



## **Mediterranean and Black Sea workshop report**

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**Euro-Argo Research Infrastructure Sustainability and  
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## Document Reference

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V 1.1	14/07/2021	A. Palazov, V. Slabakova	Added sub-chapter 4.1.2 Black Sea
V 1.2	15/07/2021	D. Kassis	Final check by the Lead Author

## EXECUTIVE SUMMARY

The extension of Argo float coverage to the European Marginal Seas (EMS) is described as one of the strategic targets of the Euro-Argo European Research Infrastructure Consortium (ERIC). Under the framework of Euro-Argo RISE H2020 project and more specifically under WP5 “*Extension towards high latitudes*” and WP6 “*Extension to marginal seas*”, the reinforcement of partnership between the Commission, Member States, Associated Countries, and relevant stakeholders is envisaged for the establishment of a pan-European marine monitoring research infrastructure. Under this aspect, dedicated Argo workshops were undertaken focusing on EMS. Pursued by T 5.2 “*Cooperation with high latitude countries*” and the three tasks of WP6, dedicated to different marginal seas: T 6.1 for the Mediterranean Sea, T 6.2 for the Black Sea and T 6.3 for the Baltic Sea, these workshops attempted to promote Argo activities and actively involve third parties on joint field activities and Argo data exploitation.

In this document, the outcomes of the “*Mediterranean and Black Seas Argo Workshop*” are presented which took place on 8-9 April 2021 and was organized by HCMR (T 6.1 leader), with the help of IO-BAS (T 6.2 leader), OGS (WP6 leader), and Euro-Argo Office. The workshop was held on-line having an unprecedented participation of more than 68 representatives from 20 countries across the Mediterranean and Black Sea regions. During the workshop several aspects of Argo infrastructure were addressed including technical and data issues, best practices on field activities, Argo for environmental policies. Additionally, issues regarding float operation in territorial waters and Exclusive Economic Zones (EEZs), and the expansion of the Argo-User community into the Mediterranean and Black Sea were also raised. The success of the workshop highlighted the need for further effort on Argo extension and outreach, and the support of Argo national initiatives under the umbrella of international cooperation.

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## 1 Introduction – General framework

During the last two decades, the international Argo programme has evolved to an essential component of the global ocean observing system. Its success is based on both the capability of providing unprecedented amounts of cost effective and high spatiotemporal resolution data (Riser et al. 2016), and international cooperation. With regards to the latter, national Argo initiatives contribute to the monitoring array of the global system under international coordination initiatives such as the Argo Steering Team (AST) (<https://argo.ucsd.edu>) and OceanOPS (<https://www.ocean-ops.org/board>). However, the ongoing enhancement and extension of Argo platform into regions that were previously under sampled such as the ice-covered regions and the marginal seas (Jayne et al., 2017) brought up an emerging need for further collaboration between regional scientific communities, agencies, and national marine research infrastructures. The timely adopted strategic plan of Euro-Argo ERIC (Euro-Argo ERIC, 2017) has identified this necessity and described the importance of international cooperation for the monitoring needs of the EMS. Under this aspect, this target has been highlighted amongst the scopes of Euro-Argo RISE project and specified for the EMS under WP6 “Marginal Seas”.

Several activities have been undertaken during the last decade by Euro-Argo ERIC members towards the expansion of the European Argo community with collaboration and partnership. Especially with regards to the Mediterranean, such efforts are ongoing since the SIDERI FP7 project (<https://cordis.europa.eu/project/id/284391>) within the period 2011 – 2013 before Euro-Argo was officially inaugurated as ERIC. During the SIDERI project and under its WP6, the first Mediterranean Argo Workshop was held on 17-18 September 2013 at Crete, Greece, with the participation of 10 scientists from different countries including Cyprus, Israel, Tunis, Lebanon, and Malta. The workshop focused on technical and Argo data issues along with field activities and cooperation practices. In the following years several initiatives have been undertaken by Euro-Argo Mediterranean Members (Italy, Greece, France, and Spain) towards the involvement of surrounding countries (with focus on North African countries) in agreements for common practices and activities, and raise legal issues regarding float operations in territorial waters and EEZs. Furthermore, special sessions have been organised in the framework of the bi-annual Euro-Argo Scientific Workshops (<https://www.euro-argo.eu/News-Meetings/Meetings/Euro-Argo-Users-Meetings>) focusing in the Mediterranean and Black Sea regions. Nevertheless, although contacts with key people from such countries were kept all along this period, the development of partnerships for the extension of the Euro-Argo membership and the expansion of the Argo user community into the Mediterranean has been proved particularly challenging.

Within the Euro-Argo RISE project such activities were further advanced aiming to strengthen international cooperation and reinforce partnership between Member States and third countries. Under this aspect, Euro-Argo RISE WP6 and WP5 partners co-organized a two-day Argo workshop on 8-9 April 2021, which was targeting scientists from countries across the Arctic, Baltic, Mediterranean, and Black Seas. The workshop was organized in two parts: first a plenary session where general aspects of the Argo platform and infrastructure were presented and discussed; second, two sessions dedicated to the different regions (Arctic, Baltic, Mediterranean and Black Seas) focusing on specific needs of each region (Fig. 1).

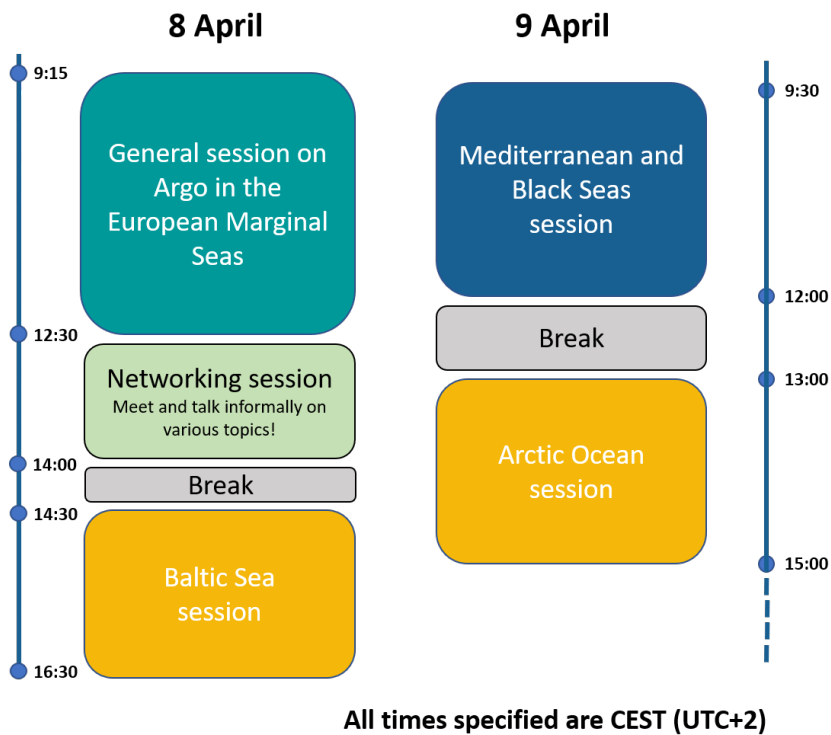


Figure 1. The workshop’s general organization and structure published on-line in February 2021 (<https://www.euro-argo.eu/News-Meetings/Meetings/Others/Mediterranean-and-Black-Seas-workshop>)

The Euro-Argo RISE workshop focusing on the Mediterranean and Black Seas took place on the 9 April 2021 and was co-organised by HCMR, OGS, and IO-BAS. Special attention was given on the approach of many participants and on the interaction with them upon scientific usage of Argo data, technical aspects of the floats, and cooperative activities (Fig. 2). During the workshop the role of Argo towards addressing environmental policies (MSFD, national ecosystems, etc.) and operational monitoring for the society (forecasts, sea-state, sea transport, etc.) was highlighted in order to attract scientists and policy makers from targeted countries, including those of North Africa and Eastern Europe.



Topics of the workshop are presented below.

 <ul style="list-style-type: none"> <li>• Welcome and overview of the organisation</li> <li>• Argo, Euro-Argo RI and Euro-Argo RISE</li> <li>• Argo float and at sea activity (pre-deployment testing, deployment, and recovery of an Argo float)</li> <li>• Parameters acquired (core + BGC)</li> <li>• Data availability/usage, Data flow and QC</li> <li>• Cooperation activities</li> <li>• Synergies and cooperations between Marine RIs</li> <li>• General discussion</li> </ul>	 <ul style="list-style-type: none"> <li>• Welcome and introduction to the Mediterranean and Black Seas session</li> <li>• EA RISE WP6 activities and scopes</li> <li>• Euro-Argo RISE float activities in the Mediterranean &amp; Black Seas</li> <li>• Engage with teams and users</li> <li>• Argo for environment and marine strategy aspects</li> <li>• Link with other RIs/communities</li> <li>• Discussion on future collaboration and cooperation activities in the Mediterranean and Black Seas</li> </ul>
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Figure 2. The workshop's topics published on-line in February 2021 (<https://www.euro-argo.eu/News-Meetings/Meetings/Others/Mediterranean-and-Black-Sea-workshop>)

In this document the workshop's results and outcomes are presented focusing on the Mediterranean and Black Sea component. More specifically, in [chapter 2](#), the organization of the workshop is discussed along with the outreach that was undertaken to attract wide participation and representation from several countries. In [chapter 3](#) the presentations, discussions, and interaction with participants are presented. Finally, [chapter 4](#) presents the outcomes of the workshop along with future activities that the Euro-Argo community should follow after the event.

## 2 Workshop organization

### 2.1 Invitations and outreach

The Mediterranean and Black Seas Argo workshop was initially planned to take place during the first half of 2020 in Greece hosted by HCMR. Invitations were sent before the end of 2019 to contacts from several countries across the Mediterranean and Black Sea regions. The acceptance was relatively warm and the initial planning was a face-to-face meeting that would include a short field session dedicated to an Argo float configuration and deployment in the Cretan Sea. However, the Covid-19 pandemic prevented this planning and the workshop was postponed until there was a clearer picture on travel restrictions. Finally, towards the end of the 2020 it was decided to hold the workshop on-line during 8-9 of April 2021 back to back with the rest of the regional workshops planned in the framework of Euro-Argo RISE project. This outcome, on one hand, had a negative impact especially regarding the interaction with the participants. On the other hand, it helped towards a wider participation. Several teleconference meetings were organized between task 6.1 and 6.2 partners, and the Euro-Argo Office for the planning and timely organization of the event. An outreach campaign started at the end of 2020 when numerous invitation e-mails were sent to scientists and policy makers across countries of the targeted regions. Furthermore, a dedicated webpage was formed by the Euro-Argo Office to host all relevant information regarding the workshop (<https://www.euro-argo.eu/News-Mediterranean and Black Sea workshop report – D 6.5>)



[Meetings/Meetings/Others/Mediterranean-and-Black-Seas-workshop](#)). In February 2021, the preliminary agenda was published on-line along with information regarding the event and a promotional video made by the Euro-Argo Office ([https://www.youtube.com/watch?v=ShbLdaQW9Ug&ab\\_channel=ERICEuro-Argo](https://www.youtube.com/watch?v=ShbLdaQW9Ug&ab_channel=ERICEuro-Argo)). Furthermore, two questionnaires were issued to better know the participants and extract useful information regarding their level of knowledge on Argo infrastructure and usability of Argo data.

The outreach and promotion for the workshop was particularly successful and the acceptance by the Mediterranean and Black Sea marine scientific community exceeded our expectations. By the end of March 2021, 118 people had registered for the plenary session whilst 71 people from 21 different countries were registered for the Mediterranean and Black Seas session.

## 2.2 Agenda and participation

The agenda of the two-day event included several topics of interest (Fig. 3). The first day was mainly dedicated to more general issues such as the Euro-Argo ERIC, the configuration, functioning and capabilities of an Argo float, deployment and recovery activities, Argo data, cooperation and synergies between countries, regional communities, and marine research infrastructures.



Figure 3. The workshop’s agenda published on-line in February 2021 (<https://www.euro-argo.eu/News-Meetings/Meetings/Others/Mediterranean-and-Black-Seas-workshop>)

In the list of registered participants, 109 people registered for the 1<sup>st</sup> day general session whilst the actual participation reached 105 attendees originating from 23 different countries. A large percentage of the attendees also participated on the 2<sup>nd</sup> day dedicated to Mediterranean and Black Sea regions. This session was attended by a total of 67 people mainly originating from countries across the Mediterranean and Black Sea (Fig. 4).

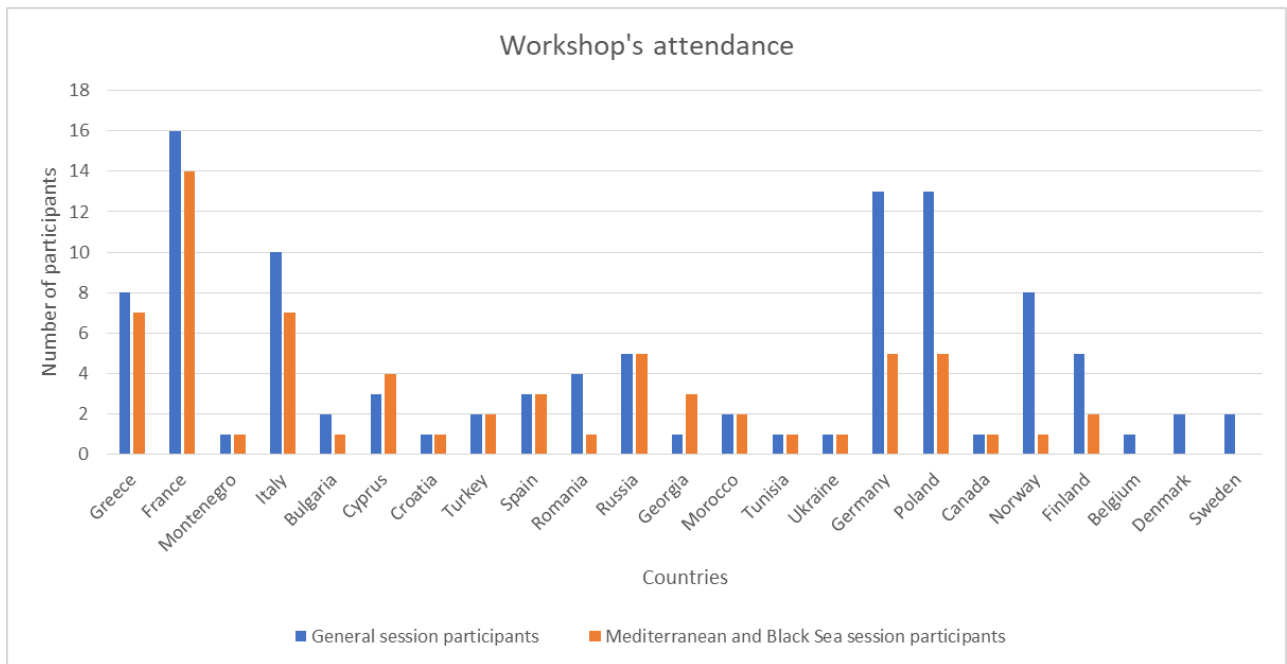


Figure 4. Number of participants per country during the General (blue) and Mediterranean and Black Sea (orange) sessions.

### 3 Workshop proceedings

#### 3.1 Presentations and discussions during the workshop

The workshop started on April 8 after the successful tests performed during the previous day for the identification of possible technical issues on the platform, the connection, the presentations and video displays. Zoom was used as the videoconferencing tool for the whole workshop, in meeting mode. Each session had a dedicated link to allow some extra-time for discussions if needed and avoid overlapping with the second session in the afternoon. This powerful system allowed the attendance of more than 100 simultaneous participants on the first day with no technical issues (network, connection...). Attendees could interact directly with the speakers, either orally (raise hand feature), or through a written comment (chat feature). For the speakers, this tool was an easy platform to share their presentations or various media (videos, animations...). For the organisers, the host controls allowed them to manage the participants and record the event.

To allow social interactions and enable networking between participants, an online networking tool was also proposed during a dedicated session: Wonder. Instructions were sent to the participants before the start of the meeting to help them familiarise with the tool. By connecting through a browser link, people were able to (1) have video conversations, either one to one or in a group, or (2) send written messages to everyone or privately. This tool was chosen in order to re-create informal discussions that people had at face-to-face meetings. The tool was configured first with an ice-breaker question at the entrance that provided a quick snippet-of-info about each attendee (institute and country). Then, attendees were able to navigate in the virtual room and start a conversation with a person of their choice. Five main areas were defined (technology / at-sea activities / discuss

cooperation / Argo data / only for chatting) to give structure to the virtual room and help attendees to find people with the same area of interest.

The first day's general session lasted approximately 3.5 hours including the programmed breaks. The presentations were mainly focused on general aspects of the Argo platform, technical description, field and operational activities, BGC Argo, Argo data, and Argo infrastructure with special focus on the Euro-Argo ERIC and the Euro-Argo RISE project (Figs 5, 6). Furthermore, the cooperation activities both between countries and other European RIs in the marine field such as EMSO ERIC, DANUBIUS RI and ICOS OTC were highlighted.

The first day ended with a general discussion where several issues were raised. The most important ones were: a) foster cooperation between the marine research infrastructures especially with regards to the coastal monitoring and the links with the glider community, b) develop new Argo sensors with focus on the CO<sub>2</sub> and hydrophones, c) enhance the Argo coverage in under-sampled areas and assess the performance of Deep Argo in the Mediterranean.



that connected to the Wonder tool expressed their high level of satisfaction regarding the ease of use and quality of social interactions, even in virtual mode.



**Euro-Argo RISE project**

**Euro-Argo Research Infrastructure Sustainability and Enhancement**

**2019-2022**  
Coordination by Euro-Argo ERIC

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- European Union's Horizon 2020 research and innovation programme
- Grant agreement ID: 824131
- Call for proposal: H2020-INFRADEV-2018-1

**19 partners**  
**13 countries** + manufacturers collaboration

Logos of partner organizations: ACRI, GEOMAR, hcmr, Ifremer, ID-BAS, ipera, Marine Institute, National Oceanography Centre, OGS, PML, Plymouth Marine Laboratory, SOBOLEVA UNIVERZITE, OceanOPS.

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Figure 6. Slide from presentation on Euro-Argo and Euro-Argo RISE by S. Pouliquen and E. Evrard during the general session of the workshop on April 8 2021

The 2<sup>nd</sup> day session focused specifically on the Mediterranean and Black Sea basins. The presentations held during this session were related to Argo activities in these areas, the outcomes from Argo monitoring and the scientific questions that the Argo platform can address. The Euro-Argo RISE float deployments in shallow coastal areas of the Mediterranean and Black Sea were presented (Euro-Argo RISE H2020 project D6.2), and the benefits from cooperative activities and engagement to the Euro-Argo community were underlined (Figs 7, 8). Furthermore, the presenters highlighted the importance of Argo for the enhancement of environmental monitoring and how relevant policies in the Mediterranean and Black Sea can be addressed. Finally, the links with other marine research infrastructures were discussed focusing on regional collaboration and joint activities.

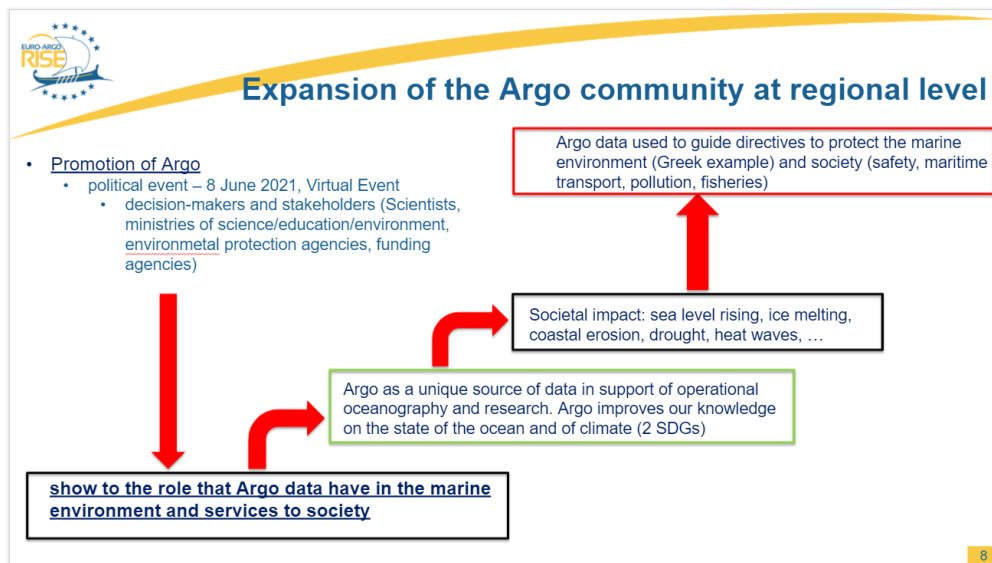


Figure 7. Slide from presentation on Euro-Argo RISE WP6 for the expansion of the Argo community in regional seas by G. Notarstefano during the Mediterranean and Black Seas session on April 9 2021.

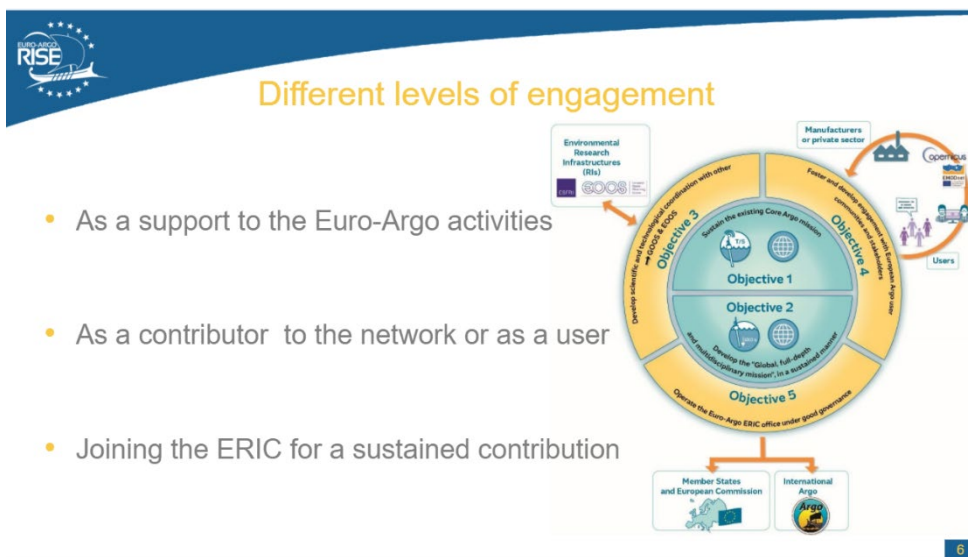


Figure 8. Slide from presentation on engagement of new teams and users by S. Pouliquen during the Mediterranean and Black Seas session on April 9 2021.

From the final discussion, the need for further similar meetings emerged along with the requirement for the organization of joint field activities and focused training sessions both on technical and data issues. The discussion minutes were further analysed in conjunction with the results derived from the two questionnaires which were distributed to the Mediterranean and Black Sea workshop participants prior, and during, the meeting.

### 3.2 Interaction with participants

#### 3.2.1 Real-time polls and discussions

During the 1<sup>st</sup> day General session, an on-line poll took place in order to extract useful information regarding the expertise, knowledge, and interests of the participants. The processing of the data showed that the vast majority of the participants originated from the research and scientific community; however, there were also some representatives from the policy and governance sector (Fig. 9). The main areas of interest amongst the attendees were the Mediterranean and Black Sea which counted 42 answers from a total of 81 votes (Fig. 10).

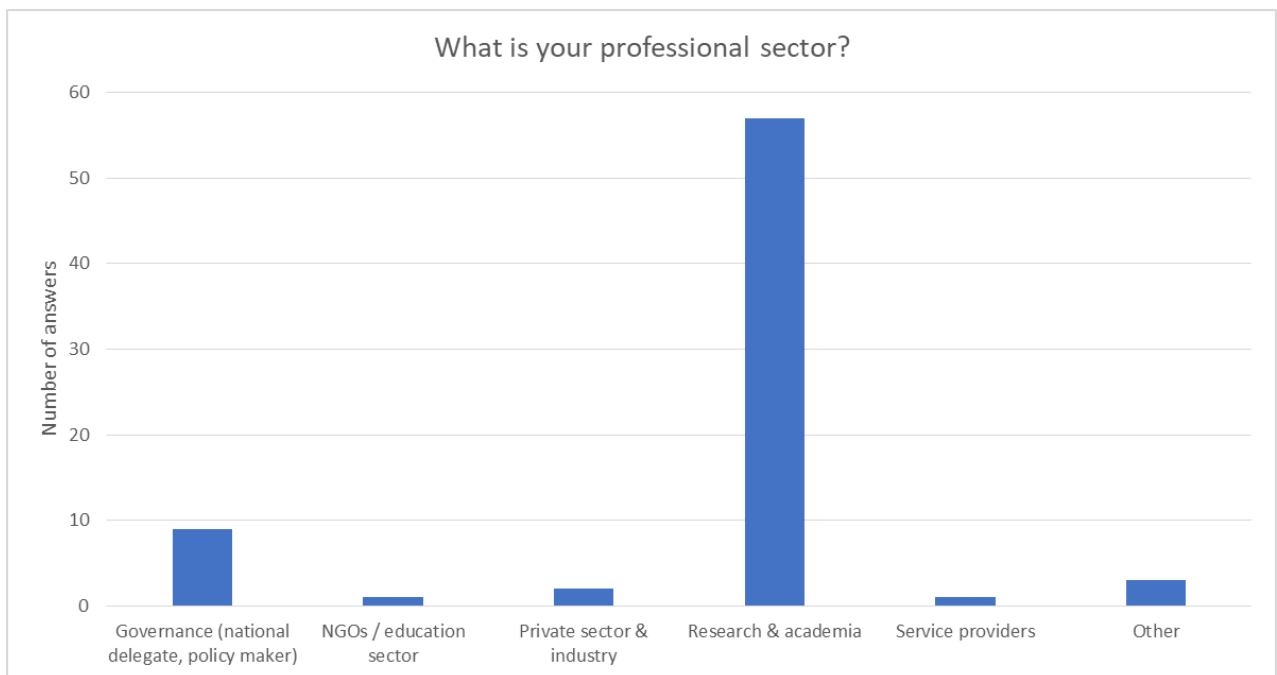


Figure 9. Poll results on the professional sector of the attendees of the General session.

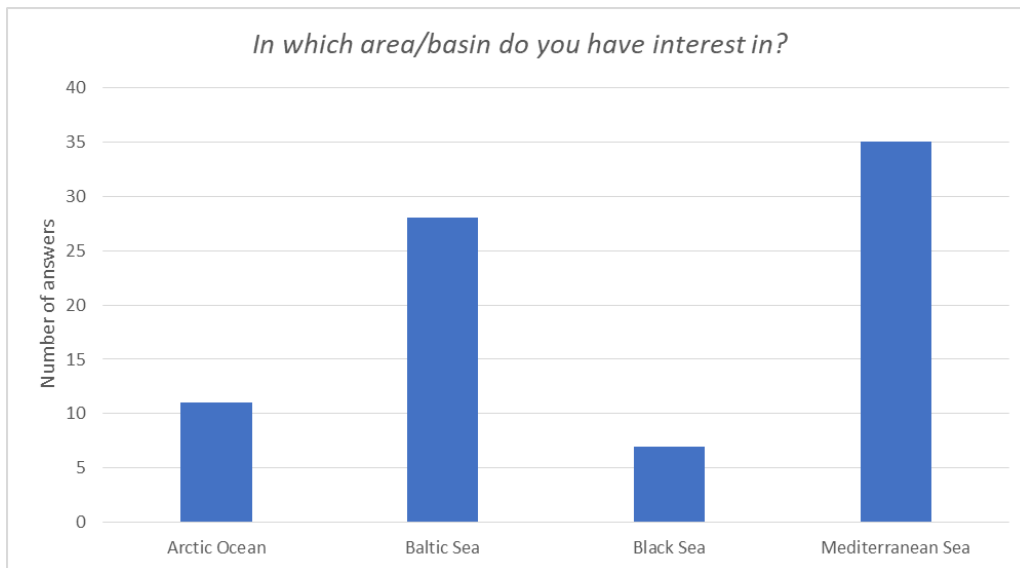


Figure 10. Poll results on the area of interest from the attendees of the General session.

With regards to the services provided by Euro-Argo ERIC, the participants seemed to be primarily aware of the centralized procurement services, and secondarily of the floats monitoring service (Fig. 11). For most attendees, the required support from the Euro-Argo ERIC is mainly on field operations, training, and Argo data (Fig. 12) whilst, new sensors and technology along with data management are amongst the specified needs for training (Fig.13). Finally, for the potential contribution of the participants to the Euro-Argo infrastructure, the field operations along with the enlargement of the national Argo communities received the most positive answers (Fig. 14).

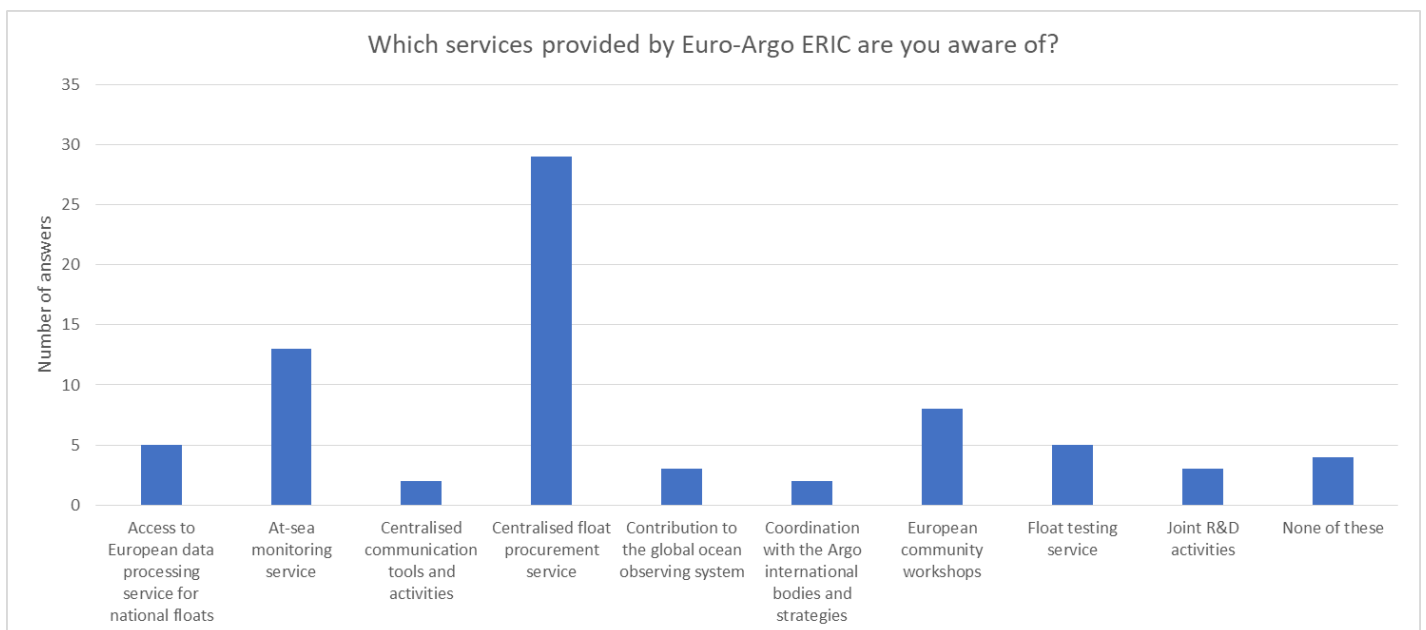


Figure 11. Poll results on the familiarity of the attendees with the Euro-Argo ERIC’s provided services.



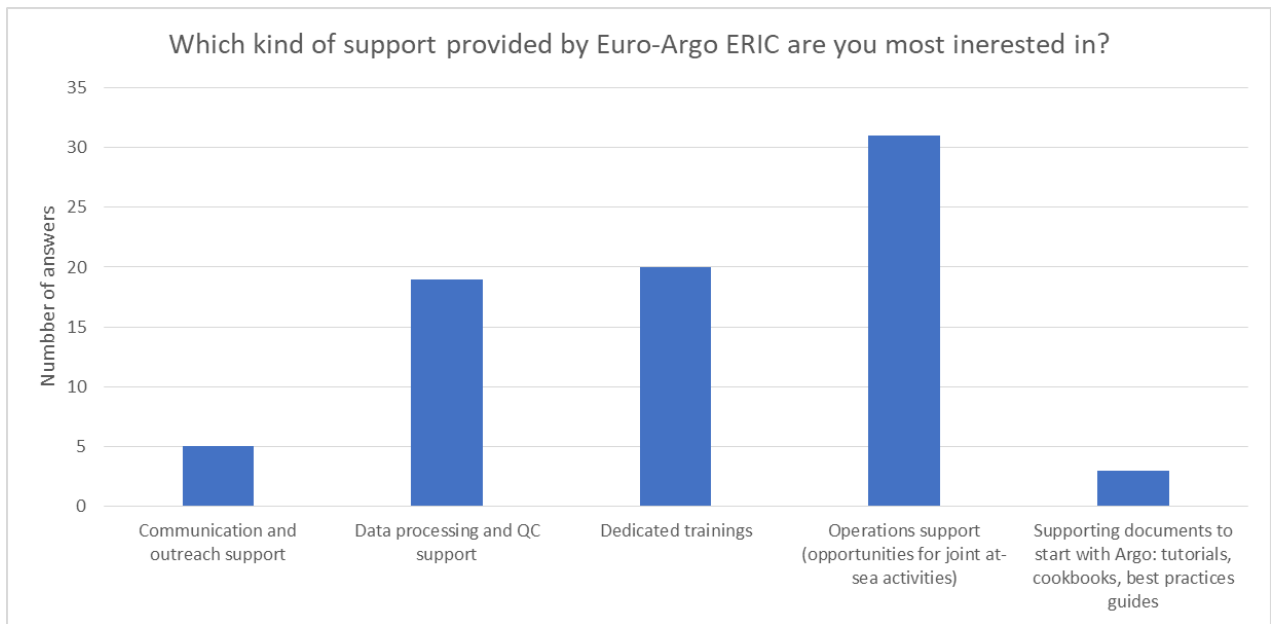


Figure 12. Poll results on the support the attendees require from the Euro-Argo ERIC.

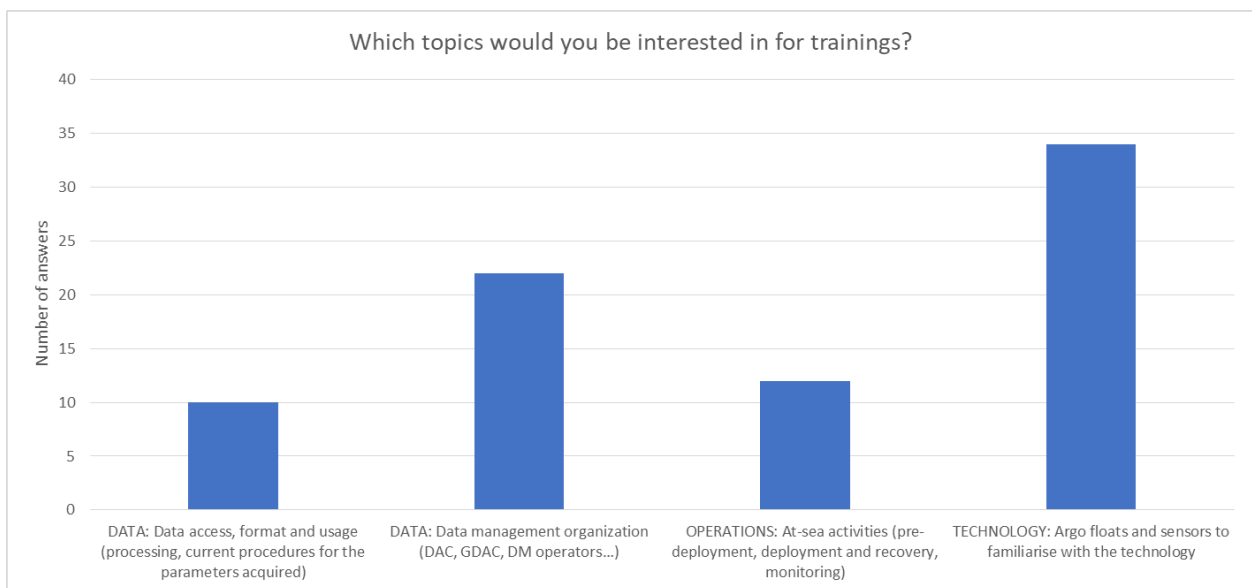


Figure 13. Poll results on the preferable to the attendees topics for training.

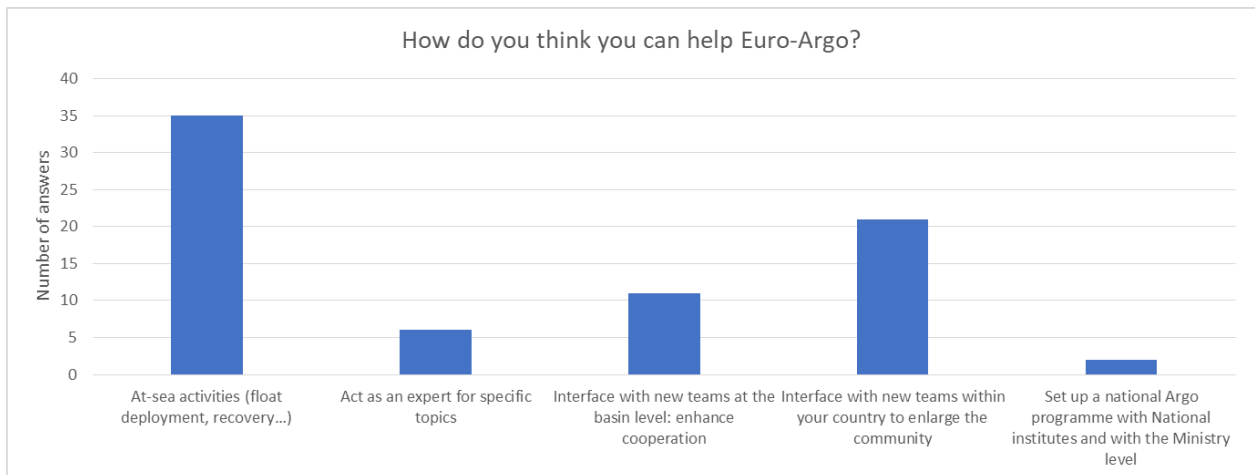
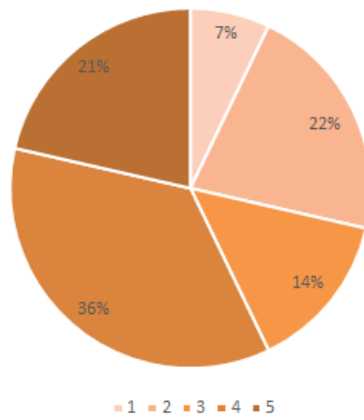


Figure 14. Poll results on the potential contribution of the attendees to the European Argo community.

### 3.2.2 Mediterranean and Black Seas 1<sup>st</sup> Questionnaire results

With focus on the two basins, an introductory questionnaire was distributed to the participants two days before the meeting. The scope of this questionnaire was to identify the level of familiarity with Argo and the importance of Argo monitoring according to the needs of the attendees. The questionnaire was answered by 14 people from 10 different countries (France, Italy, Morocco, Russia, Bulgaria, Canada, Tunisia, Cyprus, Montenegro, Georgia). According to the questionnaire outcomes, it was shown that most people had an advanced level of knowledge both on Argo platforms and the associated datasets (Fig 15). Moreover it was shown that there is an increased need for the expansion of Argo activities at regional level which is expressed by the declared high importance of Argo data both for the participants’ research needs and for their country of origin (Fig. 16). Especially with regards to the impact of Argo data and even more on their necessity, the positive answers (4, or 5 within the scale 1-5) were chosen from more than 2/3 of the participants (Fig. 16).

1. Within the scale 1 – 5 where 1 is “none” and 5 is “very much”, how would you describe the level of your familiarity with Argo platform?



2. Within the scale 1 – 5 where 1 is “none” and 5 is “very much”, how would you describe the level of your familiarity with Argo data?

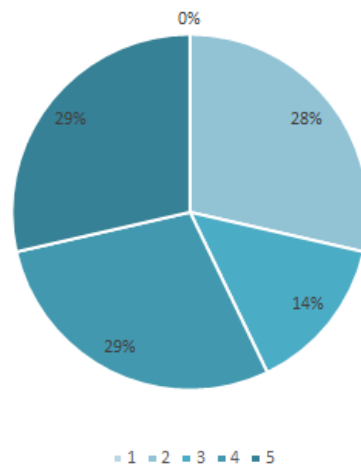
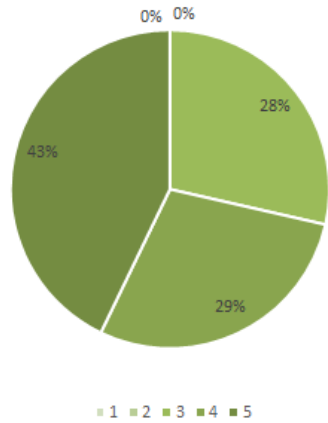
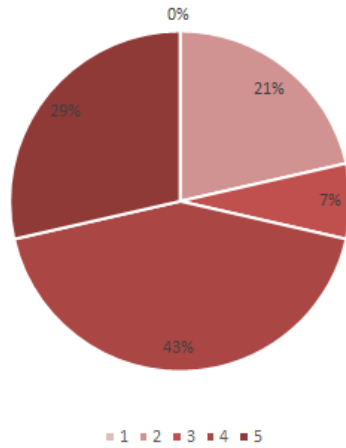


Figure 15. Distribution of answers regarding the familiarity with Argo and Argo data according to the Introductory questionnaire distributed for the Mediterranean and Black Sea Argo workshop.

3. Within the scale 1 – 5 where 1 is “none” and 5 is “very much”, how would you describe the importance of Argo data for your research?



4. Within the scale 1 – 5 where 1 is “none” and 5 is “very much”, how would you describe the impact of Argo activities regarding the research in your Country?



5. Within the scale 1 – 5 where 1 is “none” and 5 is “very much”, how much do you use Argo data for your research and scopes/work?

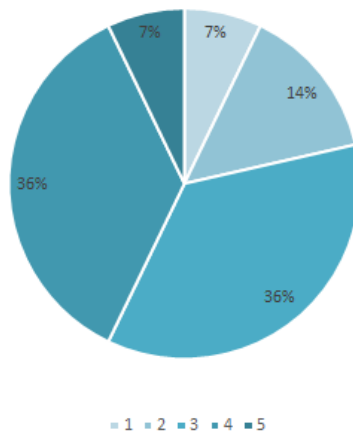


Figure 16. Distribution of answers regarding the importance of Argo data, Argo activities, and Argo data usability according to the Introductory questionnaire distributed for the Mediterranean and Black Sea Argo workshop.

Further related to Argo data, the question on the data access point was answered with positive feedback; participants mainly referred to the Coriolis system and secondarily to the Copernicus Marine Environmental Monitoring System (CMEMS). On the research thematic fields where Argo data could be useful, both for individual research and national research needs, the answers varied in many fields such as: a) identification of dense water formation events and mixing processes, b) validation of numerical models, c) biogeochemical observations and ecosystem assessment, and d) surface and intermediate current circulation. On the important parameters measured by Argo floats, along with temperature and salinity, the Biogeochemical (BGC) data were mentioned by the majority of the participants and parameters such as dissolved oxygen, fluorescence, CO<sub>2</sub>, and pH, received many preferences. Specific geographical areas of interest were also mentioned apart from Mediterranean and Black Sea. Those were namely: a) the Eastern Mediterranean, b) Levantine basin, c) Algerian Basin, d) the Tunisia - Sicily & Sardinia Channels, e) the south Adriatic, and f) the north-western Africa region. Furthermore, there were also answers indicating interest in areas of boundary currents and global oceans.

### 3.2.3 Mediterranean and Black Seas 2<sup>nd</sup> Questionnaire results

At the end of the workshop a second questionnaire was distributed to the participants. The scope of this questionnaire was to assess the workshop's success and identify the future needs for further communication and know-how transfer between the scientists and policy makers in the Mediterranean and Black Sea. Some of the questions were related to the first questionnaire for the identification of possible progress on knowledge gaps that existed before the workshop. Another group of questions focused on recommendations and requirements from the Euro-Argo community. The questionnaire was answered by 10 people from 8 different countries (Italy, Morocco, Cyprus, Montenegro, Georgia, Poland, Croatia, and Turkey). Although the participation in the 2<sup>nd</sup> questionnaire was relatively limited compared to the number of attendees, its results indicated that the workshop had a very positive impact on the participants. More specifically, on both the questions related with the level of satisfaction from the workshop and the relevance of its topics, 8 out of 10 participants were very satisfied (Figs. 17 & 18). Similar results were recorded regarding the evaluation of the level of presentations and discussions during the workshop where 9 and 7 of the answers were very positive accordingly (Figs. 19 & 20).

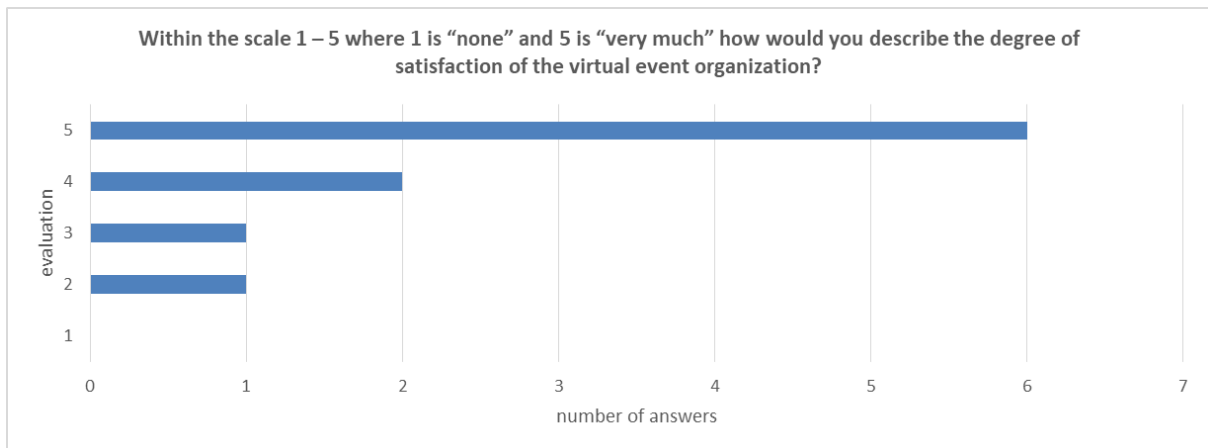


Figure 17. Distribution of answers regarding the participants’ degree of satisfaction regarding the Mediterranean and Black Sea Argo workshop.

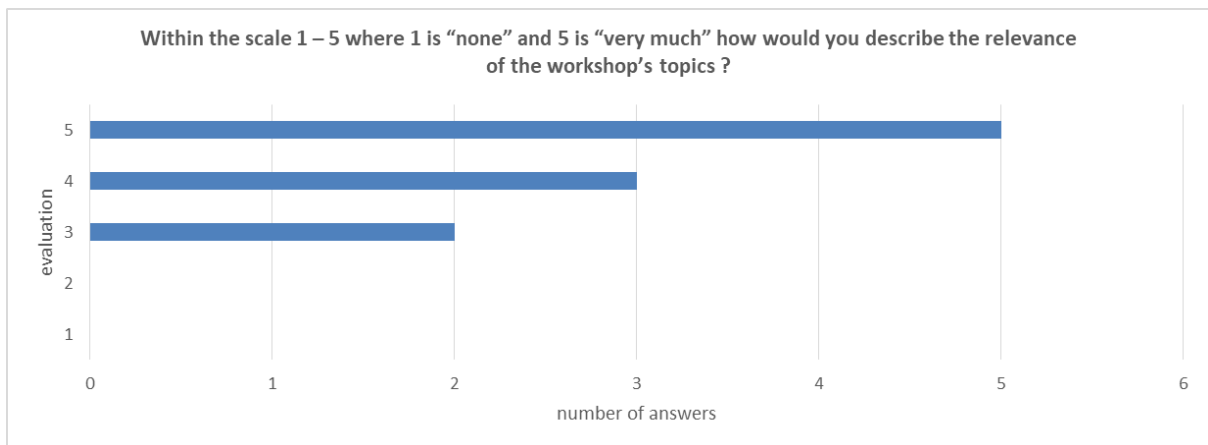


Figure 18. Distribution of answers regarding the participants’ opinion on the relevance of the topics addressed in the Mediterranean and Black Sea Argo workshop.

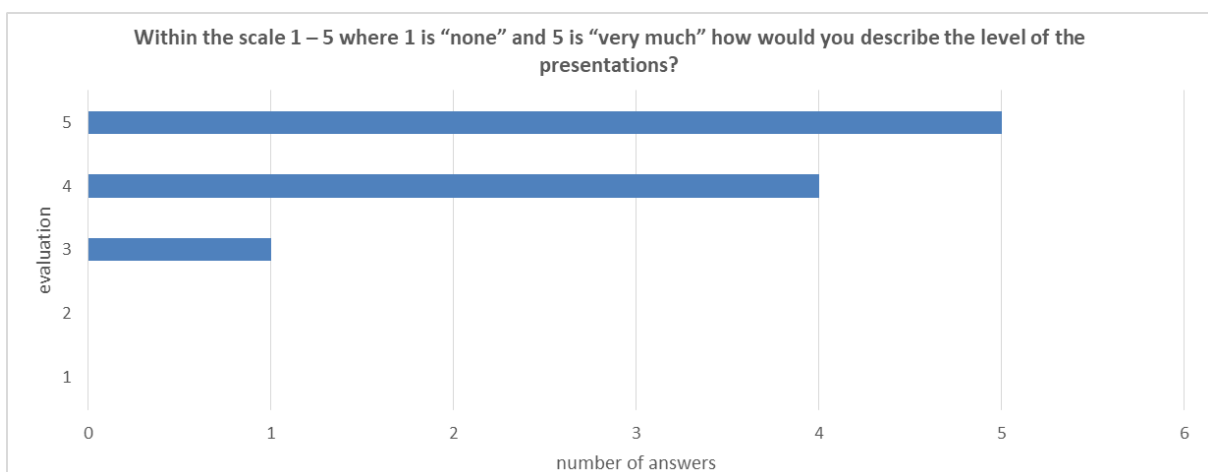


Figure 19. Distribution of answers regarding the participants’ evaluation on the level of presentations in the Mediterranean and Black Sea Argo workshop.

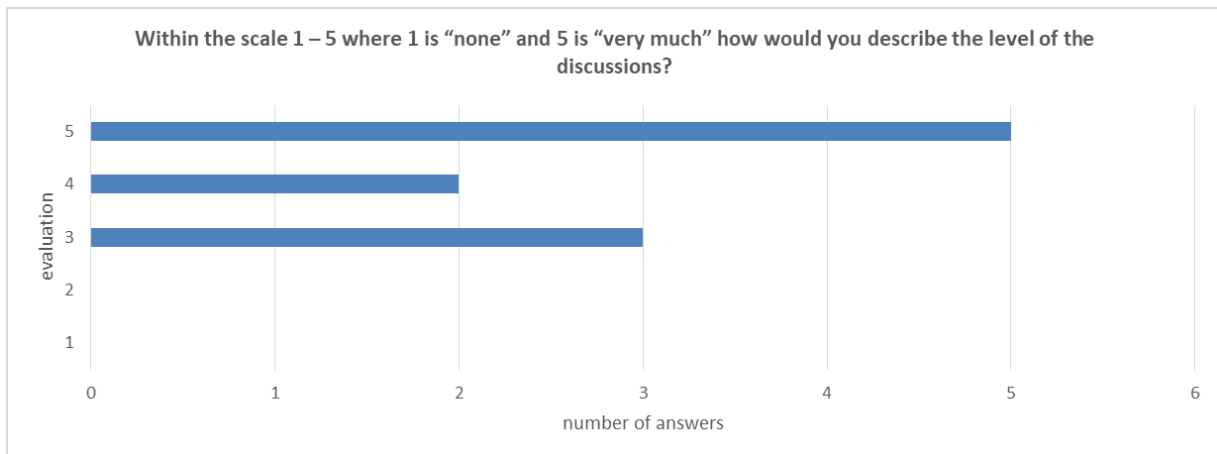


Figure 20. Distribution of answers regarding the participants' evaluation on the level of discussions during the Mediterranean and Black Sea Argo workshop.

The questionnaire included a question on the suggestions from the participants for future Argo meetings. The answers varied and included suggestions for workshops dedicated to more applications and use cases of Argo data, particularly BGC, field activities, seminars on how to help new countries to start national Argo programs and infrastructures, data availability and usage, synergies between Argo science and societal benefits/policy regulation, strengthening of the Argo community in the Black Sea. Finally, almost all participants answered that they would like to receive further information regarding Argo.

## 4 Main outcomes and future activities

### 4.1 Workshop outcomes

#### 4.1.1 Mediterranean Sea

For the Mediterranean Sea the experience from the Mediterranean and Black Sea Argo workshop can be characterized as particularly positive. The wide participation from the Mediterranean community which represented more than 40% of the total number of participants of the general session, along with the increased interest in the Mediterranean region, underlined the importance of Argo activities in this basin. The discussions held during and after the presentations highlighted the increased interest in Argo data and new technologies/sensors especially regarding biogeochemical parameters. In relevance with the latter aspect, extended discussions were made on the implementation of European and Intergovernmental policies and agreements related to the ecosystem functioning and preservation. Especially with regards to the Marine Strategy Framework Directive (MSFD), participants from EU countries showed much interest in how Argo could contribute more on the description of the Good Environmental Status (GES). Apart from the parameters, the geographical monitoring gaps were also discussed focusing on both coastal sub-basins and deep plateaus. Another important aspect of the workshop was the warm atmosphere between the participants and the willingness for cooperation especially on field activities. However, it was also shown that there is still much effort needed for the

building of a solid Mediterranean Argo community with increased interaction and cooperation. The fact that many new countries were represented at the workshop (i.e. Croatia, Montenegro, Turkey, Tunisia, Morocco) creates a large potential for the enlargement of the Argo community in the region however, some of the targeted countries were not represented although efforts were made to attract representatives especially from the North African countries of the Eastern Mediterranean. Furthermore, issues related to jurisdiction of national waters and EEZs were only superficially discussed since these are issues related to policy makers and governmental offices.

Summarizing, the workshop was very successful in relation to the Mediterranean community. It revealed a great potential for cooperation and Argo extension in the region. There were requests for participation in joint proposals, projects and activities and the continuation of similar initiatives on behalf of Euro-Argo with more thematic workshops in the near future. Finally, an especially positive outcome that followed the workshop was the interest expressed to HCMR by Dr. M. Josephides (Department of Fisheries and Marine Research (DFMR) & Argo National Focal Point – Cyprus) to join and support the Euro-Argo program activities starting from the first two stages that include float deployment and facilitation of floats. The request was forwarded to the Euro-Argo office and official discussions have started on this request. A similar approach was made by the Croatian representative Dr. Hrvoje Mihanovic who requested constructive discussion in collaboration with the Euro-Argo ERIC.

#### 4.1.2 Black Sea

The Mediterranean and Black Sea Argo workshop was very successful in relation to the Black Sea community. It was attended by 12 participants from all Black Sea countries (Bulgaria -1; Georgia -3; Romania-1; Russia-5; Turkey-2). The discussions held during and after the presentations highlighted the importance of Argo data in the Black Sea where the national research and monitoring programs of the riparian countries for the last several decades do not provide the required amount of data needed to evaluate and forecast the state of the Black Sea. This is especially valid for the deep parts of the sea, where the data collection is difficult and expensive. All participants expressed interest in biogeochemical Argo observations in the Black Sea. Additionally, the Argo data gaps were discussed mostly focusing on the coastal and shelf regions of the north-western Black Sea.

The workshop showed a substantial potential for regional cooperation for floats' deployment and recovery in the Black Sea. Especially positive outcome that followed the workshop was the interest expressed from the Istanbul University by Dr. Tülay Çokacar to join and support the Euro-Argo program activities in the Black Sea.

## 4.2 Future planning

The workshop's wide acceptance and success creates a fertile ground for similar initiatives in the near future and underlines that the Euro-Argo community should lead relevant activities for the strengthening of the Argo component in European and neighbouring countries, and promoting cooperation activities in regional seas. In relation to the short term planning, the workshop acted as a springboard for two major events organized within the framework of Euro-Argo RISE. One month after the workshop, the open on-line event "Cooperation Framework Between Marine Research



Infrastructures” under the EuroGOOS 2021 Conference took place, co-organized by Euro-Argo RISE WP8 and Euro-Argo Office whilst, a month later the Euro-Argo political event took place under the framework of Euro-Argo RISE WP6. Both events were largely promoted by the Mediterranean and Black Seas Argo workshop and were benefited by the workshop’s momentum.

In general, the workshop’s proceedings, along with the discussions and questionnaires’ results, have shown an increasing need for more training sessions and joint field activities. Under this aspect, the next five-year planning of Euro-Argo should include Argo regional training sessions in both technical and data topics. Furthermore, targeted field activities should be organized amongst Euro-Argo members and scientists from third countries. Such planning will serve the need for developing new collaborations and enlarging the Argo community. Moreover, it will enhance the Argo coverage and highlight its importance for operational oceanography, climate studies, scientific research, and environmental monitoring.

### 4.3 Conclusions

Although Argo floats are widely used in the global oceans’ oceanographic research for more than 20 years and for more than a decade in regional seas, the familiarity of scientists and especially policy makers with the Argo platform and infrastructure remains at relatively low levels. However, at a European regional scale, the oceanographic communities are showing an increasing interest in the Argo platform mainly due to the efforts of the Euro-Argo community. The Argo regional workshops held under the framework of Euro-Argo RISE project, have confirmed this interest and strengthened the links and relations with scientists and policy makers from European, Asian, and African Countries across the EMS. Especially the Mediterranean and Black Seas Argo workshop has received a large acceptance and initiated fruitful discussions amongst scientists and policy makers of these regions. Future collaborations have been established between the latter and Euro-Argo community whilst similar activities are envisaged in the near future that will include further training and float deployments for the establishment of a solid ground towards an integrated operational oceanographic monitoring of the EMS.

## 5 References

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