

Argo National Data Management Report for ADMT-25. ITALY (MedArgo ARC)

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other section prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

This task is carried out by (is the responsibility of) the Coriolis DAC

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

Italy is in charge of the DMQC of the physical variables (temperature and salinity) acquired by Argo floats (Core, Deep, BGC) deployed in the Mediterranean and Black Sea by any country. See section 5 for details.

- *What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?*

No resources available for this activity.

- *How are you implementing BGC dmode - by parameter or one expert does all parameters?*

LOV in France is in charge of DMQC for BGC parameters acquired by the Italian fleet. OGS is working to implement DMQC of Oxygen and BBP

- *What challenges have you encountered and how have you dealt with them?*

- *Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?*
- *Do you have any concerns you'd like to bring to the ADMT?*

3. Value Added items

- *List of current national Argo web pages, especially data specific ones*

The MedArgo web page is available at <http://argo.ogs.it/medargo/>. Tables and graphics are updated in near real time. The float positions are plotted daily (figure 1); the float deployments are added to the web page as soon as the technical information is available (figure 2); the monthly and the whole trajectories are also provided. Links with the Euro-Argo data selection tools and GDAC center (Coriolis) are also available for downloading both the real-time and delayed-mode float profiles.

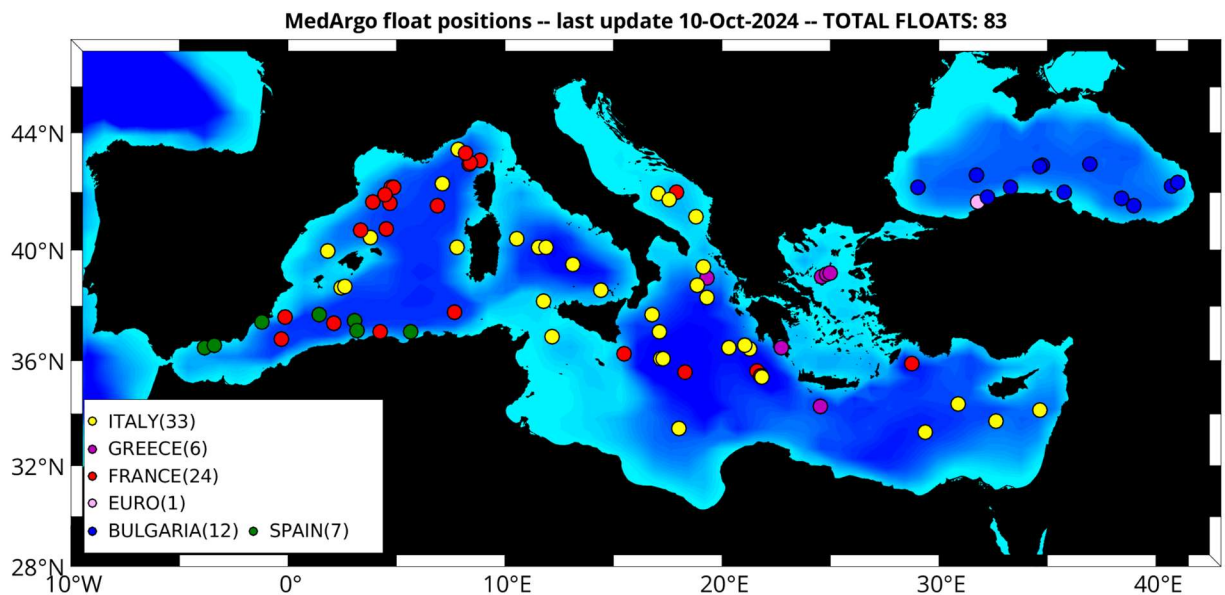
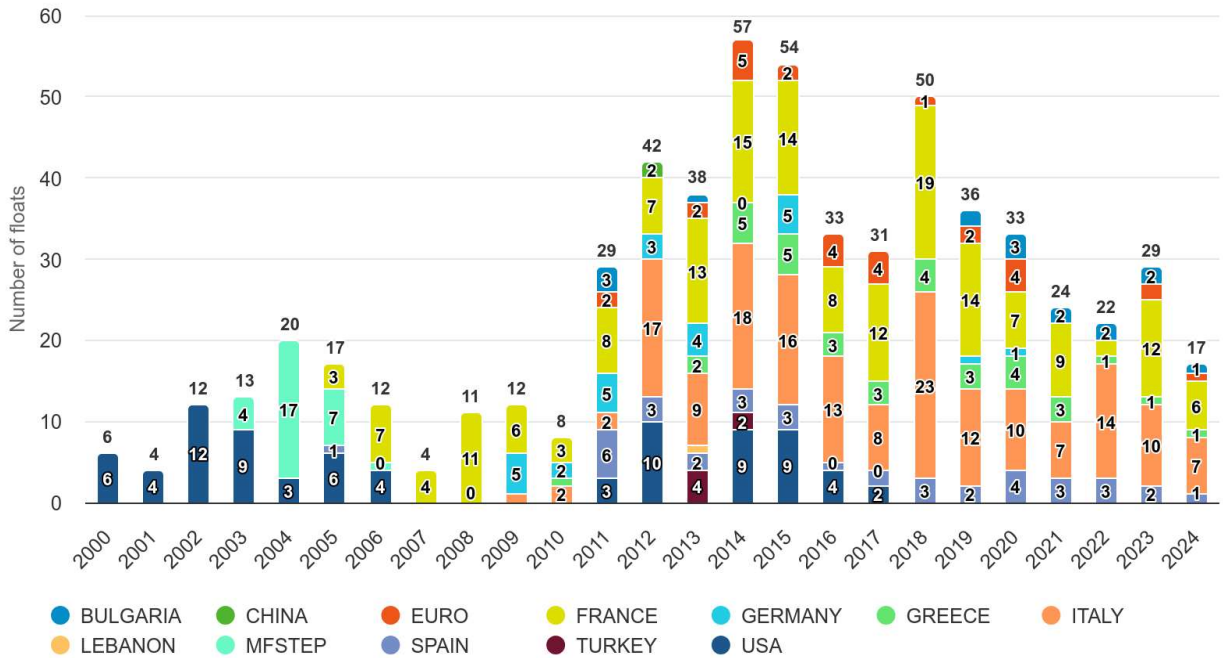


Figure 1. MedArgo float positions as of 10 October 2024 (updated daily).

Number of float deployed per year per country from 01/01/2000, to 31/12/2024, Mediterranean Sea, Black Sea



Highcharts.com

Figure 2. MedArgo number of float deployments until September 2024.

- **Known National Argo data usage**
 - Please list known operational centers using Argo data in your country in this table:

Operational center	Contact (name, email), if known	What data do they use? (for example, core, BGC, all profile data, trajectory data)
Centro Euro-Mediterraneo sui Cambiamenti Climatici (https://www.cmcc.it/it)	Emanuela Clementi (emanuela.clementi@cmcc.it) Jenny Pistoia (jenny.pistoia@cmcc.it)	Core-Argo
Mediterranean Ecosystem Analysis and Forecast (https://medeaf.ogs.it/)	Gianpiero Cossarini (gcossarini@ogs.it)	BGC-Argo

- *Products generated from Argo data that can be shared*

Physical and Biogeochemical Argo float data are assimilated in numerical forecasting models by CMCC and OGS; 3D daily maps of Mediterranean ocean forecasting systems are produced and available on CMEMS (figure 3).

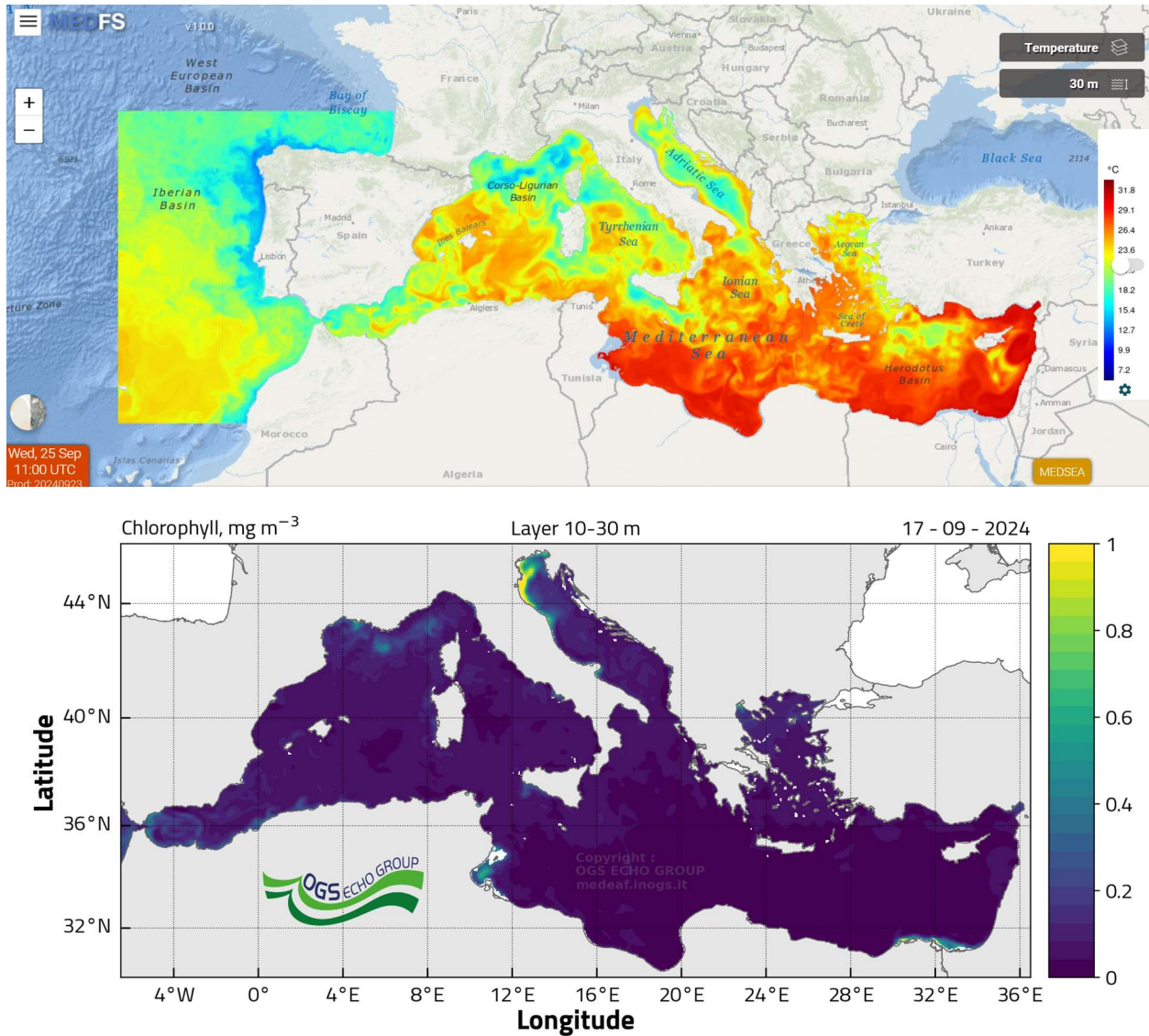


Figure 3. Forecasting models' products available on CMEMS and on the Italian operational centers. Physical (top panel <https://medfs.cmcc.it/>) and biogeochemical (bottom panel <https://medeaf.ogs.it/forecast>) products.

- *Publicly available software tools to access*

4. GDAC Functions

If your centre operates a GDAC, report the progress made on the following tasks:

No GDAC function

5. Regional Centre Functions

If your Nation operates a regional centre, report the functions performed and any future plans.

✓ 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 in order to set the planning and the deployment coordination of floats. Hence, a good coverage is maintained throughout the years. As part of these cooperations, the float data are transferred in near real time to MedArgo and 17 new floats have been deployed in the Mediterranean and Black Sea during 2024 (as of September), through a coordinated activity of deployment opportunities and thanks to scientific projects. Additional floats will be deployed before the end of 2024.

✓ More than 100,000 Argo profiles were acquired in the Mediterranean and in Black Seas between 2000 and August 2024. The temporal and spatial distribution of these profiles is depicted in figure 5 and 6 respectively, sorted by the different float types used (Core-Argo, Core-Argo with DO, Bio-Argo [carrying some of the BGC sensors], Deep-Argo and BGC-Argo [equipped with sensors to measure the 6 EOVs]); the monthly and yearly distribution is shown in Figure 7. About 80 floats per month have been operated simultaneously in the basins in 2024 and more than 5700 profiles have been acquired (up to August 2024) by different float models (figure 8).

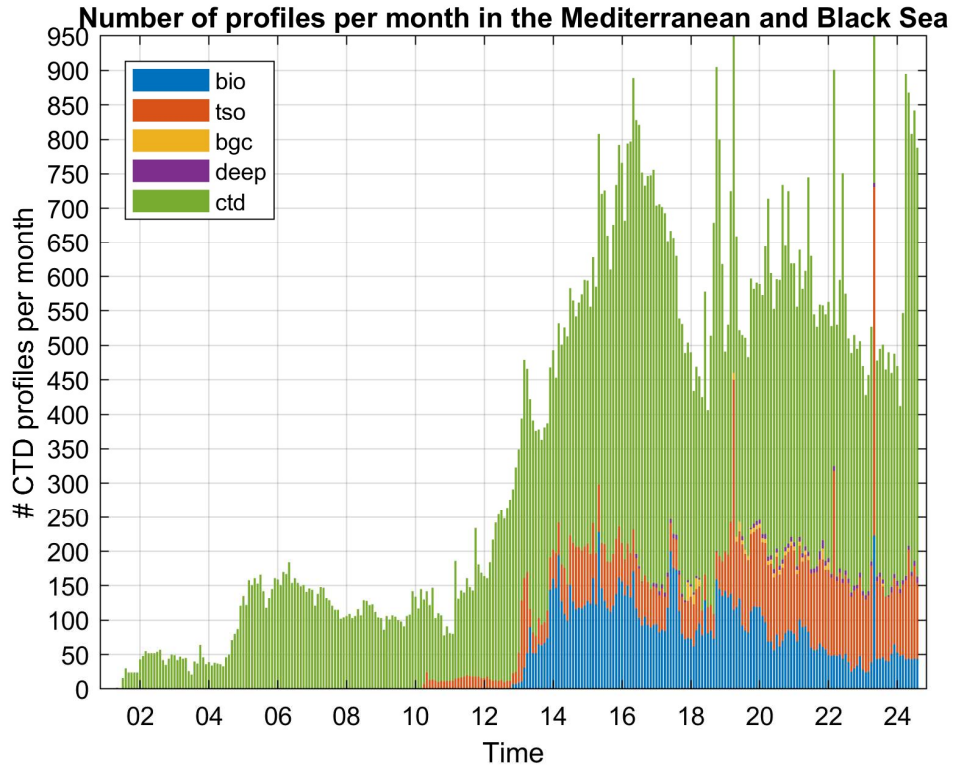


Figure 5. Temporal distribution of float profiles in the Mediterranean and Black Sea between 2000 and August 2024.

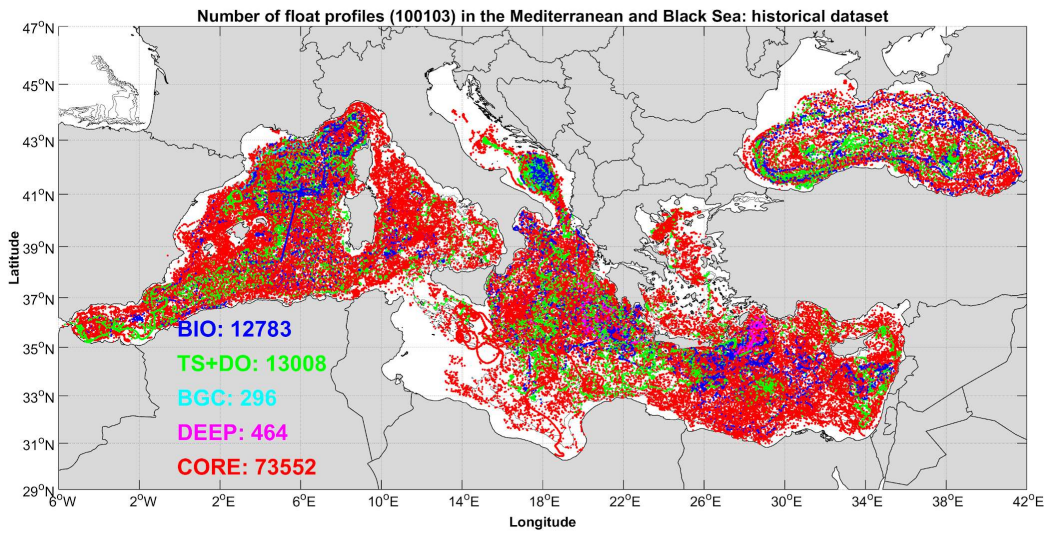


Figure 6. Spatial distribution of float profiles in the Mediterranean and Black Sea between 2000 and August 2024.

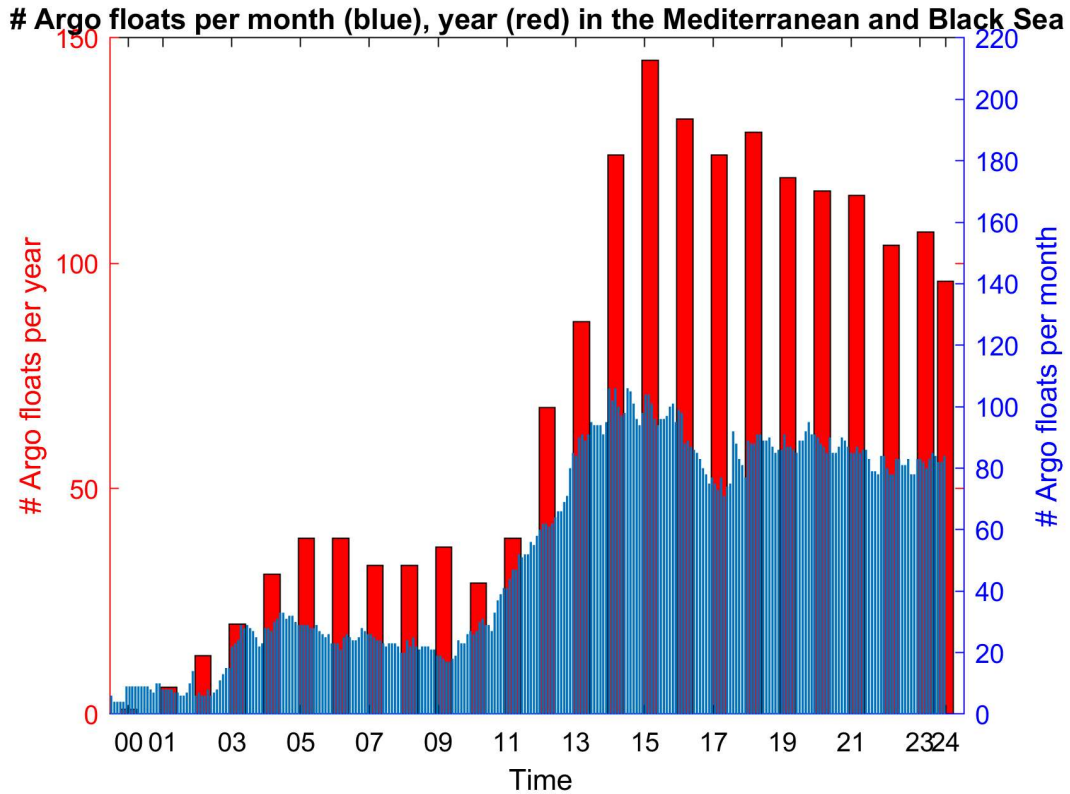


Figure 7. Monthly (blue bars) and yearly (red bars) distribution of Argo floats in the Mediterranean and Black Sea between 2000 and August 2024.

✓ The number of profiles acquired by Argo-extension floats in 2024 (January-August) is 1373 whilst the ones collected by the core-Argo floats are 4375 (figure 8). Italy, EU, Spain, Greece, France, Bulgaria (see their national reports at <https://argo.ucsd.edu/organization/argo-meetings/argo-data-management-team-meetings/argo-data-management-team-meeting-25-admt25/admt-25-agenda-national-reports/>) contributed to maintain the Argo population in 2024: a total of 17 new floats (as of September) have been deployed both in the Mediterranean and in the Black Seas; 8 out of 15 platforms are Core-Argo, 8 are Core-Argo with DO, 1 is Deep-Argo. The deployment strategy was chosen according to the project's targets and to replace dead floats or under-sampled areas.

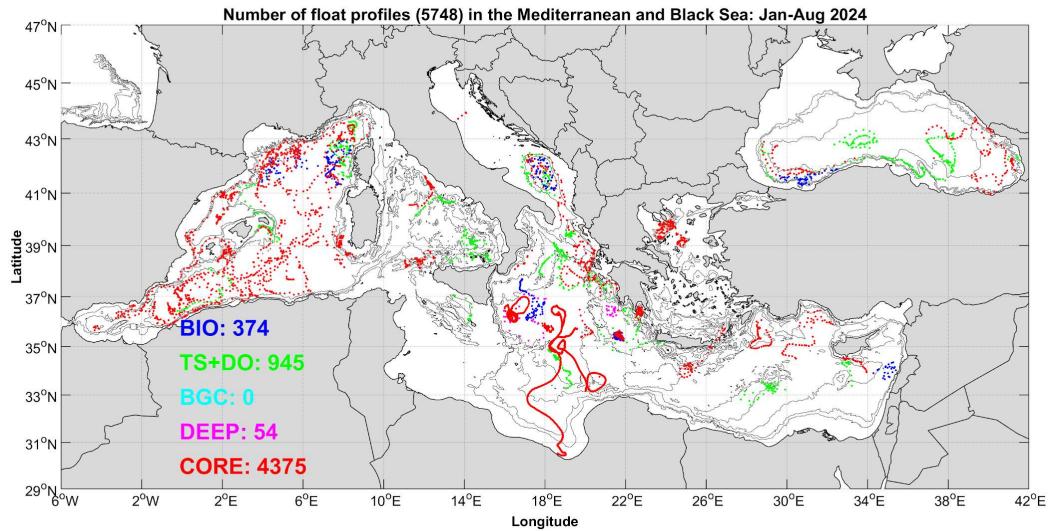


Figure 8. Spatial distribution of profiles collected by Argo floats in 2024 (January-August) in the Mediterranean and Black Sea: locations are color-coded per float type.

✓ Statistics have been computed to assess the fleet performance. The survival rate diagrams produced are separated by transmission mode (figure 9). The maximum operating life is about 600 cycles (900 when 1 out of 511 floats with an unusual high cycling time is considered), whilst the mean half-life is about 150 cycles (figure 9a). In this computation, active floats with life lower than the mean half-life and recovered floats were excluded (about 20). The vertical distance (upward profiles) traveled by floats is computed and used as an indicator of the profiler performance (figure 9b). The maximal distance observed is about 600 km, whilst the mean distance traveled is about 125 km. The balance of the population is in figure 10 and the annual death rate in figure 11.

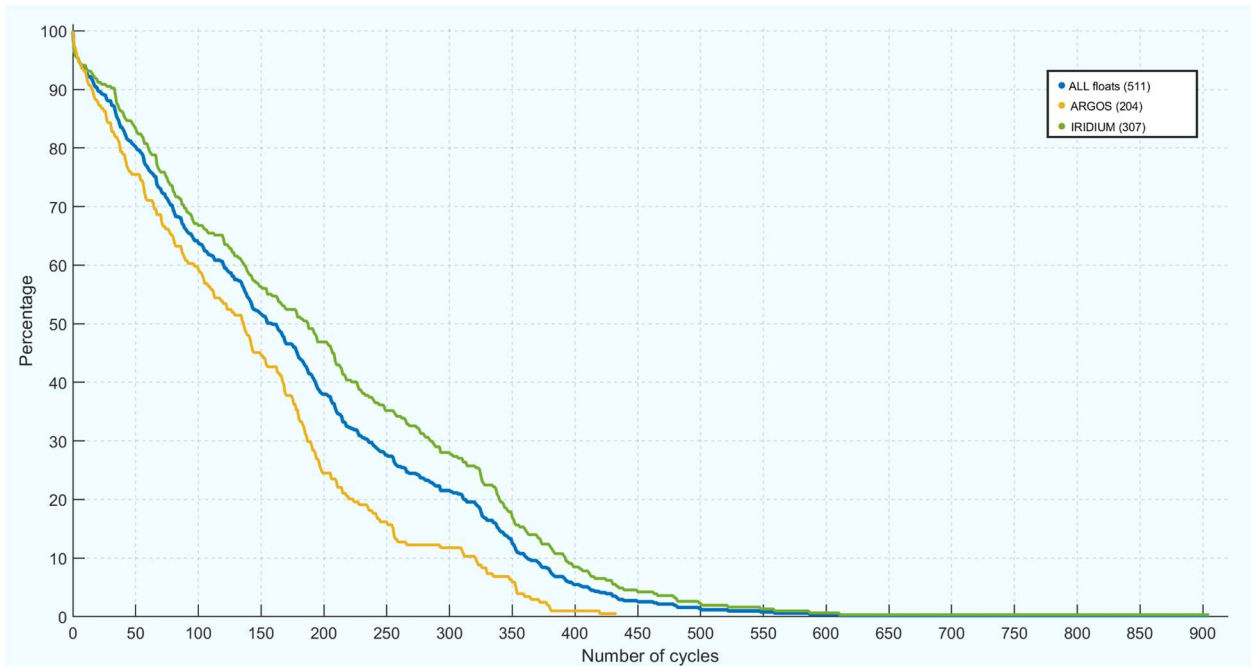


Figure 9a. Survival rate diagrams separated by telemetry system.

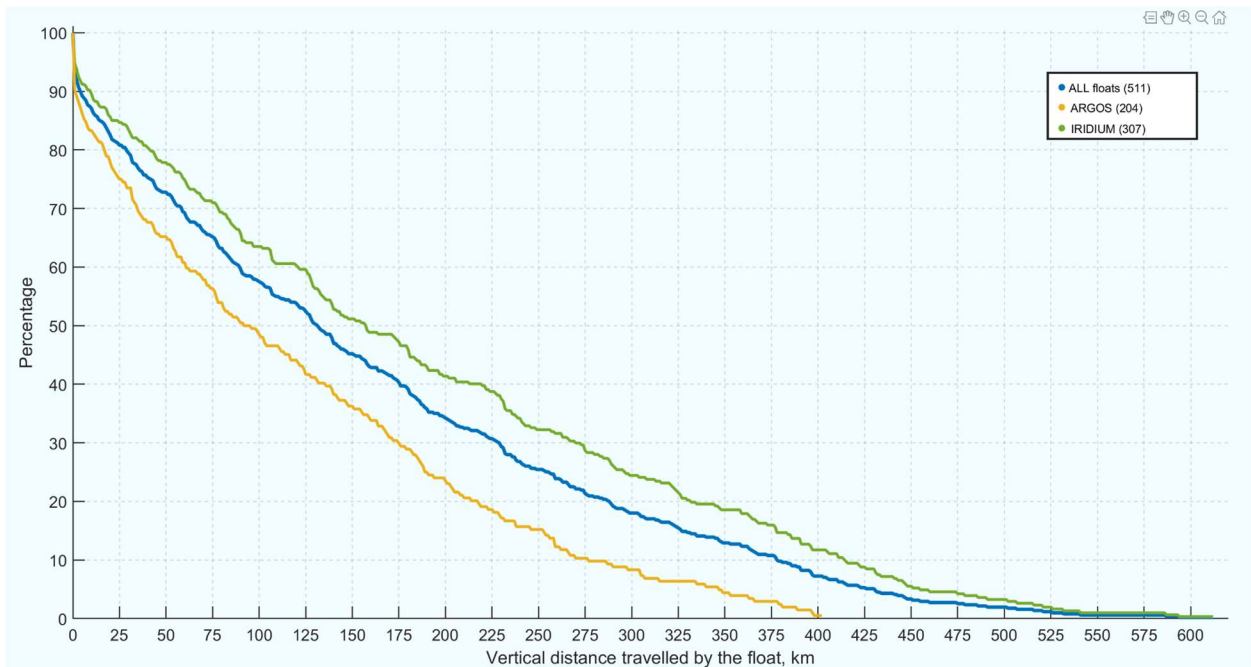


Figure 9b. Diagram of the vertical distance traveled floats, separated by telemetry system.

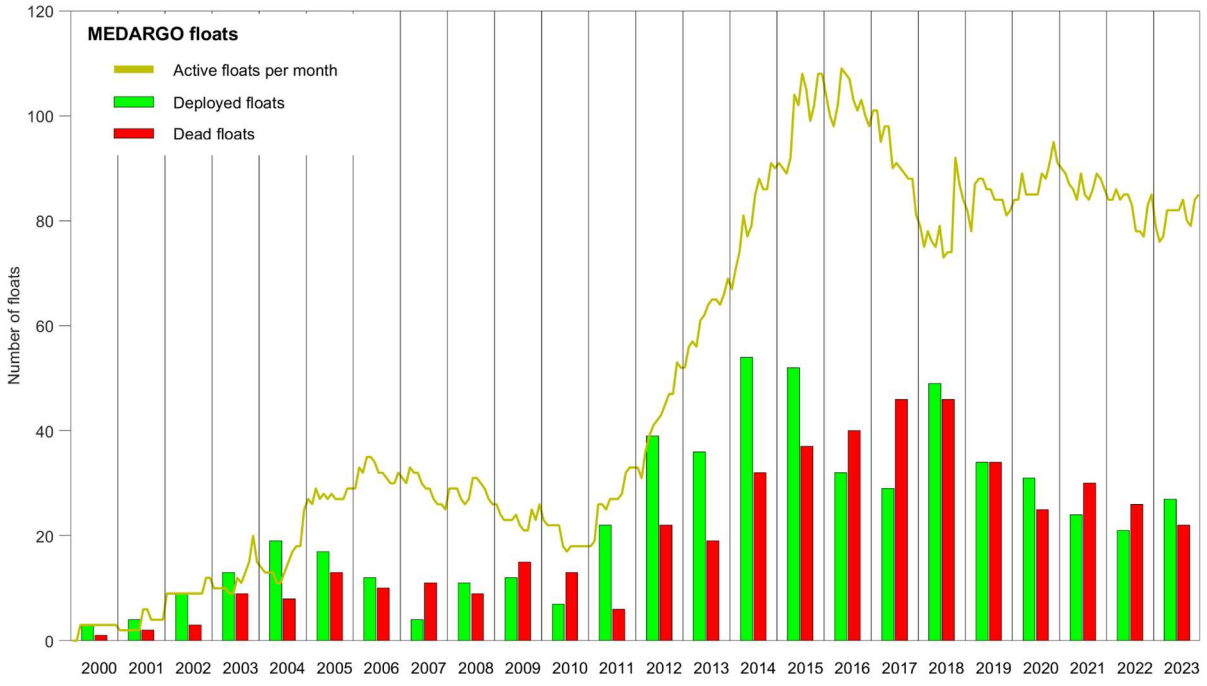


Figure 10. Balance of the population (rate of population change related to the number of yearly deployments and dead floats).



Figure 11. Annual death rate (ration between yearly failure and yearly average population).

✓ The high-quality ship-based CTD reference data from the near-surface to depths more than 2000 m, for QC purposes of Core and Deep-Argo float data in the Mediterranean and Black seas, was improved adding some new CTD data (figures 12 and 13). Data was collected from several research institutes at regional level and the main European Marine Services. Data was converted in mat format to be used in OWC procedure. A quality control was applied such as an additional visual check to avoid spike or duplication. Data was merged and divided in subsets of WMO boxes according to the climatological areas of the Mediterranean Sea. The updated reference dataset consists of about 55955 CTD profiles.

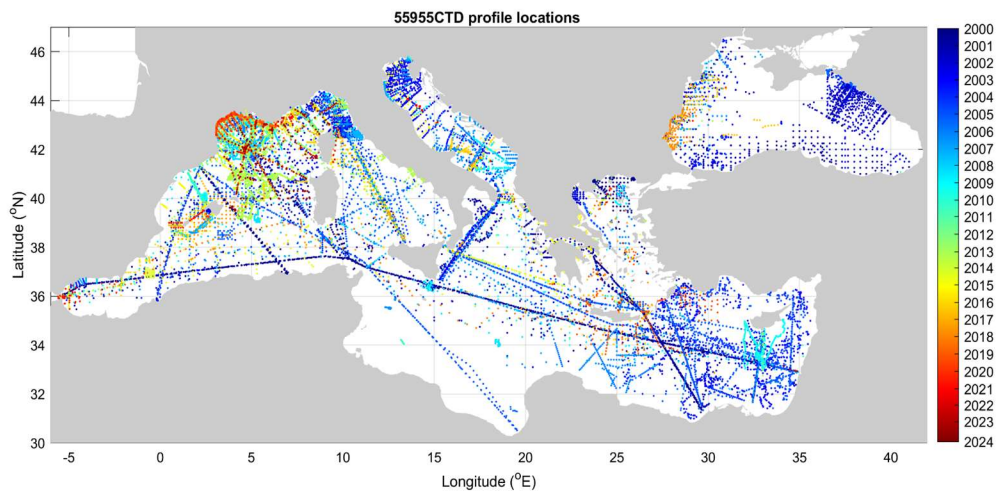


Figure 12. Spatial distribution, color-coded for time, of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas.

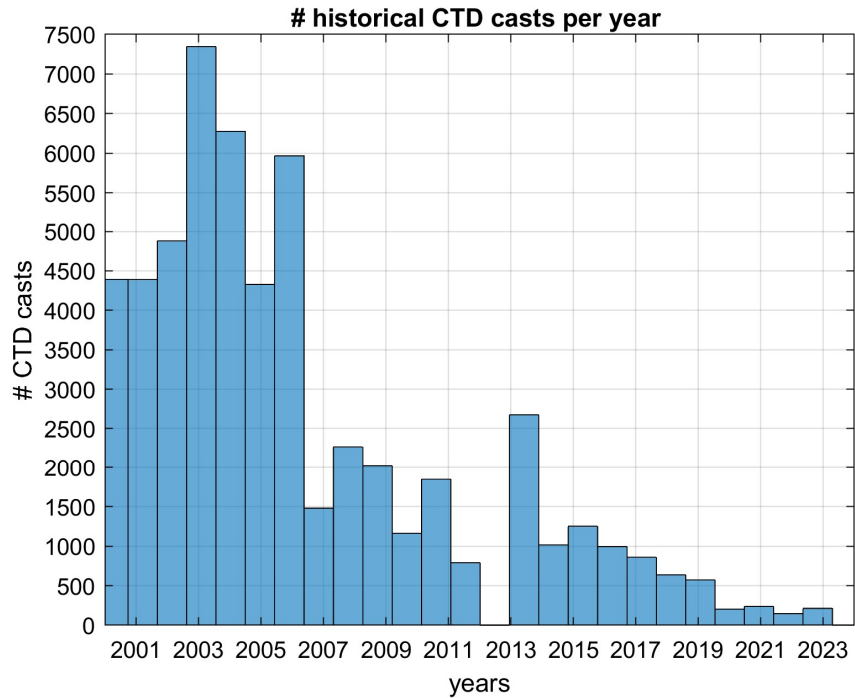


Figure 13. Temporal distribution of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas.

In addition, the method developed by BSH was applied to create a CTD reference sub dataset used only for OWC procedure. Only profiles deeper than 500 m was taken in account. This reference dataset consists of about 6294 CTD profiles. Although the image (figures 14 and 15) shows that the coverage is poor, this dataset is more consistent to be used for OWC and allows for more reliable results (more recent and deeper profiles). In the shallow basin, OWC is not applied.

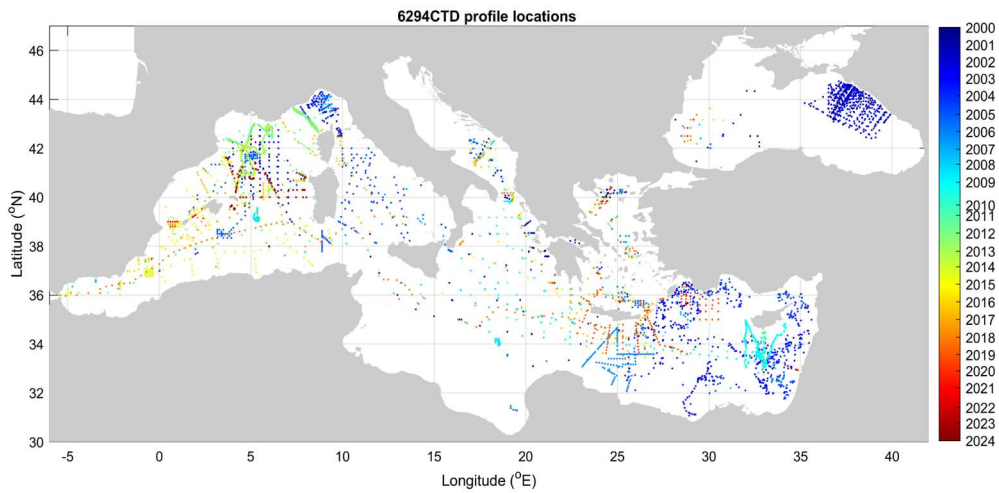


Figure 14. Spatial distribution, color-coded for time, of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas obtained with the BSH procedure.

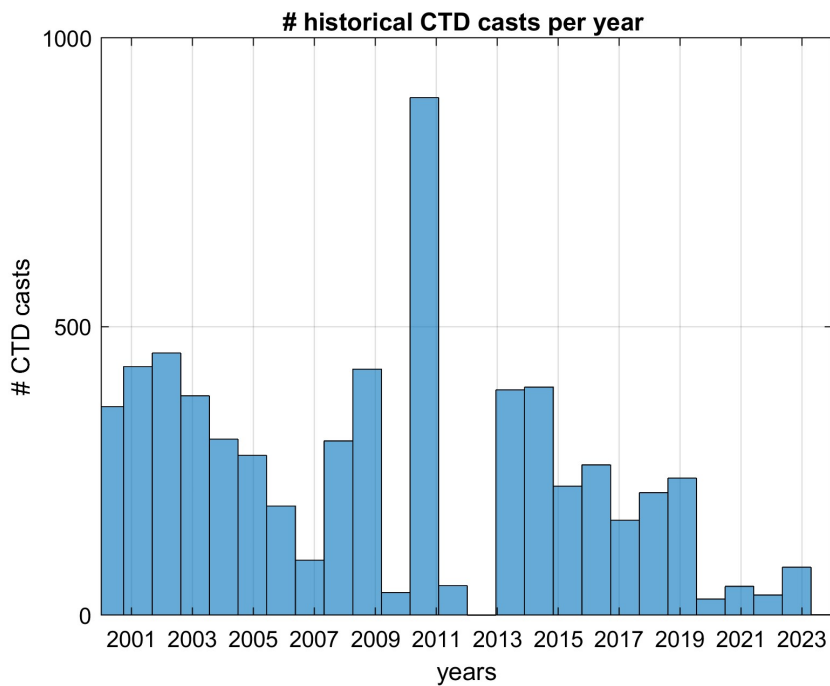


Figure 15. Temporal distribution of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas obtained with the BSH procedure.

✓ Most of the eligible floats were quality controlled in delayed-mode for salinity, temperature and surface pressure and the respective D-files were gradually sent to GDAC. The DMQC method was applied to approximately 84% of eligible floats deployed

between 2003 and 2023 in the Mediterranean and Black Seas (figures 16 and 17). 4% out of this percentage were quality controlled but the D-files were not sent to GDAC yet. This percentage includes analysis that has to be repeated due to problems related to the reference dataset (scarcity or old data), shallow/coastal floats. The DMQC report/info of each float can be downloaded by the MedArgo web page (http://argo.ogs.it/medargo/table_out.php).

DMQC ANALYSIS ON MED AND BS FLOATS FROM 2003 TO 2023

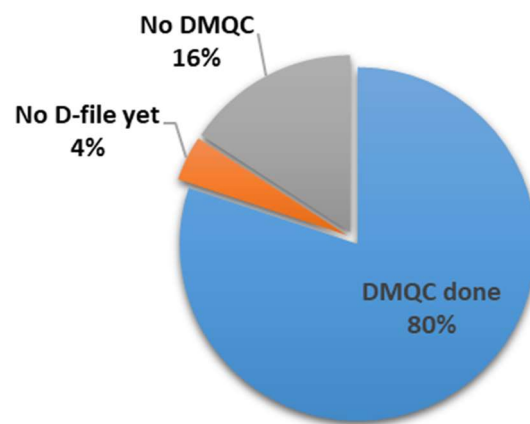


Figure 16. DMQC status.

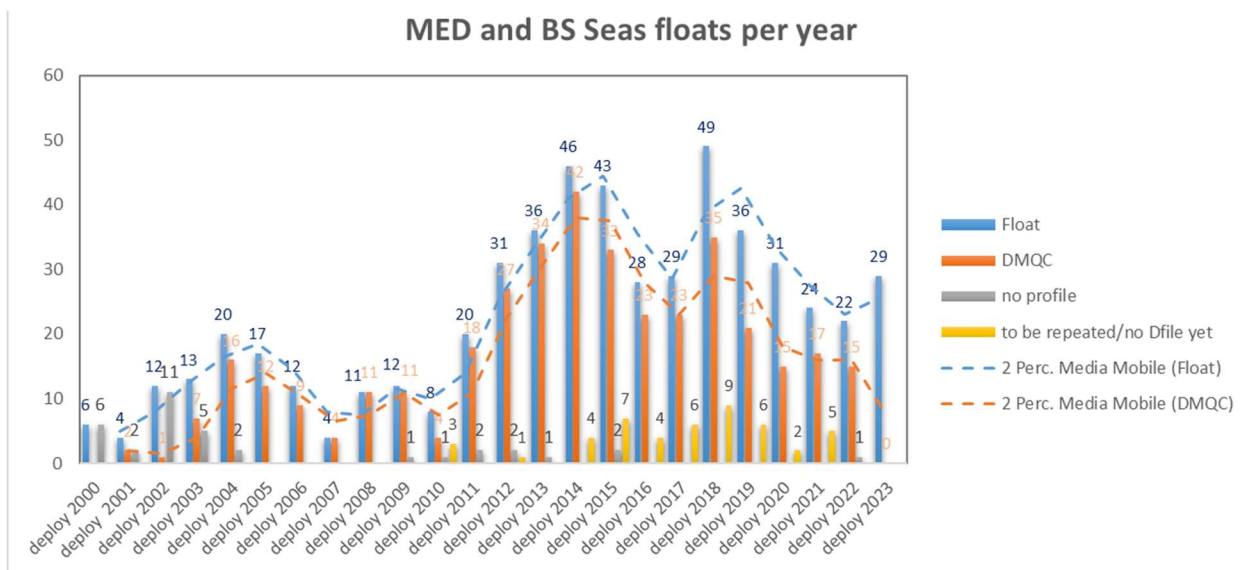


Figure 17. DMQC status per year.

Future plans:

- Maintain > 70 active floats in the Mediterranean Sea, with ~20-25% BGC-Argo)
- Maintain 2 deep floats in the deep Ionian & Rhodes Gyre area. This estimate might increase in the next years (PNRR Italian ITINERIS project <https://itineris.cnr.it/> → 4-6 Deep-Argo deployment in the deepest area of the Mediterranean Sea)
- Maintain > 10 active floats in the Black Sea, with ~10-20% BGC-Argo

6. Other Issues

Please include any specific comments on issues you wish to be considered by the Argo Data Management Team. These might include tasks performed by OceanOPS, the coordination of activities at an international level and the performance of the Argo data system.