

6th EURO-ARGO USERS MEETING

4-5 July 2017

Paris, Maison des Océans



www.euro-argo.eu



Institut
océanographique
Fondation Albert 1^{er}, Prince de Monaco





Euro-Argo-PP project 3rd User meeting in 2010

Euro-Argo: The European contribution to the global Argo ocean observations network



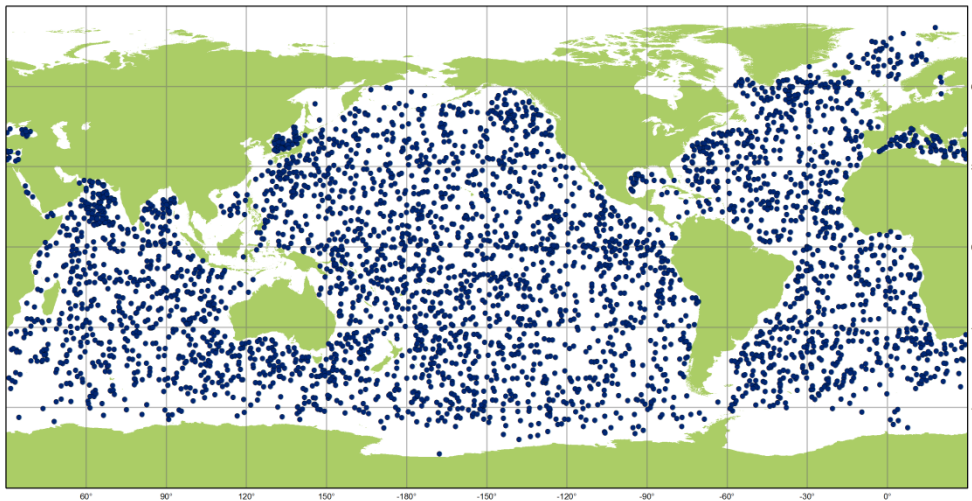
S, Pouliquen, Euro-Argo Office and
Euro-Argo Management Board

6th Euro-Argo User Workshop, Paris, 4th July 2017



Argo: global in-situ observing system

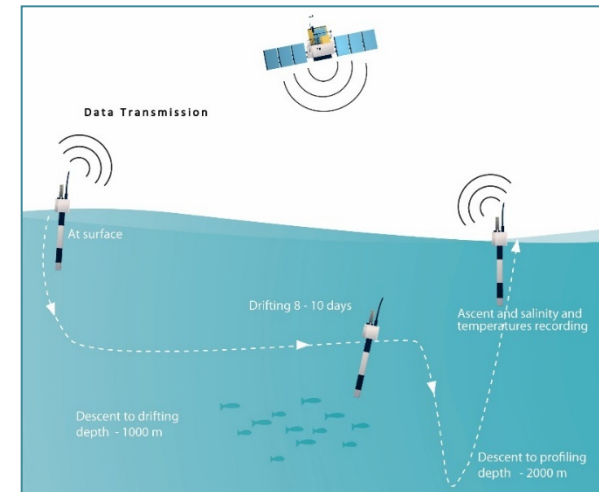
- Nearly 4000 autonomous profiling floats are measuring ocean temperature and salinity up to 2000m depth, all over the globe
- The Argo network delivers essential data both for climate change research and for ocean analysis and forecasting systems



Argo

3904 Operational Floats

May 2017



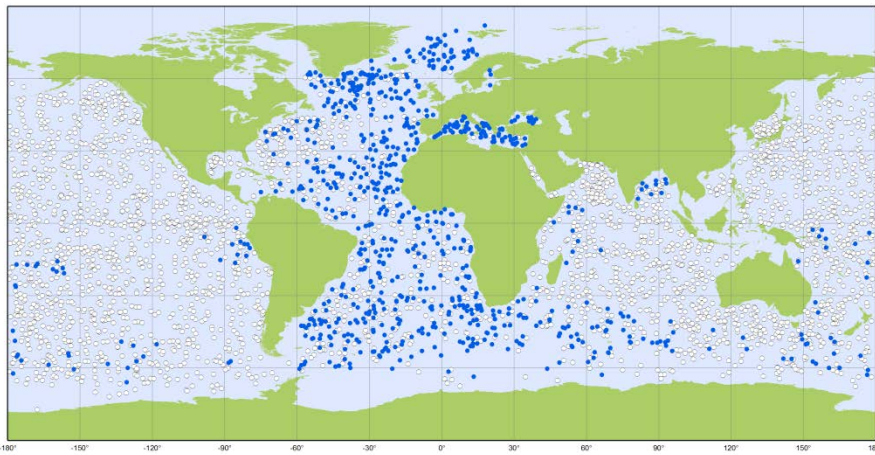
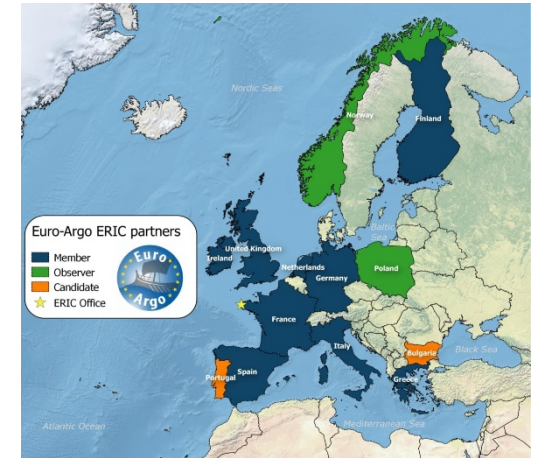


Euro-Argo Research Infrastructure



Objective : *Coordinate and sustain the European contribution to the global Argo network (1/4 of the network)*

- Euro-Argo was part of the 2006 ESFRI Roadmap
- The **Euro-Argo ERIC** (European Research Infrastructure Consortium) **was created in May 2014** with 9 members. Two additional members joined the ERIC in 2016-2017.
- Euro-Argo is a Landmark in the ESFRI 2016 roadmap

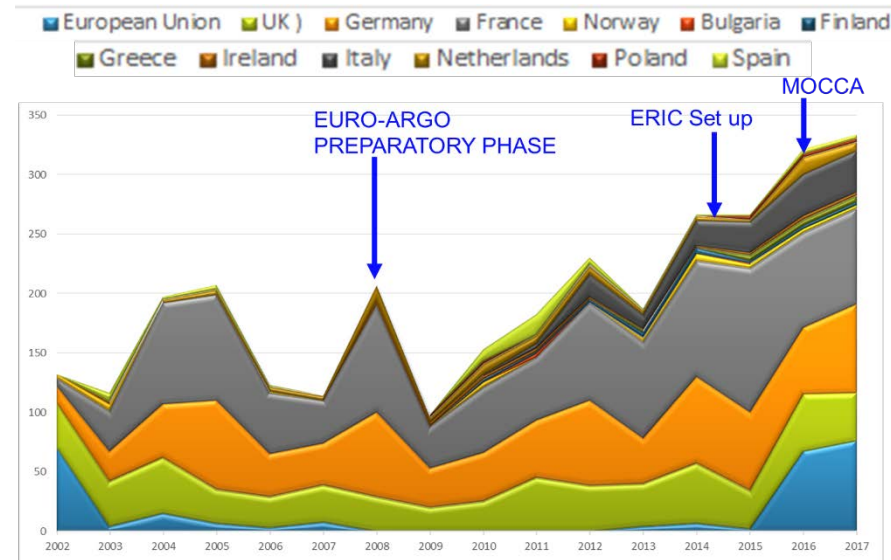


Argo May 2017 active Euro-Argo floats

May 2017 active Euro-Argo floats
21% of the global array



Generated by www.jcommops.org

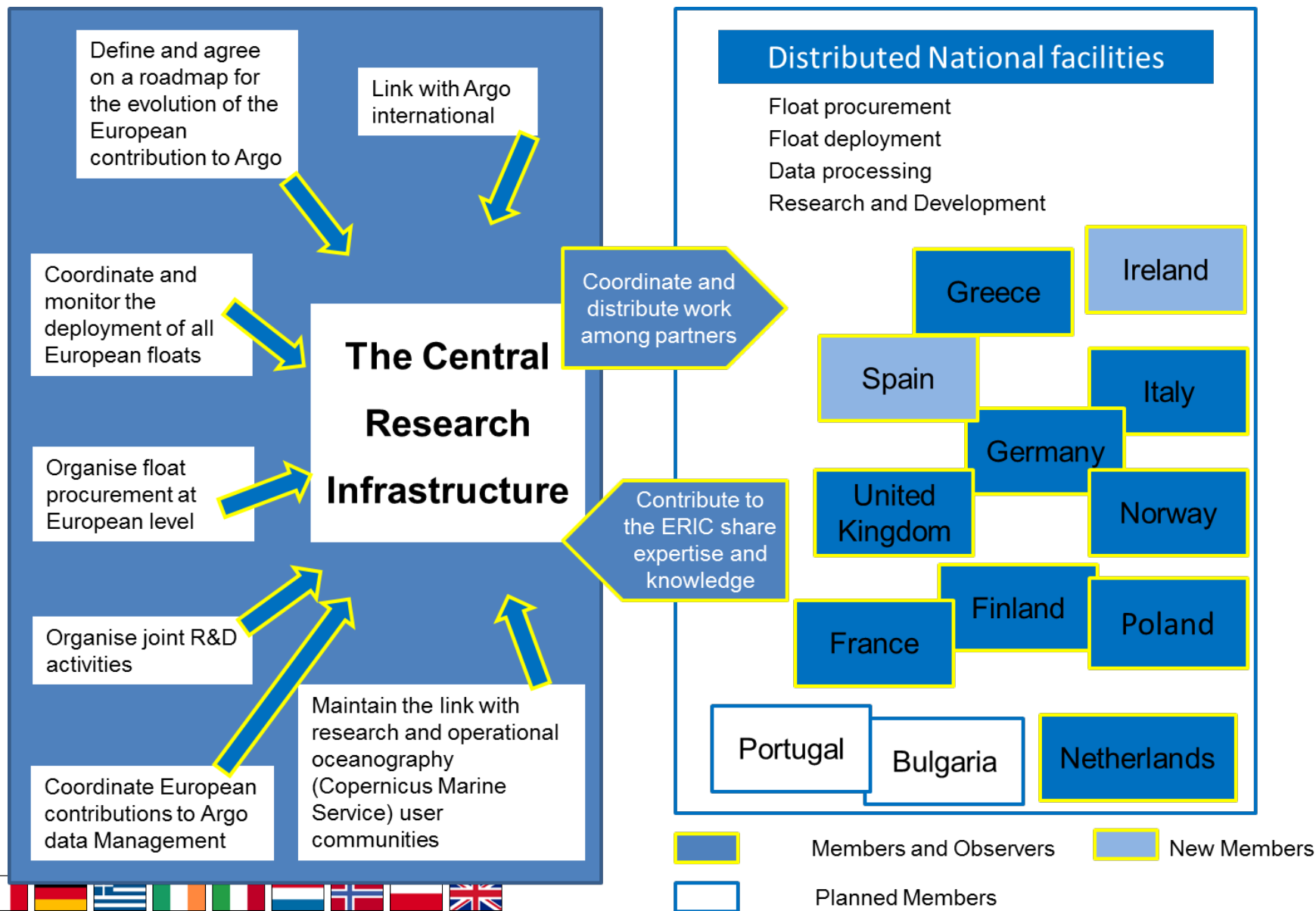


Increase of the European contribution to the international network



Organisation of the Euro-Argo RI

A central facility and distributed national facilities





The Central facility team



- Sylvie Pouliquen Program Manager



- Francine Loubrieu Program Assistant



- Grigor Obolensky Technical Coordinator



- Romain Cancouët Operational Engineer



- Claire Gourcuff : Scientific Officer

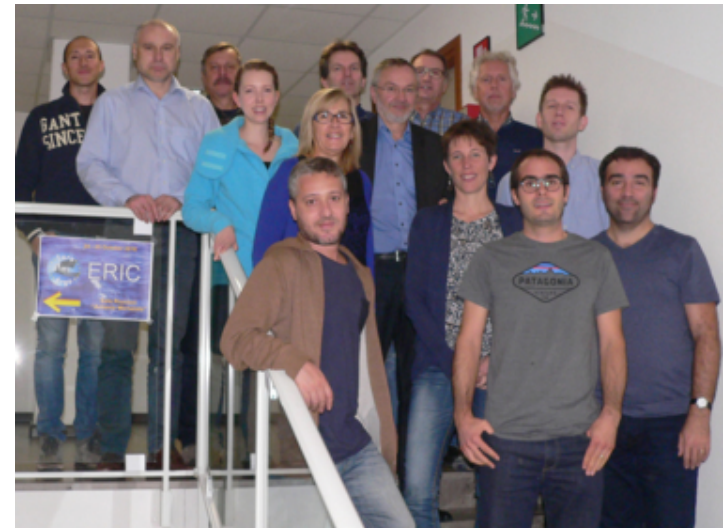




Main activities



- **Management** of the Euro-Argo ERIC
- Coordination of Euro-Argo **float deployment** and float **monitoring** activities
- Development of the Euro-Argo **implementation plan** including the extensions of Argo
- Enhance **communication** and outreach
- Organize the work of the ERIC for the **EU projects** where Euro-Argo is involved
- Develop with Member States and EC a **sustained funding schema** for Euro-Argo contribution to Argo





The Governance of the Euro-Argo ERIC

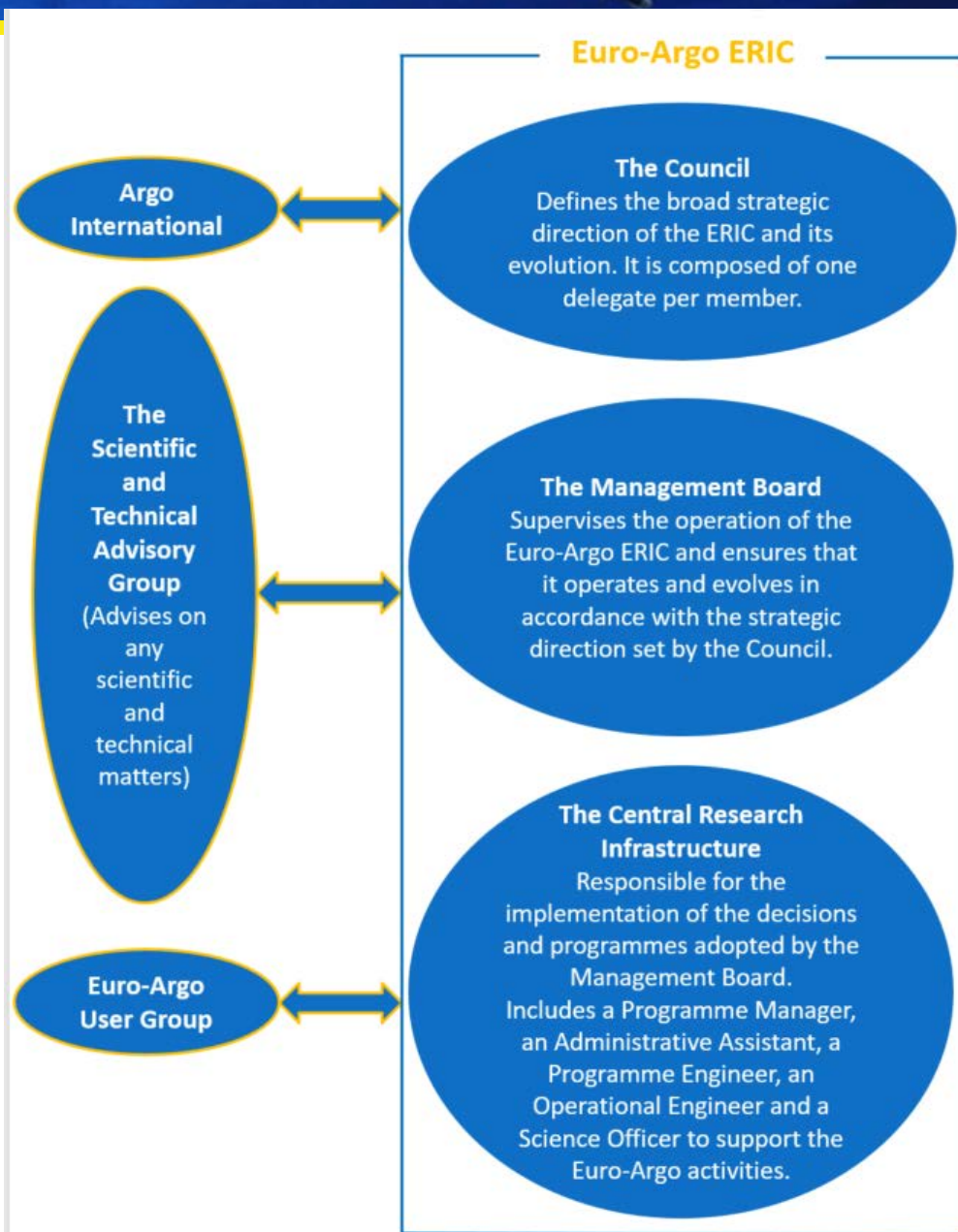
Local Host for Euro-Argo ERIC

France (Ifremer, Brest)

Members: Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, United Kingdom

Observers: Norway, Poland

Candidate Members or Observers : Bulgaria , Portugal , (Sweden, Turkey) shown interest

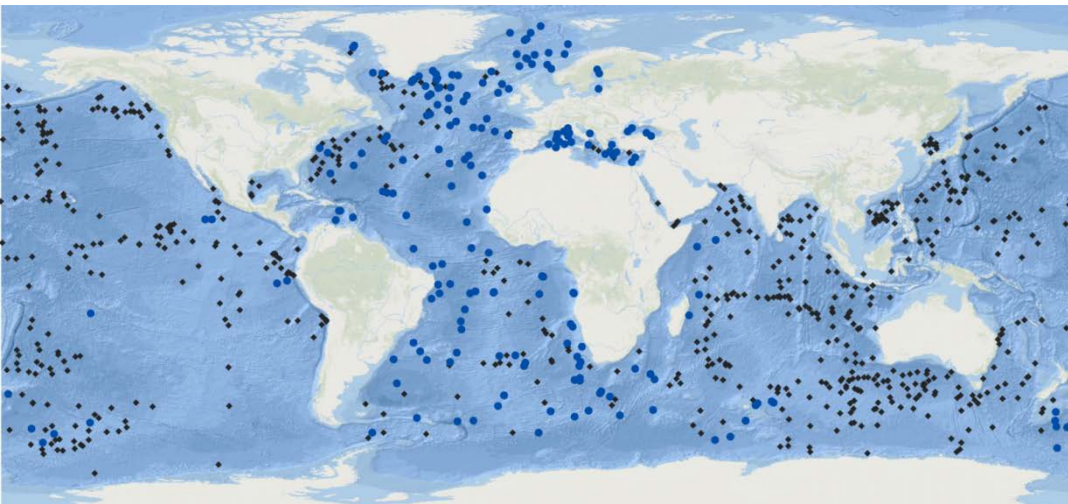




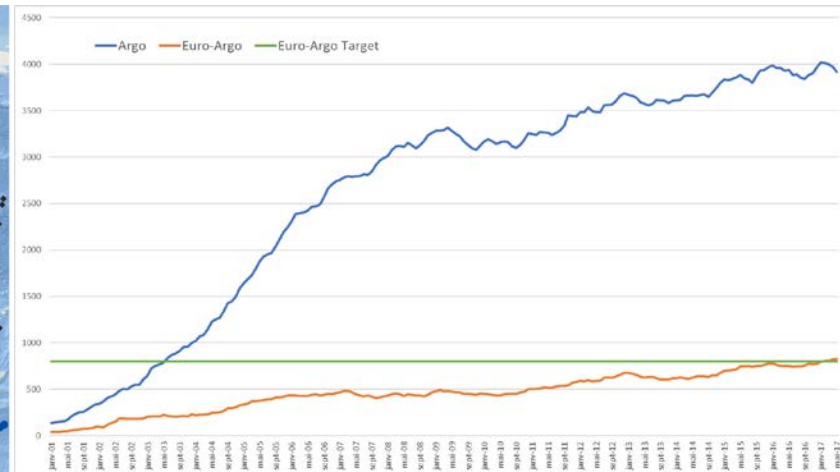
Coordination of the float deployments

- Provide **consolidated plans** of Europe to Argo International :
- **Facilitate** deployment opportunities
- Work of **join procurement** of floats
- Develop **at sea monitoring** tools of the European fleet

196 among 849 floats deployed in 2016 (23%)



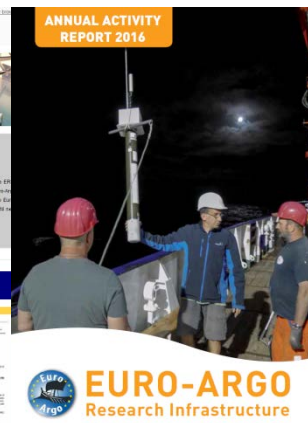
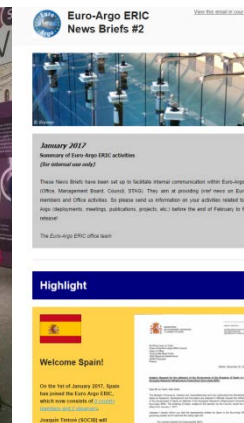
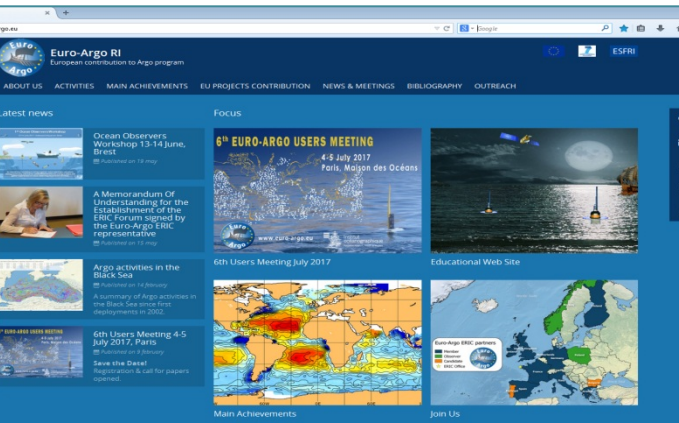
Reaching the 800 active floats





Enhance communication

- "Faire et Faire savoir" ≈ "Do and tell"
 - Euro-Argo on **twitter** [@EuroArgoERIC](https://twitter.com/EuroArgoERIC)  more than 200 followers
 - **News Briefs** to communicate on Euro-Argo members and Office activities. Next issue will be send to the Euro-Argo general mailing list . Send an email to euroargo@ifremer.fr to receive it
 - New **Brochure** issued in 2017
 - Basic material for **booth** set up (demo floats, posters, goodies) that can be used by the ERIC members
 - Improvement of the **WWW site** is on going
 - **Euro-Argo Annual Report**





Develop Outreach



- **Ocean Observers Workshop** organised jointly with JCOMMOPS : workshop on ocean observing educational activities to share experience and develop best practises.
- **Manufacturer Workshop** with ENVRI+: explore opportunities for new joint innovation projects on emerging technologies, standardization, conformity and homologation, sharing RI–Industry innovation cooperation best practices ...
- **6th User Workshop** : organised every two years
 - To bring together EU users of Argo data and other complementary observations and share their experience .
 - To provide an opportunity for users of Argo data to participate in discussions of how Argo should evolve within Europe and globally.

1st Ocean Observers Workshop
13-14 June 2017, Océanopolis Aquarium, Brest

An educational workshop to bring together ocean scientists, educators, sailing community and marine communicators who are willing to share and gather experiences on ocean observing educational activities.

1st EU Environmental Research Infrastructures–Industry
May 18 @ 8:00 am - May 19 @ 5:00 pm

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Euro-Argo and EU projects (1/4)

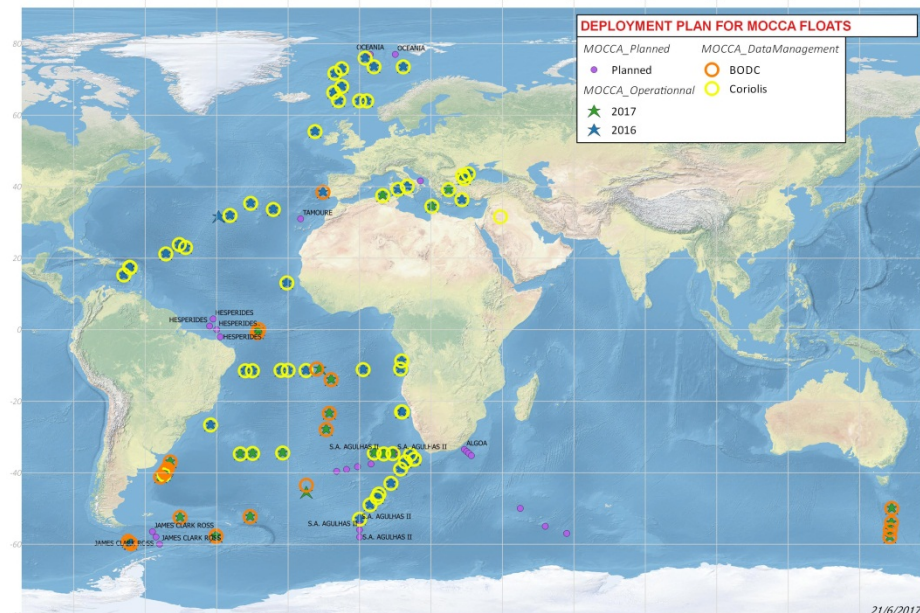
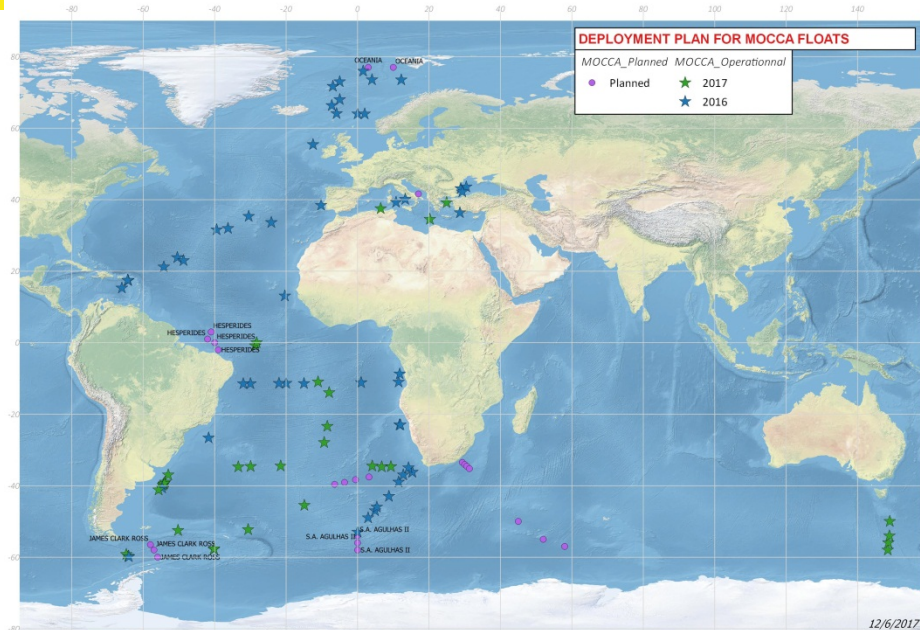
- **EU projects** have always been **important** in Euro-Argo **development**
 - Argo in Europe started with the Gyroscope project in early 2000's
 - Euro-Argo Pilot Phase contributed to the creation of the Euro-Argo ERIC
 - SIDERI has strengthened the integration of the Euro-Argo research infrastructure and initiated the Strategy of the Evolution of Argo in Europe
 - The E-Aims project prepared evolutions of Argo floats for the next decade taking into account the Copernicus Marine Service and Satellite validation needs
- **4 projects** are presently **active**
 - Monitoring the Ocean Climate Change with Argo (MOCCA)
 - AtlantOS : Towards a sustained Atlantic Ocean Observing system
 - ENVRI+ a cluster of Research Infrastructures (RIs) for Environmental and Earth System science
 - JERICO-next to foster the link with coastal ocean





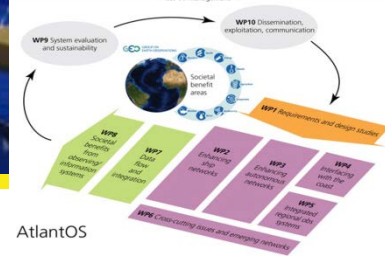
The MOCCA project (2/4)

- **The goal:**
 - procure and deploy of 150 floats,
 - process and distribute collected data as a contribution towards the European effort under the international Argo programme.
 - 80% co-funding achieved by transfer of funds from members
- **Status**
 - 126 floats deployed or planned
 - Real time processing managed by Ifremer , MetOffice and BODC
 - Delayed Mode processing will be done by EU DM operators(OGS BSH Ifremer BODC)
 - Improvement of at sea monitoring tools underway

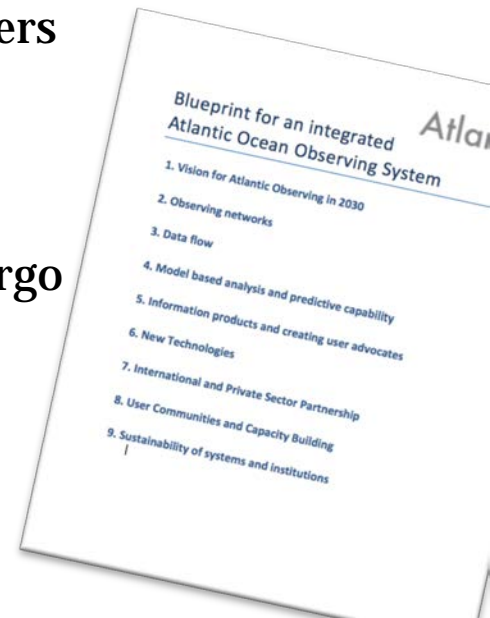




Contribution to AtlantOS (3/4)



- **AtlantOS** is a research and innovation project that proposes the **integration** of ocean observing activities across all disciplines for the **Atlantic**, considering European as well as non-European partners
- **Euro-Argo** role
 - Contribute to **pilot phases** for **Deep** and **BGC-Argo** deployment
 - Test **innovative sensor** integration with European partners (pH, pCO₂)
 - Collaborate with **Ocean Modelers** for OSE and OSSE activities
 - Contribute to **design** of the Atlantic OO design for the Argo part taking into account the Euro-Argo strategy





Contribution to ENVRI+ (4/4)

- **Cluster of 20+ RIs** from the environmental research together
 - Find common technical solutions for Observation system and Data systems
 - Build better expertise for Staff exchange and Knowledge transfer
 - Foster RI collaboration and Socio-economic impacts evaluation
- Euro-Argo contributes as one of the Marine RIs at different levels
 - **Enhance** link with other RIS (Atmosphere, and manufacturers)
 - **Demonstrate** the use of BIG Data technologies for Marine data
 - **Communication, Outreach** and Education
 - **Contribute** to the Board of European Environmental Research Infrastructures (BEERI)

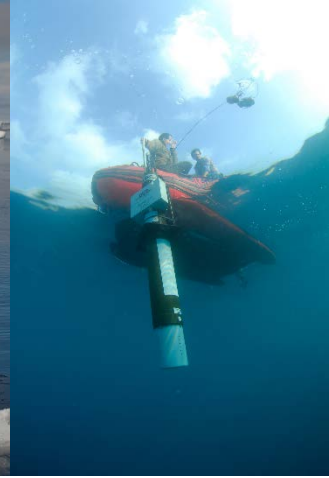




Argo in Europe for the next decade (1/6)

Main Challenges :

- **Maintain** the Research Infrastructure
- **Extend** its capacity to abyssal ocean (4000 to 6000m), partially ice covered areas and biogeochemistry



Euro-Argo is developing the European strategy in coherence with the Argo one

- 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.

“Strategy for evolution of Argo in Europe” document (Euro-Argo ERIC, 2016) - DOI: 10.13155/48526

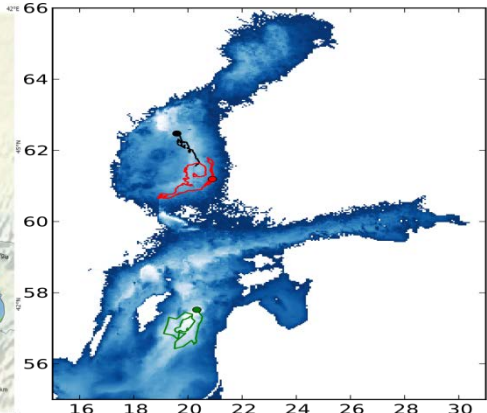
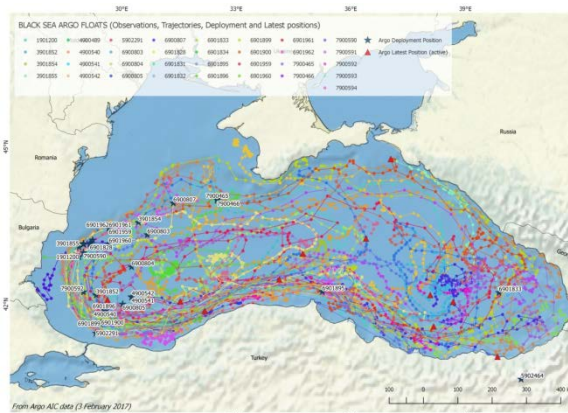
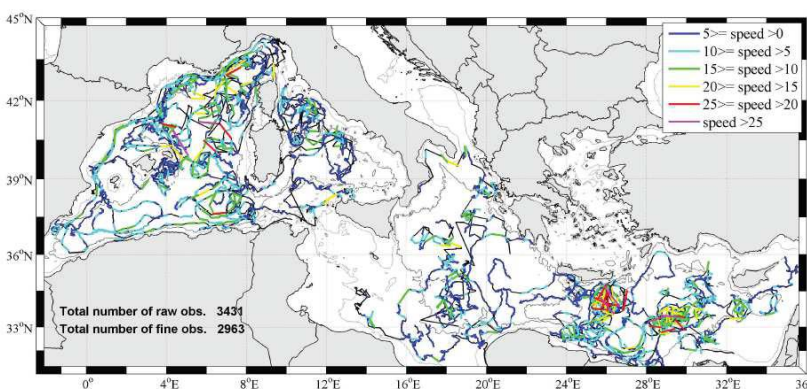




Core T/S Argo mission & marginal seas

(2/6)

- National contributions
- EU contribution: MOCCA project (*Monitoring the Oceans and Climate Change with Argo*)
- Sustain the EU contribution to the Core T&S Mission (0-2000m)
- Double the Argo coverage in Mediterranean and Black seas, with 5 day cycle and Iridium transmission , 1/3 BGC
- Regional approach in the Baltic with annual recovery before ice coverage . Technology to be improved
- Double the Argo coverage in Western Boundary currents

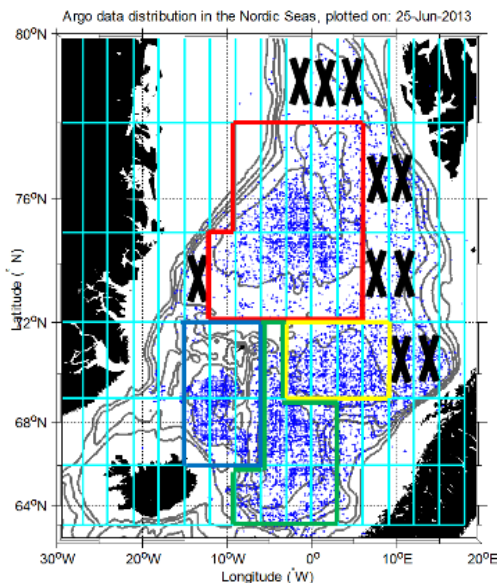




High Latitudes (3/6)



- Argo is a complementary technology to other platforms, like Ice Tethered Platforms (ITP) in the Arctic, sea mammals, vessels and mooring in Arctic and Antarctic areas
- Technology has been proven in Weddell Sea with floats able to stay for a long period under ice located with acoustic sources and is under testing in the Arctic in Baffin bay (NAOS project)
 - Collaboration opportunities within INTAROS project (acoustic sources)
- European Argo strategy in the Nordic Seas:

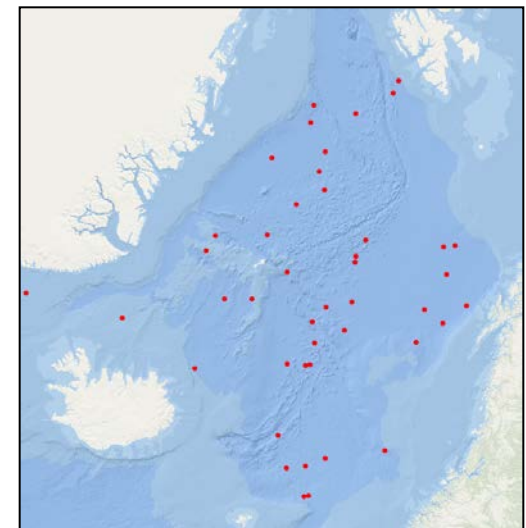


Target:

10 floats in boundary currents

29 floats in deep basins:

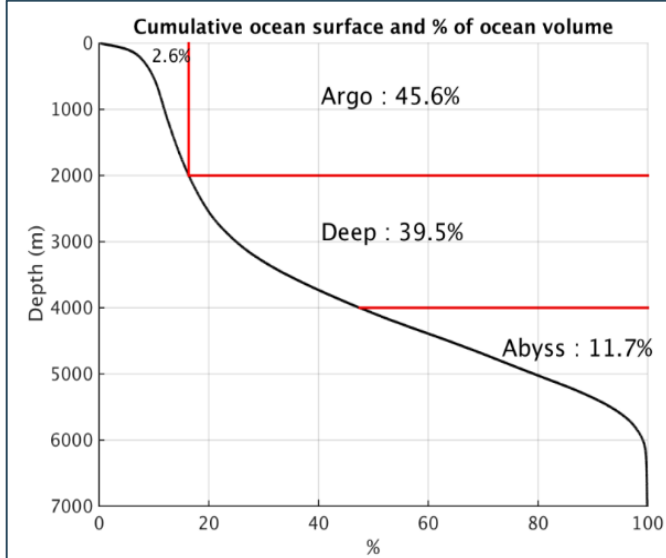
- red – Greenland Sea,
- blue – Icelandic Plateau
- yellow – Lofoten Basin
- green – Norwegian Basin.



21 April 2017: **44 active floats**
including **8 BGC floats**

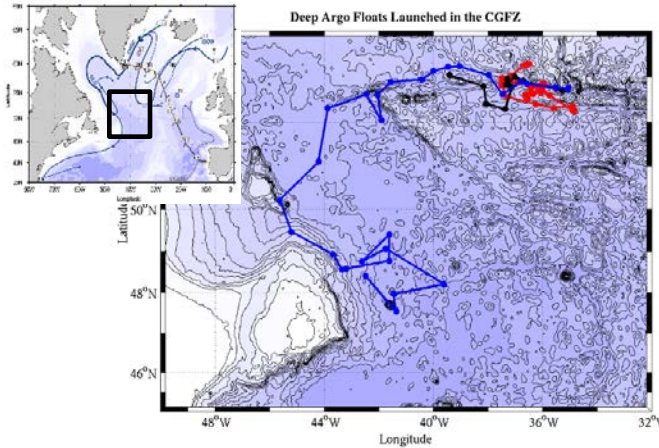


Argo extension to depth (4/6)



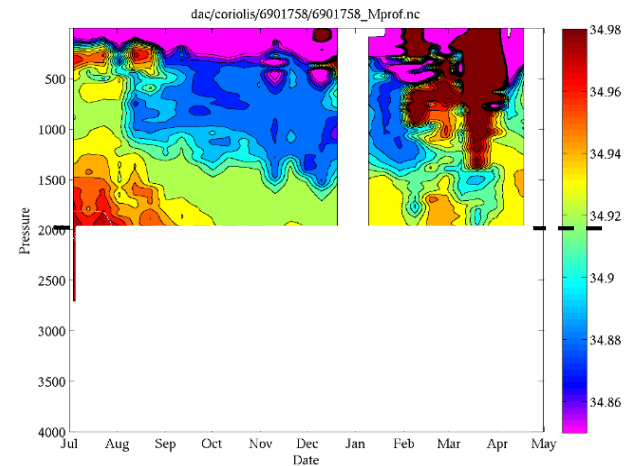
Le Reste et al. (2016)

- Argo floats (0-2000m depth) give access to ~50% of the global ocean volume
- Deep Argo floats (0-4000m depth) give access to ~90% of the global ocean volume



Southward trajectory of the deep Argo float 6901758 (blue) between deployment (July 2015) and May 2016

Courtesy of G.Maze & V.Thierry



One year time series [2015-2016] of salinity measured by the deep Argo float 6901758

Strategy for Deep Argo: Focus on areas where large deep signals are located, that is where deep-water masses are formed, namely the North-Atlantic Ocean and the Southern Ocean



Biogeochemical Argo (5/6)

- Biogeochemical-Argo *Scientific and Implementation plan* was finalized this year
- Recommended Biogeochemical Argo core variables:
 - O₂
 - NO₃
 - pH
 - Chl_a
 - Suspended particles
 - Downwelling irradiance

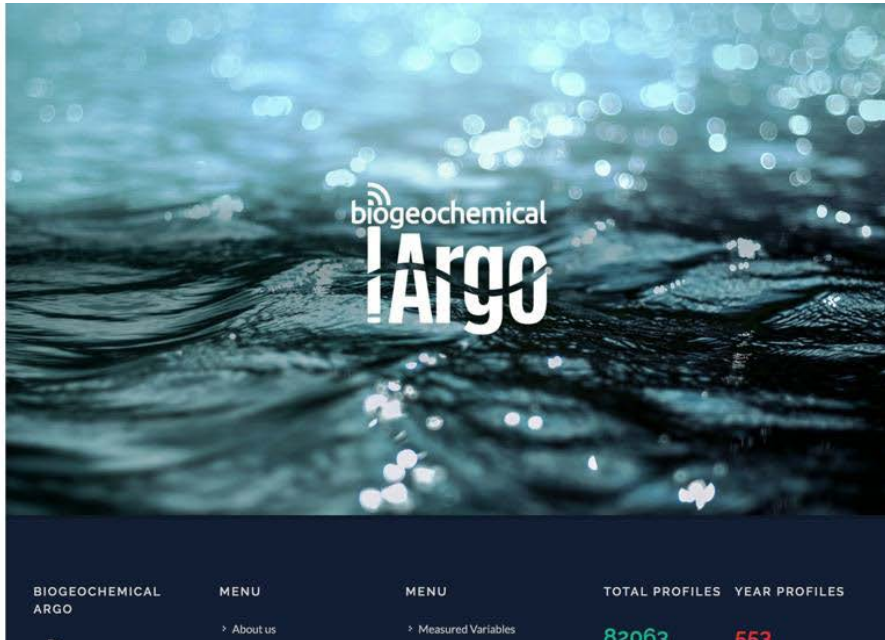
<http://biogeochemical-argo.org/>



An extension of the Argo program to include biogeochemical observations

SCIENCE & IMPLEMENTATION PLAN

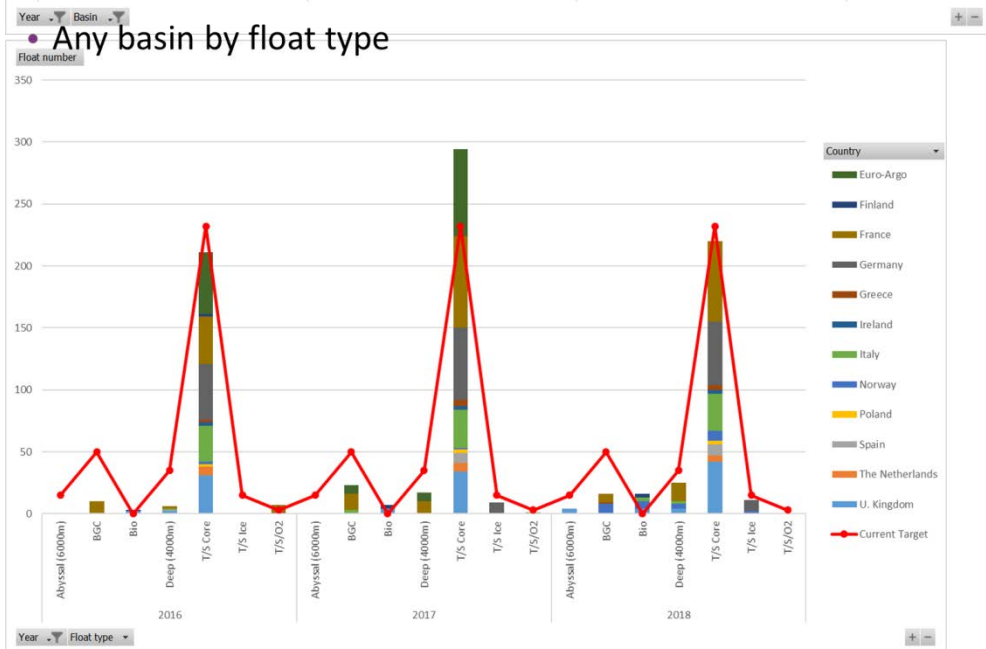
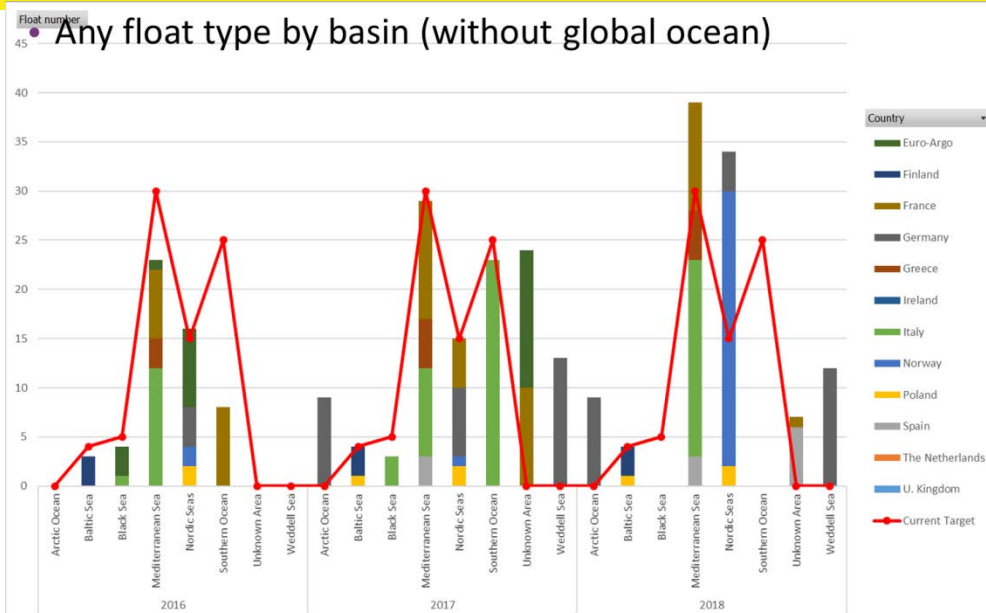
- ABOUT US
- PROGRAM LIFE
- SCIENTIFIC QUESTIONS
- MEASURED VARIABLES
- KEY AREAS & PROJECTS
- DATA
- LIBRARY
- DISSEMINATION
- FLOAT MAP & STATISTICS





Develop an Implementation Plan (6/6)

- From the strategy, targets have been defined by basin and by float type
- On a bi-annual basis
 - Revise the 2-3 year plans
 - Monitor the current year implementation
 - Evaluate the gaps
- Work with Ministries to develop a 5-10 year plan for the extensions of Argo





Conclusions & perspectives (1/2)

- The Euro-Argo Project Office team is now complete and work closely with the Management Board
- Significant progress have been made in
 - Coordination of the European contribution to Argo,
 - Development of a common strategy for the next decade
 - Enhancement of communication and outreach activities
- Euro-Argo has successfully started to organize procurement, deployment and processing of new floats at European level
 - Coordination of national activities
 - European floats (MOCCA project)
 - Development of at sea monitoring of the European fleet
 - Development of join procurements



Conclusions & perspectives (2/2)

- Euro-Argo has started to implement the new phase of Argo, following the “*Strategy for evolution of Argo in Europe*” (Euro-Argo ERIC, 2016 <http://www.euro-argo.eu/Outreach/Documents>)
- The importance of Argo for the Copernicus Marine service was proven through E-AIMS H2020 project and new OSE-OSSE underway in AtlanOS project
- Recent R&D studies conducted at European level have shown that Biogeochemical Argo technology are mature
- The Deep technology pilot development phase is still ongoing to reach the accuracy needed for climate applications
- Work is ongoing regarding sea-ice technology that will enable Euro-Argo to extend its capacity to high latitudes