



## 2<sup>nd</sup> General Assembly report

Ref.: D1.4\_V1.0

Date: 31/03/2022

Euro-Argo Research Infrastructure Sustainability and Enhancement  
Project (EA RISE Project) - 824131

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 824131.  
Call INFRADEV-03-2018-2019: Individual support to ESFRI and other world-class research infrastructures





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## Document Reference

Project	Euro-Argo RISE - 824131
Deliverable number	D1.4
Deliverable title	2nd General Assembly report
Description	Report of the 2nd General Assembly
Work Package number	WP1
Work Package title	Project Management
Lead Institute	E-A ERIC
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Submission date	31/03/2022
Due date	[M38] – 28 February 2022 – revised due date [M39] – 31 March 2022
Comments	
Accepted by	S. Pouliquen

## Document History

Version	Issue Date	Author	Comments
0.1	28/03/2022	E. Evrard	Initial draft
1.0	31/03/2022	E. Evrard	Final document after the integration of WP leaders' comments

## EXECUTIVE SUMMARY

This report describes the activities carried out during the 2<sup>nd</sup> General Assembly (GA) from 18th to 19th November 2021. This edition of the General Assembly was fully virtual (Covid-19). Work was organised between plenary sessions (WP review, future work for the reporting, communication updates) and a breakout session (collective brainstorming). A news on Euro-Argo website summarised this important moment for the project :

<https://www.euro-argo.eu/EU-Projects/Euro-Argo-RISE-2019-2022/News/2nd-Euro-Argo-RISE-General-Assembly>

A strong participation of the partners to the discussions contributed to the success of this 2nd General Assembly.

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## 1 Context of the General Assembly

This General Assembly was held on 18-19 November 2021, 2 months ahead of the initial plan. This decision was discussed with and agreed by the Executive Board, taking into account the periodic report preparation and submission (end of February 2022) as well as the planned mid-term review (early March 2022). In addition, given the Covid-19 pandemic context, it was decided to have this General Assembly in a virtual mode.

Based on the experience gained on the organisation of online events since 2 years, the format as well as the need for interactions were adapted to the audience. The General Assembly was organised into 2 half days (morning sessions) to avoid screen fatigue and ease interactions. In addition, a collaborative brainstorming session using an online whiteboard was proposed to the attendees on the first day (see Annex 1 – Agenda).

Thanks to the representation of all the partners at the General Assembly, the quorum was reached. No vote nor amendment were on the agenda of this General Assembly.

Note: This General Assembly is the actual 3rd one of the project, as the first General Assembly was held during the KickOff Meeting. To avoid any confusion, we kept the name indicated at the moment of the proposal, e.g Second General Assembly report.

## 2 WP review : progress and main achievements

### 2.1 Overview on Euro-Argo RISE progress (WP1)

Sylvie Pouliquen, coordinator of the project and Programme Manager of the ERIC, set the scene with a presentation on Euro-Argo RISE main results since the last General Assembly. The achievements were introduced along 4 areas: technology improvement, data management, services to users and community enhancement.

She highlighted that Euro-Argo RISE contributes to all objectives of the Euro-Argo ERIC 5-year plan (2019-2023). Recommendations, tools and services produced within the project aim to be endorsed and sustained after its end through the ERIC. In addition, they will be key for the development of the 2033 Euro-Argo strategy, the long-term sustainability plan and the implementation plan. Euro-Argo RISE will lay the ground for these 3 documents as they will be proposed for the next Euro-Argo ERIC evaluation in 2024.

### 2.2 WP2 progress and main achievements

Ingrid Angel Benavides, WP2 leader and Scientific Assistant in BSH reported the progress for WP2 since the last General Assembly. After a reminder of the overarching objective of the work package, Ingrid highlighted the main achievements of the tasks according to their specific objectives.

Task 2.1 *Increase floats lifetime* led to the production of Deliverable 2.1 about monitoring tools to track and compare float configurations and estimate life expectancies. One of the main outputs of the analysis was the classification of the causes of death through an audit on recovered floats. In parallel, an audit was also done on unconstrained metadata fields. All the tools used to make such analysis are available for the community on github at the public euroargodev. Next step for this task were also presented through the upcoming deliverable D2.6. This deliverable gathers information on models performances (theoretical vs at sea lifetime) per mission (Core/Deep/BGC). A best practices document covering the overall life cycle of a float is also under preparation: even if not included in the official deliverables of the project, this document is targeted to operational teams. Some main highlights about analyses on survival rates for NKE floats were shared. In particular floats performances in the Marginal Seas were compared to open water floats ones, upon various criteria as the number of cycles reached or vertical distance travelled. An example of a lifetime of Arvor-I equipped with an optode (DO sensor) in terms of cycles was also presented, with a survival decrease of 15%. This opens the floor to the discussion as previous experience from University of Washington adding DO sensor made only a small difference to survival in terms of energy budget. The 15% reduction (cycles) were communicated for an Arvor-I, whereas in Bittig et al.<sup>1</sup>, the table of energy budget gives an indication of about 2% for an optode on a BGC float (e.g. Provor). So far, the 15% is a theoretical value for the Arvor-I as well as the value observed from the floats that reached the end of their battery. Nevertheless, as this sample was small, the same calculation should be checked again in a couple of year. As a conclusion, it was highlighted to share expertise and approach between Core and BGC missions on the issues of energy and lifetime estimates.

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<sup>1</sup> <https://doi.org/10.3389/fmars.2019.00502>

Advances on task 2.2 *diversify sensors for the core mission* were presented. Since the last General Assembly, two new units (1 Apex, 1 Arvor-I) were deployed in the Baltic Sea (Bothnian Sea) by FMI and the data analysis is ongoing. So far, data acquired by the floats are good. A repository proposed by Ifremer on euroargodev allows to plot diagnostic plots, such as salinity difference between Argo profiles and reference CTD casts (on theta levels) or the recent tracks of the deployed floats. Besides these data, partners of the task have access to the swarm experiment conducted by BSH in the frame of Dargo2025, where 5 Arvor floats (RBR) and 5 Arvor floats (SBE) were deployed.

One of the main outcomes of this task is that these experiments have already increased the interest of using RBR floats by the national programs up to 10% of their budget (informal information at the time of a WP2 meeting). Nevertheless, in order to establish RBR floats, the international community needs to reach agreement on how to flag RBR CTD data for distribution. It was highlighted that European partners should reach a collective view on this before ADMT in December.

Task 2.3, *Improve observation of boundary current regions*, started with the definition of boundary currents of interest for partners. The delivery of D2.3 in December 2020 established a first version of a European strategy plan through an historical sampling assessment combined to requirements for each boundary currents of interest. Afterwards the work has focused on defining best missions configurations using the Virtual Fleet software. A tutorial session in autumn helped partners to learn and use the software in their own institution. New features have been included and experiments are currently conducted in each study area. With this software, expertise in Python is growing in the community through praxis.

A supplement to D2.3 is under construction to define specific recommendations in terms of configuration parameters (observation strategy). To that aim, both Virtual Fleet and optimization methods are used to find the optimized parameters.

A new dataset describing boundary current state and variability is under construction by Ifremer. It is based on profiles unsupervised classification and combines Argo data with other observing platforms information. This method helps to reconstruct a profile using surface variables and main outcomes will be summarised in D2.8.

Task 2.4, *Improving DMQC*, has progressed well and many things were developed. This will be of great use by the Euro-Argo community and beyond. The base of DMQC is to improve the reference database. The Argo reference database has been uploaded to the Ifremer ERDDAP server and is now accessible via its API. There is also a continuous improvement of the CTD reference database, with local updates for the Marginal Seas and new data for deep Argo DMQC.

Regarding the DMQC tools and software development, the tendency is to move to open source software and the related main effort was the conversion of OWC in Python by BODC. There is now a full consistency with Matlab OWC calibration results and the software is fully operational. Some improvements of the code performance are planned to enhance the functionality.

As for the DMQC in turbulent regions, a method has been developed by Ifremer to improve the profile selection in the reference database. This method is based on the Profile Classification Model and uses machine learning techniques. All the results have been shared in D2.4.

Work on the adaptation of existing DMQC methods to Marginal Seas is progressing. Partners develop, test and optimise DMQC methods according to regional specialities. These information will be shared in the upcoming deliverable 2.7.

The expertise on DMQC is shared widely: one of the main tool is euroargodev GitHub that has grown and is now fully used. A public QC forum on euroargodev allows to discuss issues on DMQC and a DMQC cookbook was published and will be continuously enriched. Finally, all this expertise will be



shared and discussed in the 2nd Euro-Argo / 7th International Argo Delayed-Mode QC workshop that is planned to be organised in person in 2022.

## 2.3 WP3 progress and main achievements

Pedro Velez-Belchi, WP3 leader and Research Professor in IEO presented the work and main achievements reached after a reminder on the overall objectives of the work package for the deep ocean (> 2000m).

The first task tackles technological challenges by testing RBR deep sensor (RBR concerto) and addressing the stability and accuracy of SBE61 sensor. To that aim, the work is done on two types of prototypes (dual-headed float and tri-headed float) to intercompare the sensors. The progress on the 3-headed deep-Arvor, (fitted with SBE41 on cap and SBE61 and RBR sensors on the side) for its design, deployment and data analysis was presented. Pedro stressed that the design of such floats is the only way to make this kind of analysis and is unique in the Argo community.

The analysis revealed that the pressure difference between the sensors ranges from 0 at the sea surface to +/- 5db at 4000 dbar or even 9dbar when comparing the SBE61 and the RBR pressure sensors. The RBR sensor exhibits a pressure response below 2500 dbar that has been corrected since those deployments.

The SBE temperature sensors agree within sensor accuracy (temperature differences are less than 1m°C). As known, the SBE conductivity sensor exhibits a pressure dependent response (referred to as Cpcor correction). Once corrected with an optimized Cpcor value, only one of the four SBE conductivity sensors present no offset compared to the reference CTD cast.

These first analyses indicate that neither SBE61 nor RBR concerto are more accurate than the current generation of sensors. However the interaction with RBR manufacturer has been very positive and productive.

Regarding the technology itself, the integration was more complicated than planned, both for 3-headed and 2-headed floats. All the sensors are claimed 'ready to be integrated' by the manufacturers but the experience on these prototypes demonstrated that a lot of interactions had been needed for the integration. In addition, Covid-19 pandemic led to increase lead times for the delivery of sensors, that postponed further testing and deployments. Nevertheless, even though there has been delays, the activity progressed as planned and partners will start to draft the reports in 2022.

Regarding the second task on DMQC for deep Argo, one main activity of the partners has been the update of the Argo data QC manual (RT QC flags and RT adjustments) as a contribution to the international deep Argo group. This update was combined to a draft version of the procedures for the deep salinity data. These procedures have started to be implemented by the Deep Delayed-Mode groups. Partners have also contributed to the virtual BGC & 3<sup>rd</sup> Deep Argo workshop organised on 27 September – 01 October where they shared experience in DMQC for their deep floats.

Next steps for the partners will focus on the decision-making process for CpCorr values with the aim to populate the deliverable planned on the outcomes of the comparative study for deep Argo DMQC.

As important as the DMQC methods for the accuracy of the deep Argo observations are the reference data, and therefore significant work has been done to improve the availability of high-quality ship-based CTD for QC of deep Argo floats. Progress has been made in increasing the quality and amount of most recent reference data from regions of deep Argo floats deployments.

As a conclusion for this part on DMQC, it was highlighted that there was a need for the manufacturers to calibrate their sensors under pressure to obtain CpCor values. RBR is now making calibrations in a seawater pressure tank and there is now a need for SBE to do the same.

In addition, Birgit Klein shared a solution to cope with floats when people don't have a direct comparison between the sensors such as the prototypes developed within Euro-Argo RISE. Experiments were carried out by Germany in an eddy with five 2000m-floats equipped with SBE and five 2000m floats equipped with RBR sensors. These floats were not pressure-calibrated in sea water tanks but based on bottle data together with deployment CTD, RBR was able to provide corrections for the ten floats that get the data into a good agreement.

There was a discussion about the need to keep on presenting and sharing some elements with the international community at AST or ADMT meetings, as they represent key milestones for the project. As regard this discussion and based on the experiments of prototypes, a comment from Brian King was raised on the flagging of deep data, above and below 2000m. A recommendation was issued to come to a European consensus on the flag of RBR deep data before the next ADMT. This would move forward the adoption of RBR sensors into the fleet.

## 2.4 WP4 progress and main achievements

Fabrizio D'Ortenzio, Senior Scientist at Laboratoire d'Océanographie de Villefranche (SU/CNRS), presented WP4 progresses, which are relevant and numerous for the last months. A prototype float with the RAMSES sensor was deployed in the Baltic Sea and it is generating a unique data set of multi spectral irradiance observations (some examples have been presented during the meeting). Selected advancements on BGC QC methods were presented to the GA (details of all the parameters can be found in the deliverables). Fabrizio focused on Irradiance and CHL DM (including use of remote sensing) and on the new RT QC for suspended particles. Fabrizio also presented the state of the art of the discussions about the organization of the BGC-Argo QC at European level. Three scenarios have been identified and they will be in depth analyzed on the basis of the new QC processors proposed in Euro-Argo RISE.

One of the outputs of WP4 is to have a document proposing a different scenario for BGC data processing, with pros & cons as well as the costs that could be presented to the Euro-Argo ERIC Council for discussion and then clear commitments. Without such a document, discussions at Euro-Argo ERIC Council are useless. Fabrizio also reminded that the first step of the task for BGC was of high importance in order to establish the scientific basis of the system (e.g. processors, methods and algorithms) before the organisation steps have to be considered.

Finally, Fabrizio presented the progress concerning the generation of new carbon products, based on BGC-Argo data (mainly pH and O<sub>2</sub>). An issue on the pH sensor mounted on floats was identified, and the deployment of 5 pH floats were organized and carried out by GEOMAR colleagues in order to obtain a robust data set to identify and correct the issue. The production of the new products is still planned for the end of the project.

## 2.5 WP8 progress and main achievements

Alan Berry, WP8 leader and Research Infrastructure Manager at Marine Institute presented the work and main achievements reached in integrating Euro-Argo activities in the general context of global ocean observations. After a brief recap of the overarching objective of the work package to build and develop links and synergies with other RIs, increasing efficiency and long-term sustainability of the ERIC & the integration in the network of global ocean observations, Alan highlighted the main achievements of the tasks according to their specific objectives. Alan noted that all WP8 deliverables were not due until M36 (December 2021) or later.

Good progress was made since January 2021 in approaching other ERICs/RIs and official communication with all Marine RIs/ERICs and regional communities such as MonGOOS has started. This has benefitted from the top-down approach agreed in Sept 2020. An event for marine RIs was organised in collaboration with the 9th EuroGOOS International Conference 3-5 May 2021. Marine Research Infrastructures Side Event – 5th May 2021. “Cooperation Framework between Marine RIs” During the event 11 Marine RIs presented their activities along with suggestions and opportunities for cooperation. Apart from the RIs representatives, BEERI and ENVRI was represented whilst more than 80 attendees participated in the discussion. Regarding the monitoring strategy for shelf open ocean boundaries, an extended investigation was made and the feedback from key people from marine RIs and research communities was included in the “Draft Report on strategy for shelf-open ocean boundaries monitoring in collaboration with other ERICs and research communities” uploaded on-line so as partners could add their contribution.

The second task in WP8 was also progressing with OceanOPS to determine the legal aspects of float deployments and operations in countries EEZs. A draft report organised as a “decision-tree” to deal with different cases, practical solutions, turnarounds, future pathways and national points of contacts is under development and was expected to be available for review by the end of the month.

Industry engagement has continued, with some informal in-person meetings held at Ocean Business '21, along with ongoing interactions with more than a half-dozen manufacturers. Brian King (NOC) has proposed organising one-hourly meetings with individual commercial suppliers and a dedicated page on the Euro-Argo website has been set up.

(<https://www.euro-argo.eu/EU-Projects/Euro-Argo-RISE-2019-2022/Meetings/Euro-Argo-RISE-series-of-meetings-between-Argo-suppliers-and-European-users>)

Mathieu Belbeoch (OceanOPS) indicated that the Osean company is qualifying a 4000m depth float and needs guidance for the best sensors' choice: SBE41, 61, or RBR. Brian King (NOC) set up the current meetings according to the manufacturers that partners already have links with, but could set up a session with Osean for the European community. Sylvie Pouliquen encouraged every partner to participate in such unconstrained discussions that last only one hour.

SOCIB also held discussions with Valeport, Chelsea and NKE. An NDA was signed between SOCIB, NKE and Euro-Argo ERIC to allow further detailed discussions take place.

The new Euro-Argo ERIC strategy was discussed at the March 2021 Management Board meeting and again at the October 2021 meeting. A living document has been created to gather partners inputs on the mission, vision and objectives for the new strategy, to be agreed before end of 2021. In parallel, for the sustainability plan the Marine Institute surveyed all Management Board members to gather the financial details of the national Argo programmes which will be the bases for the sustainability plan. The final deliverable, the Implementation Plan will be developed in tandem with the other two documents. All deliverables due at the end of the project.

Finally, the coordination with the international Argo bodies was presented, showing that the Euro-Argo RISE project was presented to the Argo Data Management Team in December 2020, at the Argo Steering Team meeting in March 2021 and at the International BGC-Argo and Deep Argo workshops in September 2021.

## 2.6 Breakout session – collective brainstorming

This General Assembly was an opportunity for each partner to share ideas about the progress of the project and follow-up work during a collaborative brainstorming session.

Through an online tool called MIRO, people were able to share their thoughts/ideas on defined questions through virtual post-its on a whiteboard. The brainstorming session was organised into 4 questions.

Two questions were project-related (Q1 & Q2), with a limited timeframe (e.g the project's one - 2022). They concerned the key results of the project to promote and how to promote them.

Two questions were “ERIC-related” (Q3 & Q4), with a wider timeframe and more oriented on building on the legacy of the Euro-Argo RISE project for the European community.

A main outcome of the brainstorming session was the strong participation of the partners, that were keen to provide many inputs. These inputs were analysed and reorganised by the Euro-Argo ERIC office in order to provide a cleaned view to progress on the selection of the main ideas.

These views are shown in figures 1 to 4.

### What are the key results of Euro-ARGO RISE?

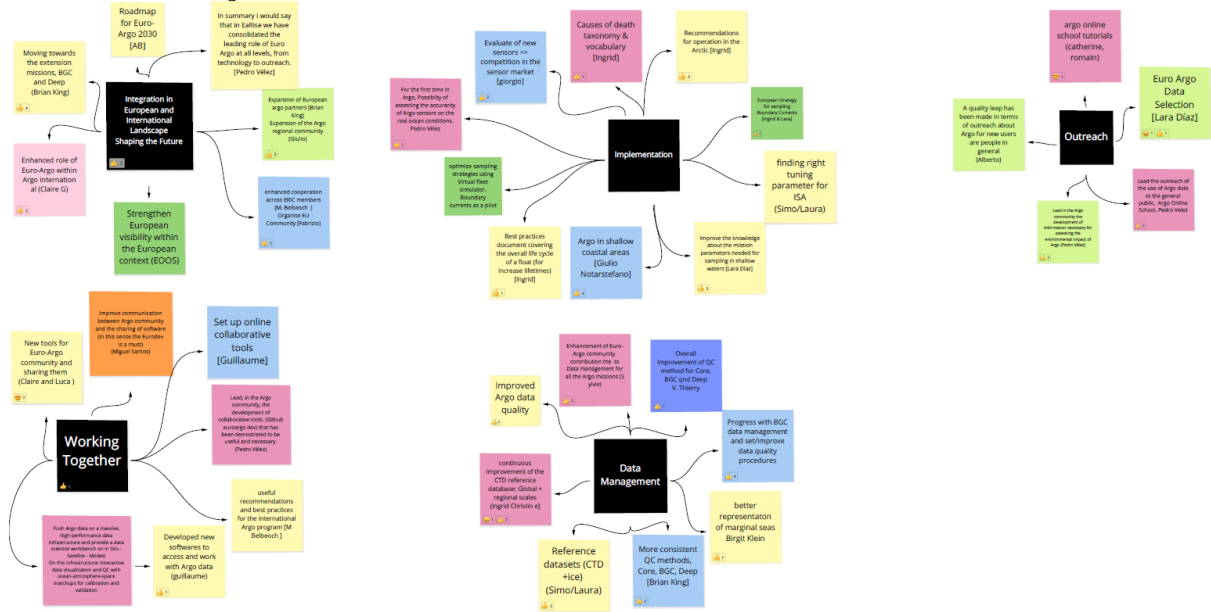


Figure1: Results reorganised for question 1

## How to spread or facilitate the uptake of the key achievements outside the project?

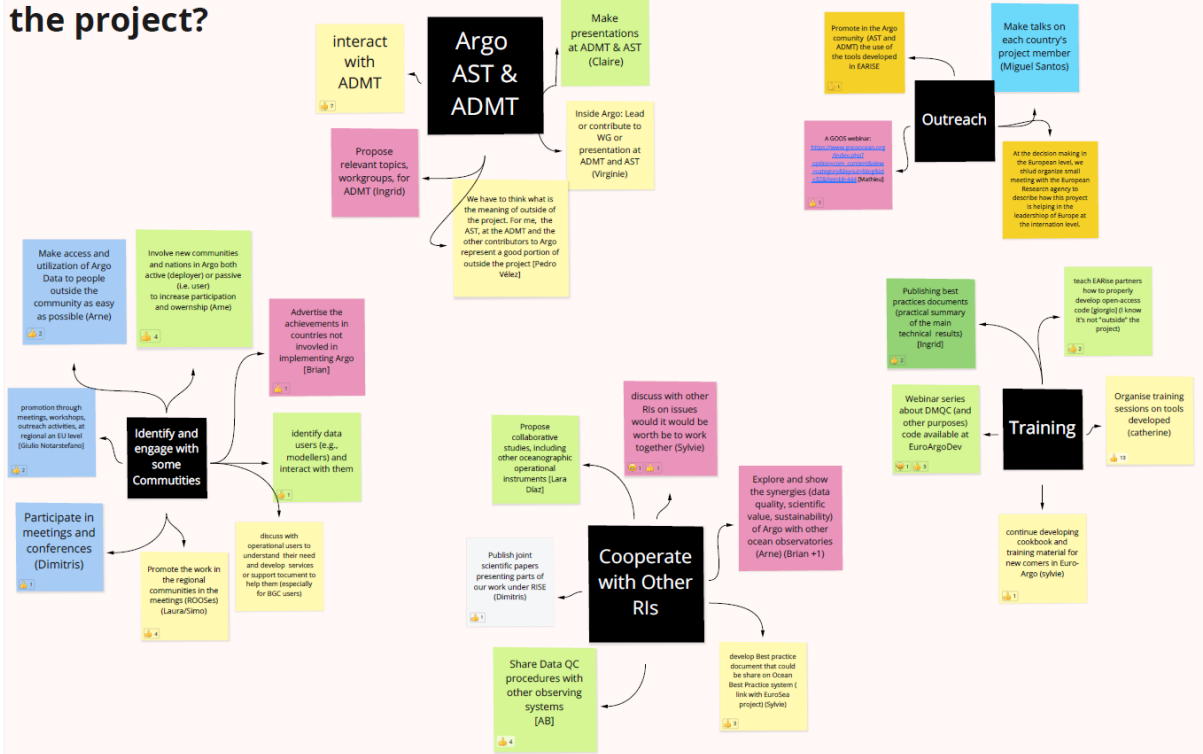


Figure 2: Results reorganised for question 2

## What are the activities that need to be pursued after the end of Euro-Argo RISE project?

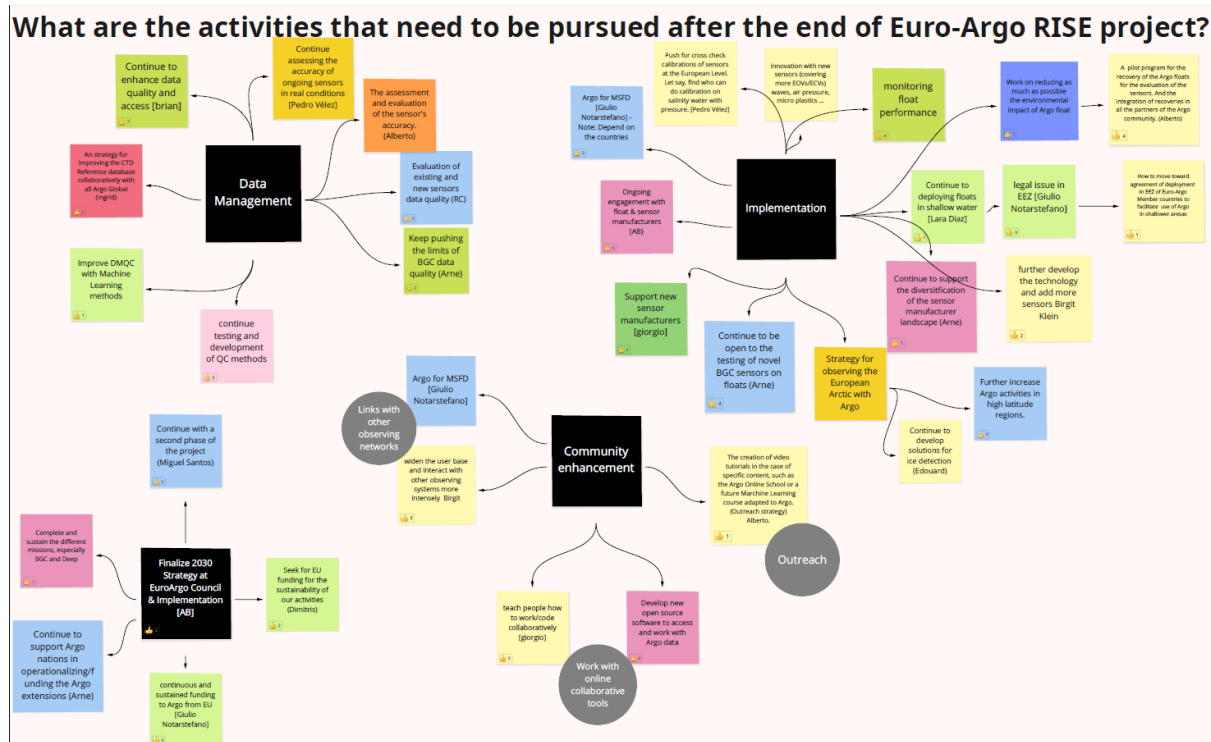


Figure 3: Results reorganised for question 3

## How do you propose to progress on those topics?

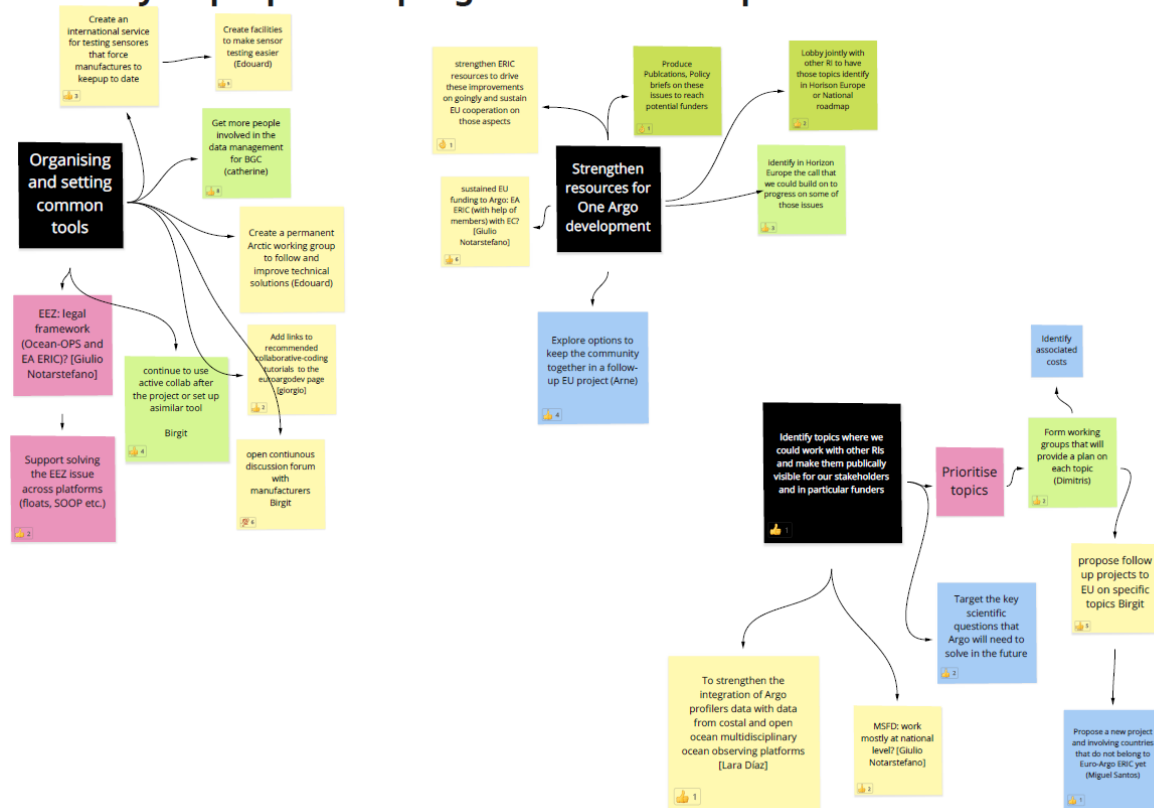


Figure 4: Results reorganised for question 4

Regarding the next steps after the General Assembly, questions 1 & 2 have been proposed to the Executive Board of the project. Each WP leader had to choose his/her two or three top priorities for each topic (as represented by the black squares). Depending on the order of these priorities, the communication key messages will be defined and turned into comprehensive final leaflet.

The questions 3 & 4 are now dedicated to the ERIC Management Board. They have been shared at the last Management Board meeting early March with an action to select the priorities per topic. According to the results, a list of priorities will be set up and could serve as a basis to answer future calls or drive future strategic goals of the ERIC.

## 2.7 WP5 progress and main achievements

Laura Tuomi, Head of Unit Marine Research at FMI, presented the progress and main achievements in WP5 - Extension to high latitudes. In Task 5.1 ,New technologies for under-ice measurements, best practises to operate Argo floats under ice have been studied. Reference databases including temperature profiles and ice concentration data have been gathered to evaluate best possible settings for ice avoidance algorithms in different areas of the Nordic Seas and Arctic Ocean. Recommendations for ISA settings will be provided in the Task deliverable “D5.1 Report on the current state of ice avoidance methods and recommendations for deploying Argo floats in the Arctic Ocean” due by the end of 2021. Also scripts to evaluate the best ISA settings for the target area and for sophisticated



estimate of float profile positions under ice have been made available in the Euroargodev github. Partners have also been active in deploying national floats to the high latitudes in order to provide more data and possibilities to study settings for ISA in different areas. To complement the view presented, 4 Provor CTS5 were deployed at the end of October in Baffin Bay with 3 Canadian Arvor (as part of Dark Edge cruise from Takuvik).

In Task 5.2, Cooperation with high latitude countries, Arctic workshop was held in April 2020 together with Marginal Seas workshop. The workshop was participated by 75 people from 13 countries. Presentations were given by the project partners about how to operate Argo floats in Arctic Ocean, what is the current status of floats in the high latitudes and how the Argo data can and could be used in different oceanographic applications. A questionnaire was also made to estimate the current and potential use of Argo data in this area. A detailed summary fo the workshop will be provided in deliverable “D5.2 Progress made on engagement with countries surrounding the Arctic Ocean”.

In Task 5.3, Southern Ocean regional data quality assessments, progress has been made to find more data for the reference database. Data from Pangea has been identified, collected and added to the reference database. Search for other possible sources continues. Possibilities to utilise model based data for DMQC is also under investigation. Effort to utilise machine learning techniques to characterise the profiles both in the Argo float and reference CTD datasets has been started. The idea is to utilise tools developed in WP2 and use them to identify in which zone of the Southern Ocean profiles have been measured. This will help to find the correct match-up pairs for the DMQC. Deliverable “D5.3 Improvement of the assessment of Argo floats in the Southern Ocean including Weddell sea as part of the Argo Southern Ocean ARC” is due by October 2022.

During the discussion time, one recommendation issued was that the outputs of the Arctic questionnaire should be used for the Euro-Argo updated strategy.

From a more technical point of view, the tool developed for under-ice positions was very useful for the task 5.1. A recommendation was to present the tool at ADMT22, in agreement with the developer Kaihe Yamazaki. Depending on the international interest, there might be a need to organise a tutorial session to present the code more widely to the community.

## 2.8 WP6 progress and main achievements

Giulio Notarsefano, technologist at OGS presented the progress of WP6 according to the two main objectives.

As a reminder, objective 1 of WP6 is about the expansion of the regional Argo community and objective 2 is about the regional extension and implementation of the Argo array.

Regarding the expansion of the regional Argo community, collaborations between WP6 partners and new riparian countries on the 3 European Marginal Seas (EMS) were established for 1) operations at sea (donations, deployment, recoveries) with Morocco, Romania, Russia, Estonia; 2) data sharing (Turkey and Croatia); 3) for sharing knowledge, expertise and joint activities between countries (Morocco, Croatia) on Argo platform, programming, data processing; between working groups (Ocean Gliders) where integration of different systems is crucial for improving knowledge and for best practice, deployment and recovery plans, joint missions, QC; within regional networks (MONGOOS, BOOS, Black Sea GOOS) with the aim of fostering and strengthening the Argo network, facilitating Argo

operations and creating synergies; between RIs for joint activities at regional level (EMSO France, Greece and Italy). In a general context, connections between different ERIC is carried on in task 8.1.

An important step for the expansion of the regional Argo community was done with the organization of two specific workshops: one for the Mediterranean & Black Sea and one for the Baltic Sea. Several new countries potentially interested in Argo participated and the audience came from oceanography, politics, industry, technology. It showed the specificity of Argo operations in shallow/coastal and ice-covered areas. Then, use cases of Argo data in several sectors (climate action, environmental protection, operational oceanography) were presented and the discussion regarding Argo for MSFD was initiated. An important outcome was the discussions with Cyprus and Turkey representatives after they officially expressed intention to actively contribute to Euro-Argo activities at a first stage and become a potential member in the near future. Legal problems related to the exploitation of Argo in the EMS that are divided into Exclusive Economic Zones were presented.

A political event was organized and it has been a unique occasion to put in touch scientific research and the Argo system with high level decision-makers and stakeholders from ministries, EC, International organizations, research institutes and university. It was shown the value of Argo data in support to environmental and maritime policies in the Marginal Seas of Europe. It was highlighted the success of Argo in European Marginal Seas and the benefit of this system for the marine environmental monitoring and support to service for society along the coasts. It was shown the importance of Argo for science, operational services and applications. It was said that there is need of a continuous and sustained funding to Argo in European Marginal Seas. It was mentioned that the use of Argo floats in the marginal seas is also triggering regional collaboration and can facilitate policy and law development and ratification as the floats tend to drift out from the territorial and EEZ waters.

The second main objective of WP6 is the regional extension and implementation of the Argo array. 8 Euro-Argo floats were deployed in EMS: 4 in the Mediterranean Sea, 2 in the Black Sea and 2 in the Baltic Sea. In addition, some national floats were also deployed to further investigate the potential of the Argo platform in shallow/coastal waters. Floats were deployed in difficult areas characterized by shallow water, proximity to the coast, complex geography and bathymetry.

WP6 partners developed some home-made tools (anticipate data decoding and have last location quicker), alert and warning systems (distance from deployment, depth) to be used in conjunction with the main monitoring tools provided by EA and Ocean-OPS. They also used other kinds of tools that provide additional and useful information for the monitoring of the fleet (sea water velocity, marine traffic). Partners tested different float configurations according to their targets and areas (also high-density gradient and ice-covered areas). It was shown that the setting of a relatively deep parking depth was an advantage because it prevents the float from drifting away from the targeted area. Some floats were used as virtual mooring with a parking depth at the bottom. Also, the use of high frequency sampling allows to check distances between consecutive profiles and to be ready to react quickly to change the configuration, if needed.

Almost all WP6 deliverables were delayed due to the pandemic but the work has continued without any particular problem.

WP6 has been successful in objective one for:

- Contacting Riparian countries potentially interested in Argo (and to join EA ERIC)
- Approaching the main relevant marine RIs



- Promoting Argo within regional networks and working groups and for MSFD
- Showing the value of Argo data in support to environmental and maritime policies to decision-makers and stakeholders.

Further work or different strategy is needed to:

- better talk to north African countries.
- try to solve EEZ legal problems that are critical for Argo operations in EMS (this work is carried on in task 8.2).

Regarding the second objective of WP6 we were successful in:

- Argo platform can be used in shallow/coastal waters of EMS
- Different float configurations tailored for shallow/coastal operations have been tested
- Additional tools were designed and selected for the monitoring activity

WP6 contributed to improve the Euro-Argo and OceanOPS controlling and monitoring tool (link with T2.1). WP6 proposes 1) implementation of notification/warning/alert systems to take into consideration the distance from the shore, critical bathymetry, distance from targeted areas and/or deployment location, malfunctioning sensors; 2) Tools for assessing the battery health; 3) Add links to the Euro-Argo fleet monitoring tool to other existing tools (marine traffic, sea water velocity); 4) Add layers (bathymetry).

We noticed that:

- A more careful monitoring of the fleet and human-platform interactivity is needed
- Grounding, proximity to the shore are manageable but there is still work to be done on determining the optimal methods of operation and improving the life expectancy (link with T2.1).
- Collisions with anthropogenic sources are unpredictable and are more likely to occur in coastal water where human activity is higher (fishery, maritime traffic, dams, wind-farms, gas platforms, ...). For that reason, deployment locations have to be carefully chosen.

Plans for the future and until the end of the project are the following:

For the first objective (Expand the regional Argo community):

- Continue the promotion of Argo data and the strengthening of the relations with countries and research communities
- Need to keep on establishing easy collaborations and/or training with new countries to move forward
- When organizing a user workshop or a regional conference, invite new countries to help them and move forward the process of joining Argo activities (and the ERIC)

For the second objective (Regional extensions and implementation of the Argo array):

- Continue the monitoring with Euro-Argo RISE and National floats and try to improve the «optimal» setting and sampling strategy
- WP6 meeting in January 2022 for preparation of D6.8 (first draft in April/May, advanced version end of June, final version in September 2022)

During the discussion time, a comment was raised about the follow-up of the countries which expressed an interest for Euro-Argo after the workshops (Turkey, Cyprus...) and how to collaborate

with them. This action will progress through the EuroGOOS/EuroArgo Task Team, that should help to progress with the engagement of new countries but also institutes not part of the governance bodies of the Euro-Argo ERIC.

On that point, Dimitris Kassis highlighted that the field missions are very promising: there is indeed a need to start discussions more thoroughly to look what is going on and especially for the coverage of floats in the Marginal Seas. In addition, Marginal Seas are an ideal place for multi-platform activities such as synergies of deployments with the gliders, moorings.

A discussion was also on the difficulties to operate floats in areas with human activities (question is also similar for gliders for example). Giulio Notarstefano highlighted that Argo operators should have in mind the human activities in the coastal areas and take them into account when deploying floats. For gliders, some periods are indeed avoided for deployments in the Baltic Sea (ex: during the fishing period) as explained by Laura Tuomi. Nevertheless, it is not possible to do this for Argo floats.

The final consensus was to define a strategy for floats operating close to the coast taking into account human activities. This should be provided in the final recommendations (D6.8).

As for the EEZ issues, Sylvie Pouliquen proposed to work first at the ERIC level to have an agreement between the Members. This would be a first step to progress on deployments within Europe. Giulio Notarstefano proposed to go further by making an agreement between the partners, as an easier solution. As a final word on the EEZ issue, there was an agreement to propose a strategy for the ERIC and push this later on through EuroGOOS and the EOOS strategy.

## 2.9 WP7 progress and main achievement

After a short reminder on WP7 objectives, Claire Gourcuff, science officer at Euro-Argo ERIC, reported on work performed in each of the 5 tasks of the WP.

The analysis of Euro-Argo user needs (task 7.1) was finalised and 8 recommendations were proposed by MI, and published - after validation by Euro-Argo Management Board - in the associated Deliverable in May 2021 (D7.4).

Regarding task 7.2 (promotion and improvement of data access and usage), the new version of the Argo Data Selection Tool developed by IFREMER was officially released in June 2021 and presented to various audiences during spring 2021. Progress was made by IEO on the Argo Online School content (content is almost complete) and after discussions it was decided to host the school on the euro-argo website. The associated Deliverable D7.9 should be ready to be submitted in December 2021. Deliverable associated with the 3D visualisation tool developed by OceanOPS was submitted in June 2021 as planned, and describes the tool and its most recent fonctionnalites. The Deliverable associated with the Argo Use Cases (D7.11) that describes the use cases template and the first use case (“Argo in the Baltic Sea: a breakthrough in monitoring”) written by FMI and E-A ERIC was also submitted during summer 2021 and a second use case on “Argo under ice” is in progress. To progress on highlighting the role of Argo for the MSFD, an online file was distributed by HCMR to Euro-Argo Management Board members in order to collect information at national level to complement the work done for Greece. The associated Deliverable D7.13 is in preparation and should be submitted in December 2021.

Task 7.3 relates to links with key Euro-Argo users. The links with CMEMS have been reinforced, with the signature of a MoU between Mercator Ocean and Euro-Argo that was submitted in July 2021 (D7.5). For C3S/ECMWF, it was agreed in autumn 2021 to formalise the collaboration through a letter of support instead of a MoU, to speed up the process. The letter has been drafted and the associated Deliverable (D7.7) should be submitted to EC in December 2021. No progress was made on links with EmodNET, due to the lack of opportunities to discuss with the appropriate representatives. The associated Deliverable D7.6 will be delayed to early 2022. This task 7.3 also includes a Deliverable on new products developed to better serve the key Euro-Argo user, which is in progress and should be submitted in December 2021.

Work has progressed on educational activities (Task 7.4), with the branding of Ocean Observers (new logo and background image) and refit of the [www.oceanobservers.org](http://www.oceanobservers.org) website during summer 2021. OceanOPS and E-A ERIC also worked with the Ocean Observers WG on the preparation of the 2nd Ocean Observers to be held on 29-30 November and 1 December 2021: a company was selected to help in the technical aspects of the workshop (100% virtual), a call for abstracts was launched during summer and a final programme released in autumn. 132 participants registered to the workshop.

Task 7.5 on the general communication of the Euro-Argo RISE project was presented by Estérine Evrard in a dedicated talk later on the agenda (see 2.11).

A few words were said regarding the next Euro-Argo Science Meeting, to be organised as part of WP7 in 2022, in collaboration with Argo international. The period was selected by Euro-Argo Management Board to autumn 2022 and a call for volunteers to form the organising committee has been sent to the AST-23 some weeks after the General Assembly. Brian King underlined that the co-organisation of the Science Meeting with Argo international will be a great opportunity for Europeans to attend the international workshop. Having more Euro-Argo people in the organisation team will help to build the link between Argo international and Euro-Argo.

As a summary on Deliverables: four deliverables from WP7 were submitted to the EC since last General Assembly, and 6 deliverables are due by the end of 2021: 4 are on track and two will be delayed (MoU with EMODNET and C3S, D7.6 and D7.7 respectively). Several great tools have been developed and links have been reinforced with key stakeholders, and important milestones are expected in the next months/period: the 2nd Ocean Observers workshop, the 8th Euro-Argo Science Meeting and final communication of the project results.

## 2.10 WP1: Project management and 2nd reporting period

Estérine Evrard, Project Manager at Euro-Argo ERIC, presented an overview of the project progress and the plans for the 2<sup>nd</sup> periodic report preparation.

After a reminder of the milestones achieved and deliverables submitted during the reporting period 1 (RP1), details were provided on the status of deliverables and milestones in the second reporting period (RP2). A massive effort from partners was highlighted at the end of December 2021, with 13 deliverables to be submitted.

A view of the meetings (both internal & external) carried out within the period was also provided to the consortium. As the sanitary situation keeps on changing from month to month, a postponement of all the planned external meetings has been done compared to the initial plan, but still with a holding of events in RP2 thanks to the adaptability of the partners.

It was highlighted that this period, marked by Covid-19 pandemic, has seen a slow down of some actions but without major issue as the partners managed to carry out the activities in a different format.

The financial status of the project and associated budget shifts was also provided to the consortium as well as several items on administrative changes. It was also highlighted that a major step for the project will be the review in March 2022, with an action for the coordination to check for any conflict of interest between the consortium and the selected reviewer.

As for the preparation of the periodic report, the steps relying on collaborative documents were presented to the consortium. A particular attention will be devoted to deviations, both on the use of resources or the tasks, to provide all the necessary justifications. This step is new and will be followed-up by the coordination through a dedicated file. The schedule was also provided, with clear deadlines to be achieved, both on technical and financial parts.

As a conclusion, future milestones in 2022 were presented, both for the project itself, but also at the European or international level.

## 2.11 Euro-Argo RISE communication updates and future plans

Estérine Evrard presented the communication actions done during the last 18 months. A particular effort was done to respond to a need for transversal communication within the consortium. A summary news is now being published every 6 months, to highlight the main achievements along the four main pillars (technology, data management, services to users and community enhancement). This summary is also published into the Euro-Argo ERIC website and included in the Euro-Argo ERIC newsbrief to share the results to a large community involved in the ocean observations. In addition to this, communication with the governance and advisory bodies of the Euro-Argo ERIC has started and will be improved during the last year of the project.

Regarding the external communication, a review of the main actions by channels defined within the communication plan was proposed to the consortium, as well as related KPIs. To enhance the dissemination of Euro-Argo RISE results, a Zenodo community was created. The validated deliverables are now referenced properly with a DOI, that appears in the section of deliverables within the project webpage. Partners have also been very active in conferences, workshops to present the results to the community. In addition, 7 publications were published as of November 2021, with many more to come.

Futures conferences of interest were also highlighted, in particular the Argo Science Workshop or the Marine and Inland Waters Research Symposium that will propose a special session for Argo in the Mediterranean Sea. Dimitris Kassis, convener of this specific session, asked for volunteer to present BGC Argo to this event but also stressed to spread the word in each partner's network. Fabrizio proposed some names of contact for BGC Argo in the Mediterranean, such as Laurent Coppola (link with EMSO) or Emanuele Organelli (Data Management for some BGC parameters in the Mediterranean Sea). Sylvie proposed to include the importance of Argo and BGC Argo for the operational users (Copernicus) in this session. The conclusion was to discuss directly with the BGC community to see what makes more sense for this session, as the community of the Symposium will be mainly biologists and environmentalists.

Plans for the communication for the end of the project were presented by Marine Bollard, Communication Officer at Euro-Argo ERIC. Two formats have been defined for the communication

material. Leaflets and video will be prepared for various targets and selected communication channels will enhance the dissemination of the project's results.

A recommendation on the communication for the end of the project was to use the official communication channels of the ERIC. These official channels should also rely on the national programs - that are linked together on Twitter- to target their own stakeholders. In this case, as there will be different languages, subtitles or translations might be needed for the supports chosen and should be planned. This should help engage people if they can hear/read in their local languages.

Marine also plans to define a global strategy once the support are ready to spread the word within each partner's network and have a common and harmonised communication. Sylvie also reminded that the European Commission (DG Research and Innovation, DG MARE, DG DEFIS) has to be considered as one of the main targeted stakeholders. This would also highlight the success of a project managed by an ERIC.

## 2.12 Conclusion

This General Assembly showed that the project is progressing well towards its objectives, committing with the planned documents within the deadlines defined at the beginning of the project as much as possible. During the last year of the project, it is important to start to prepare the follow-up of the project and how the results will be taken onboard by the ERIC itself. It is also important to think on how the activities will be continued through the European and the national contributors of the ERIC.

Sylvie Pouliquen stressed that it is not only important to do things but to make the community aware of all the results and the achievements reached within the project. This last year is important to build on and consolidate on Euro-Argo RISE, within Europe and within the international context. The main challenge of the last year will be to finalise everything so that it can be continued afterwards.

Pedro Velez-Belchi also stressed that with this project, Europe has demonstrated its leadership in a lot of actions, from technical actions to outreach at the international level. We need to think how to keep going with these activities, in the same way the community has been doing in Euro-Argo RISE. A final meeting with invitations of representatives of several DGs of the EC should also help to demonstrate how the European community is organised and what is the benefits of the ocean observations. The example of the FP7 E-AIMS project was discussed: the final meeting was in Brussels, which is a clear asset for the policy officers. Another idea is to have a side event of the Argo Science Meeting (mid October in Brussels) to focus on Euro-Argo RISE with the EC policy officers.

Birgit Klein indicated that this communication aspect towards the EC should be prepared before the end of the project. Birgit asked for experience on this and see what timeline should be defined. Sylvie Pouliquen indicated that calls for 2022 are already written and that calls for 2023-2024 are under definition and discussions. The only unknown variable is the follow-up on the survey from DG MARE on the ocean observations: this is where the ERIC would possibly get a follow-up of MOCCA project. Alan Berry confirmed that something is in the pipeline for the beginning of 2022 : this should be followed carefully. We also need to have an action plan during the first semester of 2022 to take actions.

For WP4, Fabrizio d'Ortenzio highlighted that the Euro-Argo RISE project demonstrated that the BGC community has grown and is well structured at the European level. The critical point for BGC Argo is now maintaining the fleet. The number of BC floats to be deployed in 2022 is still very low with regard

to the targets the community set up. Hervé Claustre reminded some elements on the number of required floats for the OneArgo strategy: 1000 BGC floats, representing 250 floats for Europe, e.g 60 to 70 floats to be deployed per year depending on the duration of the BGC floats. The sustainability of the network through a new BGC project as a follow-up of MOCCA will be essential at the European level.

Sylvie Pouliquen underlined that Euro-Argo could be a good showcase for the lobbying with the EC and this is why the three documents for the strategy, implementation and sustainability of the ERIC are important to work on. Hervé Claustre added that Euro-Argo ERIC is a clear asset for the purchase of the BGC floats. If the centralised option is retained for the BGC organisation, we should also include the costs for the data stream in addition to the purchase of the floats. This is something to be studied in terms of man power and associated costs.

There was a final agreement to present a solution cost effective to the ERIC Council but also to the Commission.

The General Assembly ended with a social event: a contest of the best Euro-Argo RISE picture was proposed. Through an online repository, partners were able to see the proposed pictures and vote for them using the poll feature of the videoconference system. Alan Berry from the Marine Institute was the winner of the contest and get a Tee-shirt to promote the ocean observations.



## 3 Annexes

### 3.1 Annex 1 – Agenda



## GENERAL ASSEMBLY FINAL AGENDA

Date: 18-19 November 2021  
Virtual event

Euro-Argo Research Infrastructure Sustainability and Enhancement  
Project (EA RISE Project) - 824131

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 824131.  
Call INFRADEV-03-2018-2019: Individual support to ESFRI and other world-class research infrastructures





## DAY 1 - Thursday 18 November 2021

Zoom connection link:		
<a href="https://us06web.zoom.us/j/84148386204?pwd=WEFTa2VPbXVYcU5tRTgzSUcyVHJxZz09">https://us06web.zoom.us/j/84148386204?pwd=WEFTa2VPbXVYcU5tRTgzSUcyVHJxZz09</a>		
09:00	Welcome and overview on Euro-Argo RISE progress (WP1)	<b>Sylvie Pouliquen (Euro-Argo ERIC)</b>
09:20 *	WP2 progress and main achievements	<b>Ingrid A. Benavides (BSH)</b> <i>Partners involved: EA ERIC, FMI, IEO, Ifremer, IO PAN, IPMA, NOC, OGS, SOCIB, SU, OceanOPS</i>
09:40 *	WP3 progress and main achievements	<b>Pedro Velez-Belchi (IEO)</b> <i>Partners involved: Ifremer, NOC, OGS</i>
10:00 *	WP4 progress and main achievements	<b>Fabrizio D’Ortenzio (SU)</b> <i>Partners involved: ACRI-ST, BSH, FMI, GEOMAR, Ifremer, NOC, PML</i>
10:20 *	WP8 progress and main achievements	<b>Alan Berry (MI)</b> <i>Partners involved: EA ERIC, BSH, HCMR, IEO, IPMA, NOC, SOCIB, SU, OceanOPS</i>
10:40	Coffee Break	<b>20 min</b>
11 :00	<p><u>Breakout session:</u> Collective brainstorming with Miro (online tool) on 4 questions</p> <p><a href="https://miro.com/app/board/o9J_lmEQk4Y=?invite_link_id=538892683832">https://miro.com/app/board/o9J_lmEQk4Y=?invite_link_id=538892683832</a></p> <p>Questions based on 2 topics :</p> <ul style="list-style-type: none"> <li>● TOPIC 1: How successful is Euro-Argo RISE and how to spread widely the results outside the project?</li> <li>● TOPIC 2: What activities should be pursued, either within the ERIC infrastructure or outside the infrastructure, and how?</li> </ul>	<b>Sylvie Pouliquen / Estérine Evrard (Euro-Argo ERIC)</b>
11:45	Closing remarks for Day 1 - Reminder for Day 2	<b>Sylvie Pouliquen / Estérine Evrard (Euro-Argo ERIC)</b>
<b>12:00 - End of Day 1</b>		

\* **Format: 20 minutes (15' talk + 5' questions)**

## DAY 2 - Friday 19 November 2021

Zoom connection link:		
<a href="https://us06web.zoom.us/j/84148386204?pwd=WEFTa2VPbXVYcU5tRTgzSUcyVHJxZz09">https://us06web.zoom.us/j/84148386204?pwd=WEFTa2VPbXVYcU5tRTgzSUcyVHJxZz09</a>		
09:00 *	WP5 progress and main achievements	<b>Laura Tuomi (FMI)</b> <i>Partners involved: BSH, IMR, IO PAN, NOC, SU</i>
09:20 *	WP6 progress and main achievements	<b>Giulio Notarstefano (OGS)</b> <i>Partners involved: FMI, HCMR, IEO, IO BAS, IO PAN, SOCIB, SU</i>
09:40 *	WP7 progress and main achievements	<b>Claire Gourcuff (Euro-Argo ERIC)</b> <i>Partners involved: FMI, HCMR, IEO, Ifremer, MI, SOCIB, SU, OceanOPS</i>
10:00	WP1: project management and 2 <sup>nd</sup> reporting period	<b>Estérine Evrard (Euro-Argo ERIC)</b>
10:30	Coffee Break	<b>30 min</b>
11:00	Euro-Argo RISE communication updates and future plans	<b>Estérine Evrard / Marine Bollard (Euro-Argo ERIC)</b>
11:20	Concluding remarks	<b>Sylvie Pouliquen (Euro-Argo ERIC)</b>
11:30	Picture contest: votes and prizes	<b>Estérine Evrard (Euro-Argo ERIC)</b>
<b>11:40 - End of Day 2</b> <b>End of the General Assembly</b>		

\* *Format: 20 minutes (15' talk + 5' questions)*

### 3.2 Annex 2 - List of attendees

First name	Surname	Organisation
John	ALLEN	SOCIB
Luca	ARDUINI PLAISANT	E-A ERIC
Kevin	BALEM	Ifremer
Mathieu	BELBEOCH	OceanOPS
Ingrid	BENAVIDES	BSH
Vincent	BERNARD	Ifremer
Alan	BERRY	MI
Marine	BOLLARD	E-A ERIC
Marine	BRETAGNON	ACRI-ST
Phil	BROWNE	ECMWF
Romain	CANCOUËT	E-A ERIC
Thierry	CARVAL	Ifremer
Hervé	CLAUSTRE	SU/CNRS
Christine	COATANOAN	Ifremer
Giorgio	DALL'OLMO	PML
Damien	DESBUYERES	Ifremer
Lara	DIAZ-BARROSO	SOCIB
Fabrizio	D'ORTENZIO	SU/CNRS
Estérine	EVARD	E-A ERIC
Deirdre	FITZHENRY	MI
Antonella	GALLO	OGS
Andrea	GARCIA	Ifremer
Alberto	GONZALEZ SANTANA	IEO/CSIC
Claire	GOURCUFF	E-A ERIC
Quentin	JUTARD	SU
Dimitris	KASSIS	HCMR
Brian	KING	NOC
Birgit	KLEIN	BSH
Arne	KOERTZINGER	GEOMAR
Nathanaele	LEBRETON	SHOM
Edouard	LEYMARIE	SU/CNRS
Antoine	MANGIN	ACRI-ST

Guillaume	MAZE	Ifremer
Malgorzata	MERCHEL	IOPAN
Kjell-Arne	MORK	IMR
Giulio	NOTARSTEFANO	OGS
Atanas	PALAZOV	IOBAS
Etienne	PAUTHENET	Ifremer
Miguel	PIECHO-SANTOS	IPMA
Noé	POFFA	Ifremer
Antoine	POTEAU	SU/CNRS
Sylvie	POULIQUEN	E-A ERIC
Petra	ROIHA	FMI
Emanuela	RUSCIANO	OceanOPS
Carolyn	SCHEURLE	SU/CNRS
Catherine	SCHMECHTIG	SU/CNRS
Simo	SIIRIÄ	FMI
Violeta	SLABAKOVA	IOBAS
Vincent	TAILLANDIER	SU/CNRS
Virginie	THIERRY	Ifremer
Joaquin	TINTORE	SOCIB
Laura	TUOMI	FMI
Luc	VAN DYCK	E-A ERIC
Pedro	VELEZ-BELCHI	IEO/CSIC