



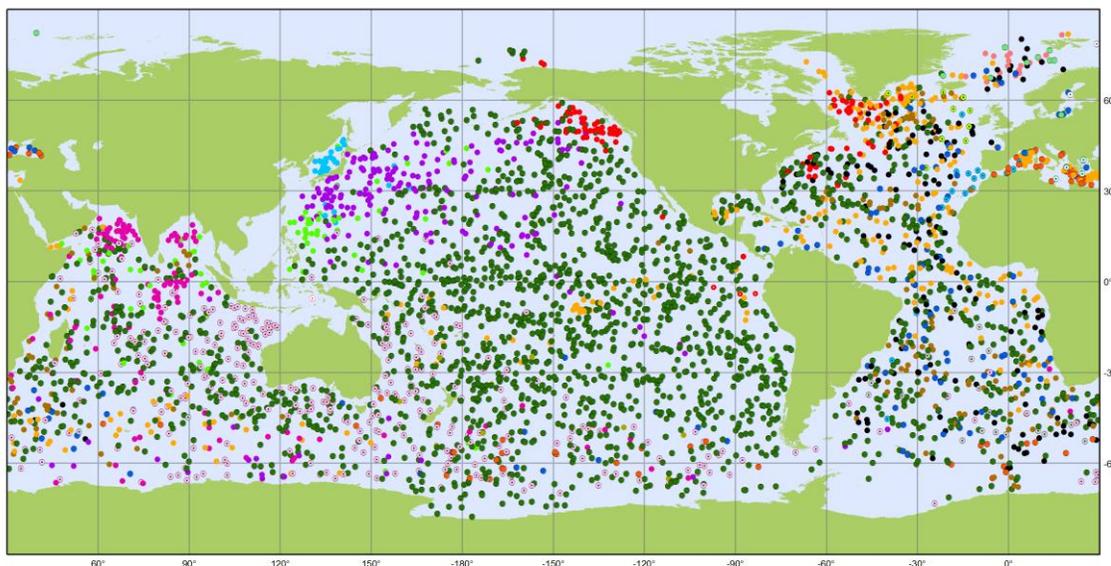
# Euro-Argo

The European contribution to the global Argo ocean observation network



# Argo: a global *in situ* observing system

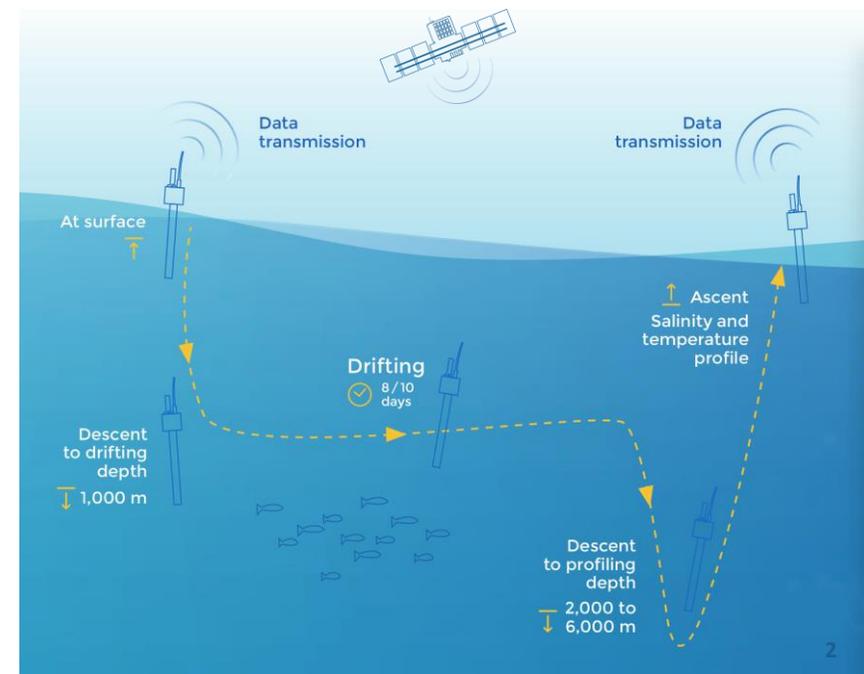
- About 4000 autonomous profiling floats are measuring ocean temperature and salinity up to 2000 m depth, all over the globe
- The Argo network delivers essential data both for climate change research and for ocean analysis and forecasting systems



Argo National contributions - 3852 Operational Floats August 2019  
Latest location of operational floats (data distributed within the last 30 days)

● AUSTRALIA (337)	● FINLAND (2)	● INDIA (139)	● JAPAN (199)	● NEW ZEALAND (10)	● KOREA, REPUBLIC OF (35)
● CANADA (99)	● FRANCE (286)	● INDONESIA (1)	● KENYA (1)	● NORWAY (19)	● SPAIN (24)
● CHINA (81)	● GERMANY (153)	● IRELAND (11)	● MEXICO (1)	● PERU (3)	● UK (155)
● EUROPE (118)	● GREECE (6)	● ITALY (69)	● NETHERLANDS (21)	● POLAND (11)	● USA (2073)

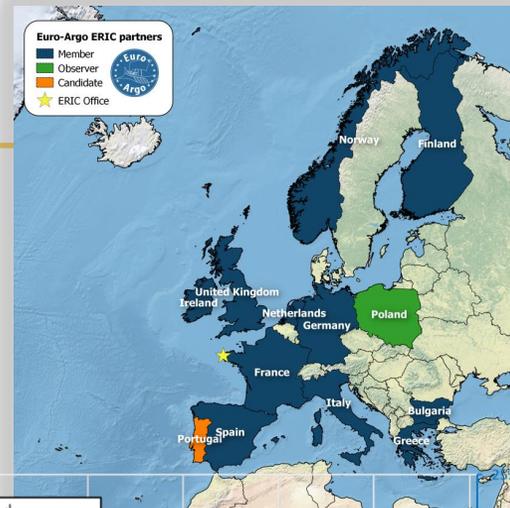
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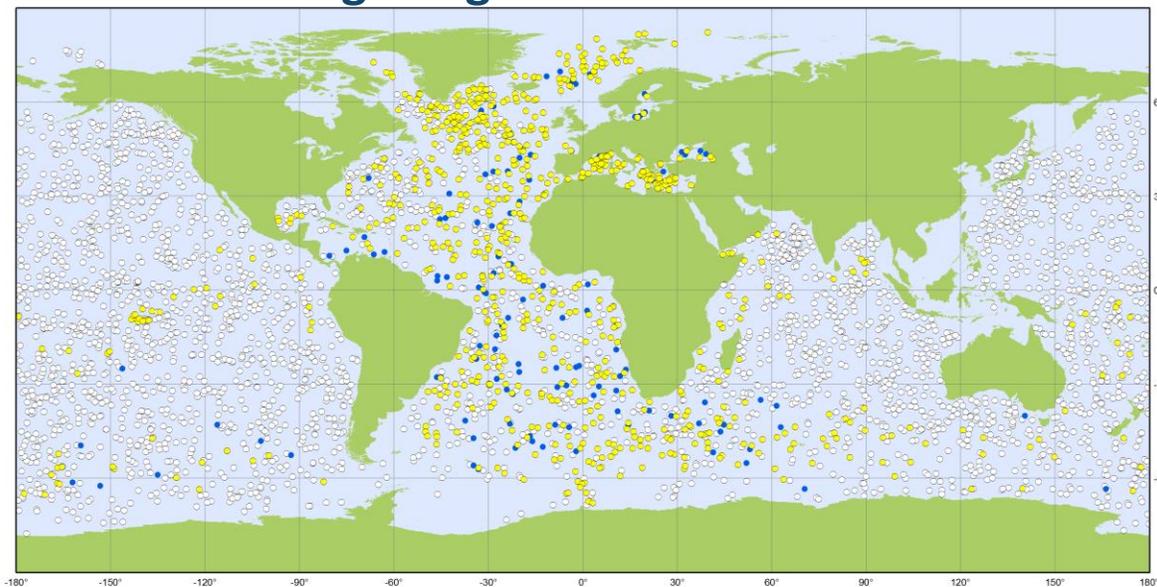


# The Euro-Argo Research Infrastructure

## Objective : To coordinate and sustain the European contribution to the global Argo network (1/4 of the network)

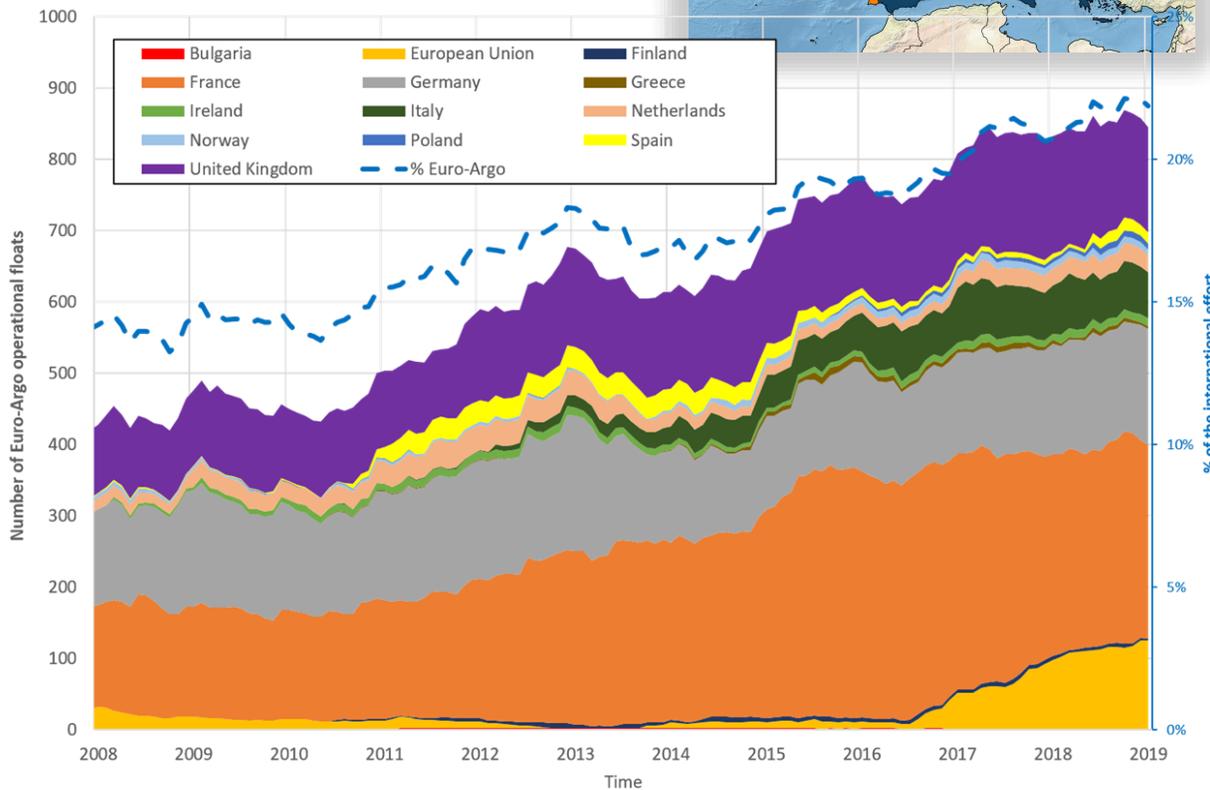


### 22 % of the network including marginal seas enhancement



Argo **EuroArgo** August 2019  
 Contribution of the EuroArgo European Research Infrastructure Consortium (ERIC) to the Argo observing network  
 Latest locations of operational profiling floats (data distributed within the last 30 days)

● EuroArgo - national contributions (757) ● EuroArgo - EU funded (118) ○ International - non EuroArgo (2979)

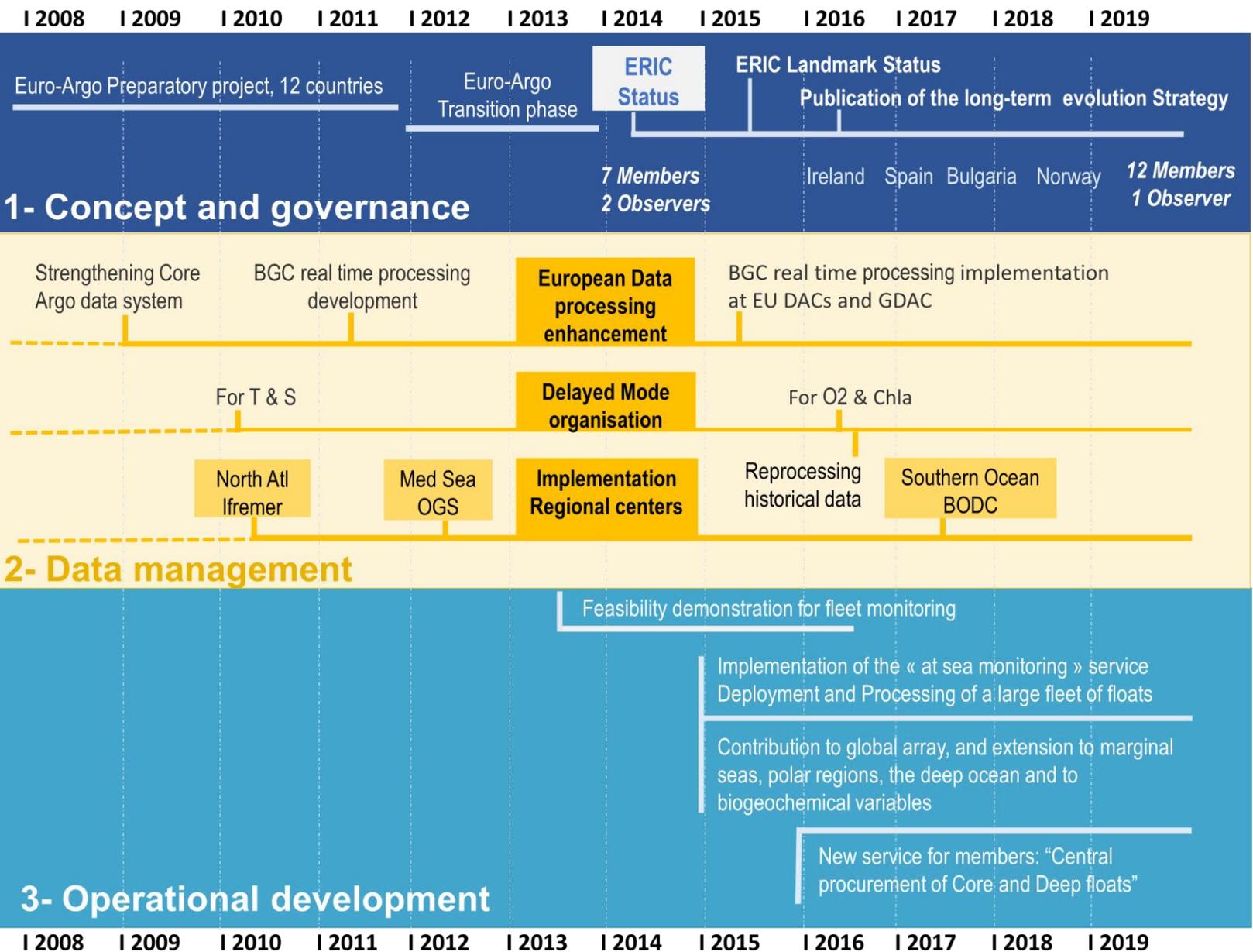


### Increase of the European contribution to the international network (number of deployments / year)





# A long process that started in 2008

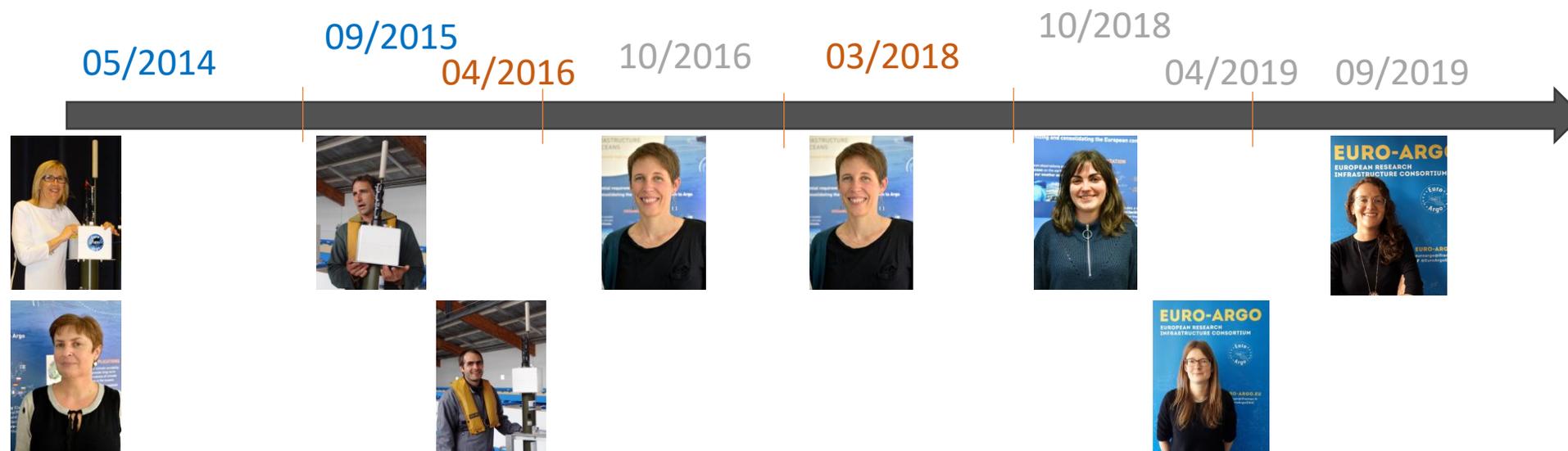
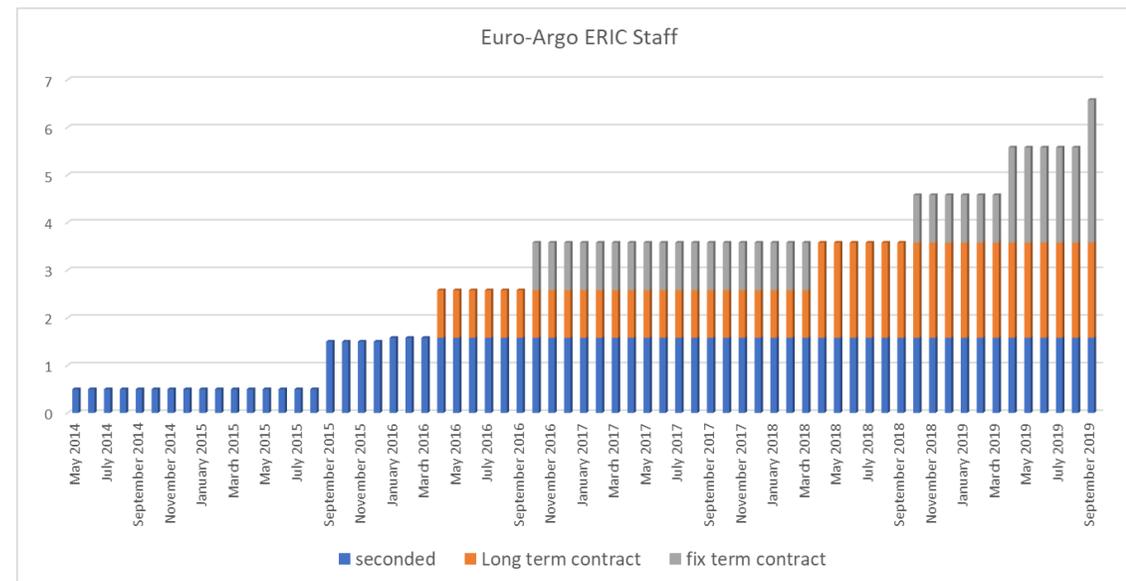


## 5-Year evaluation June 2019 by independent experts

- Assess the achievement of past 5 years
- Plan the next 5 year

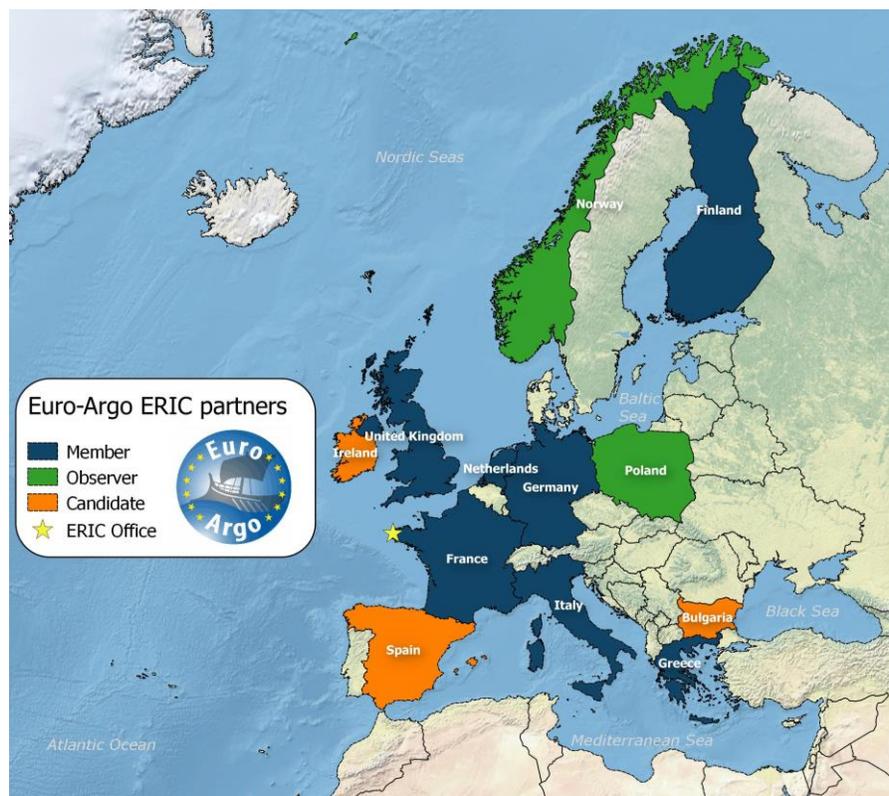


- Distributed national facilities & a central ERIC office
  - ERIC office (Brest, France): A team that expended during 2014-2018 .

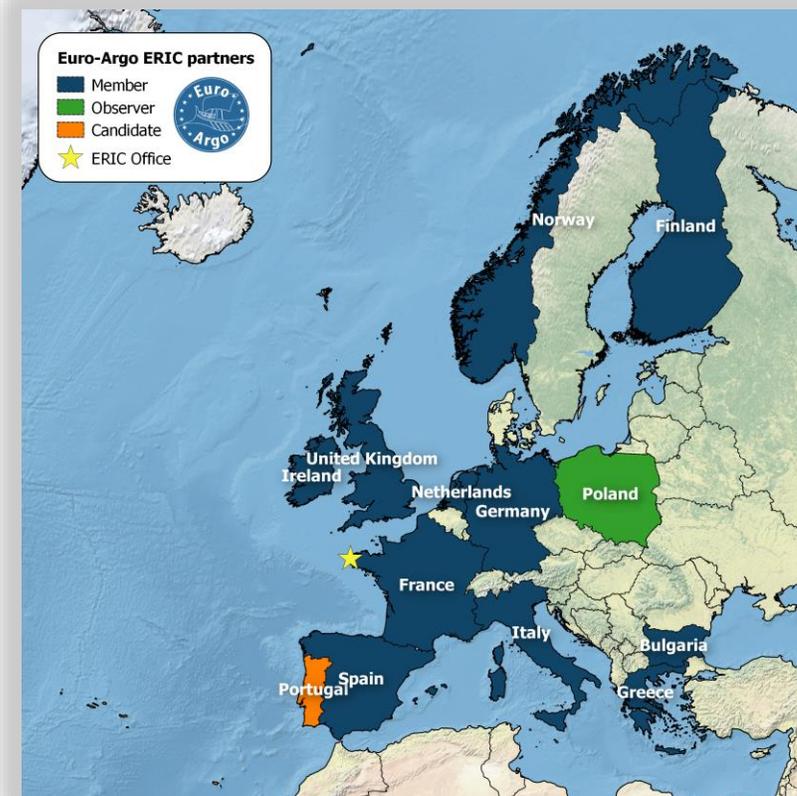


Seconded  
 Long term contract  
 Fix term contract

- 2014 : 7 Members (France, Finland, Germany, Greece, Italy, Netherlands, UK) and 2 Observers (Norway ,Poland)
- 2017 : Ireland joined as a Member
- 2018: Spain and Bulgaria joined as Members , Norway changed from Observer to Member
- 2019: Portugal is a Candidate Member



2014



2019

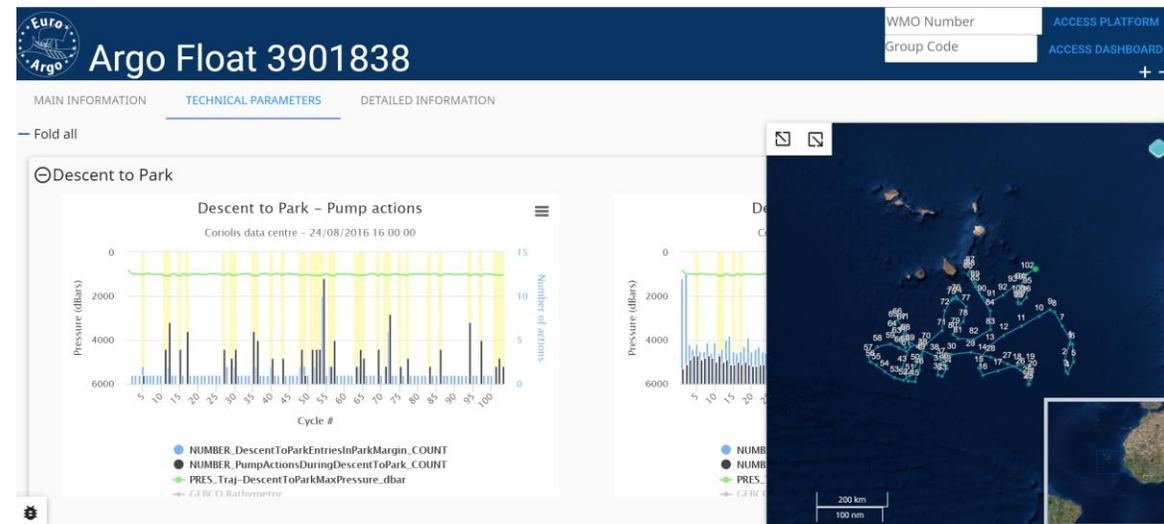
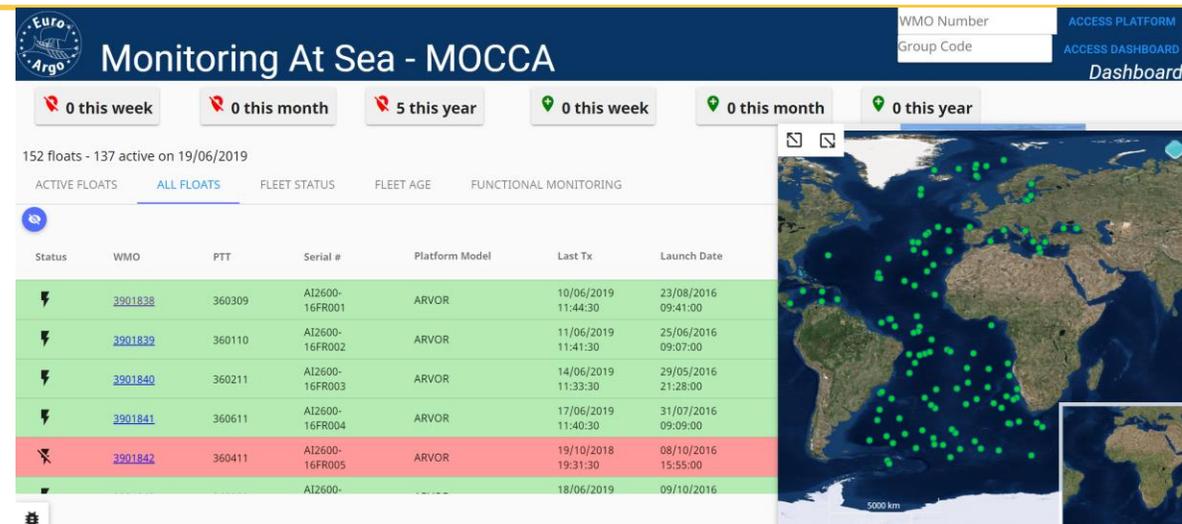


# New services to members

- Centralised float procurement/testing.
- Tools for at-sea monitoring of the Argo fleet to complement JCOMMOPS services.



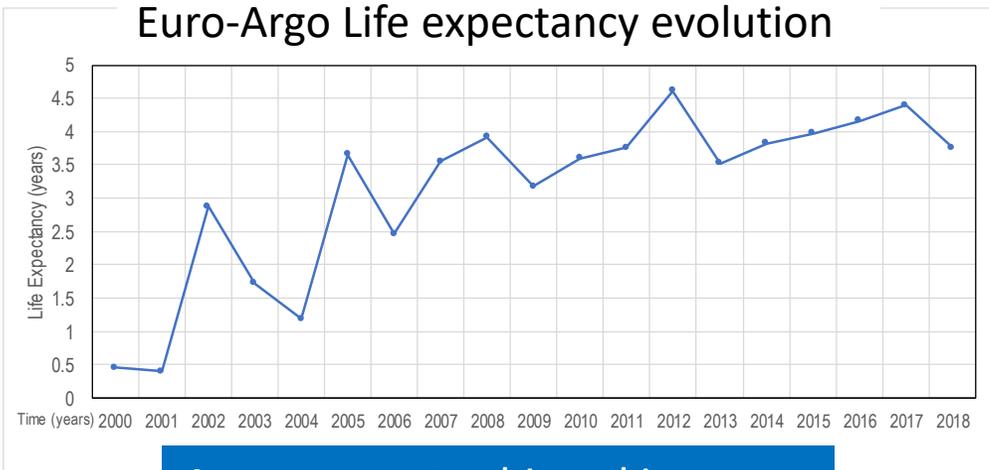
More than 220 floats tested



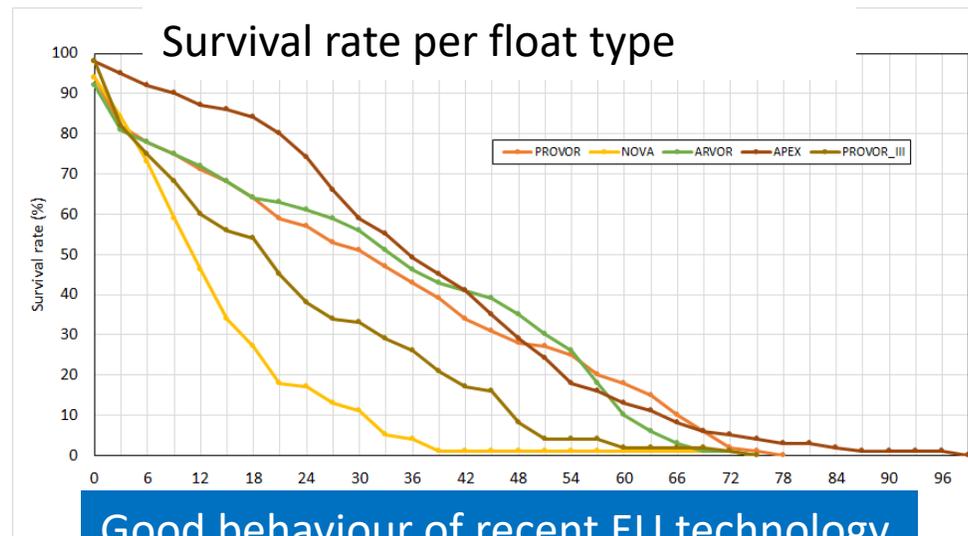


# EU float performances

### Euro-Argo Life expectancy evolution

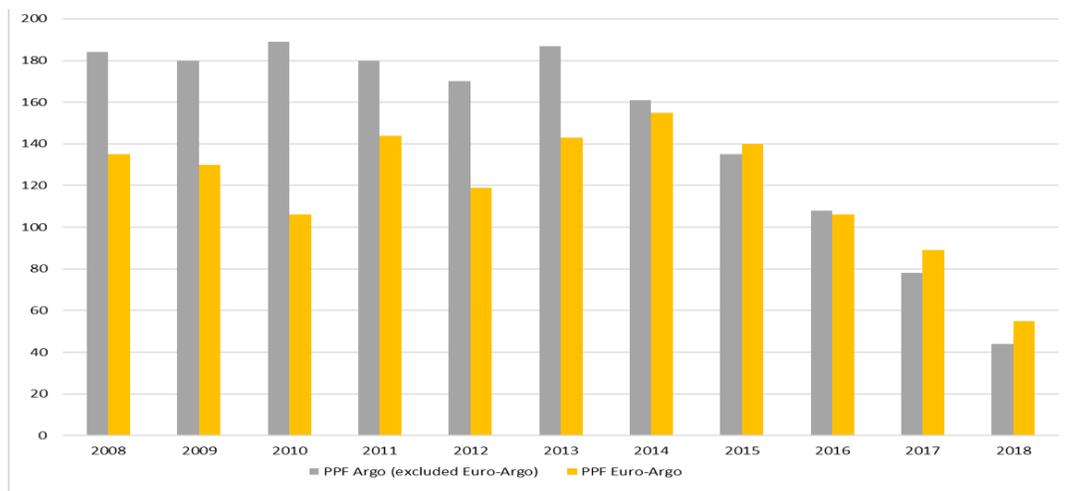


4 years target achieved in mean



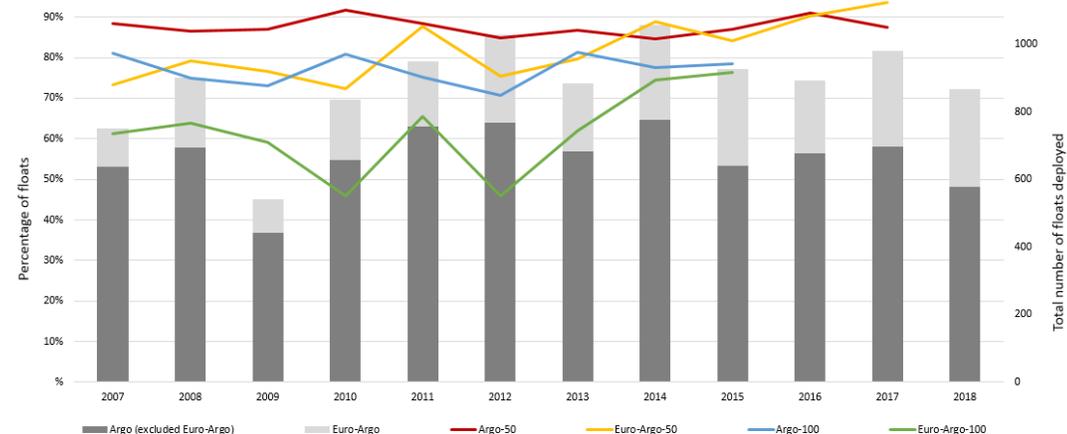
Good behaviour of recent EU technology

### Average number of profiles per float per year of deployment



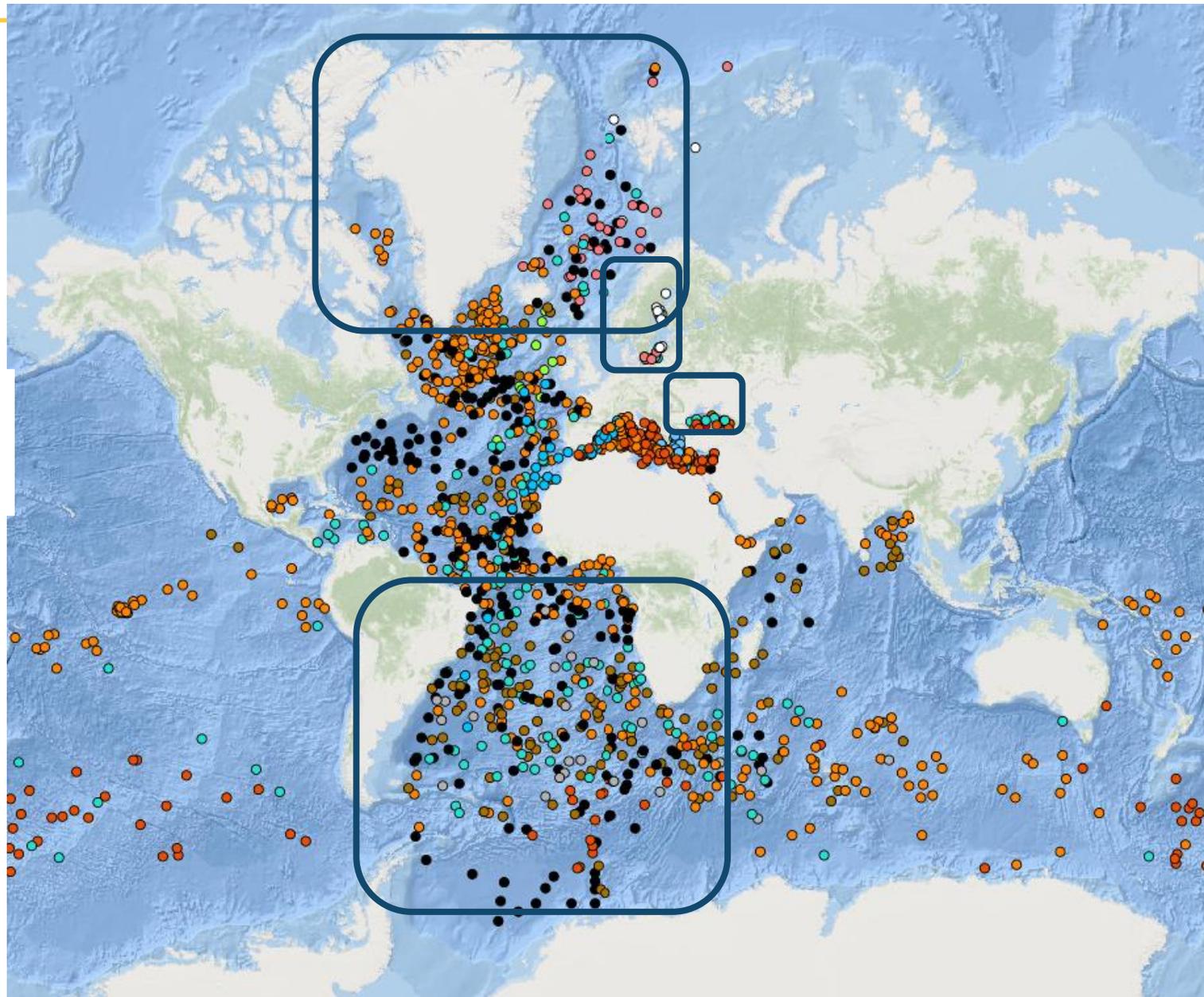
Improvement of the EU fleet compared to Argo fleet

### % of floats reaching 50 & 100 profiles target /year of deployment



Improvement of the EU fleet compared to Argo fleet

- EUROPE
- FINLAND
- FRANCE
- GERMANY
- GREECE
- IRELAND
- ITALY
- NETHERLANDS
- NORWAY
- POLAND
- SPAIN
- UK

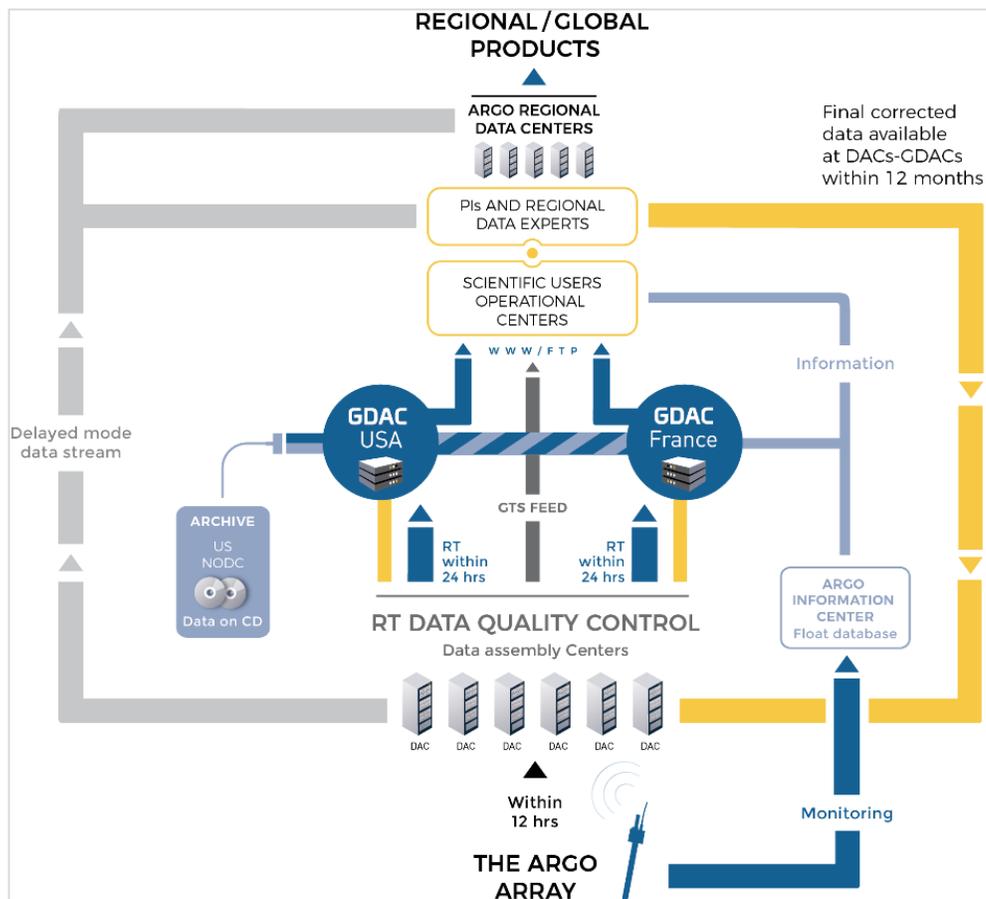


Extension to high latitudes

Enhancement of marginal seas

Priority on South Atlantic and Southern Ocean

Data system existed before the Euro-Argo ERIC set-up => ERIC , with support from EU projects , helped to enhance the existing elements and develop new ones needed for the extensions



### Automatic Real time Quality control Test

- Profile per Profile
- Detect obviously bad data

### Scientific Delayed mode Assessment

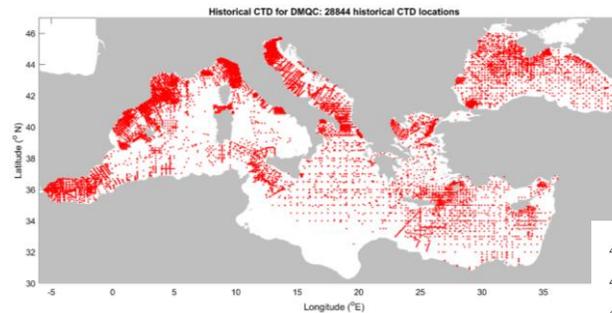
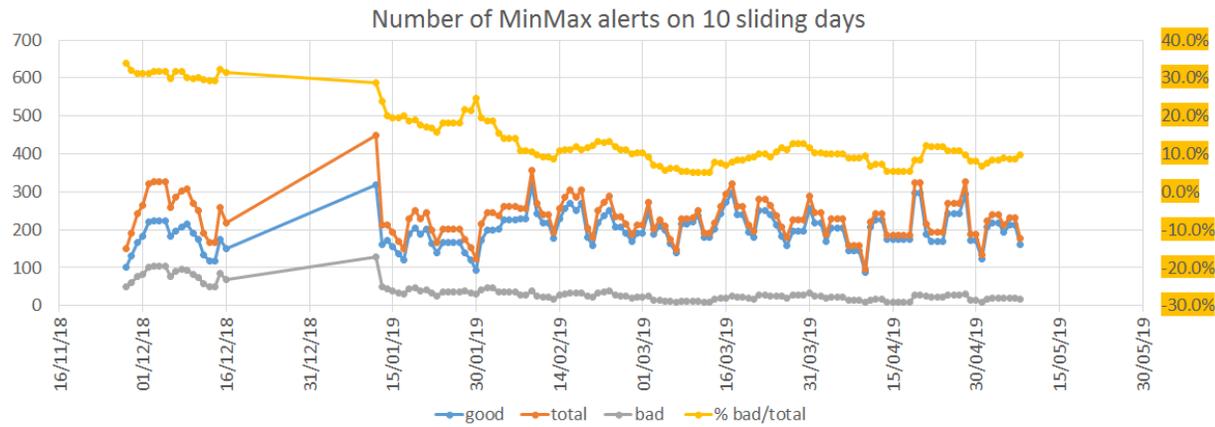
- Float by Float looking at the complete time serie
- Detect bad sensor behaviour

### Basin scale Consistency check

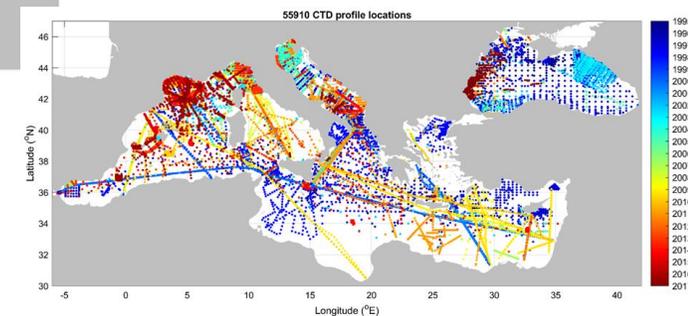
- Look at a batch of floats in an area
- check if they are consistent with eachother

- France (Coriolis) hosts **one of the two Global Data Assembly Centres (GDAC)**
- **Two DACs** (Data Assembly Centres) are operated by France (Coriolis) and UK (BODC).

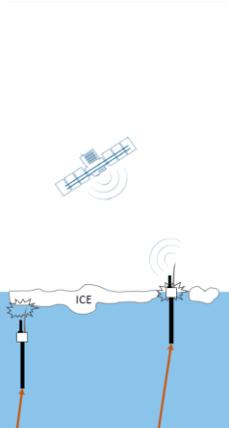
- **NA-ARC** and **MedArgo** respectively led by France (Coriolis) and Italy(OGS) have been strengthened
- **SO-ARC** led by BODC setting up



Enhanced reference database for DMQC



Automatic check against an Argo MinMax climatology => raise suspicions for early salinity drifts => used to prioritize floats processing in delayed mode

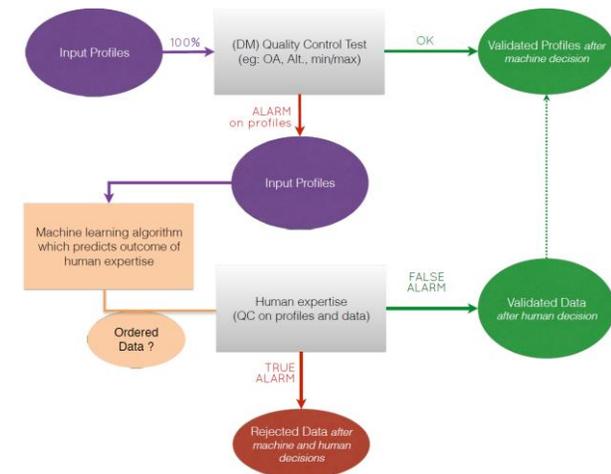


Month 1-4	1	2	3	4	5	6	7	8	9	10
Method	Imedian	Tmin	Imedian	Tmin	Imedian	Tmin	Imedian	Tmin	Imedian	Tmin
Depth range	50-20m	20-10m	50-20m	20-10m	50-20m	20-10m	50-20m	20-10m	50-20m	20-10m
thresholds	<= -1.75°Cs				<= -1.0°Cs					
Ice % (21 obs)										
Near ice % (88)										
Open water % (528)										

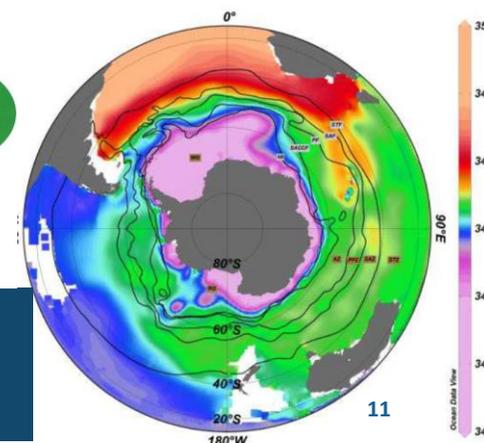
  

Month 5-8	1	2	3	4	5	6	7	8	9	10
Method	Imedian	Tmin	Imedian	Tmin	Imedian	Tmin	Imedian	Tmin	Imedian	Tmin
Depth range	50-20m	20-10m	50-20m	20-10m	50-20m	20-10m	50-20m	20-10m	50-20m	20-10m
thresholds	<= -1.75°Cs				<= -1.0°Cs					
Ice % (17)										
Near ice % (85)										
Open water % (741)										

Tuning Ice detection criteria in Barents sea



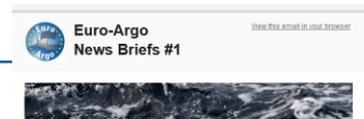
Enhancing QC using alternative methods such as Machine Learning or tuning the existing method to better take in account the complexity of the area





# Communication tools

Marine joined the team as Communication Manager



News Briefs

Website - logo

Website re-organisation



Brochure

New Brochure + new logo



Poster



Demo float



Booth material



# Future Challenges

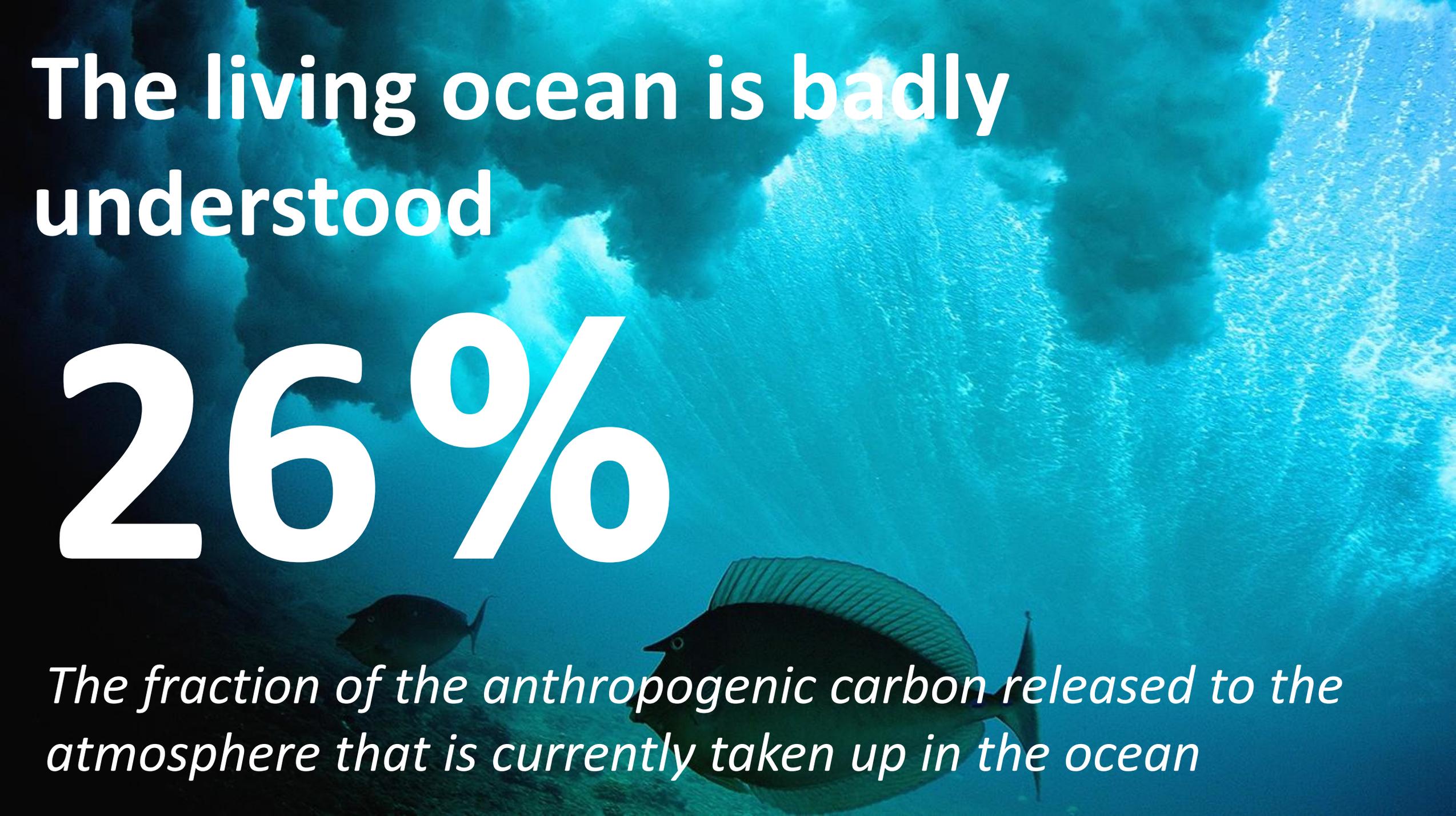


The deep ocean remains  
unexplored

49%

*The fraction of ocean volume  
NOT observed by Argo*



An underwater scene with a blue and green color palette. Sunlight rays filter through the water from the top right. Two fish are visible: a smaller dark fish on the left and a larger, more detailed fish with a prominent dorsal fin on the right.

The living ocean is badly understood

26%

*The fraction of the anthropogenic carbon released to the atmosphere that is currently taken up in the ocean*



High latitudes are impacted by  
climate change

**Very few**

*in situ observations available*



Coastal areas are lacking  
observations to answer societal  
needs

28%

*Of the global population live at less than 100km from the  
coast (IPCC report)*

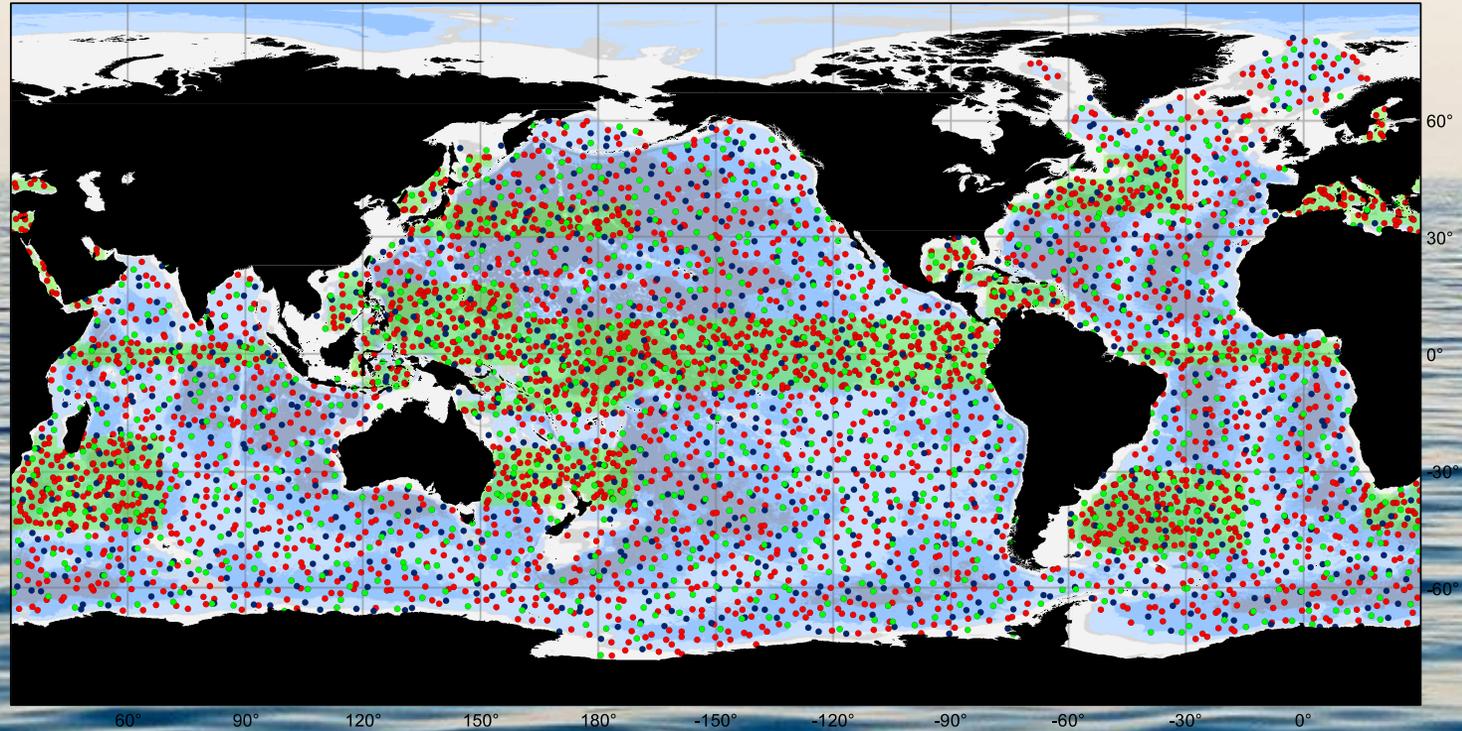
# New mission: Global, full-depth, and multidisciplinary

*From half to all the ocean*

*From 2 to 8 parameters*

**3 times the initial mission cost**

*Community ready, need a political decision*



New fields of scientific discovery and applications development  
will become possible

# Argo in Europe for the next decade

- Main Challenges:
  - **Maintain** the Research Infrastructure
  - **Extend** its capacity to abyssal ocean (4000 to 6000m), biogeochemistry, partially ice covered areas and shallow waters regions
- Euro-Argo is developing the European strategy in coherence with Argo international:
  - Sustain the core T&S mission, with an emphasis in Western Boundary regions
  - Monitor European marginal seas (Baltic, Mediterranean & Black seas)
  - Monitor high latitudes
  - Monitor the abyssal oceans
  - Monitor ecosystem parameters
- Euro-Argo plans to contribute **to ¼ of the global network** and is now starting to implement the new phase of Argo
- Reference document: ***“Strategy for evolution of Argo in Europe”*** (Euro-Argo ERIC, 2017)  
**DOI: 10.13155/48526**



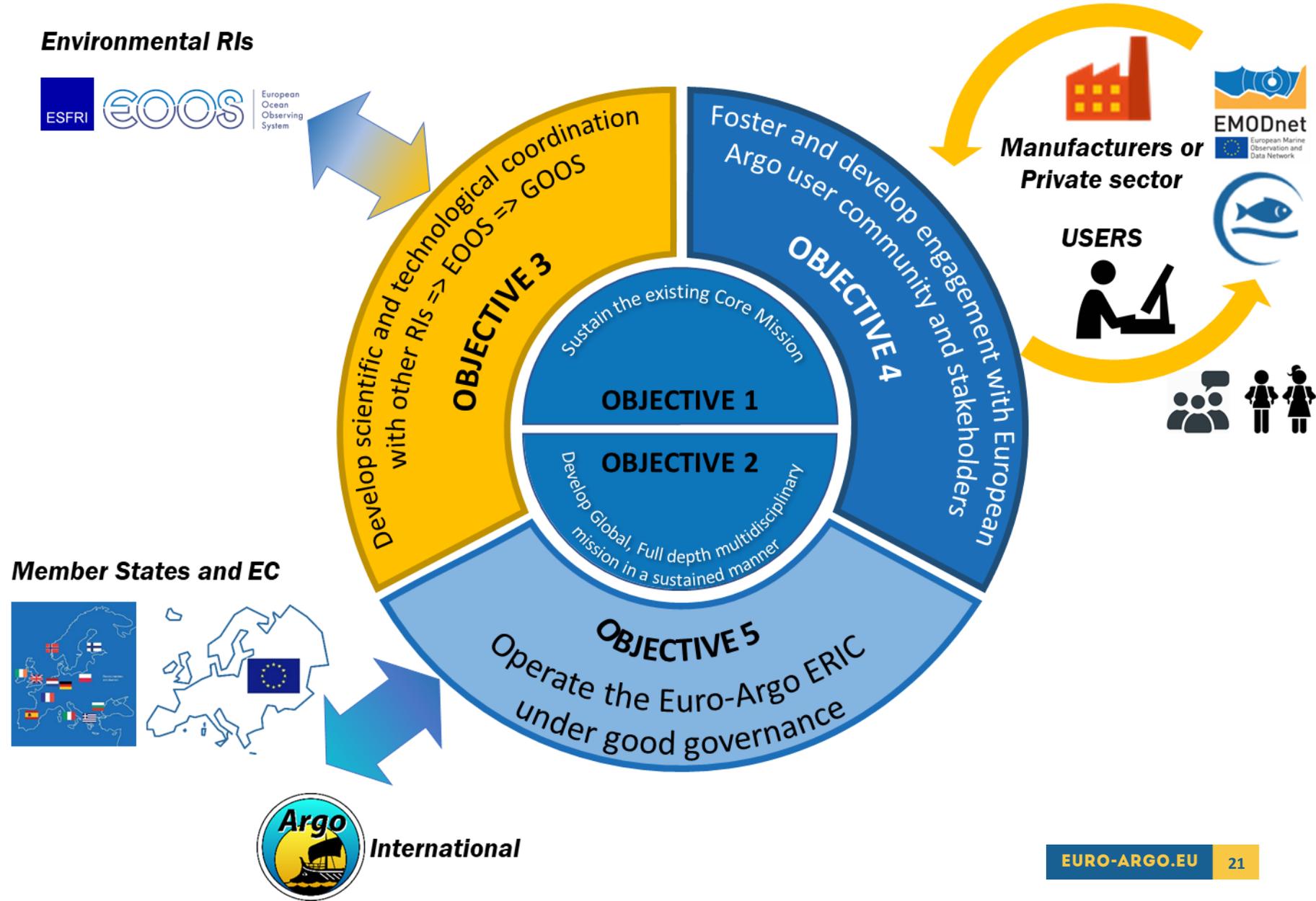


**5 year plan**

The Euro-Argo ERIC contribution



# 5 year plan objectives





# 5 year plan objectives

**MOCCA**

**EURO-ARGO RISE**

**ENVRI**  
LIFE IS NOT FAIR  
OUR DATA IS  
FAIR  
WWW.ENVRI.EU

**ERIC FORUM**

**EUROSEA**

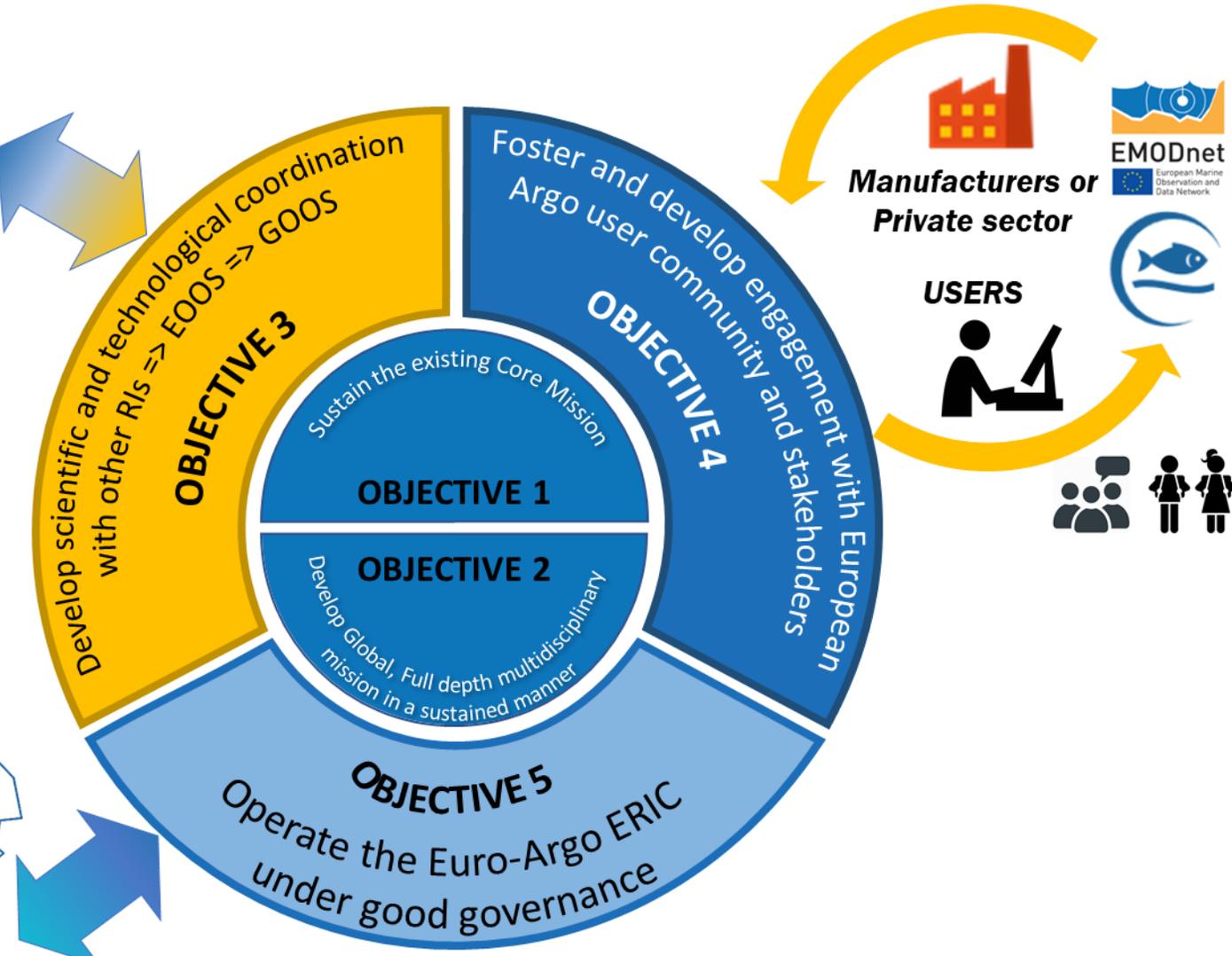
## Environmental RIs



## Member States and EC



Argo International





## Euro-Argo 5 year plan

- Develop the maturity of the different elements of Argo network in Europe
  - ✓ Improving the technology & the data system
  - ✓ Engaging with the private sector upstream fostering the development of instruments and sensors required by the Argo programme
  - ✓ Developing recommendations and Best Practices for the Euro-Argo Community
- Strengthen the Euro-Argo ERIC by increasing the membership and develop new services to members
- Enhance services to users by enhancing the products to better fit their requirements
- Integrate Argo in a multi-platform observing system in link with the EOOS initiative





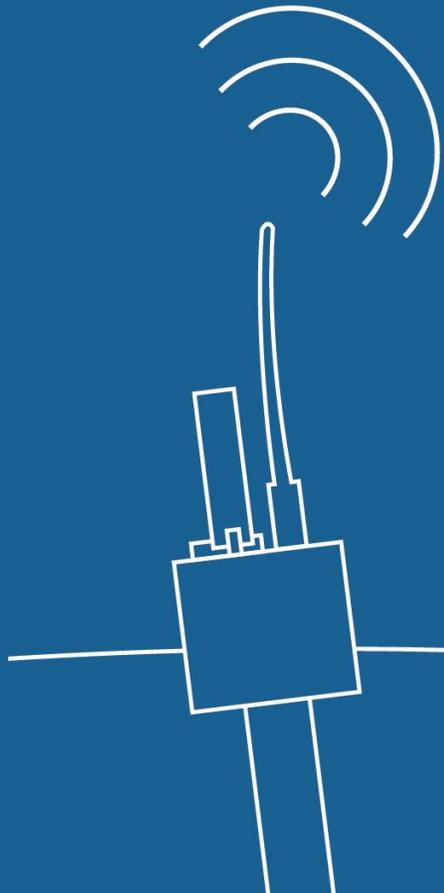
# Expected results

- Network
  - Recommendations to operate Argo floats in all the areas Euro-Argo plan to deploy floats
  - Recommendations for use of alternative sensors for both physical and BGC parameters and engagement with manufacturers for their implementation on existing float types
  - Enhancement of Euro-Argo fleet behavior through monitoring facilities
- Data Management
  - Strengthening Core and Deep-Argo data system by enhancing methodologies used
  - Development and Organization of BGC data processing (NRT and DMQC) in Europe
  - Contribution to improvement of the Argo data management system FAIRness that will facilitate its integration in EOOS and GOOS but also CMEMS or EMODNet
- Strategy
  - Plan for the Euro-Argo strategy implementation as well as revised Strategy for next decade



## Conclusion

- Developing the “Full depth multidisciplinary” Argo mission is a challenge that will require involvement of both Members Countries ( i.e ministries, institutions and scientists) and Euro-Argo ERIC office
- Already project funds are available to complement national funding and foster the development of this challenging mission. The set-up of the ERIC is an asset to contribute to EU projects in a coordinated way
- The Euro-Argo ERIC has set up services that need to be sustained and enhanced and is able to develop new ones within the limitation of the man power available
- The integration of Euro-Argo within an integrated observing system that will require closer cooperation with European and International RIs and the ERIC office can facilitate and reinforce such coordination at all levels.
- The success of Euro-Argo requires Involvement of the Euro-Argo community : Science meetings organised every 2 years is a way for you to influence Euro-Argo activities and priorities



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