



EU seafloor and water-column observatories
Challenges and Opportunities towards integration
EMSO ERIC All Regions Workshop



Euro-Argo ERIC

10th October 2017, Rome



Outline

- About the RI
- Science
- Infrastructure
 - Description
 - Data/ Services
- International collaboration
- EMSO & Euro-Argo
- Conclusions



Euro-Argo ERIC



Euro-Argo started as an FP7 EU Project in 2008 and became an **ERIC in May 2014** with 9 countries involved. Two additional countries joined the ERIC in 2016-2017

➤ A Central Research Infrastructure +
Distributed National facilities

➤ 11 Partners: 9 members & 2 observers

➤ Governance:

➤ Management Board (Institutes level)

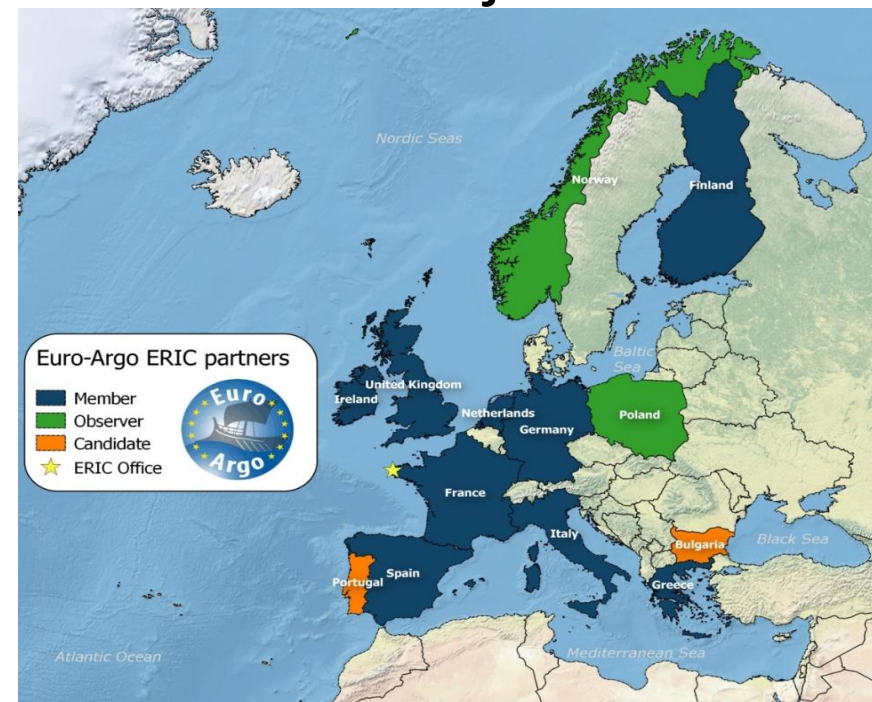
supervises the operation of the RI and ensures that it operates and evolves in accordance with the strategic direction set by the Council, and the requirements set forth by the research and operational communities

➤ Council (Ministry level)

The body having ultimate decision-making authority. It is composed of one delegate per Member acting collectively

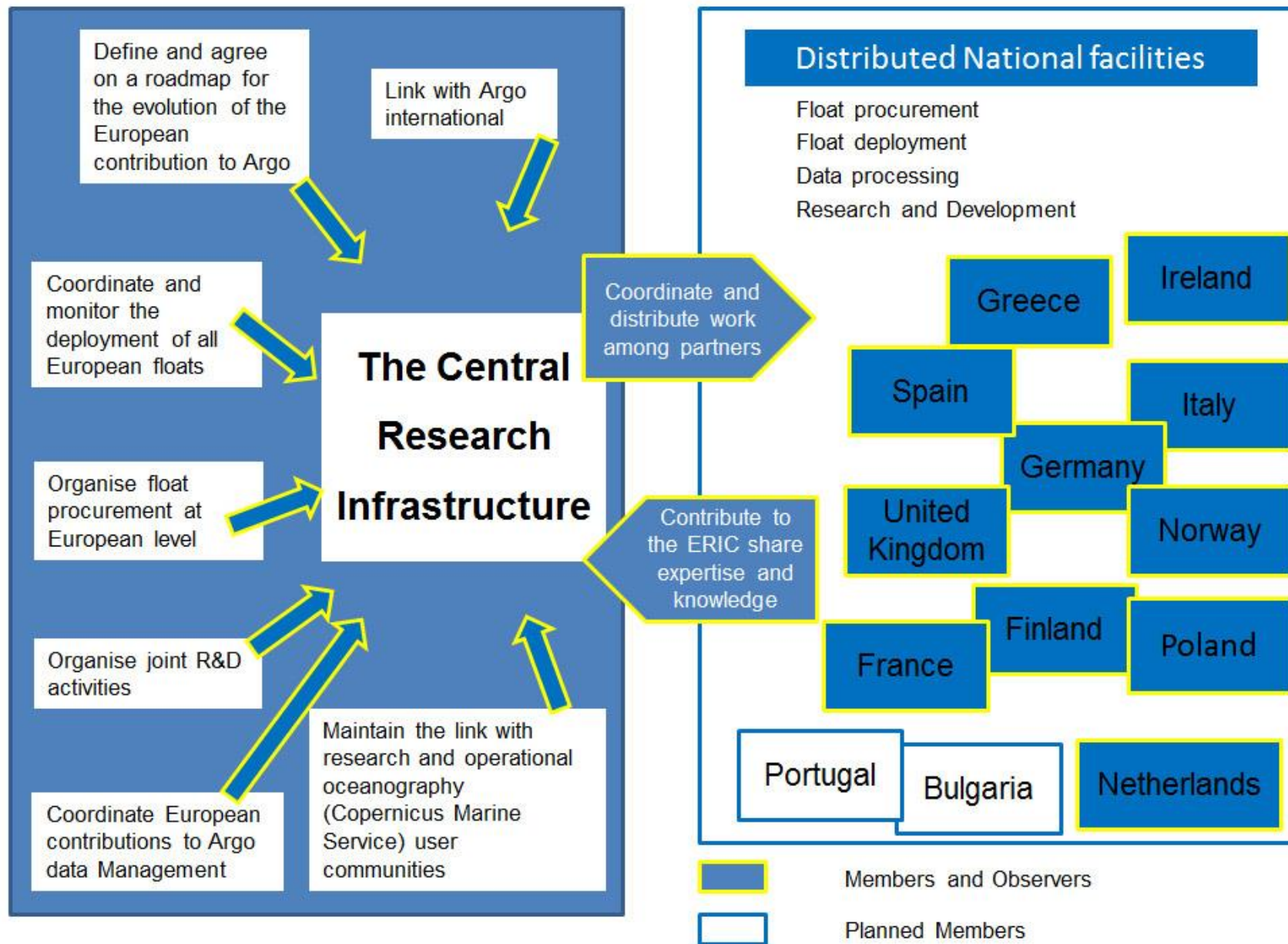
➤ Scientific and Technical Advisory Group

consisting of independent experts, is established to advise the Council on any scientific or technical matters





Euro-Argo ERIC





Euro-Argo ERIC

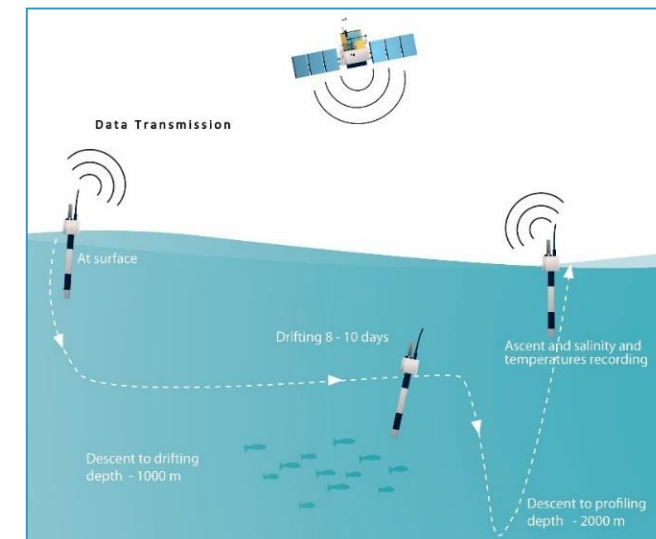
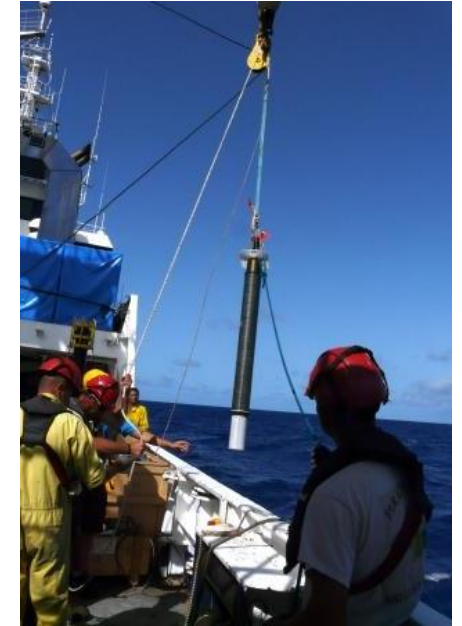


Science objectives

The global Argo network delivers essential data both for **climate change research** and for **ocean analysis and forecasting systems**, thanks to more than 3800 autonomous profiling floats measuring ocean temperature and salinity up to 2000 m depth, all over the globe.

Objective of Euro-Argo: to coordinate and sustain the European contribution to the global Argo network (1/4 of the network, i.e. 250 floats deployed per year)

- Pursue the Argo-core mission (T/S measurements up to 2000m depth)
- **Extend** the network capacity to abyssal ocean (4000 to 6000m), Biogeochemical monitoring and marginal seas including partially ice covered areas





Euro-Argo ERIC

Infrastructure Description

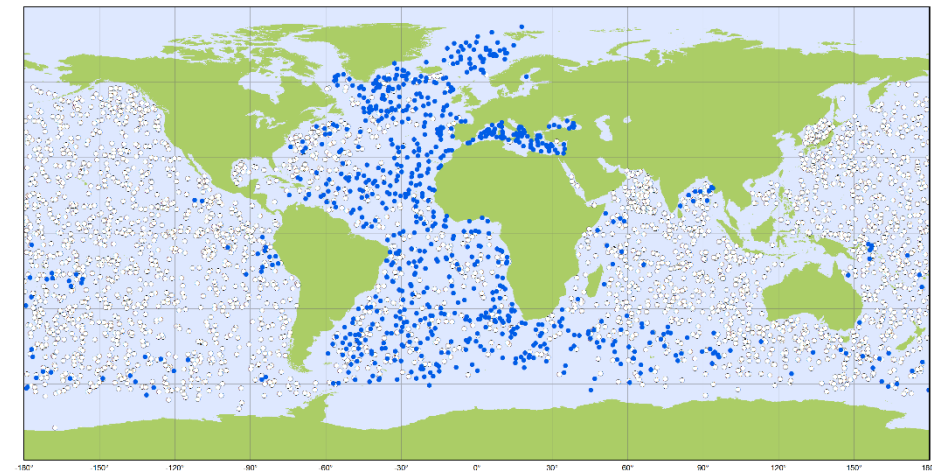
➤ Euro-Argo provides measurements from all over the globe, from the surface up to 2000m depth

➤ **Global Argo** programme set up in **2000** and European countries gathered with a common aim to provide an **optimized and sustained European contribution to Argo in 2008**.

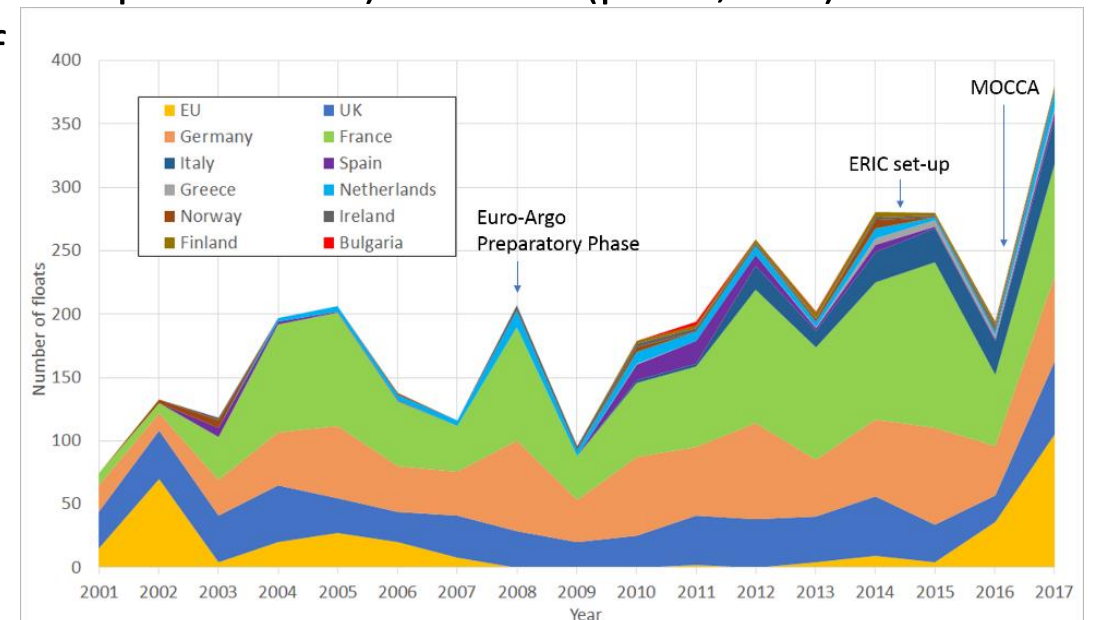
➤ Parameters: Temperature, Salinity (CTD, all floats) + Dissolved Oxygen, Nitrate, pH, Downwelling Irradiance, Chl-a, Suspended Particles (official BGC parameters) + others (pCO₂, etc.)

➤ Operation: The testing and operability of the floats are under both National Infrastructures and the RI.

At Sea Monitoring tools have also been implemented for the monitoring of the fleet.



Argo
EuroArgo
European contribution to the Argo program via EuroArgo Research Infrastructure
Latest locations of operational profiling floats (data distributed within the last 30 days)
July 2017
Argo EU (808) Argo non EU (2984)
Generated by www.jcommaps.org





Euro-Argo ERIC



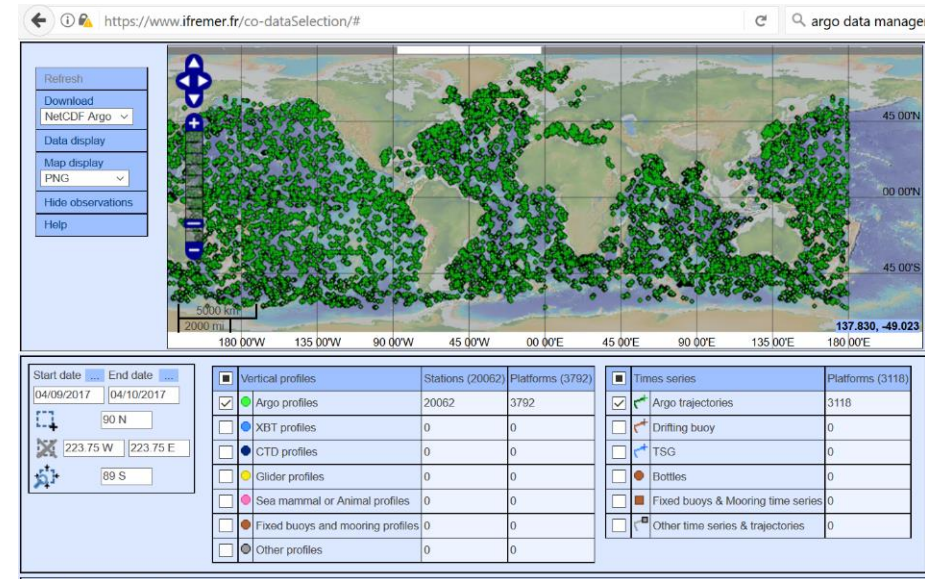
Data & Services

- Physical & Biogeochemical data
- Open access data policy
- Argo data are accessible through the Coriolis Global Data Assembly Center:

➤ via ftp: <ftp://ftp.ifremer.fr/ifremer/argo>

➤ via a «Data Selection Tool»: <https://www.ifremer.fr/co-dataSelection/>

➤ Data are available in Real Time (after automatic Quality Control checks) and in Delayed Mode (after careful analysis and data corrections by scientists). The quality control procedures are the highest and most stringent for the delayed-mode data stream which is designed to deliver data for climate quality



Access conditions to the Infrastructure:

- Euro-Argo data are public and freely available
- Open Access to the information on Argo data processing and to documentation on formats and Quality Control procedures



Euro-Argo ERIC



International collaborations:



....Links with EMSO



Euro-Argo has identified EMSO ERIC as a major interlocutor for common planning, cooperation, and joint activities in operational, technical, scientific, and data management fields.



Euro-Argo ERIC & EMSO

Euro-Argo and EMSO are two important and complementary marine observing networks:

- fixed platforms versus drifting platforms
- some common sensors -> collaboration opportunities on data issues
- possible cooperation on float deployment/recovery during EMSO maintenance campaigns

Euro-Argo and EMSO are both ERICs:

- collaboration opportunities on administrative/management/communication issues
- develop common strategy for socio economic impact studies

Euro-Argo and EMSO are both working on integration into a multi-platform observing system (the EOOS initiative led by EuroGOOS & the Marine Board)

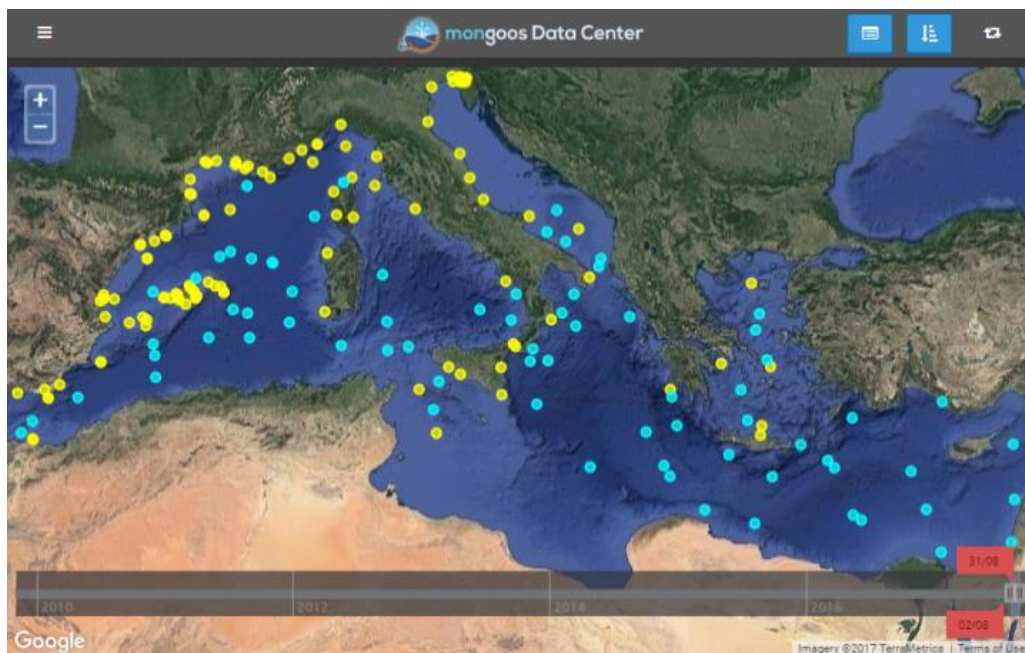
The expected benefits from such collaboration are multiple and can be briefly described as following:

Enhanced data coverage

Fixed-point observatories can provide multiple variables in a high temporal resolution for long time periods. However, such systems have limited spatial coverage.

European marginal seas:

The expansion of Argo provides an unprecedented coverage of profiles from the sea surface down to the deep parts of each basin.



The combination of time-series and profiles provides enhanced datasets of a large variety of physical and biochemical parameters, with increased spatio-temporal coverage capable of rendering the complexity of targeted areas

Data integrity, establishment of validation and assessment processes

The validation of ocean data is an important process for scientific research and operational marine services.

The data assessment is strongly reliant on the inter-comparison of different datasets acquired from different platforms.

Especially regarding biogeochemical data and deep sea measurements, the availability of Argo profiles within an area of a fixed-point observatory can be extremely valuable for data qualification processes.

Common data management and homogenization of large datasets

As the availability of ocean data increases, the data management process is becoming more demanding; there is a continuous need for homogenization and interoperability.

The International Argo program has been pioneering in terms of operational data management, quality control methodology, data accessibility and visualization.

Euro-Argo could share this accumulated experience with EMSO data management team through knowledge transfer, and sharing of common practices and methods. Both RIs could investigate options for developing an integrated robust system of data collection and dissemination for either monitoring or evaluation.

Share knowledge on new sensors and technological advancements

New state-of-the-art sensors and platforms technologies now enable a new variety of important real time observations. EMSO Seafloor and water-column observatories are test-case instrumentational platforms for new technologies and measuring methods.

EMSO field practices and know-how regarding new technology, interoperability, and integration of data and sensors could significantly benefit Euro-Argo, which focuses on new sensors to monitor additional biological parameters and the deep sea basins

Coordination of deployments

Even before Euro-Argo ERIC was formed, its members had highlighted the necessity of a Pan-European coordination of the research cruises and ships of opportunity. This required synergies on deployments between operational researchers at a national, regional, and international level.

Regarding the maintenance of fixed-point platforms, there are a large number of cruises that are more or less routinely operated. Such information could be preliminary shared between EMSO and Euro-Argo thus leading to an easily accessed cruise calendar.

Such coordination would be extremely cost-effective and benefit especially Euro-Argo since the needs of floats deployments and recoveries in open and regional seas will expand in the upcoming years.



EURO-ARGO AND EMSO JOINT ACTIVITIES TOWARDS AN ENHANCED MONITORING OF THE EUROPEAN SEAS



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The upgrade and expansion of the observing network in the European Seas has been the main priority of several major operational oceanography initiatives, aiming to meet both scientific and societal needs. This process includes the optimization of data coverage from local to sub-basin scale (physical and biogeochemical data) in a long-term perspective. Thus far, such activities have relied on national observational networks or EU projects within restricted timescales, and thus limited sustainability. The forming of the **European Research Infrastructure Consortiums (ERICs)** has significantly increased the capability of a long-term planning and implementation of the monitoring component of the European Seas. Such benefits can be amplified by the combined activities, and joint efforts, of different Research Infrastructures (RIs). Such an example is the synergies between Lagrangian and Eulerian platforms, at basin scale in the deep offshore, and selected coastal areas, that are nowadays considered essential for enhanced spatiotemporal monitoring.



Location of 3790 active floats of the global Argo array during July 2017. Blue dots indicate the 806 European floats. (www.euro-argo.eu generated by www.jcomomps.com)

Strategy for evolution of Argo in Europe

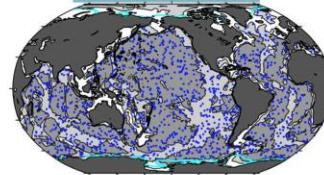
Argo floats have become the "eyes" of the scientists throughout the world's oceans forming a network of almost 4.000 active profiling drifters. In recent years, a number of new, upgraded, floats have the capacity to measure a variety of biogeochemical parameters such as chlorophyll-a, dissolved organic matter, nitrates, and dissolved oxygen in addition to the standard CTD instrumentation. Furthermore, Argo technology is progressing towards enabling floats to monitor the deep parts of the oceans, down to 6000 m depth. Since 2014, the Euro-Argo ERIC has been a major contributor towards an enhanced monitoring of the European marginal Seas along with its contribution to the core Argo programme. The recent revised strategy plan of Euro-Argo for the evolution of Argo in Europe highlights the need of an updated implementation plan which includes:

Increased coverage of the marginal seas



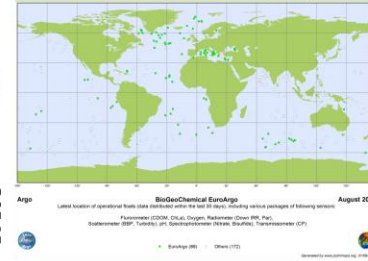
Location of the fixed-point stations (yellow dots) and the Argo floats (blue dots) in the Mediterranean during August 2017 (www.monacoos.eu/data-center/)

Deep ocean monitoring



Straw-plan of a nominally 5° x 5° distribution of 1228 Deep Argo floats (blue dots) randomly populating the global ocean excluding areas shallower than 2000 m (white areas), and areas with mean 1981-2010 ice concentrations > 75% (poleward of thick cyan contours). Lightest gray areas indicate bottom depths between 2000 m and 4000 m, darker gray areas indicate bottom depths exceeding 4000 m, and darkest gray areas indicate land (Johnson et al., 2015)

Extension of the Biogeochemical Argo component



Euro-Argo & EMSO links

The success of such a plan will require close collaboration with additional monitoring infrastructures such as national observational networks, and relevant ERICs. Regarding the latter, Euro-Argo has identified EMSO ERIC as a major interlocutor for common planning, cooperation, and joint activities in operational, technical, scientific, and data management fields. Taking into account the existing synergies with national projects and EC programs that EMSO has already established regarding key sites where EMSO nodes are operating. The expected benefits from such collaboration are multiple and can be briefly described as following:

- *Enhanced data coverage*
- *Data integrity, establishment of validation and assessment processes*
- *Common data management and homogenization of large datasets*
- *Share knowledge on new sensors and technological advancements*
- *Coordination of deployments*

Key message

Euro-Argo and EMSO will both benefit from a close collaboration that will advance the monitoring capacity of both the physical and biogeochemical processes which range from the sea surface to the seabed. It is also of great importance that through this link the two consortiums can jointly work for the successful outreach of their activities in order to raise societal awareness regarding management, protection, and understanding of the European marine environments. This will further advance the implementation of an integrated observing system for the European Seas which, combined with numerical models and data assimilation, will create the baseline for the development of a new form of Integrated Coastal and Ocean Management in response to society needs.

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For further information please visit the web pages of Euro-Argo ERIC & EMSO ERIC

www.euro-argo.eu & www.emso-eu.org

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Discussions held during the poster session

- In general the feedback was really good
- From EMSO side they are planning more targeted activities towards links with other RIs
- EMSO-Link project, WP7 outreach and establishing links
- Joint participation in calls and funding schemes
- Proposal to include someone from EMSO ERIC to our STAG
- Participation of some members of both RIs in workshops and plenary meetings
- Argo float deployments at EMSO nodes (important especially at deep sites)
- Deployment opportunities, start a cooperation now (discussion on EuroFleets 3)
- Data management issues, EMSO DM team to contact Euro-Argo DM team



Conclusions or main take home message

Being the two largest RIs regarding ocean monitoring, Euro-Argo and EMSO will both benefit from a close collaboration that will advance the monitoring capacity of both the physical and biogeochemical processes which range from the sea surface to the seabed. Thus, a link should be established for the coordination of all the aforementioned activities.

In the EOOS and Environmental RIs landscape it is important that Marine RIs join their efforts to provide a more structured view of the Marine landscape, that is better organized than what we presently show. Such joint efforts can also target new funding schemes through joint participation in calls and projects.

It is also of great importance that through this link the two consortiums can jointly work for the successful outreach of their activities in order to raise societal awareness regarding management, protection, and understanding of the European marine environments.

This will further advance the implementation of an integrated observing system for the European Seas which, combined with numerical models and data assimilation, will create the baseline for the development of a new form of Integrated Coastal and Ocean Management in response to society needs.