2012: Assimilation of SLA along track observations in the Mediterranean with an oceanographic model forced by atmospheric pressure. *Ocean Science*, **8**, 787-795, <http://www.ocean-sci.net/8/787/2012/>

Kovačević, V., B. B. Manca, L. Ursella, K. Schroeder, S. Cozzi, M. Burca, E. Mauri, R. Gerin, G. Notarstefano, and D. Deponte, 2012: Water mass properties and dynamic conditions of the Eastern Mediterranean in June 2007. *Progress in Oceanography*, **104**, 59-79, <http://www.sciencedirect.com/science/article/pii/S0079661112000638>

Nilsson, J. A. U., S. Dobricic, N. Pinardi, P. M. Poulain, and D. Pettenuzzo, 2012: Variational assimilation of Lagrangian trajectories in the Mediterranean ocean Forecasting System. *Ocean Science*, **8**, 249-259, <http://www.ocean-sci.net/8/249/2012/>