Argo National Data Management Report – Italy (2017) - MedArgo

1. Status

- **<u>Data acquired from floats</u>:** 426 floats were deployed in the Mediterranean and in Black Seas between 2001 and 2017 (the floats temporal distribution is shown in Figure 2) and more than 49900 CTD profiles were acquired. The temporal and spatial distribution of these profiles is depicted in Figure 1, sorted by the two main float models currently used (bio-Argo and core-Argo floats). Note that here bio-Argo also includes the floats with dissolved oxygen. About 115 floats per months have been operated simultaneously in the basin in 2017 and more than 6000 CTD profiles have been acquired (up to October 2017) by different float models (Figure 3).

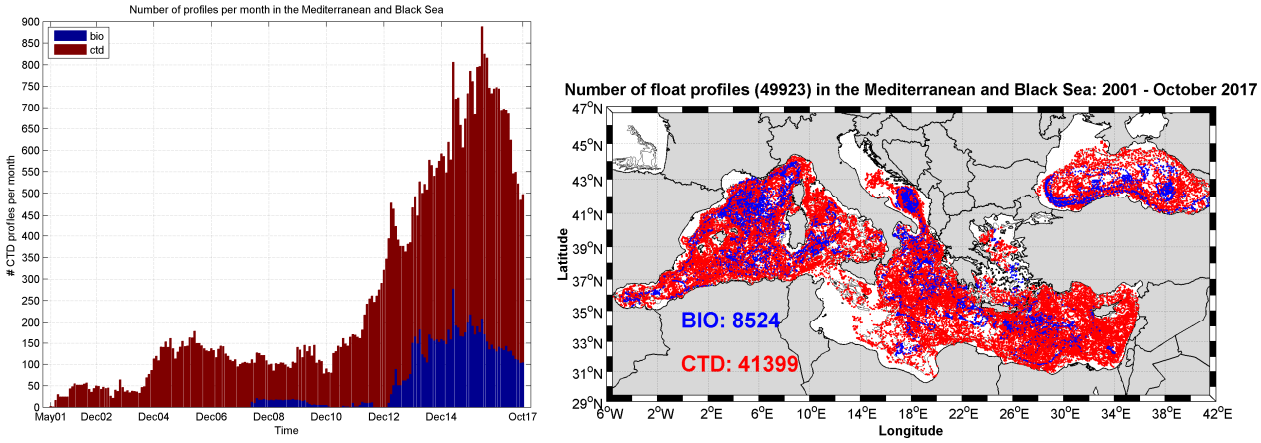

Figure 1. Temporal (left panel) and spatial (right panel) distribution of float profiles in the Mediterranean and Black Sea between 2001 and 2017.

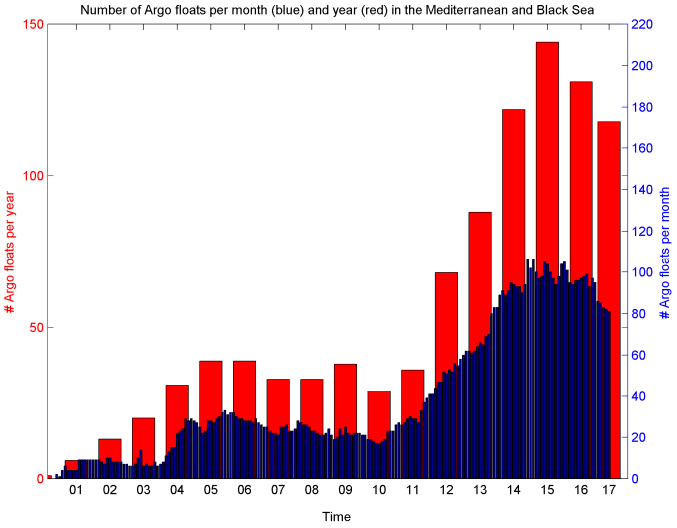

Figure 2. Monthly (blue bars) and yearly (red bars) distribution of Argo floats in the Mediterranean and Black Sea between 2001 and 2017.

The number of CTD profiles acquired by bio-Argo floats in 2017 (up to October) is about 1200 (contributors: France, Italy and Greece) and the data collected by the "standard" CTD Argo floats about 4870 profiles (up to October). The Euro-Argo ERIC and Spain, Greece, France and Italy contributed to maintain/increase the Argo population in 2017: a total of 27 new floats (manufactured by Teledyne Marine, Metocean and NKE) have been deployed both in the Mediterranean and in the Black Seas (Figure 3); 4 out of 27 platforms are equipped with biogeochemical sensors and the deployment strategy was chosen in order to replace dead floats or under-sampled areas.

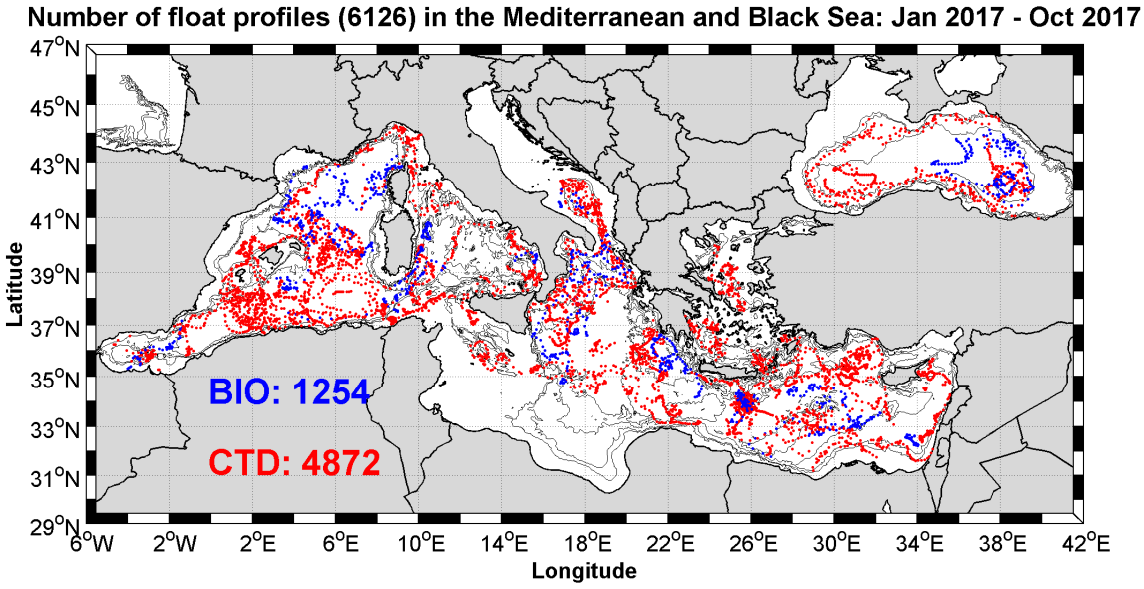

Figure 3. Spatial distribution of profiles collected by Argo floats in 2017 (January-October) in the Mediterranean and Black Sea: bio-Argo floats (blue dots) and standard Argo floats (red dots).

Statistics of the float survival rate in the Mediterranean Sea were computed, using the entire dataset. The survival rate diagram produced are separated by transmission mode (figure 4a). The maximum operating life is more than 400 cycles, whilst the mean half life is about 140 cycles. The vertical distance travelled by floats is computed and used as an indicator of the profiler performance (figure 4b). The maximal distance observed is about 400 km, whilst the mean distance travelled is about 125 km.

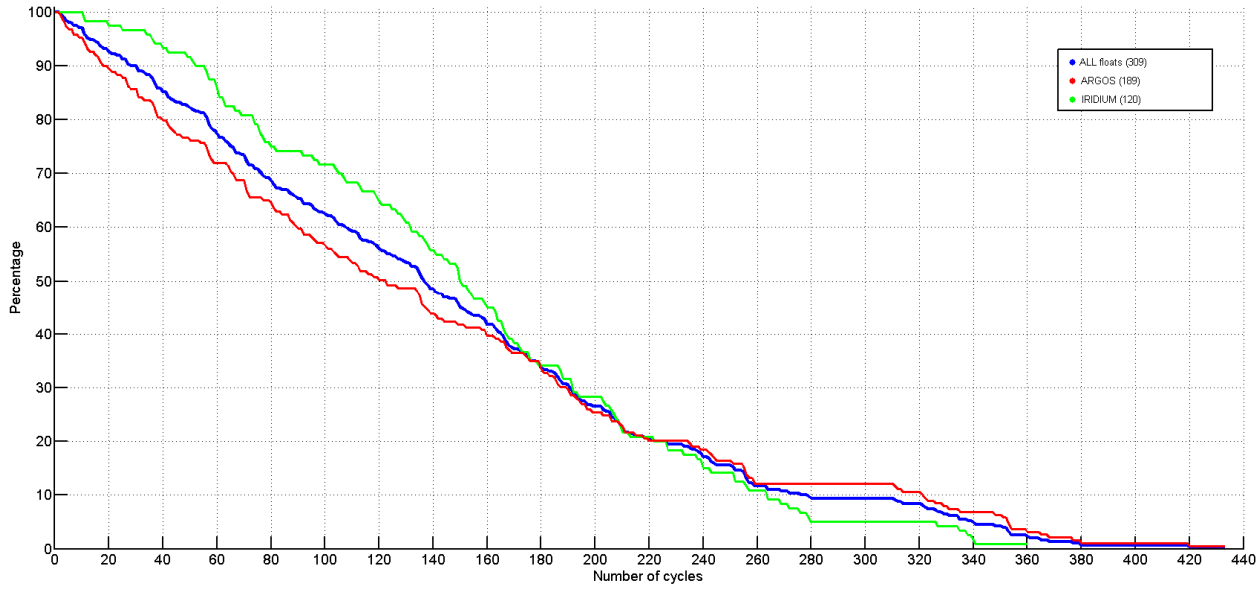

Figure 4a. Survival rate diagrams separated by telemetry system.

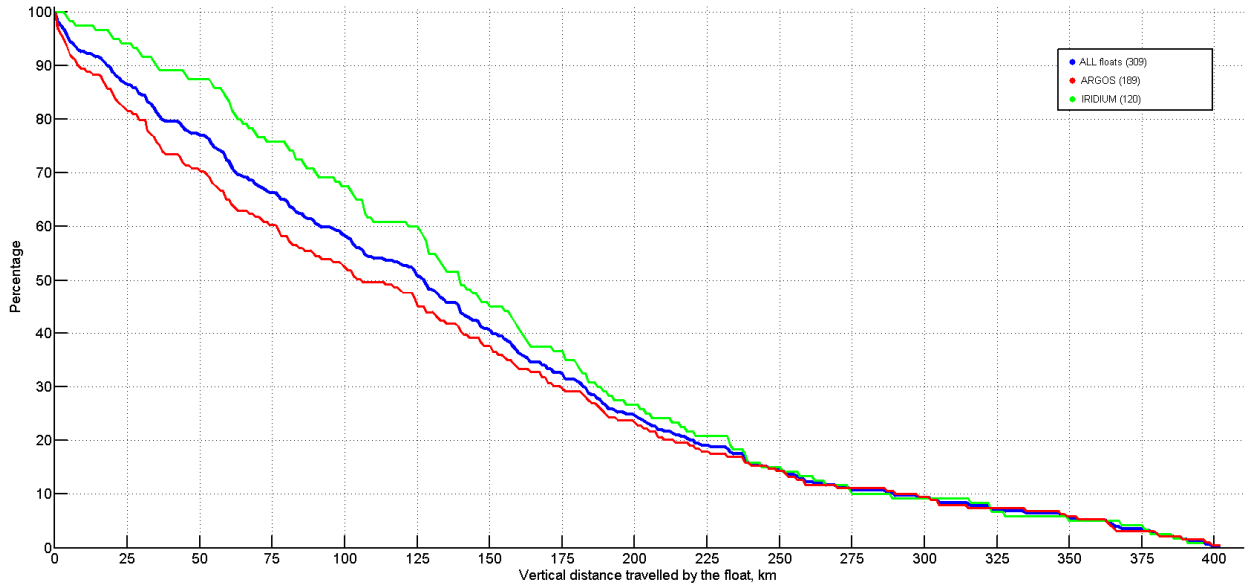

Figure 4b. Diagram of the vertical distance travelled floats, separated by telemetry system.

- **Web pages:**

The MedArgo web page (http://nettuno.ogs.trieste.it/sire/medargo/active/index.php) has been maintained and tables and graphics have been updated in near real time. The floats deployed during 2017 have been added to the web page as soon as the technical information are available. The float positions are plotted daily (Figure 5); the monthly and the whole trajectories are also provided (Figure 6). Links with the GDAC center (Coriolis) are also available for downloading both the real-time and delayed-mode float profiles. A link with the Laboratoire d'Oceanographie de Villefranche (OAO - Oceanographic Autonomous Observations) can provide detailed information about Argo floats equipped with biogeochemical sensors.

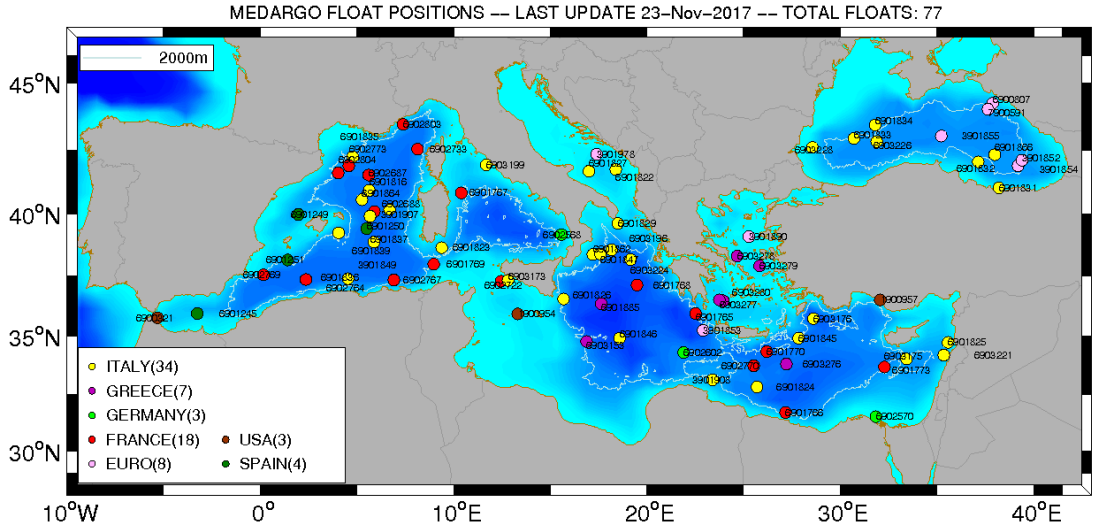

Figure 5. MedArgo float positions as of 23 November 2016 (updated daily).

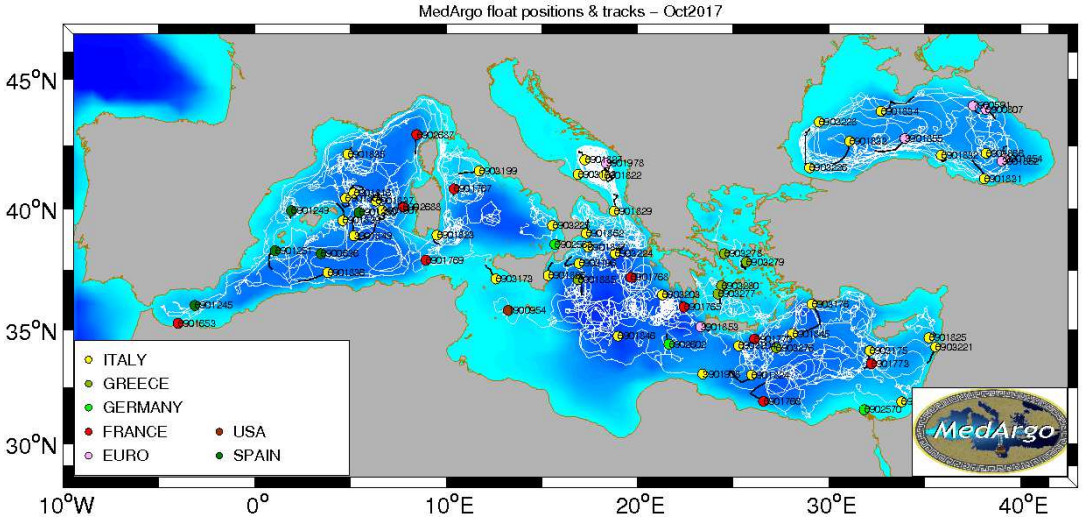

Figure 6. MedArgo float positions and tracks (October 2017. The monthly tracks are in black while the entire float trajectories are in white.

- **Statistics of Argo data usage:** (operational models, scientific applications, number of National Pis…):
- **Products generated from Argo data:**
    a. Daily maps of float positions (Figure 5)
    b. Monthly maps of float positions and track (Figure 6)
    c. Float data are assimilated in numerical forecasting models by INGV (MFS); daily and weekly maps of Mediterranean ocean forecasting system are produced (Figure 7).

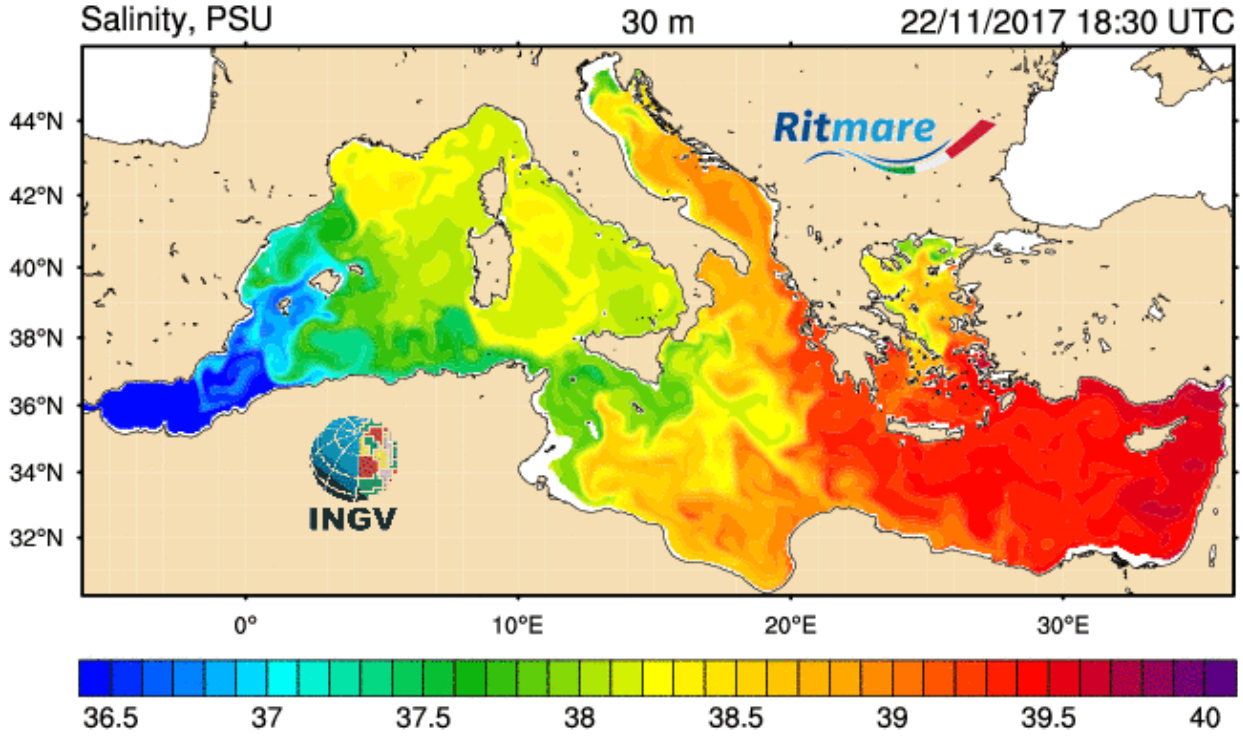

Figure 7. Forecasting model of salinity at 30 meters.

2. Delayed Mode QC

OGS has continued to carry out the DMQC for the Argo data in the Mediterranean Sea. 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. The OW method in conjunction with other procedures is adopted to conduct the quality control analysis for the salinity data. The D files of floats in the "density inversion test" list were examined and feedback was provided.

Additional Argo reference data for the Mediterranean Sea have been added to the current reference dataset

The DMQC method has been applied to the majority of the floats deployed between 2001 and 2016 in the Mediterranean Sea: they were quality controlled in delayed-mode for salinity, temperature and surface pressure and the respective D-files are gradually sent to GDAC. The DMQC report/info of each float can be downloaded by the MedArgo web page (http://nettuno.ogs.trieste.it/sire/medargo/all/table_out_all.php).

The DMQC of the dead US Argo NAVOCEANO (Argo equivalent project) floats in the Mediterranean Sea (71 platforms) has been done and the D-files of 28 floats were created and sent to the AOML DAC. The Surface Pressure Offset have been corrected if needed and the variables recalculated before running the OW method. The TNPD status has also been checked. Some issues have been found related to tech and meta files, time and surface pressure. The data of other 25 floats are available only at GTS, where the meta files are missing and the T and S data are truncated to two decimal places.

The DMQC of floats in the Black Sea has been started. The reference dataset has been downloaded from the CMEMS INSTAC but it seems that the most recent CTD data available are too scarce to provide a reliable comparison. Nevertheless, the OW method has been applied in order to have an estimate of any potential conductivity sensor drift. The float data have been also cross-compared to the closest (in time) Argo profiles in the basin: the float Θ-S diagrams were use as an indicator of the salinity behaviour at different Θ levels.

3. Regional Centre Functions

MedArgo is the Argo Regional Centre for the Mediterranean and the Black Sea. OGS, who coordinates the MedArgo activities, established several collaborations with European and non-European countries (Bulgaria, France, Spain, Greece, Germany, Turkey, Malta and Lebanon) in order to set the planning and the deployment coordination of floats. Hence, a good coverage is maintained throughout the years. A network of deployment opportunities is well organized with R/V, commercial boats and the Seakeepers Discovery Yacht program. As part of these cooperations the float data

are transferred in near real time to MedArgo and 27 new floats have been deployed in the Mediterranean and Black Sea during 2017.

The second Arvor Deep was deployed in December 2016 in the Hellenic Trench area (Cretan Passage), a depression of about 4000 m located in the deepest area of the Mediterranean Sea. It was set to cycle every 5 days and the parking depth equal to the maximal profiling depth (3000 dbar at the beginning and currently at 4000 dbar). The vertical resolution is set at 2 dbar in the upper layer (0-100 dbar), 10 dbar in the intermediate layer (100-700 dbar) and 25 dbar in the deep one. The grounding mode is set to "0" that means the float goes up 50 dbar after grounding and wait there before starting its ascent.

MedArgo gives also a substantial contribution to the Euro-Argo ERIC whose 5 members are very active in the Mediterranean Sea.

There are 65 active Argo floats in the Mediterranean Sea and 12 in the Black Sea as of 22 November 2017.