MedArgo: the regional Argo network for the Mediterranean and Black seas

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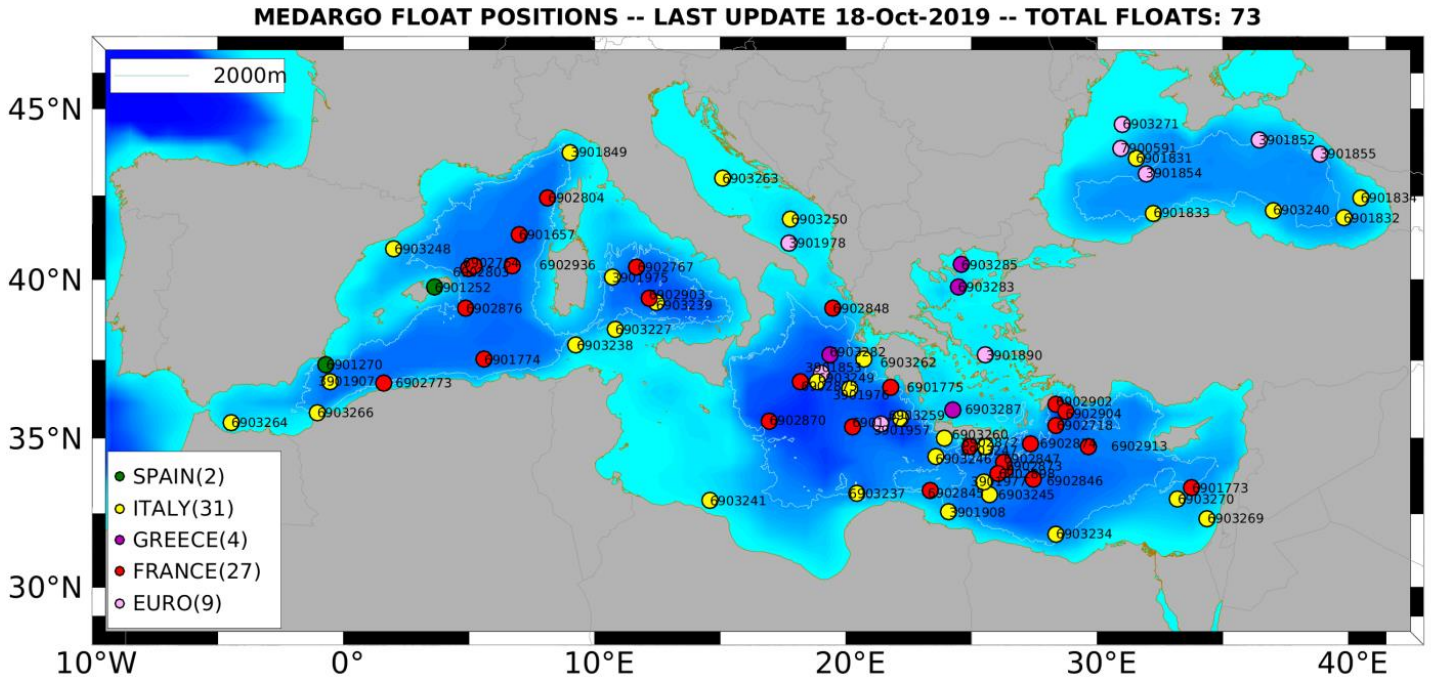
Outline

1. The Mediterranean Argo Regional Centre: MedArgo
2. MedArgo sampling characteristics and data statistics
3. Accuracy of the MedArgo float data (DMQC)
4. Argo extension (deep, BGC) in the Med and Black seas
5. MedArgo future plans

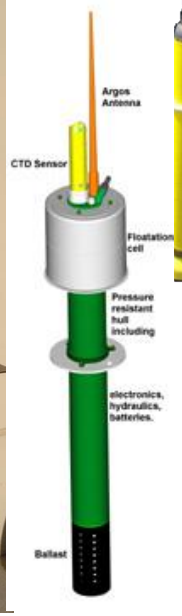
MedArgo

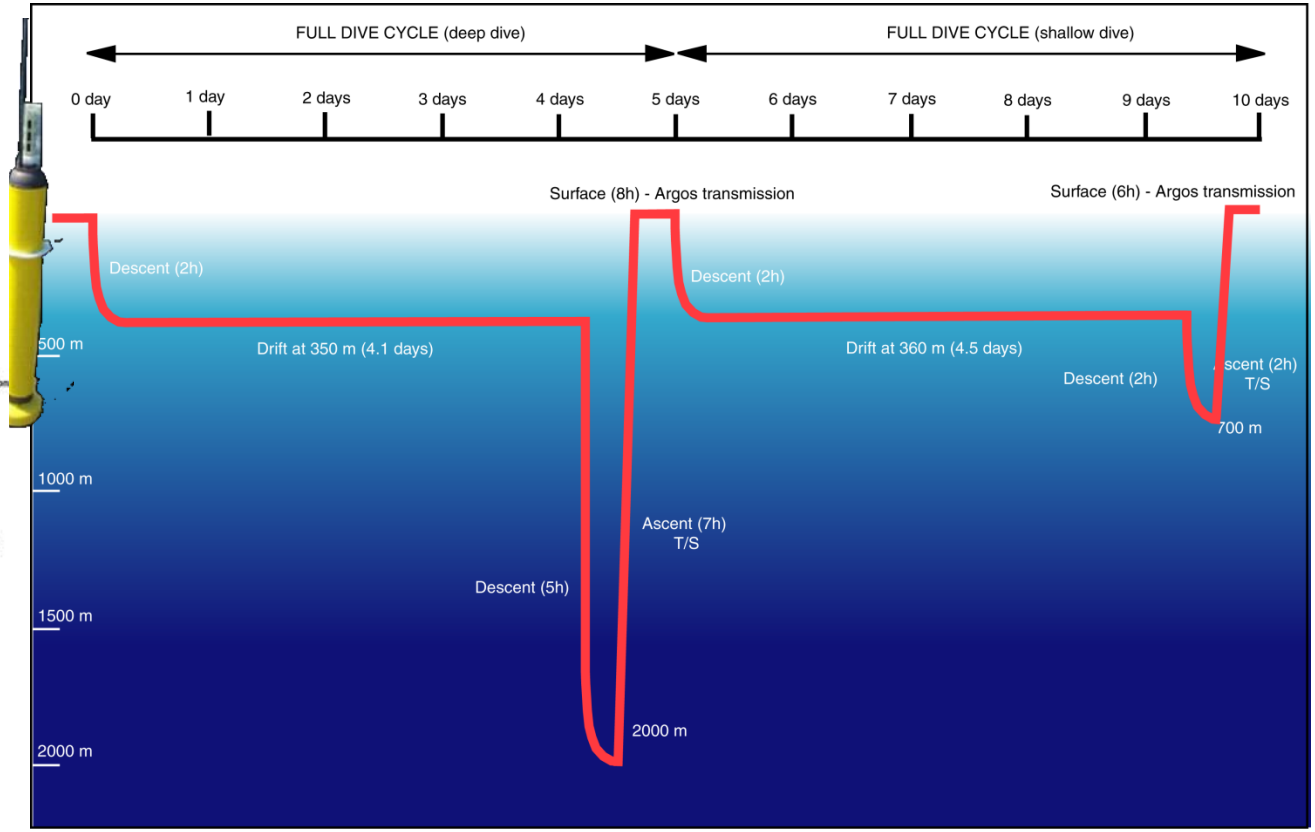
- Argo Regional Center (ARC) officially since 2012
- Overall coordination of profiling float operations in the Med and Black Seas
  - ✓ Coordination of float deployments
  - ✓ Preparation and distribution of Argo products
  - ✓ Delayed Mode Quality Control (DMQC)



MedArgo

Mediterranean Sea profiling floats: Sampling characteristics

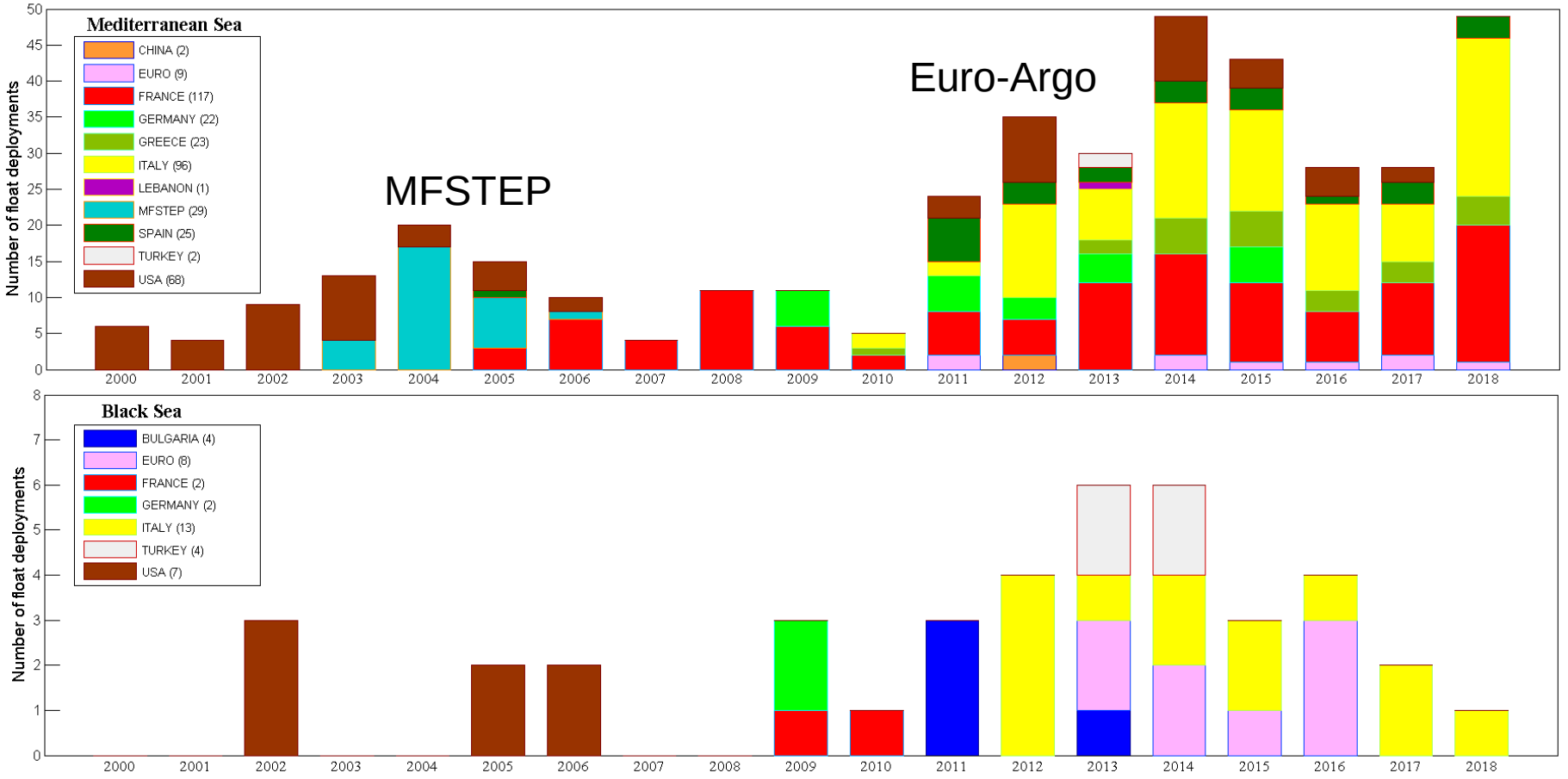




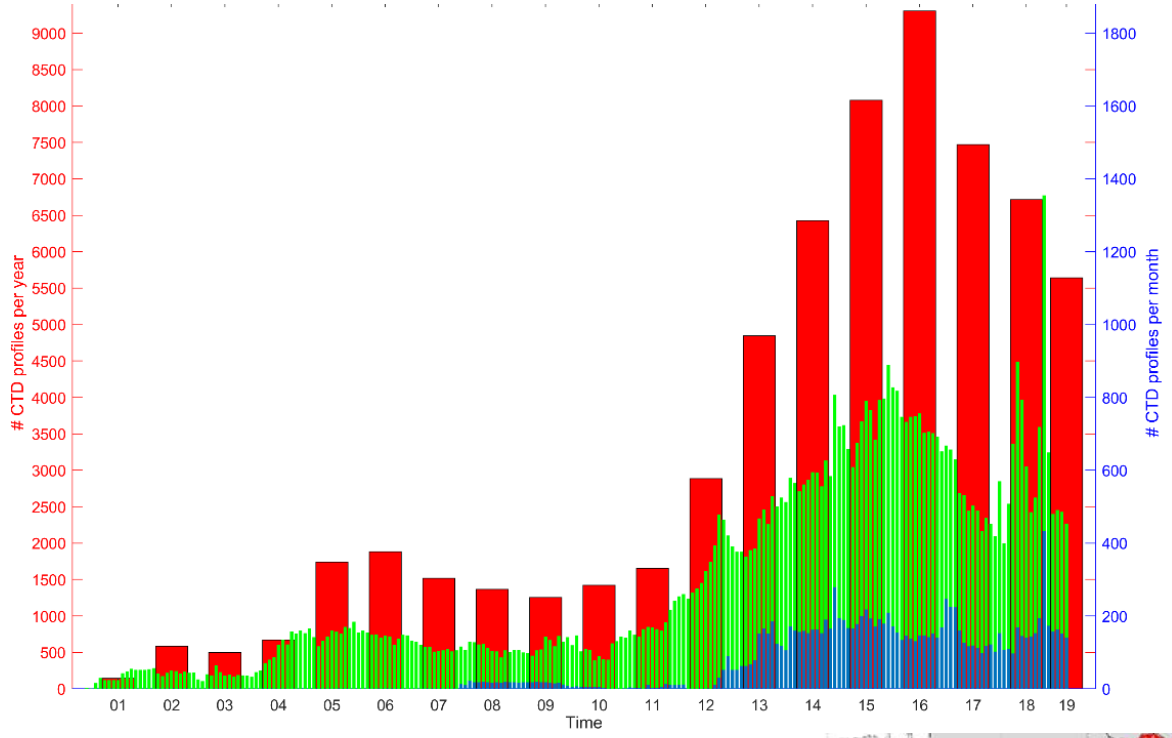
The majority of the floats in the Mediterranean have 5-day cycles and most floats do alternated deep/shallow profiles (700/2000 m).

MedArgo

Data statistics: Float deployments (2000-2018)



Data statistics: CTD and BGC profiles (2001-2019)



Temporal distribution of profiles

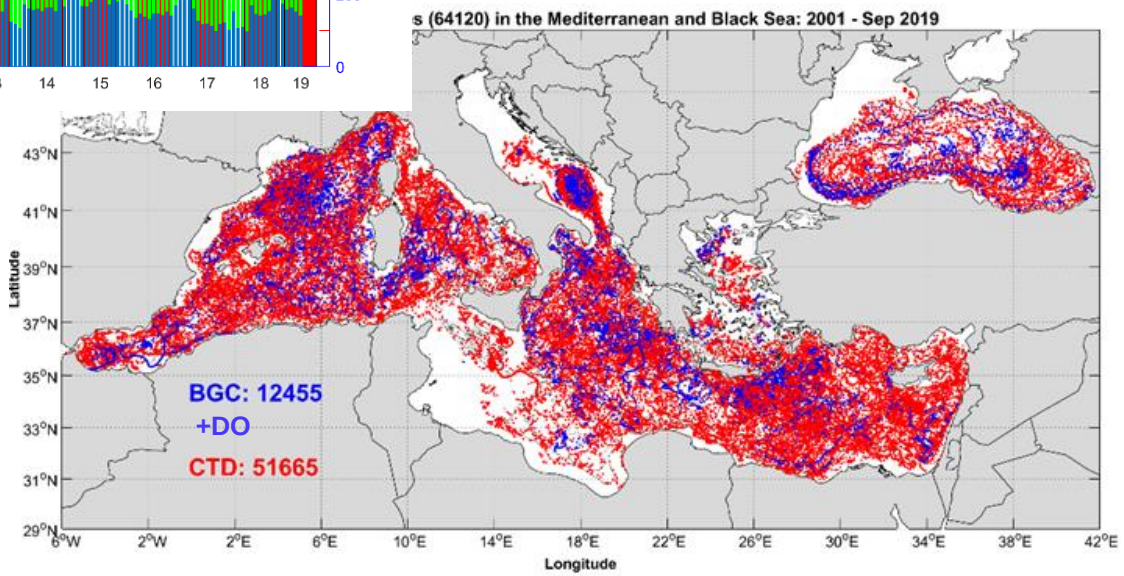
RED → Yearly

GREEN → Monthly (CTD)

BLUE → Monthly (DO + BGC)

457 Floats

~64000 CTD profiles

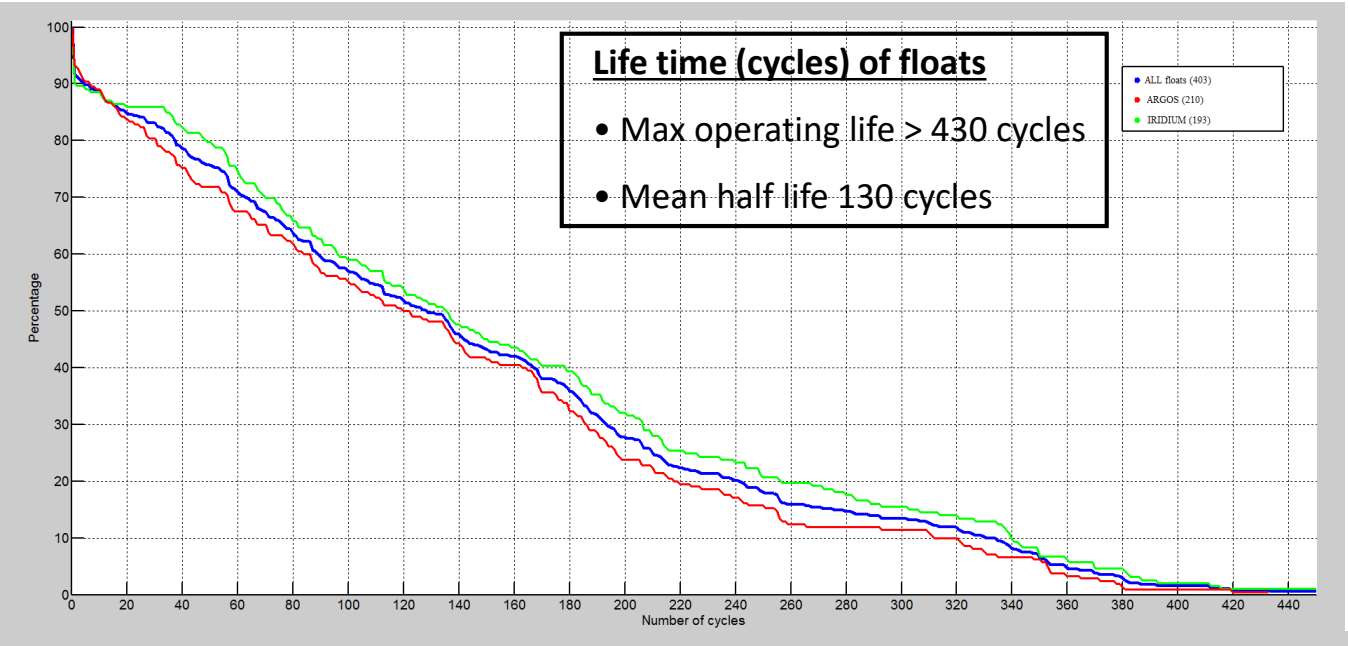


2019:

- ~ 110 floats (new deployments + at sea)
- 31 deployments (Spain, France, Italy, Greece, Europe). 17 out of 31 are BGC floats
- > 5500 CTD profiles collected

Updated to October 2019

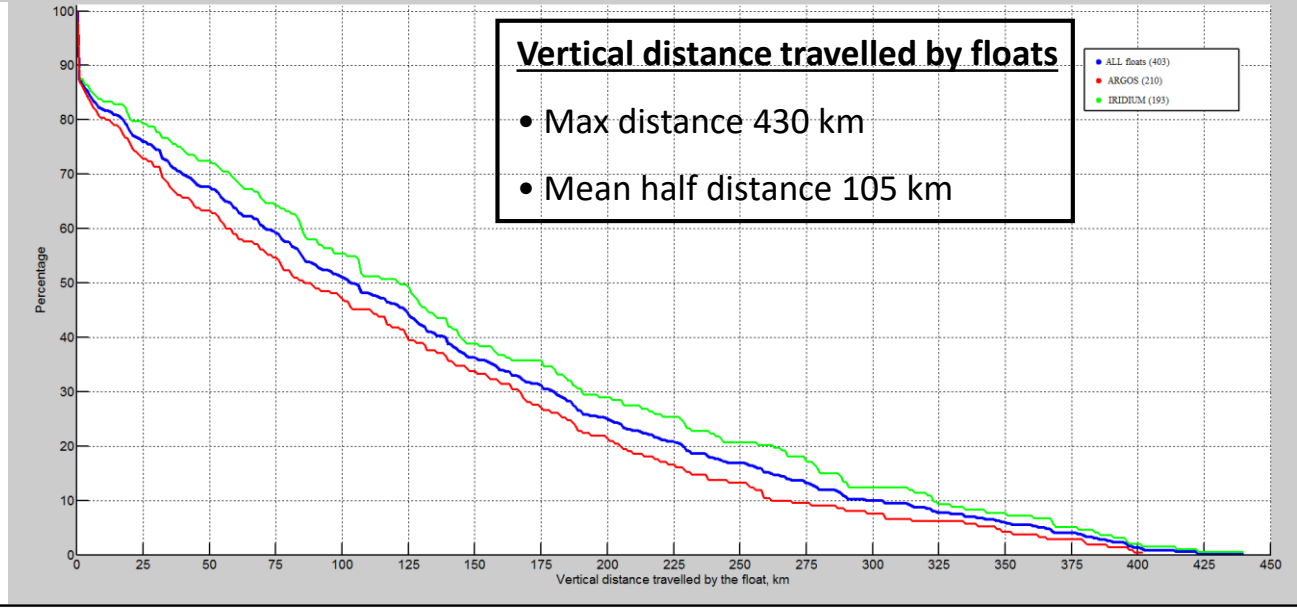
Data statistics: life time and distance travelled



Iridium 193
Argos 210
All 403

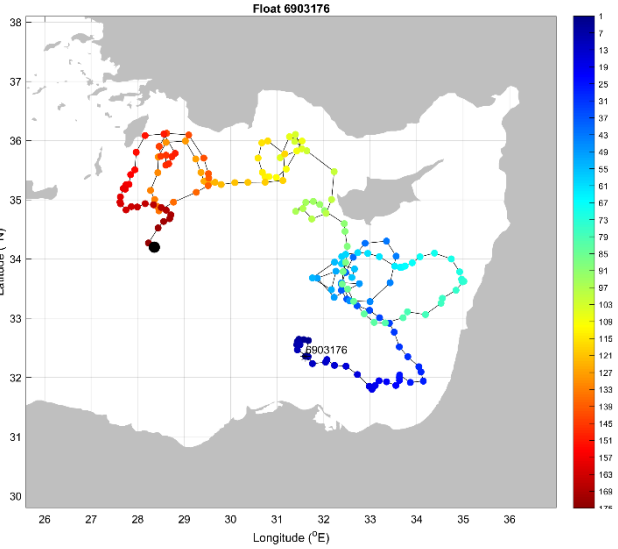
Criteria used in the statistics:

- exclude floats < estimated MHF & alive
- exclude floats recovered
- vertical distance computed during the ascent

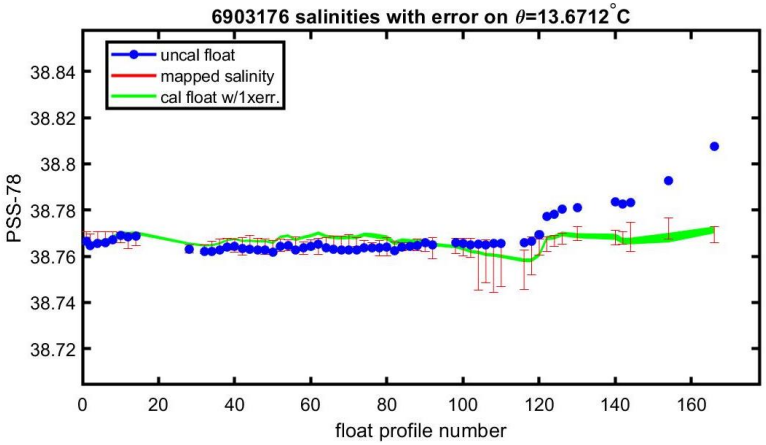


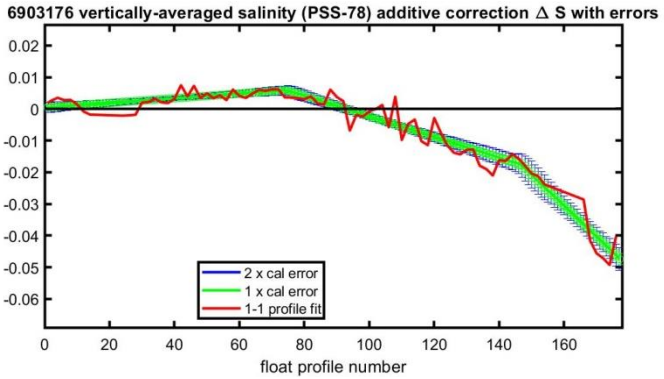
MedArgo data accuracy: Example of DMQC

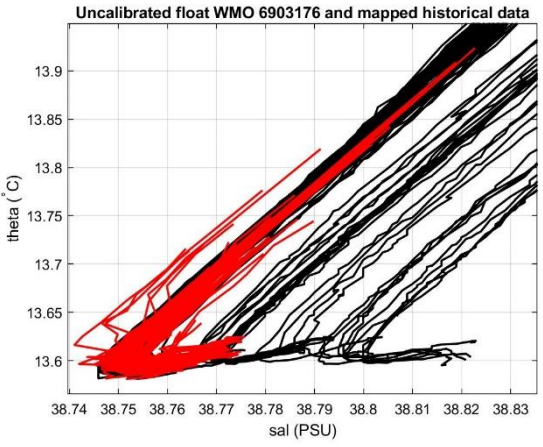
WMO 6903176: Levantine (Eastern Mediterranean) cell SN 6315, Druck SN 3847187

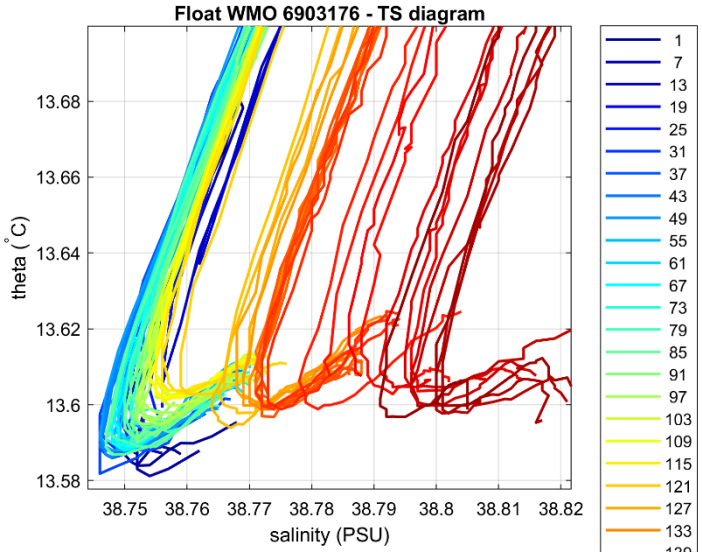


Substantial positive salinity drift



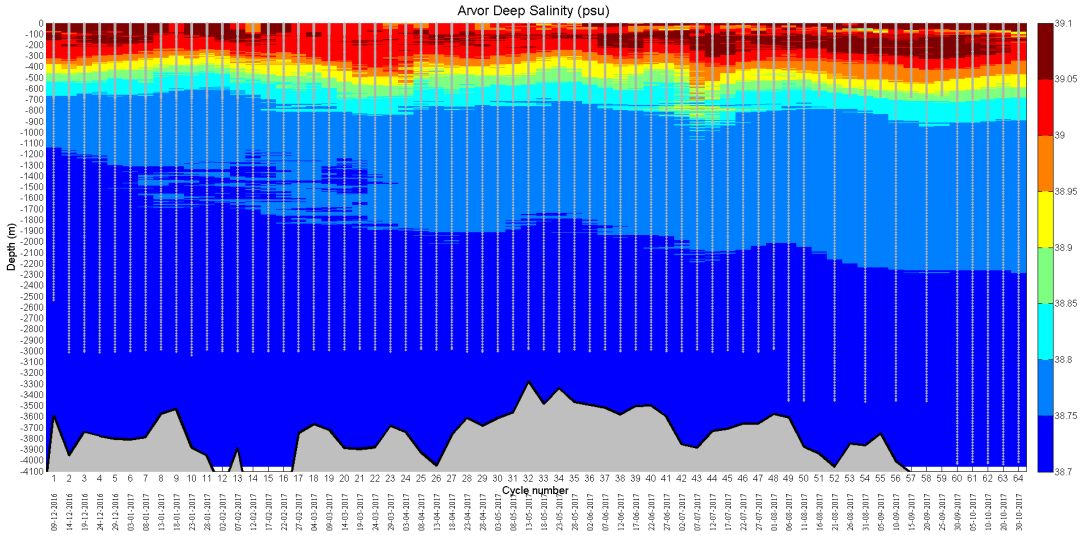


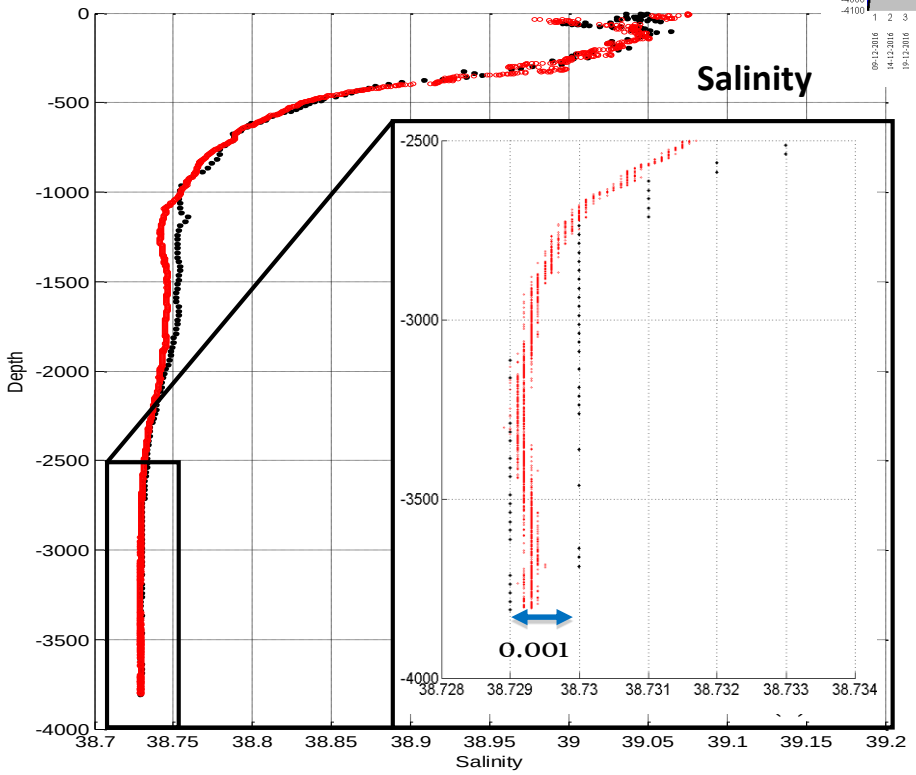


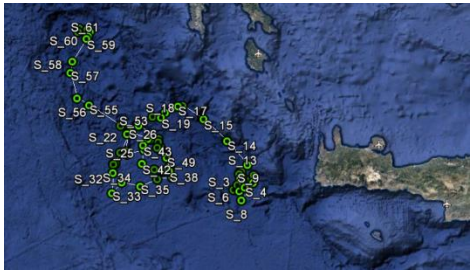


Deep-Argo in the Med Sea

Since June 2016, Argo Italy has deployed **4 Deep Arvor** floats in the eastern Ionian. Only one (WMO 6903203) worked satisfactorily for 4 months!







Deployment location: Hellenic trench (Cretan Passage), a depression of about 4000 m located in the deepest area of the Med – Dec 2016

Cycle length: 5 days

Parking depth: 3000-4000 dbar

Max profiling depth: 3000-4000 dbar

65 profiles

BGC-Argo in the Med and Black seas

Deployment: BGC-Argo France WMO 6901773 deployed in May 2015 in Eastern Med (NAOS project)

Parking depth: 1000 m

Cycle length: 1/7 days

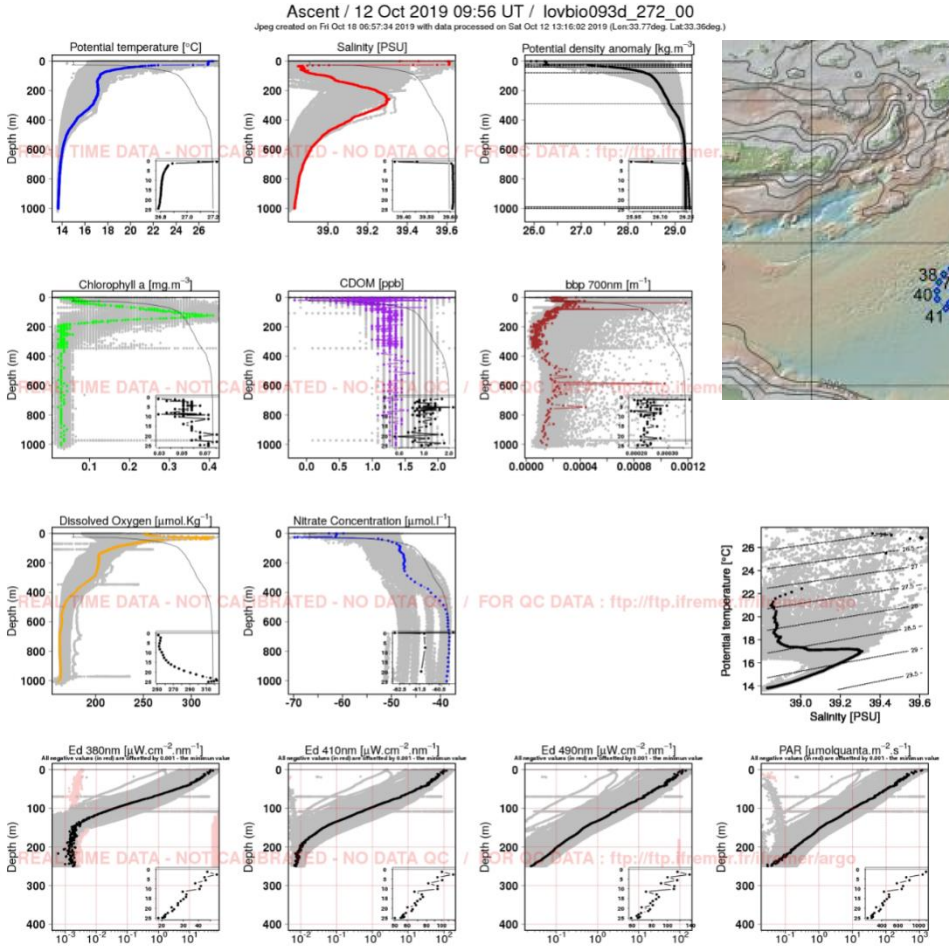
Provided by OAO group based at the Osservatoire Océanographique de Villefranche (France).
http://www.oao.obs-vlfr.fr

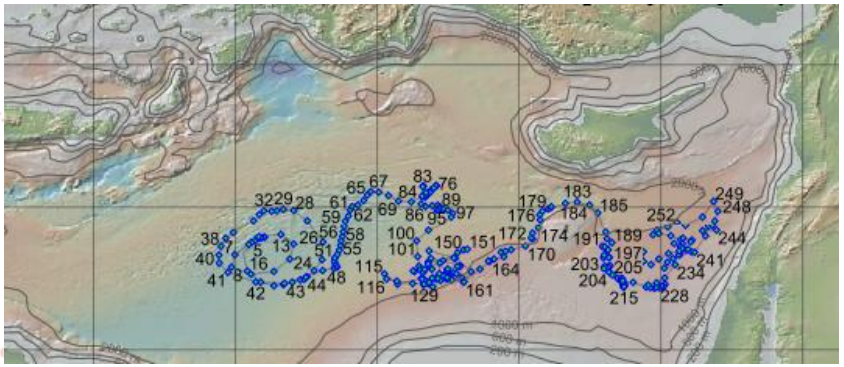
Physics

Biology

Optics

Chemistry



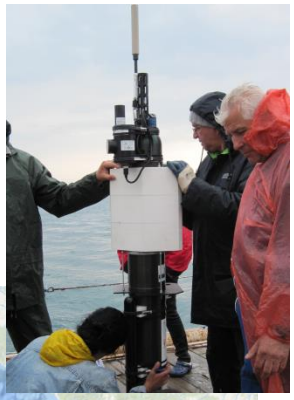


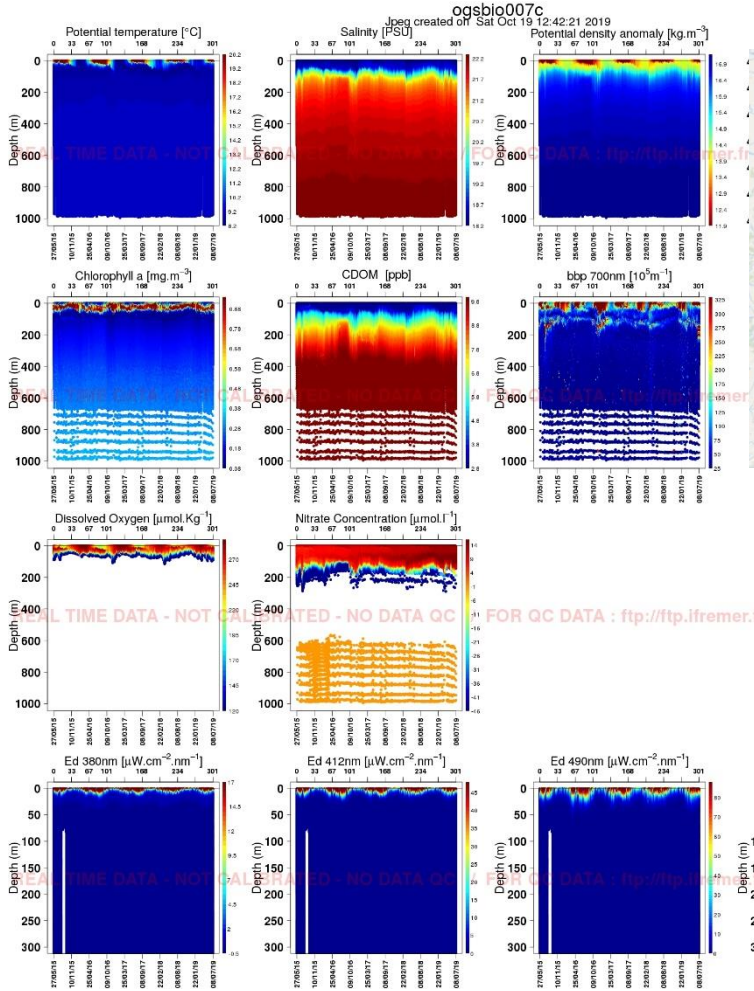
BGC-Argo in the Med and Black seas

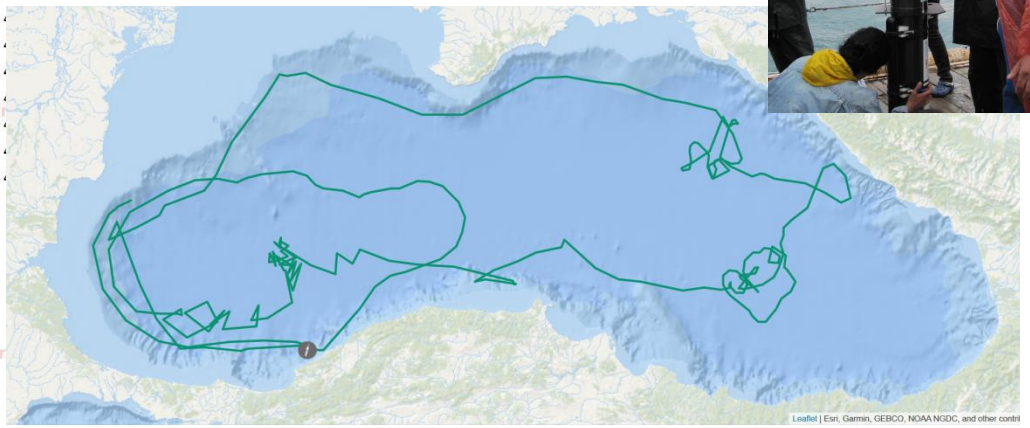
Deployment: BGC-Argo Italy WMO 6901866 deployed in May 2015 in Black Sea with Suna sensor for Nitrate and hydrogen sulfide

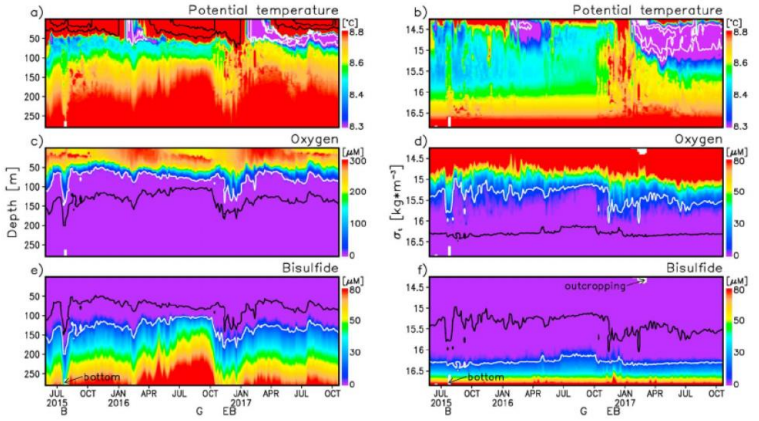
Parking depth: 1000 m

Cycle length: 1/5 days





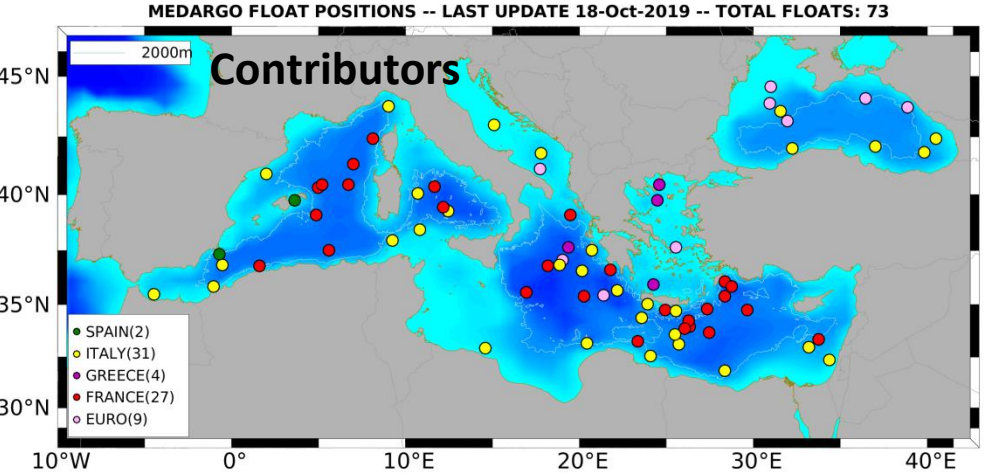


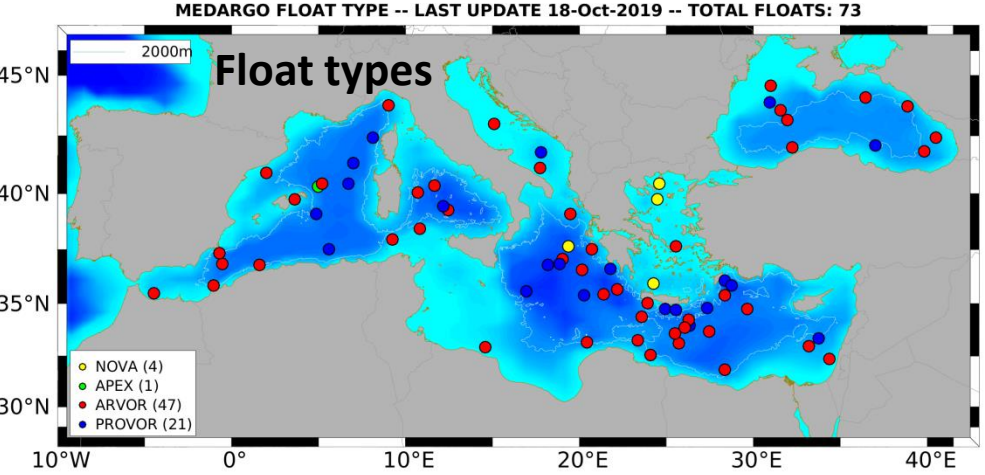


Stanev et al., GRL, 2018

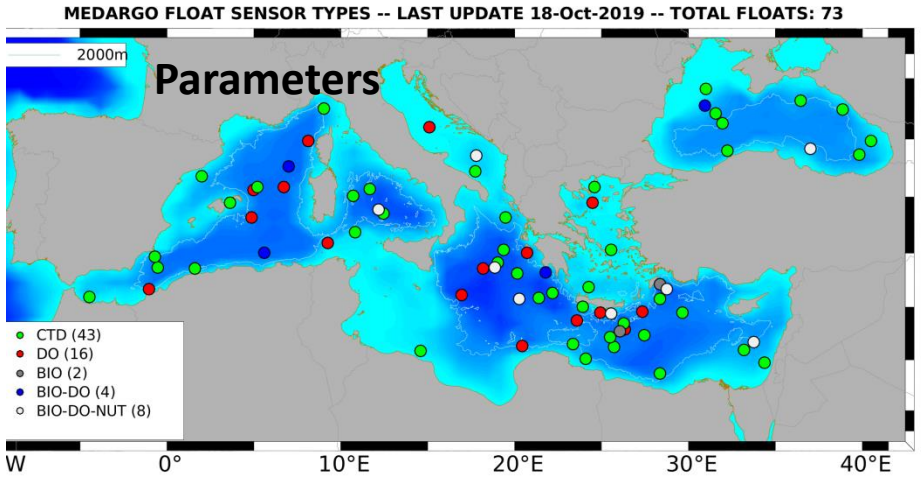
MedArgo products: Current status

- MedArgo web page **http://nettuno.ogs.trieste.it/sire/medargo**
- Tables and graphics updated in near real time
- Link with GDAC (Coriolis) and LOV





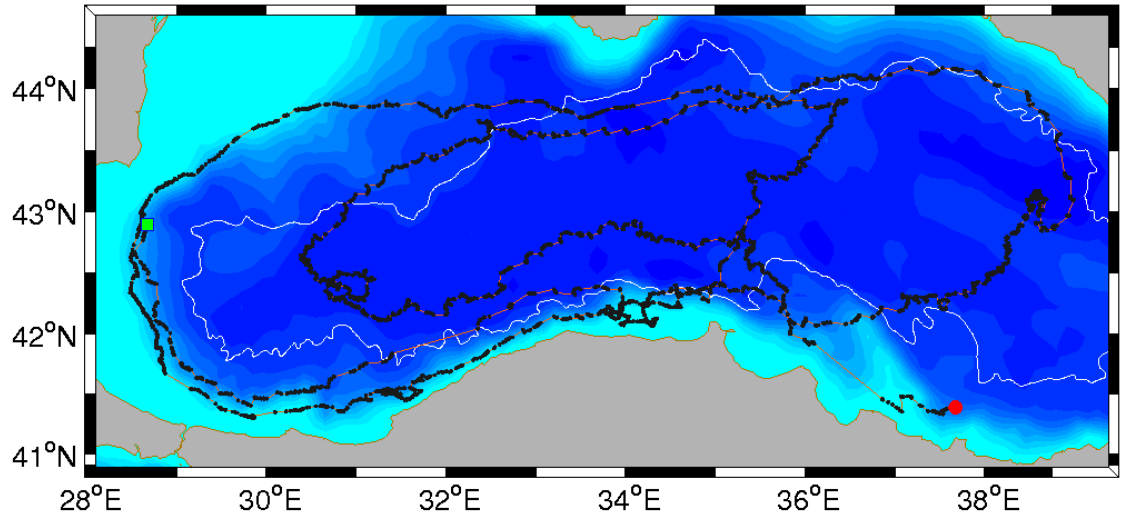
Med Sea: 63 floats with
18 DO & 14 BGC



Black Sea: 10 floats with
1 BGC

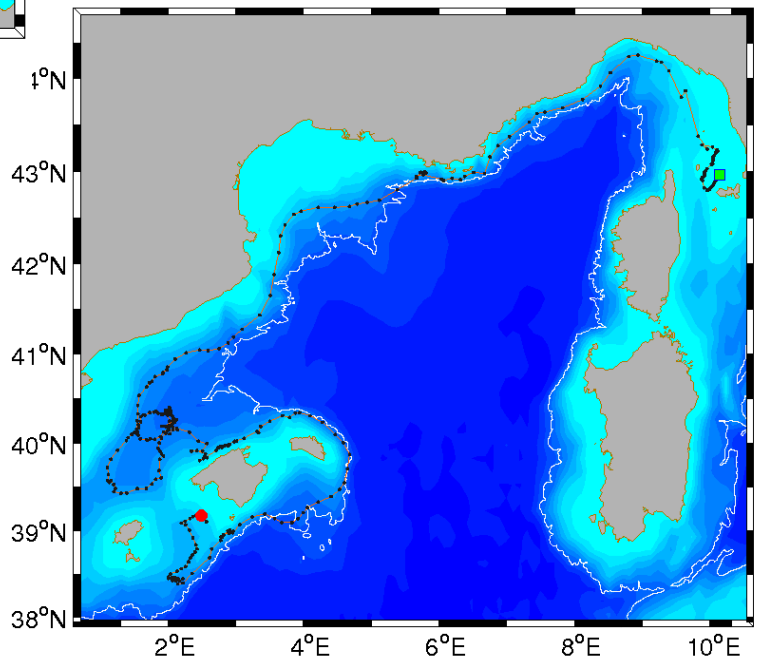
MedArgo products

Examples of individual float trajectories



WMO 6900805: 19-Mar-2011 to
12-Nov-2016
360 cycles

WMO 6901839: 15-May-2014 to
10-Oct-2019
393 cycles



MedArgo products

Examples of scientific results based on MedArgo data presented at this meeting

TALKS

A study of the Tyrrhenian Intermediate Water (TIW) using Argo floats, XBT and model data. Napolitano et al. (Italy)

Local Re-analysis of the Cyprus Basin: assimilating gliders and profiling floats to reproduce surface drifter tracks. Matsikaris and Hayes (Cyprus)

Evaluation of the first baroclinic Rossby radius in the Black Sea using reanalysis data and in-situ Argo profiles. Georgieva and Peneva (Bulgaria)

Investigating the impacts of a strong Medicane on the upper layers of the Eastern Mediterranean Sea. Kassis and Varlas (Greece)

Levantine Intermediate and Levantine Deep Water Formation: An Argo float study from 2001 to 2017. Kubin et al. (Italy)

Atmospheric and in-water radiative transfer model validation with BGC-Argo float data in the Mediterranean Sea. Terzic et al. (Italy)

How multivariate BGC-Argo data assimilation can improve the biogeochemical component of the CMEMS Mediterranean operational forecast system. Cossarini et al. (Italy)

POSTERS

Climate change and regional ocean water mass disappearance in the Black Sea. Chtirkova et al. (Bulgaria)

A neural network approach to estimate water-column nutrient concentrations and carbonate system parameters in the Mediterranean Sea: CANYON-MED. Fourrier et al. (France)

Long-term variability of the Black Sea cold intermediate layer properties. Valcheva and Marinova. (Bulgaria)

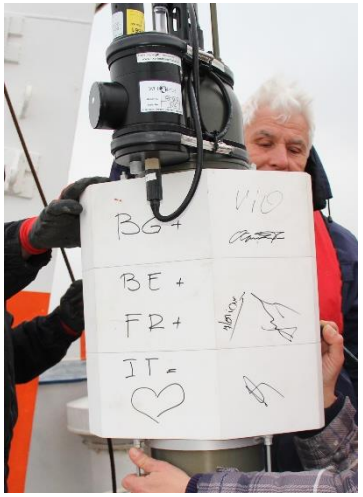
Argo missions and synergies with other platforms in marginal seas: The north Aegean and south Ionian test cases. Kassis and Korres (Greece)

Synechococcus in the Black Sea – an alternative explanation of the deep red fluorescence signal. Valcheva et al., (Bulgaria)

High-frequency variability of temperature and salinity profiles in the Mediterranean Sea as revealed by Argo floats. Poulain et al. (Italy)

MedArgo: future plans

• Deployments/Collaborations plans already established with ~10 countries ensure that a good coverage is maintained



• Effort in trying to involve new countries (also to resolve EEZ issues)

• A network of deployment opportunities is well organized (R/V, military and commercial boats, super yachts, …)

• MedArgo contributes to Euro-Argo ERIC (5 members are active in the Mediterranean)

• Deployment plans for 2020:
  - Mediterranean
    - ✓ Maintain >60 active floats, with ~20% BGC
    - ✓ Maintain 2-3 deep floats in deep Ionian & Cretan Passage!
    - ✓ Expand to shallow coastal areas (EA-RISE)
  - Black Sea
    - ✓ Maintain >10 active floats, with ~20% BGC
    - ✓ Expand to shallow coastal areas (EA-RISE)

MedArgo

Thanks for your attention

Any questions?