



European contribution to OneArgo



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&
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members

OceanPredict Symposium OP'24
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Copernicus Observations In Situ
Networking and Sustainability
COINS project

GEORGE



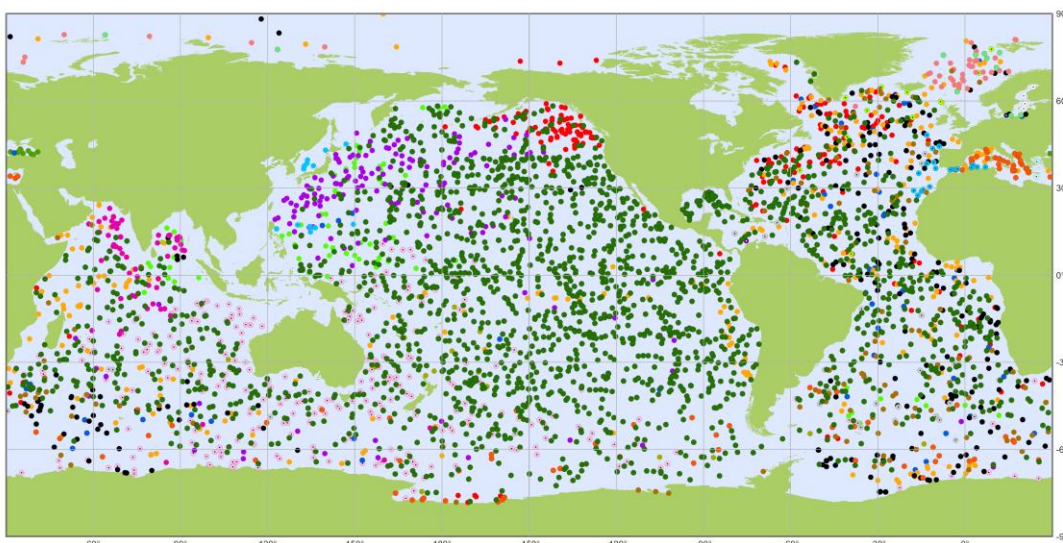
The Argo international programme



- Argo represents a fleet of about **4000 autonomous profiling floats**, deployed all over the world ocean, making measurements down to 2000m, some of them with 6000m capabilities (Deep-Argo).
- The floats carry sensors to report profiles of temperature, salinity and possibly up to 6 additional biogeochemical parameters (BGC-Argo)



Crédit: C-SCOPE project / GEOMAR



Argo

National contributions - 3866 operational floats
Latest location of operational floats (data distributed within the last 30 days)

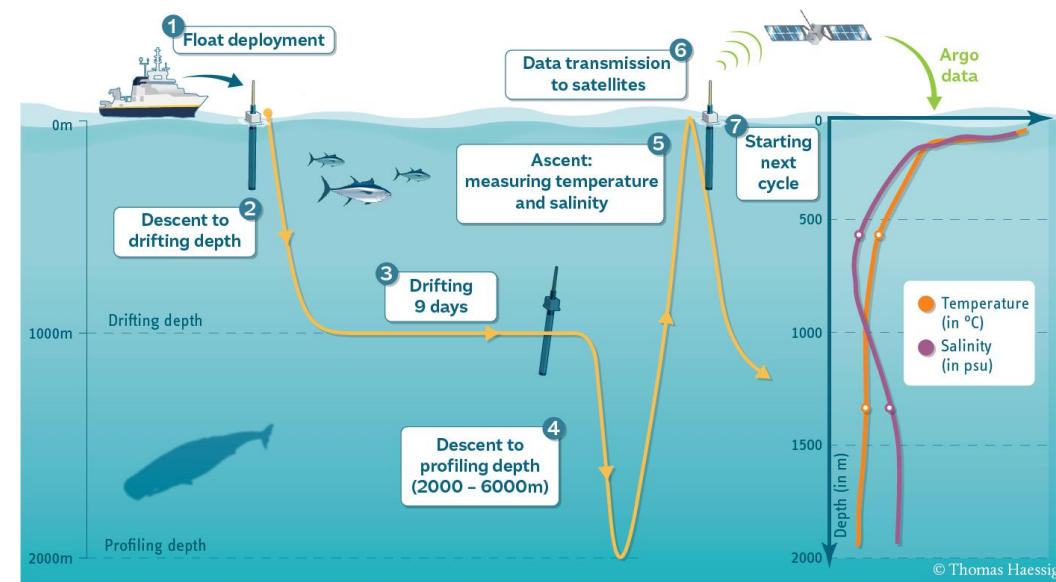
October 2024

• AUSTRALIA (296)	• DENMARK (2)	• GREECE (6)	• NETHERLANDS (32)	• SPAIN (19)
• BULGARIA (12)	• EUROPE (53)	• INDIA (60)	• NEW ZEALAND (16)	• UK (119)
• CANADA (201)	• FINLAND (4)	• IRELAND (12)	• NORWAY (42)	• USA (2172)
• CHINA (71)	• FRANCE (282)	• ITALY (89)	• POLAND (11)	
• COLOMBIA (1)	• GERMANY (242)	• JAPAN (159)	• KOREA, REPUBLIC OF (14)	



Generated by ocean-ops.org, 2024-11-07
Projection: Plate Carree (-150.0000)

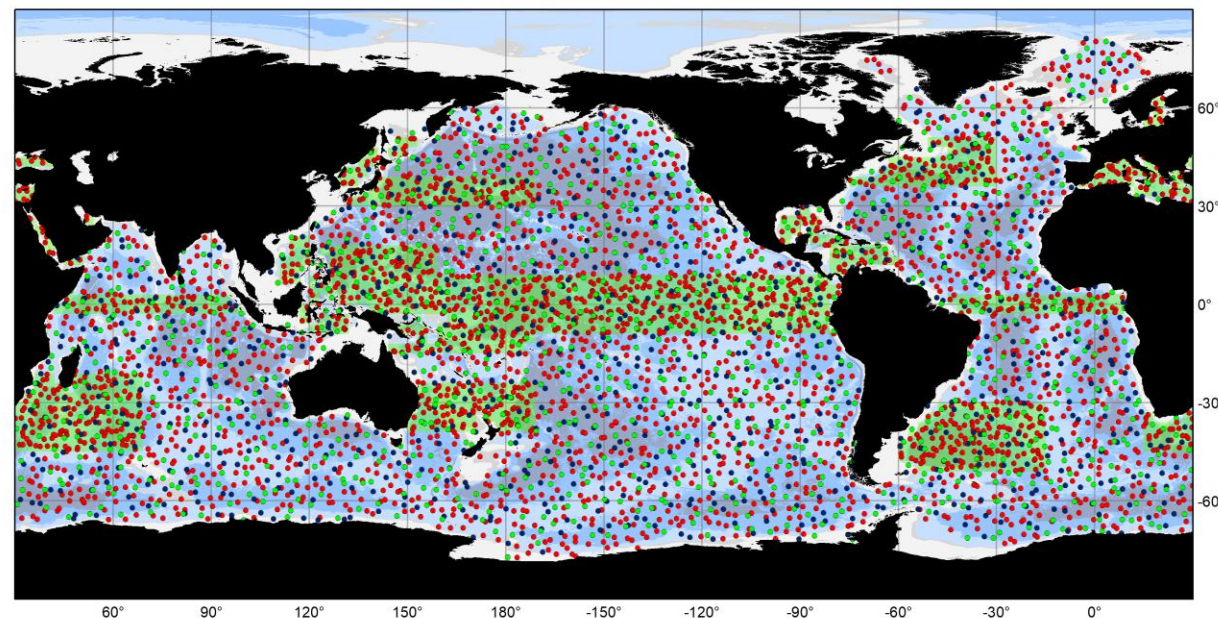
TEN DAYS CYCLING OF AN ARGO FLOAT



© Thomas Haessig

- **Initial design (late 90's) achieved in 2007:**
 - 3000 active floats, measuring T/S from surface to 2000m, 60°S - 60°N
- **New OneArgo design:**
 - **Global:** includes ice covered areas, marginal Seas and higher density in highly dynamic regions
 - **Full Depth:** Deep Argo
 - **Multidisciplinary:** Biogeochemical Argo

OneArgo implementation has started but the **full implementation will require additional funds**



Argo

Argo global, full-depth, multidisciplinary design: 4700 floats

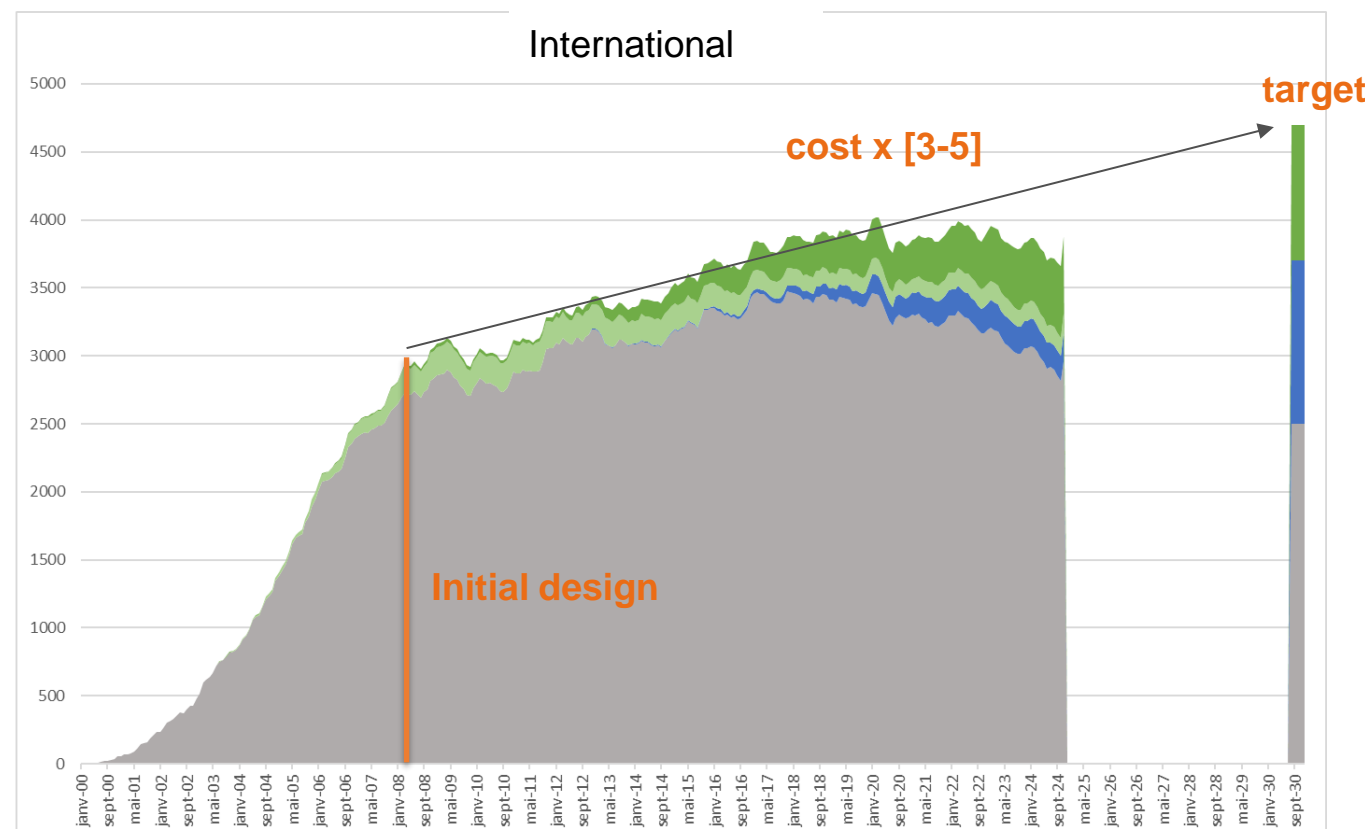
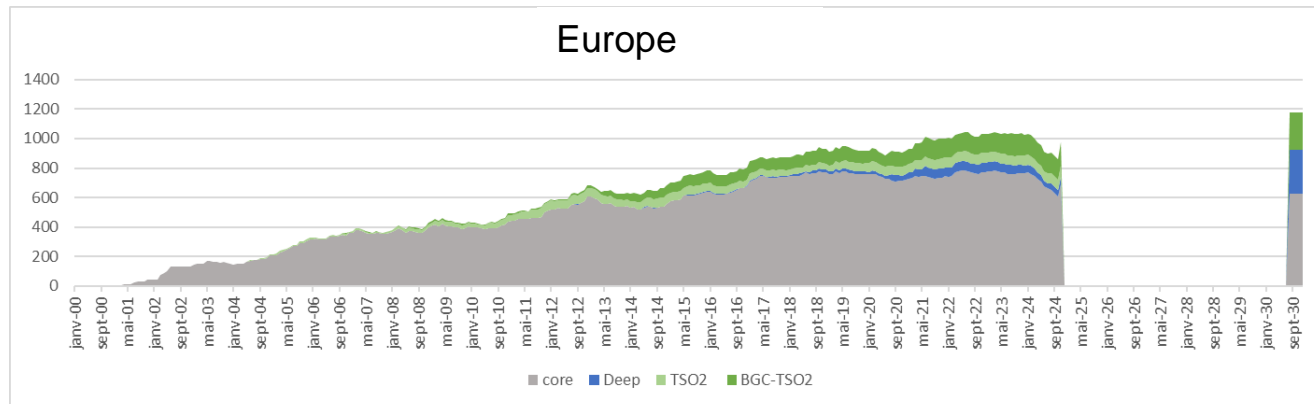
- Core Floats, 2500 Target density doubled
- Deep Floats, 1200
- BGC Floats, 1000





The « Global, full depth and multidisciplinary » OneArgo design

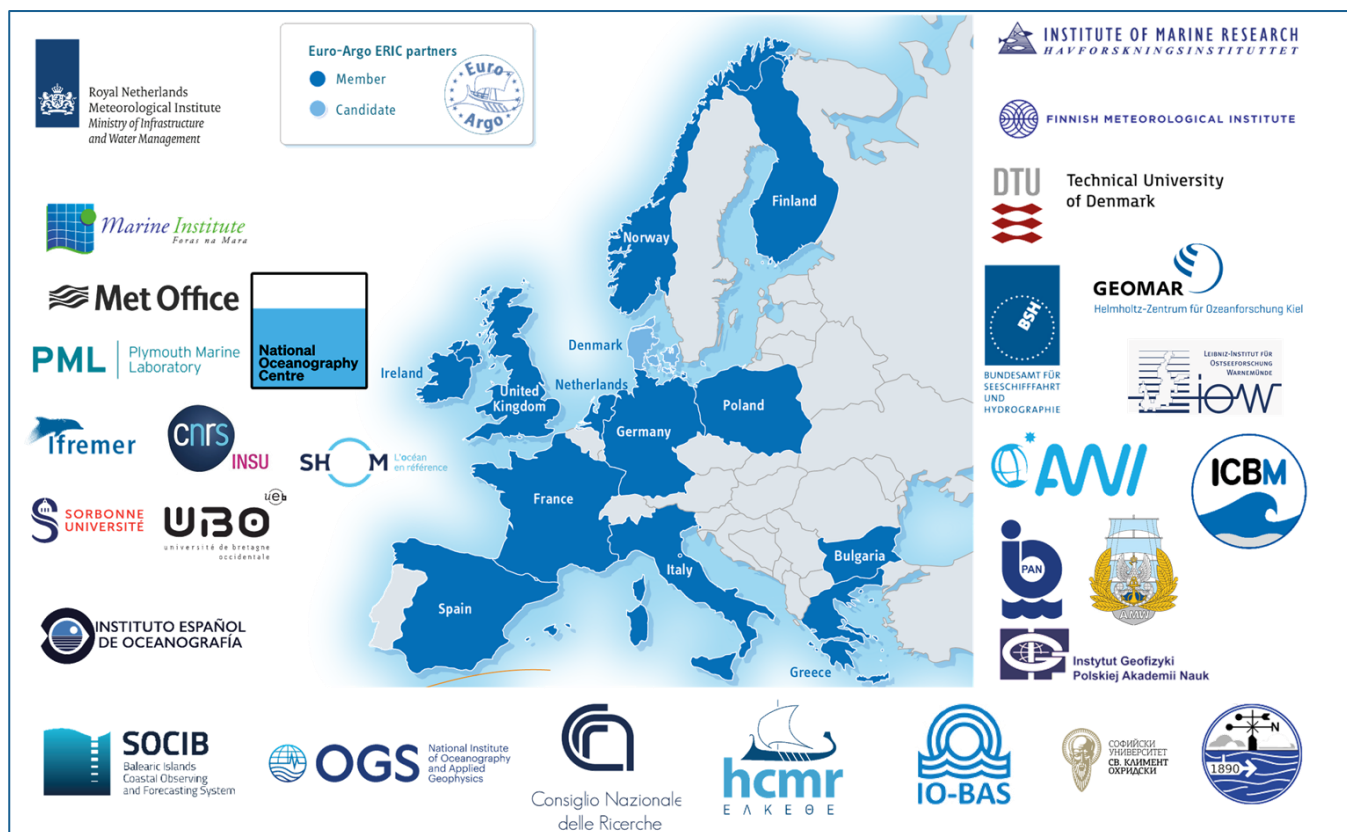
Evolution of the Argo array since 2000, in number of active floats and by type of float (grey: core, blue: Deep, green: BGC)



Challenge:

OneArgo implementation cost is **3 to 5 times** the cost of the initial array

- Euro-Argo **sustains** and **optimises** the European contribution to the **international Argo programme**, providing, deploying and operating **25%** of the international network.

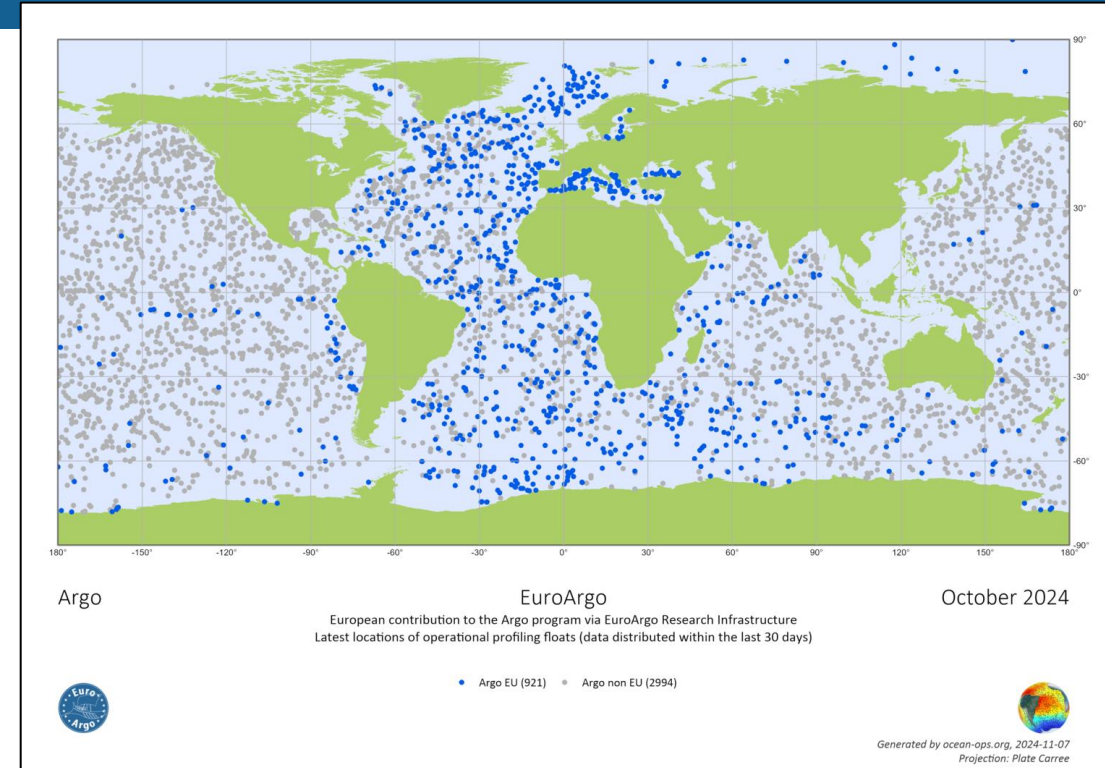
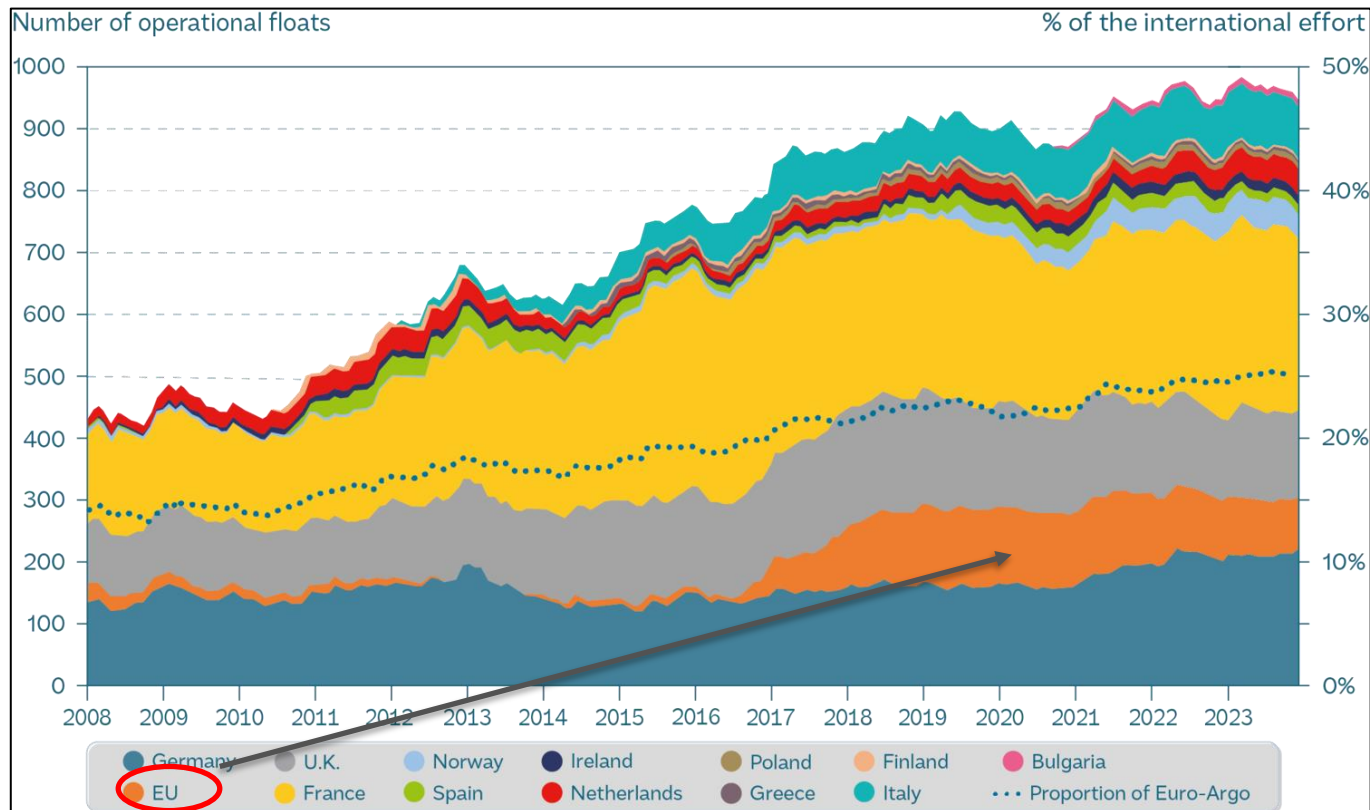


- The **Euro-Argo European Research Infrastructure Consortium (ERIC)** was created in May 2014, and engages the countries and their ministries.
 - **13 countries**, 28 institutes
 - Office in Brest, France
- [\[2024-2033\] Euro-Argo ERIC strategy](https://doi.org/10.5281/zenodo.10653294)
<https://doi.org/10.5281/zenodo.10653294>



European contribution to the international Argo programme

- Sum of European national contributions from **13 countries plus** occasional and targeted project-based contributions from the **European Commission**

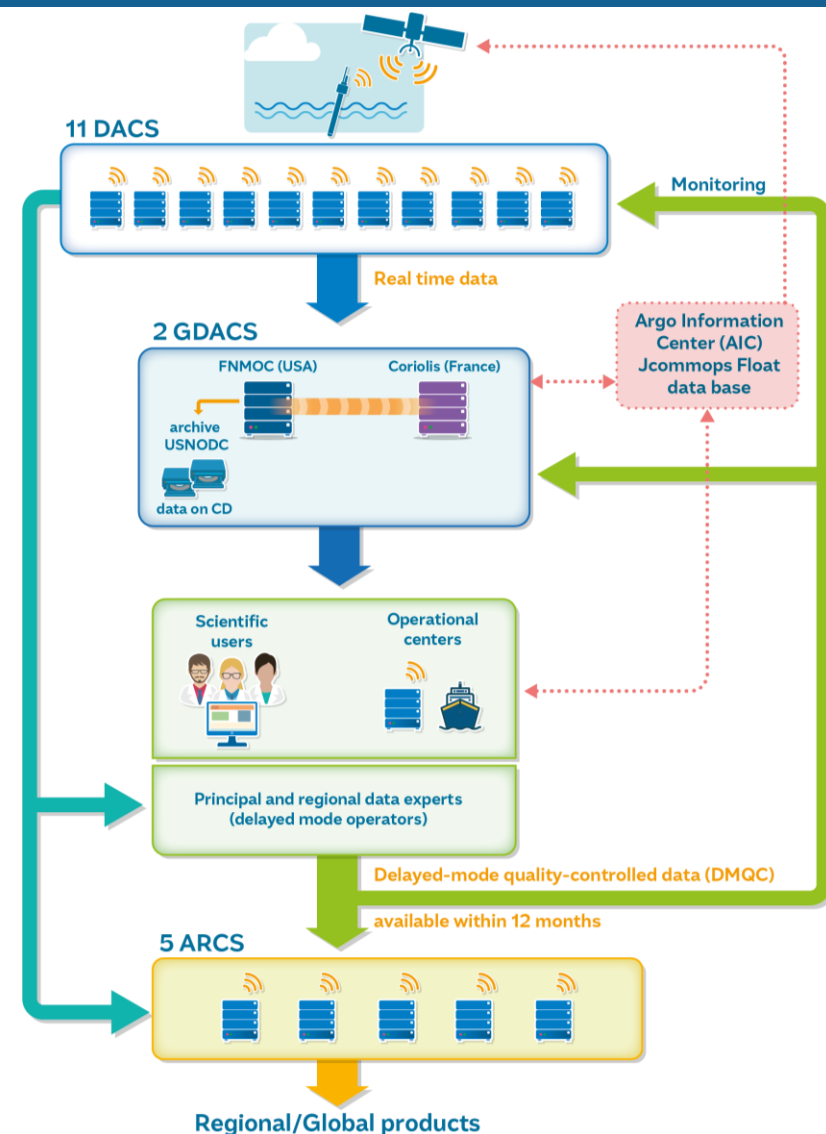


- Past EU projects (MOCCA) were crucial to achieve a European contribution of 25% of the international effort
 - MOCCA, AtlantOS, EuroSea
- Current EU projects do not include floats procurement



Euro-Argo Data Management

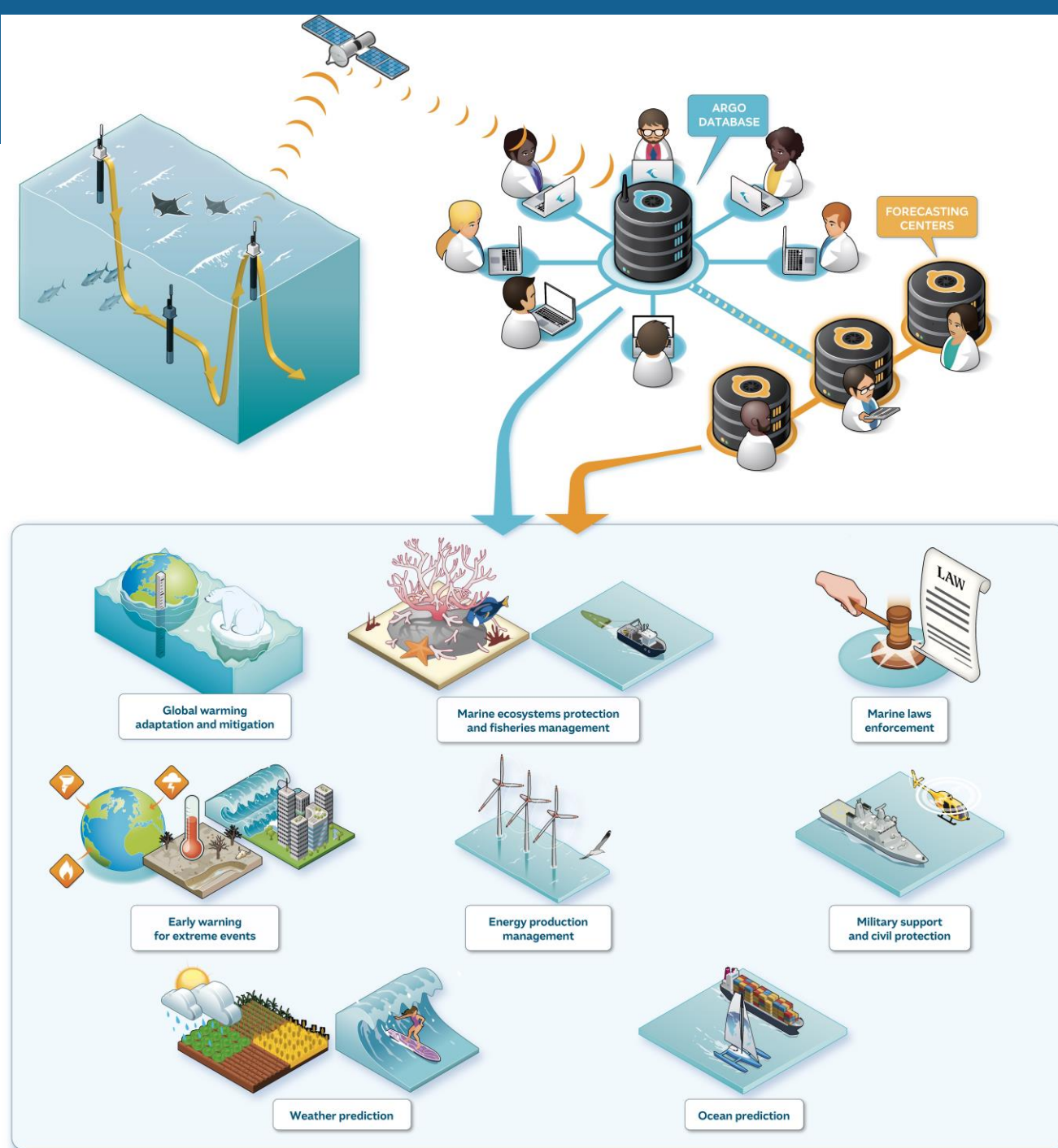
- A **free** and **open** data policy relying on an international data management system
- Two versions of Argo data:
 - Real-Time data (with QC flags)
 - Delayed-Mode data (carefully quality controlled by experts)
- NetCDF Format, access through various tools and webservice (ERDAPP, s3, argopy, etc.)
 - [Fleet monitoring](#)
 - [Data Selection](#)
- The Argo Data Management Team is implementing a framework to increase Argo data FAIRness
- 1 of the 2 GDACs & 2 of the 11 DACs are hosted in Europe



→ Poster “Accessing and using the evolving OneArgo data stream”

*DAC: Data Assembly Centre
*GDAC: Global Data Assembly Centre
*ARC: Argo Regional Centre

- Scientific questions
 - Climate change (ocean heat content, desoxygenation, carbon uptake etc.)
 - Ocean dynamics
 - Ocean ecosystems
- Operational services
 - Ocean predictions and analyses
 - Satellite validation
 - ✓ Ocean Colour
 - ✓ SST
 - Ocean health monitoring (e.g. Marine Strategy Framework Directive)





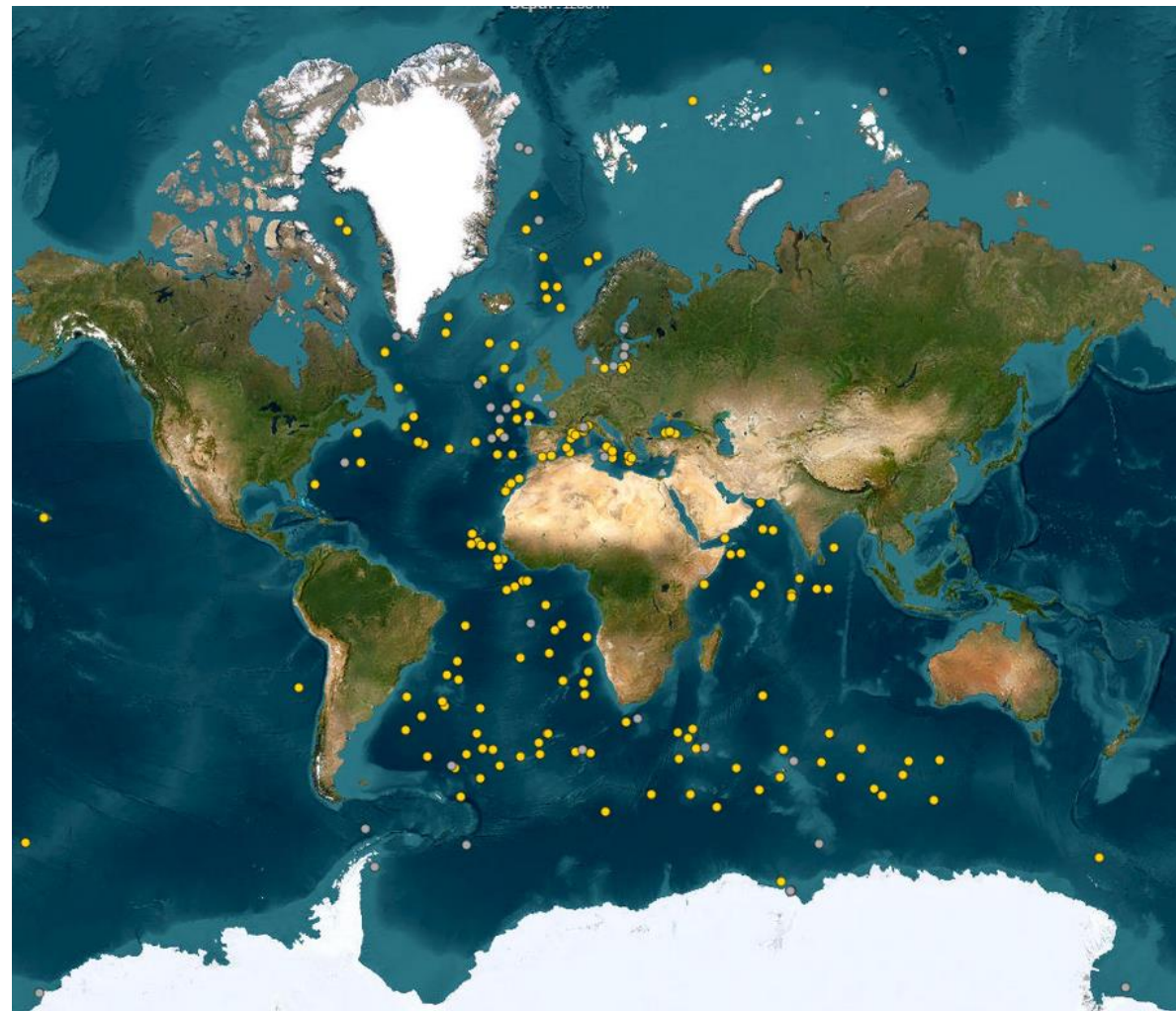
Euro-Argo as part of an integrated Ocean Observing system

- Argo is one of the 13 Ocean Observing networks of GOOS
 - Strong link with GO-SHIP (float deployments, reference data for QC, etc.)
- Euro-Argo is involved in the development of the European Ocean Observing System (EOOS)
 - Development of a joint EOOS Technical Support Center in collaboration with all European Marine RIs contributing to EOOS, EuroGOOS, OceanOPS, etc. - AMRIT project
 - Initiative to connect European RIs to the WMOG3W to jointly significantly improve our ability to quantify the Southern Ocean Carbon sink – TRICUSO project
- ENVRI community in Europe
 - Improvement of data and metadata interoperability & access - ENVRI-Hub Next & FAIR-EASE projects

- European marginal Seas
 - Baltic Sea
 - Mediterranean Sea
 - Black Sea
- High latitudes: Nordic Seas and European Arctic
- Maintain the Deep Argo pilot array in the North Atlantic
- Oxygen measurements on *most of the* floats
- Contribution to the global implementation (Deep & BGC)

Described in EuroSea Deliverable:

https://doi.org/10.3289/eurosea_d3.16



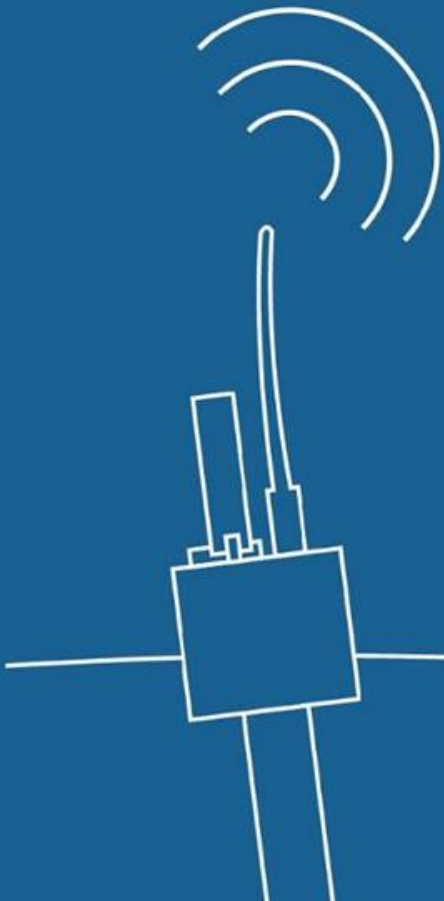
Last position (7/11/2024) of European floats deployed in 2023
(yellow: active, grey: inactive)

- Privileged links with the European Union Copernicus programme
 - MOU signed with the Copernicus Marine Service, letter of support from Copernicus Climate Change Service
 - [Workshop Copernicus/Euro-Argo organised in March 2024](#)
 - ✓ COINS & GEORGE EU projects
- Recommendations from this 1st workshop:
 - It is indispensable that Argo ensures, in the future, the same level of service as currently - the implementation of OneArgo should not degrade the current core array
 - Polar data (under ice), and coastal data are seen as priorities for Copernicus, for most of the parameters
 - Oxygen measurements are very valuable as they allow, thanks to machine learning techniques, to produce synthetic nutrients and carbonate system variables
 - ✓ efforts should be pursued by Euro-Argo to improve the uncertainties provided with Oxygen data (Euro-Argo ONE project)
- Such workshops should be repeated regularly

- OneArgo is opening new opportunities but also comes with **challenges**:
 - Network implementation
 - Data management
- Additional European contribution will be crucial to achieve the OneArgo implementation by 2030
- Euro-Argo strategy in terms of float deployments and sampling (e.g. surface):
 - European scientific interests
 - European operational services
 - Contribution to the global OneArgo implementation & complementarity with other observing networks
- OneArgo is the main source of ocean *in situ* observations for the Copernicus EU programme

- Design studies to refine the European strategy for float deployments, in the GOOS and EOOS context (EU projects Euro-Argo ONE, GEORGE, TRICUSO, AMRIT)
 - Deep-Argo
 - Arctic sampling strategy
 - Oxygen sampling
 - Carbon uptake
- Advocacy, both at national and European levels
 - Strategy in development
 - Policy brief will be developed in collaboration with Copernicus partners
- Continue to strengthen the links with the modelling and satellite communities to better answer the needs and develop common advocacy

Thank you



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