EURO-ARGO
Research Infrastructure

ANNUAL ACTIVITY REPORT
2017

ANNUAL ACTIVITY REPORT 2017

PREFACE

Welcome to the 2017 annual report of the Euro-Argo ERIC. In its fifth year, the Euro-Argo ERIC continues and increases its successful contribution to the international Argo programme. We would then like to congratulate the partners and the ERIC members for the 2017 achievements.

As you will read in this report a lot of activities have been conducted concerning the network implementation this year. Euro-Argo deployed indeed 27% of the whole fleet and operates more than 20% of the fleet moving gradually towards its 25% target.

Furthermore Euro-Argo ERIC has set up a new service so that Members/Observers can procure standard or Deep rated float depth for Temperature and Salinity through the ERIC.

Another auspicious development is the rise of European projects, in particular the DG MARE/MOCCA and H2020/ AtlantOS projects. Both projects are developing very well with deployments that are nearly successfully completed. MOCCA provides, in particular, an excellent demonstration that the Euro-Argo
ERIC can deploy and organize the processing of a large fleet of floats (150) on behalf of the EU (DG MARE). On the other hand Euro-Argo participated to the 3rd AtlantOS General Assembly as coordinator of the Argo task within the "Autonomous Platforms" work package. The goal of this task is first to demonstrate the importance of Deep and Biogeochemical extensions to the Atlantic Integrated Observing Network and to contribute to the strategy for a sustained observing system in Atlantic. In the frame of the AtlantOS H2020 project, the Euro-Argo ERIC is in charge of the procurement, logistics, deployment and data monitoring of 6 Deep (4000 dbars) and 7 Biogeochemical floats to enhance the growing associated extensions of the Global Argo Programme.

In 2017, a number of workshops about data management issues took place. Very fruitful discussions between all participants allowed moving towards the same goal: to provide the best possible Argo quality data, both in real time for operational activities and in delayed mode for climate and scientific studies, this not only for temperature and salinity but also for the 6 Biogeochemical parameters endorsed by BGC Argo.

Finally two great news: The Euro-Argo ERIC welcomed Spain as a new member in 2017 and is welcoming Bulgaria in 2018, which will allow in particular strengthening the Mediterranean and Black Seas contributions to the Euro-Argo programme.

We hope that you will enjoy reading this new annual report and learning more about the detailed activities of the Euro-Argo ERIC.

Jean-Marie FLAUD
Chair of the Euro-Argo ERIC Council

EXECUTIVE SUMMARY

In early 2017, Euro-Argo welcomed Spain as a new member and achieved a total of 11 partners, 9 members and 2 observers.

The ERIC Office team is now composed of five persons funded by the ERIC. Two Council meetings were held, in March and November (in Paris, France) and three Management Board meetings, in March (in Sopot, Poland), July (in Paris, France) and October (in Dublin, Ireland).

In 2017, the main activities of Euro-Argo included: management of the ERIC, coordination of float deployment and float monitoring, preparing the new phase of Argo, enhancing communication and outreach, and organizing the work of the ERIC for the EU projects where Euro-Argo is involved.

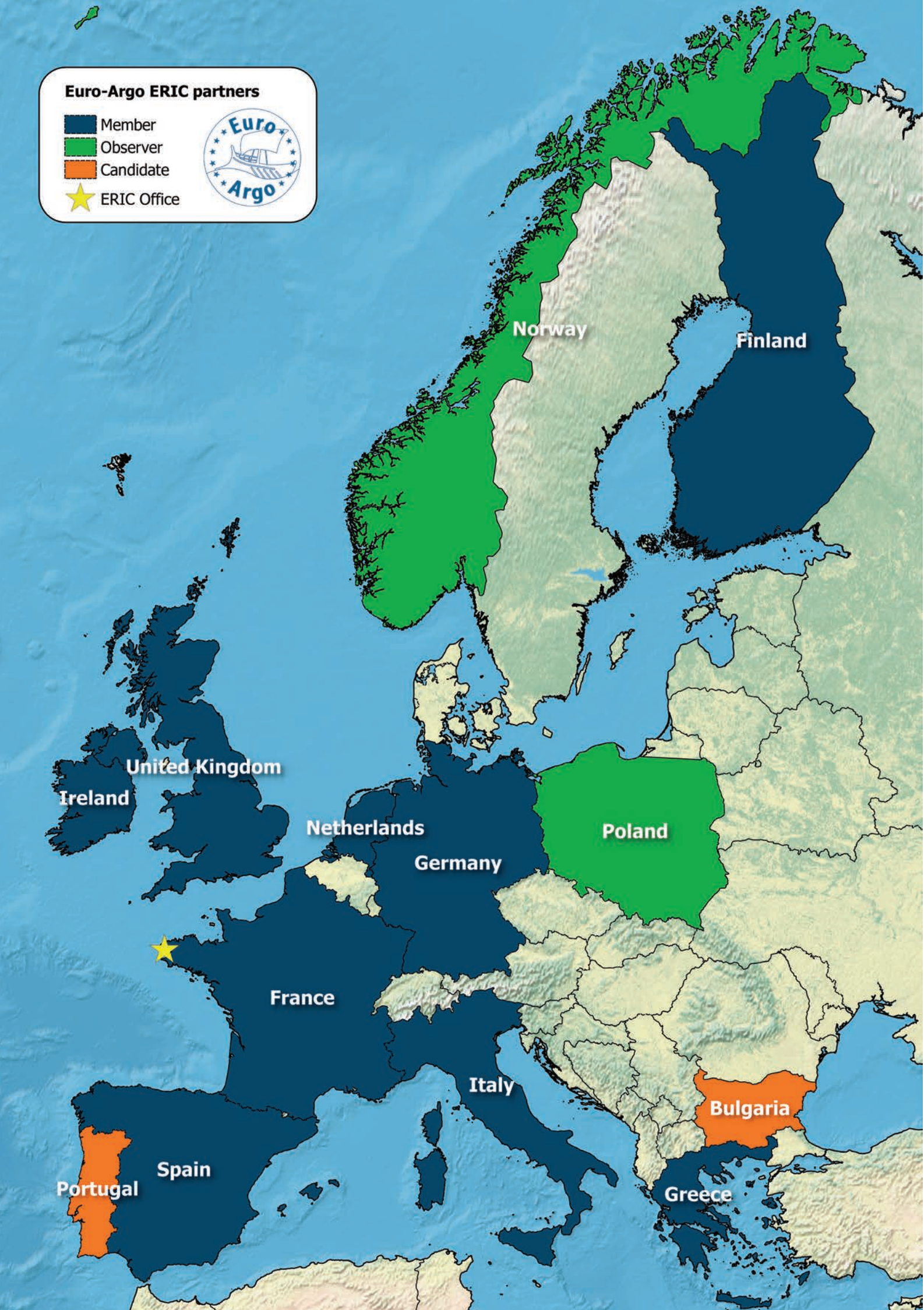
284 floats were deployed in 2017, among 1068 floats for the whole Argo international programme. This corresponds to almost 27% of the total effort which is an excellent achievement partly related to MOCCA contribution. In terms of number of operating floats, Europe is at about 21% (797 floats) of the international effort and thus not yet at (but close to) its initial target of 25%.

Since this year, a new procedure has been set up so that the ERIC can procure floats on behalf of Euro-Argo ERIC members. Following a contract signed with NKE Instrumentations in July 2017, letters of agreement (LoA) were signed by all institutes that wanted to procure floats through the ERIC and a first order was made on September 2017 for 27 floats (3 for Poland, 16 for Italy, 4 for Netherlands and 4 Ireland).

Euro-Argo activities within European projects (MOCCA, AtlantOS, ENVRIplus) are progressing well. The MOCCA project is progressing as planned and despite a few technical problems (pressure sensors, GPS signals), the MOCCA fleet is working very well.

During 2017, special efforts have been made on communication activities (brochure, news briefs, new website) with a strong participation to international exhibitions or conferences all around the world, leading to a higher level visibility of Euro-Argo.

As for budget execution, the Euro-Argo ERIC has finished year 2017 with a positive balance of about 82K€. This is due, in part, to the 177K€ contribution that the ERIC received in 2017 for staff funding through the EU projects.


Euro-Argo ERIC partners
Member
Observer
Candidate
ERIC Office
Euro
Argo
Norway
Finland
United Kingdom
Ireland
Netherlands
Germany
Poland
France
Italy
Bulgaria
Spain
Portugal
Greece

1 MAIN OPERATIONAL OUTCOMES IN 2017

1.1 Euro-Argo ERIC partners

On the 1st of January 2017, Spain has become a new member of the Euro Argo ERIC. An adherence letter following written approval from all council members was signed by the Spanish ministry of research, the chair of the Council and the programme manager. Euro-Argo ERIC statutes were updated accordingly.

The Spanish Institute of Oceanography (IEO) and the Balearic Islands Coastal Observing and Forecasting System (SOCIB) are the representatives of Spain in the governance bodies of Euro-Argo ERIC ensuring the commitments that imply for Spain to participate as a full member of the Euro-Argo ERIC.

Joaquin Tintoré (Director of SOCIB) represents Spain in the Council and Pedro Vélez-Belchí (Coordinator of the Spanish contribution to Argo and researcher at IEO) in the Management Board.

Spain has contributed to the Argo observation network since the beginning of the European contribution in 2002. Currently, the Spanish contribution to the Argo network includes a fleet of 10 active floats distributed between the Atlantic Ocean and the Mediterranean Sea. The IEO and SOCIB have secured a minimum of 6 floats per year deployed for the next 5 years.

ARGO Spain website
http:/www.argo.oceanografia.es

Argo-España
Parte de la estrategia global de observación del océano

Figure 1: Euro-Argo Eric partners in 2017

1.2 Euro-Argo ERIC Office team

The ERIC Office team is now composed of five persons funded by the ERIC, with a Programme Manager (Sylvie Pouliquen), an Administrative Assistant (Francine Loubrieu), a Programme Engineer (Grigor Obolensky), an Operational Engineer (Romain Cancouët) and a Science Officer (Claire Gourcuff).

Figure 2: The team at Euro-Argo ERIC office in Brest, France, in 2017. From left to right: F. Loubrieu, C. Gourcuff, R. Cancouët, S. Pouliquen, G. Obolensky

1.3 Management of the Euro-Argo ERIC

In 2017, the Euro-Argo ERIC worked along six main activities:

- Management of the ERIC;
- Coordination of Euro-Argo float deployments and float monitoring activities;
- Strategy and implementation plan for Euro-Argo including Argo extensions to BGC (Biogeochemistry), Deep and marginal seas;
- ERIC activities in EU projects (MOCCA, AtlantOS and ENVRIplus);
- Communication and outreach;
- Continuing seeking for additional long-term support from the European Commission.

Two Council and three Management Board (MB) meetings were organized during the year, as well as the annual STAG meeting:

- The **9th MB meeting** in Sopot (Poland) on 2-3 March;
- The **7th Council meeting** on 28 March in Paris;
- The **10th MB meeting** in Paris on 3-6-7 July;
- The **2nd STAG meeting** in Paris on 6 July;
- The **11th MB** meeting, in Dublin (Ireland) on 25-26 October, where Birgit Klein (BSH, Germany) and Diarmuid O' Conchubhair (Marine Institute, Ireland) were respectively elected as Chair and vice-Chair of the Euro-Argo ERIC Management Board for a period of three years. Birgit replaces Pierre-Marie Poulain (OGS, Italy) and Diarmuid replaces Hartmut Heinrich (BSH, Germany) who is now retired.
- The **8th Council meeting** on 16 November 2017 in Paris, during which Jean-Marie Flaud and Alessandro Crise were respectively elected as Chair and vice-Chair of the Euro-Argo Council.

Figure 3: (top) Jean-Marie Flaud (MESR, France), new chair of Euro-Argo Council and (bottom) Alessandro Crise (OGS, Italy) new vice-chair of Euro-Argo Council

Figure 4: Pierre-Marie Poulain (OGS, Italy) former chair, Birgit Klein (BSH, Germany) new chair, Diarmuid O'Conchubhair (MI, Ireland) new vice-chair of Euro-Argo Management Board.

1.4 Float procurement and deployment: status and plans

1.4.1 Euro-Argo ERIC Purchases floats for its members

In the continuity of the AtlantOS project in the frame of which the Euro-Argo ERIC Office has set up a pluri-annual call for tender for Deep and Biogeochemical floats, the Euro-Argo ERIC Office has opened in 2017 an individual open European call for tenders to allow its members to purchase standard T&S floats, with two optional features: integration of a dissolved oxygen optode including in-air measurements, and implementation of an ice-avoidance algorithm for floats intended to be deployed in partially ice-covered areas.

Several manufacturers answered to this four years framework contracting call, and finally the French NKE Instrumentations company was awarded with their Arvor Iridium floats. For floats purchased through this contract, Euro-Argo Office technical team proposes to its members to deal with the inbounding logistics (follow-up of the manufacturing process, delivery dates, coordination of the telecommunication contracts opening), to handle the acceptance tests in the IFREMER testing facilities (sea-water basin for real profiling down to 20 meters) and finally to ship the material either to the purchasing institutes,

or directly to the deployments ports of call. For the four years to come, two purchasing periods will be proposed, one in the beginning of calendar year, one during summer to fulfil the deployment plans of Euro-Argo ERIC members, and also to accommodate with the various financing constraints for each purchasing institute. The first batch has been ordered in September 2017, for a total number of 27 floats.

BATCH	LOT	COUNTRY	N° float	TYPE AND OPTIONS
2017_ORDER1	1	IRELAND	4	T/S
2017_ORDER1	1	ITALY	13	T/S
2017_ORDER1	1	ITALY	3	T/S + DO
2017_ORDER1	1	NETHERLANDS	4	T/S
2017_ORDER1	1	POLAND	2	T/S + ISA
2017_ORDER1	1	POLAND	1	T/S + DO

Table 1: First batch for the common call for tender for T/S floats + optional ISA (Ice Sensing Algorithm) and DO (Dissolved Oxygen) in 2017.

1.4.2 Contribution to the Argo international programme

The geographical repartition of Euro-Argo national contributions in 2017 is shown per countries in Figure 5, and European deployments for 2017 are compared to the global ones in Figure 6.

1.4.3 Implementation of the Euro-Argo strategy for the next decade

Euro-Argo has started to implement the new phase of Argo, following the "Strategy for evolution of Argo in Europe" (Euro-Argo ERIC, 2017[1]). This reference document, which will be revised regularly to consider both technological developments and the international Argo strategy, provides recommendations on Argo floats deployments, including insights on the European contribution to the core-Argo programme, and targets in terms of number of floats to deploy for the new components of Argo Biogeochemical, Deep Argo, marginal Seas, high latitudes).

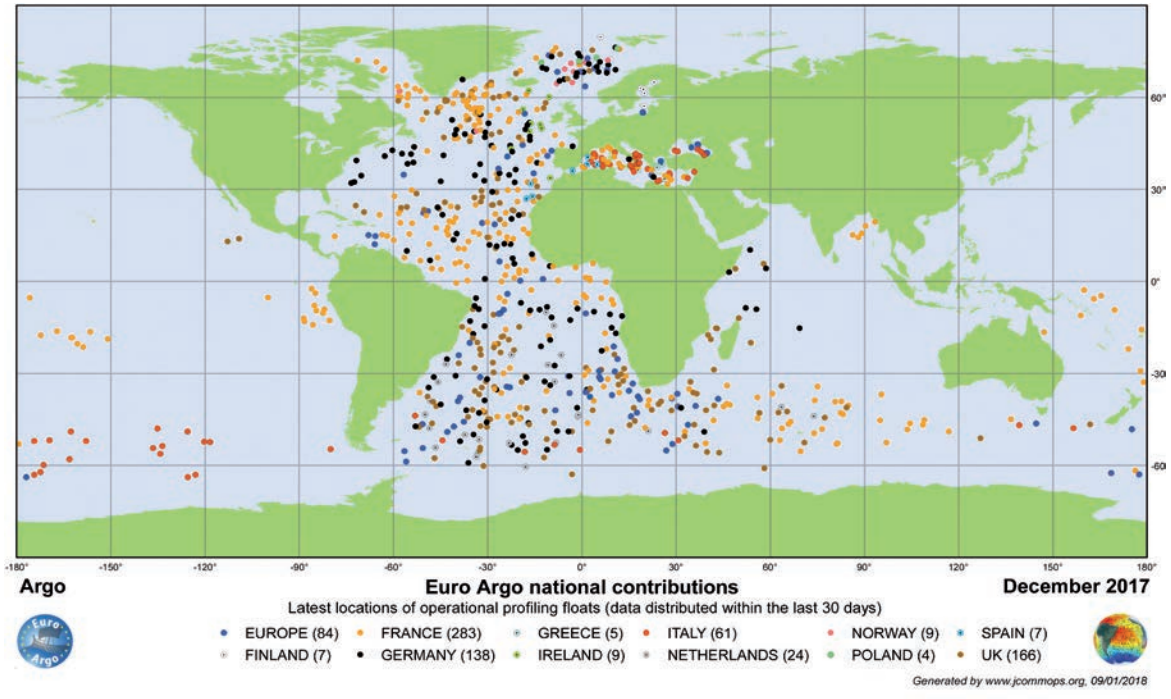


Figure 5: Euro-Argo national contributions per country: 797 active floats among the 3081 active floats, about 20% of the network (©Jcommops/AIC)

[1] Euro-Argo ERIC (2017). **Strategy for evolution of Argo in Europe**. EA-2016-ERIC-STRAT. *http://doi.org/10.13155/48526*

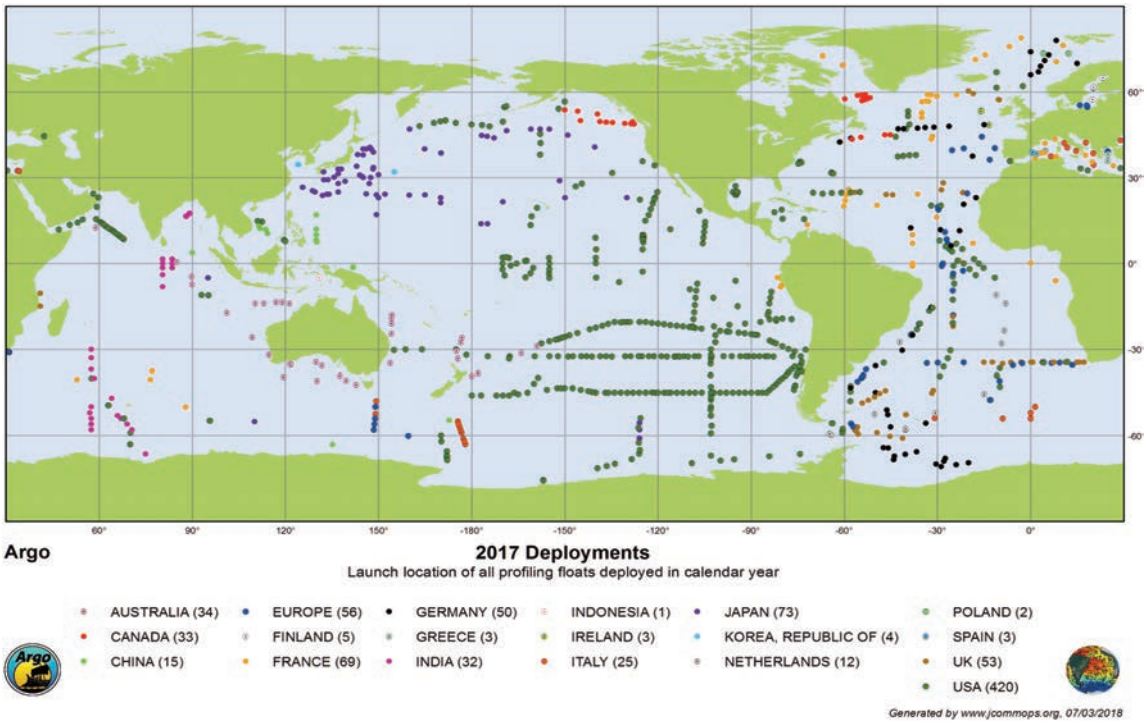


Figure 6: Argo 2017 deployments: 284 Euro-Argo floats among the 1068 deployed in 2017, representing 27% of the deployments (© JCOMMOPS/AIC)

The European partners aim at sustaining about ¼ of the entire Argo array which requires the capacity to procure and deploy about 350 floats (250 T&S, 50 deep and 50 BGC) per year, to monitor these floats properly and to ensure all data can be processed and delivered to users in a timely manner. Euro-Argo will ensure that the European deployments fulfil both the international Argo programme requirements in terms of geographical repartition and the European scientific and operational oceanography community's needs.

Table 2 shows the status of floats deployed in 2017 compared to the targets fixed in the strategy (Euro-Argo ERIC, 2017) both in term of location and float type, to achieve an appropriate number of operational floats in each region. Table 3 shows the 2017 deployments status compared to previous years (2015-2016) and the estimation for 2018 and 2019. In 2017 a total of 284 floats were deployed (Table 2), slightly more than in 2016 (215), mainly due to the MOCCA and AtlantOS floats funded by EC that have complemented the national contributions that stayed stable (for the evolution on a longer period and as a percentage of international numbers, see section 4).

1.5 Data Processing

Euro-Argo plays an active role in Argo data management, through 3 elements:

- **One Global Data Assembly Centre (GDAC),** Coriolis, in France, proposing services to the operational and research communities;

- **Two Data Assembly Centres (DACs)** In Europe: The French DAC (Coriolis) processes float data deployed by France and 10 European countries (Bulgaria, Finland, Germany, Greece, Italy, Norway, Netherlands, Poland and Spain). The UK DAC (BODC) processes all U and Irish float data;

Status of European floats	T/S Core			T/S Ice			T/SiO2			BGC			Bio			Deep			Total (any float type)		
	Target	Deployed	Gap	Target	Deployed	Gap	Target	Deployed	Gap	Target	Deployed	Gap	Target	Deployed	Gap	Target	Deployed	Gap	Target	Deployed	Gap
Nordic Seas	7	11	4	0	5	5	5	0	-5	3	0	-3	0	0	0	0	0	0	15	16	1
Mediterranean Sea	15	21	6	0	0	0	8	5	-3	7	2	-5	0	0	0	0	0	0	30	28	-2
Black Sea	2	0	-2	0	0	0	1	0	-1	2	0	-2	0	0	0	0	0	0	5	0	-5
Baltic Sea	0	5	5	0	0	0	1	1	0	3	0	-3	0	2	2	0	0	0	4	8	4
Southern Ocean	0	2	2	15	17	2	0	0	0	10	0	-10	0	0	0	0	0	0	25	19	-6
Arctic Ocean	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Global Ocean	102	165	63	0	9	9	94	20	-74	25	10	-15	0	0	0	50	9	-41	271	215	-58
TOTAL	126	204	78	15	31	16	109	26	-83	50	12	-38	0	2	2	50	9	-41	350	284	-66

Table 2: European float deployments per type of float and region, compared to Euro-Argo targets.

	2015			2016			2017			2018 (estimates)			2019 (estimates)		
	core-Argo	BGC & Deep	total	core-Argo	BGC & Deep	total	core-Argo	BGC & Deep	total	core-Argo	BGC & Deep	total	core-Argo	BGC & Deep	total
E.U.	2		2	36		36	52	5	57	20	9	29			
Bulgaria		1	1										3		3
Finland		2	2		3	3	2	3	5	2	3	5	2	3	5
France	101	20	121	37	20	57	46	23	69	57	15	72	65	22	87
Germany	66		66	44		44	50		50	57	3	60	59		59
Greece		5	5		3	3	3		3	4		4	4	1	5
Ireland	2		2	3		3	3		3	4		4	3	1	4
Italy		26	26	25	2	27	21	5	26	21	6	27	25	2	27
Netherlands	2		2	3		3	12		12	3		3	4		4
Norway	3		3	2		2	0		0	6	8	14	5	8	13
Poland	3		3	2		2	3		3	3		3	3		3
Spain	1		1		1	1	3		3	8		8	8		8
U.K.	32		32	27	7	34	43	10	53	32	9	41	34	5	39
TOTAL	212	54	266	179	36	215	238	46	284	217	53	270	215	42	257

Table 3: Float deployments 2015-2017 and plans for 2018-2019.

- **For the Delayed-Mode Quality Control (DMQC)**, Euro-Argo partners contribute with **4 DM operators** (BSH, Coriolis, OGS and BODC) and the coordination of **3 Argo Regional Centres (ARCs)**: the Atlantic ARC (NA-ARC), the Mediterranean and Black Seas ARC (Med-ARC) and the Southern Ocean ARC (SO-ARC).

Thanks to the Euro-Argo ERIC, the European Argo data system is strengthened to ensure it is able to process all European floats and deliver the data to users, thus improving Europe's ability to meet its data processing commitments to the global Argo programme (Coriolis GDAC, NA-ARC, Med-ARC and SOARCs). Every effort is made to deliver data with delays as short as possible and with extensive qualitycontrol. Both Real-time (less than 24 hours) and delayed mode delivery systems are addressed. The quality control procedures are the most stringent for the delayed-mode data stream which is designed to deliver data for climate studies.

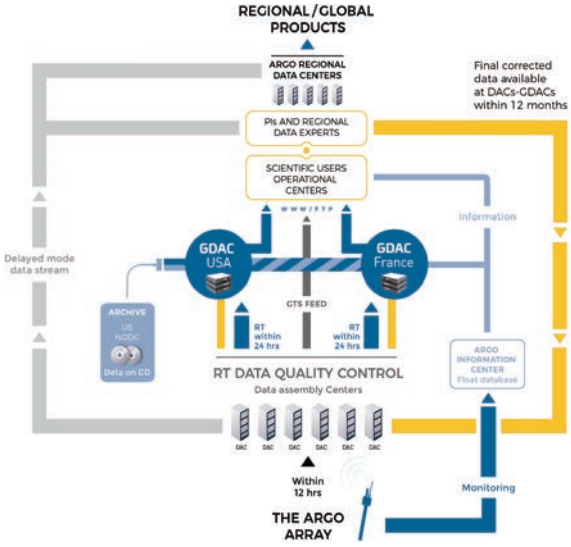


Figure 7: Argo Data Flow.

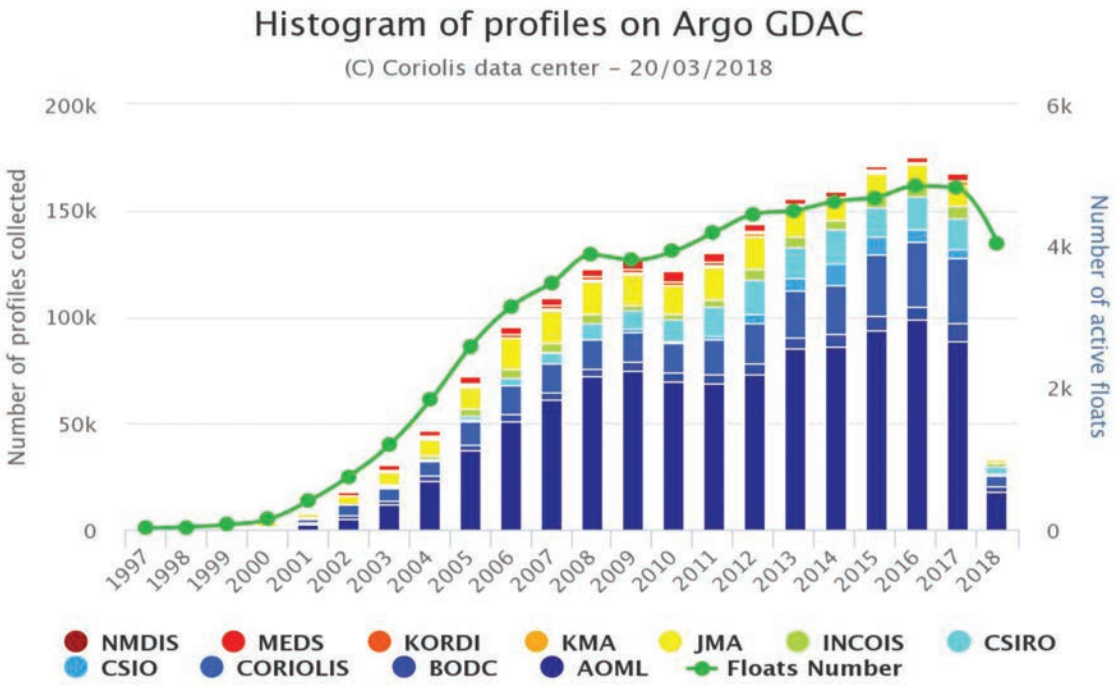


Figure 8: Histogram of active floats and profiles collected on Argo GDAC. Colors indicate the contribution of each National Data Centre (©: Coriolis Data Centre - 20/03/2017)

In 2017, 4803 active floats have been processed on Argo GDAC, which represent more than 177 000 profiles collected during the year (Figure 8). An important effort has been done at European level to recover backlog in term of delayed mode processing reaching 70% for Coriolis and 55% for BODC DACs, still behind the 75% target that should be reached in 2018.

Concerning the ARC activities, Euro-Argo has been active in two areas. In the North Atlantic, as part of a collaborative effort lead by France (Ifremer) and involving Germany (IFM-HH, BSH), Spain (IEO), Italy (OGS), Netherlands (KNMI), UK (NOC, UKMO), Ireland (MI), Norway (IMR), Canada (DFO), USA (AOML), Greece (HCMR) and Bulgaria (IOBAS), consistency of the delayed mode data at basin scale has been performed allowing detecting 10 floats among 1682 floats checked, for which the operator had to revise the original DM correction. This work, of major importance for climate studies, has been done using a modified OW method published by Cabanes et al. (http://*dx.doi.org/10.1016/j.dsr.2016.05.007*).

In the Mediterranean Sea, the reference database used for delayed mode quality control has been enhanced with high quality CTD data, and floats deployed by operational teams with no scientist able to do the delayed mode QC were also processed. Finally, BODC - in partnership with BSH/ Germany and CSIRO/Australia in link with SOOS (Southern Ocean Observing System coordination) - proposed plans to set up activities similar as what was done in the North Atlantic to enhance the delayed mode data quality in the Southern Ocean.

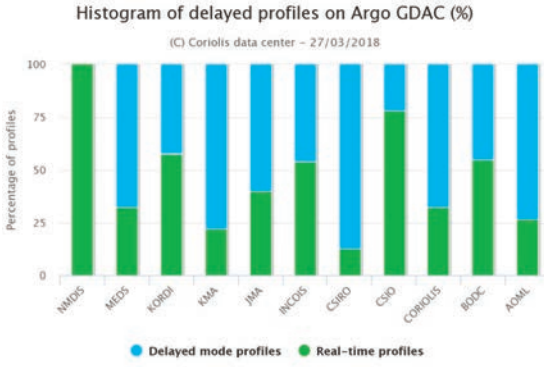


Figure 9: Status of DMQC processing for Argo (Coriolis and BODC are related to European fleet)

1.6 Communication and Outreach

1.6.1 Communication plan and tools

The Euro-Argo ERIC maintains its informational materials up to date and keep them attractive for the various kinds of attendance (public, scientists, educational world, stakeholders, manufacturers, etc.). A Communication Plan was released by the Euro-Argo ERIC in June 2017 which identifies Euro-Argo ERIC various audiences and the related tools and channels for implementing the ERIC communication strategy. This strategy includes tools and material which have been enhanced in 2017:

- The twitter account was created during autumn 2016 and has presently more than 400 followers (130 in 2016). It is a suitable mean to reach the European Commission, ministries and stakeholders in general. https://*twitter.com/euroargoeric?lang=e*

- A new version of the brochure was released in July 2017, with new pictograms and a redesigned logo. This brochure, which is likely to be updated only every 5 years or so, offers the possibility to insert thematic A4 posters updated more regularly with highlights on hot topics related to specific events.

- Booth materials (transparent demo floats, rolling posters, goodies) within a carry-on box is available for Euro-Argo partners since this year.

- A general one-page A4 leaflet (electronic format) is available and will be translated, if desired, by each country in its native language in 2018.

- The website (www.euro-argo.eu) has been reorganized and updated in 2017 with five main sections. The new structure released in September 2017 is designed so that the information is more accessible, not redundant and easy to update, so that the website does not become obsolete after a few years. In addition, Euro-Argo twitter thread was added onto the website front page. Thanks to this work, there was an increase in number of visits. The website will be updated monthly with information on Euro-Argo community events, progress on projects, etc.

- Two Euro-Argo News Briefs were issued in 2017. The first one has been published in July for spring and summer news, and the second one published in autumn. The aim is to provide updates on Argo activities to the Euro-Argo community, with a target of a quarterly publication. News Briefs are archived on Euro-Argo website.

In the future, the visibility of Euro-Argo ERIC actions will also benefit from better communication with the European users. A reflection is planned on the way to better interact with the community taking advantage of internet tools (e.g. Slack).

It is proposed to continue to organize one event per year, including Users Meetings every two years and thematic workshops the other year, such as training on data management, float technology, educational workshops, etc.

1.6.2 First Ocean Observers educational workshop

The 1st Ocean Observers educational workshop was co-organized by JCOMMOPS/IOC/WMO and the Euro-Argo ERIC in Brest, France, 13-14 June. The event brought together ocean scientists, educational authorities and teachers, marine communicators, and other stakeholders interested in sharing marine science educational resources and experiences, focusing on *in situ* observations, for exploring the possibilities to establish new international collaborative activities. The international workshop gathered about 70 persons from 7 countries (though around 3/4 of theparticipants came from France), with a widerepartition between people from diverse sectors (Figures 11 and 12). The workshop was very well welcomed by the participants and the feedback after the two days was globally positive.

Figure 10: 1st Ocean Observers Workshop attendees in Brest (France), July 2017 (JCOMMOPS/Euro-Argo).

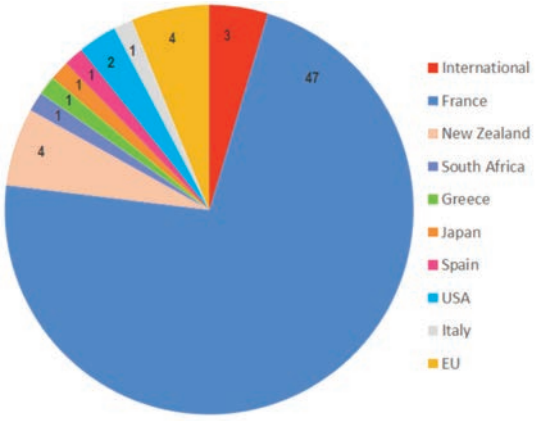


Figure 11: Countries of origin of workshop attendees.

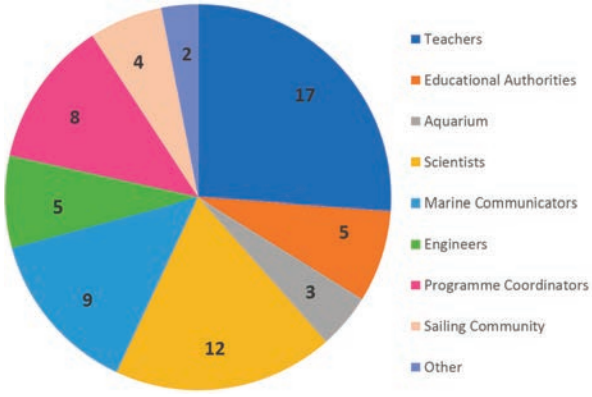


Figure 12: Background of workshop attendees.

The main idea that emerged during the workshop was the necessity to establish an international Working Group with representatives of each type of background (some of the participants already volunteered to be part of such a team) which should meet (via web conferences) once every two-three month for the project to move forward.

1.6.3 Sixth Euro-Argo Users meeting

Two years after the last edition, the 6th scientific Euro-Argo Users meeting was organized on July 4-5 at the Maison des Océans in Paris. It was sponsored by EC through MOCCA and Atlantlos projects. 70 people attended to 34 oral presentations within 6 thematic sessions and 15 posters were displayed. Two roundtables were organised on "How can Argo contribute to an integrated observing system: European Ocean Observing system (EOOS)" and "How the Euro-Argo Office can better support the development of Argo in Europe". A summary is available on Euro-Argo website.

1.6.4 Other events

During this year, all Euro-Argo ERIC office team members and some of Euro-Argo partners were particularly involved in many conferences and exhibitions all over the world (see table 4). Some of these events are detailed hereafter.

Figure 13: Group photo of Users meeting in Paris (July 2017).

Description	Location	Date in 2017
18th Argo Steering Team meeting	Hobart, Australia	13-17 March
EGU General Assembly	Vienna, Austria	23-28 April
6th ERIC forum	Helsinki, Finland	9-10 May
4th ENVRI week	Grenoble, France	15-19 May
Ocean Observers Workshop	Brest, France	13-14 June
6th Euro-Argo Users meeting	Paris, France	4-5 July,
SeaFest Galway 2017	Galway, Ireland	30 June - 2 July
Argo platform and sensor workshop	Seattle, USA	11-15 September
ENVRI+ Board of European Environmental Research Infrastructure (BEERI) meeting	Frankfurt, Germany	21 September
Copernicus Marine Week	Brussels, Belgium	25-29 September
52nd European Marine Biology Symposium	Piran, Slovenia	25-29 September
8th EuroGOOS International Conference	Bergen, Norway	3-5 October
EMSO workshop	Rome, Italy	9-11 October
French Science Fest	Paris, France	7-9 October
International Cooperation in Marine Scientific Research in the Black Sea	Kiev, Ukraine	19 October
5th ENVRI week	Málaga, Spain	6-10 November
8th annual meeting of GODAE Ocean View Science Team	Bergen, Norway	9 November
6th MonGOOS annual assembly	Athens, Greece	14-16 November
7th ERIC Forum	Graz, Austria	16-17 November
AtlantOS 3rd General Assembly	Gran Canaria, Spain	21-23 November
Arctic ROOS annual meeting	Bergen, Norway	27 November
18th Argo Data Management Team meeting	Hamburg, Germany	27 Nov.- 2 Dec.

Table 4: Chronolgical list of workshops 2017 in which Euro-Argo ERIC were involved.

EGU General Assembly

In April, in Vienna (Austria), Euro-Argo participated in an ENVRIplus joint booth at the EGU General Assembly, together with 14 other Environmental Research Infrastructures. Lunch talks were organized every day, where P.-M. Poulain (OGS, Italy) and B. Klein (BSH, Germany) both took part to present Euro-Argo activities (Figure 14).

Figure 15: Sylvie Pouliquen signing the MoU at the 6th ERIC Forum - May 2017.

6th ERIC forum

An ERIC Forum's Memorandum of Understanding was signed between 13 ERICs from diverse domains. The objectives of the MoU are to establish a Forum to further intensify collaboration between ERICs and inparticular:

- To identify common challenges affecting the Forum Members as entities subject to the ERIC Regulation;
- To collectively develop responses to these challenges;
- To contribute to the further development of the ERIC Regulation, ESFRI framework and European and international research context;
- To foster the visibility, impact and sustainability of ERICs.

Figure 14: (left) Claire Gourcuff explaining Argo float operating and (right) Pierre-Marie Poulain presenting Argo activities inthe Mediterranean Sea during Wednesday lunch talks organised at ENVRIplus joint booth in April 2017.

SeaFest Galway

SeaFest showcases Ireland's abundant maritime resources – raising awareness of the value and opportunities provided by the sea and also celebrating its proud maritime heritage. Over 100,000 people attended SeaFest in 2017. As part of the event, Irish Argo activities were presented, including an exhibition in the wetlab of the R/V Celtic Explorer, where the Marine Institute had the Euro-Argo demonstration Argo float on display alongside their own operational TWR Apex float, which attracted many people.

Argo platform and sensor workshop

A workshop on "Profiling Floats and Sensors" was organized at the University of Washington in Seattle (U.S.A) in September. The meeting was designed for engineers, technical staff, and anyone involved in or responsible for procurement decisions and float specification, mission planning, float evaluation. Four people from Euro-Argo were among the 70 participants who attended the workshop. The audience was composed both of manufacturers and users. There was an overall approval of having both communities in the same room sharing their results/concerns. The major topics discussed there were acceptance tests, batteries performance, alternative CTDs, recommendations on Deep floats. All discussions led to the conclusion that it would be useful to organize a similar event in Europe.

Copernicus Marine Week

The Copernicus Marine Environment Monitoring Service (CMEMS) provides a wealth of marine data, from analyses to forecasts, designed to governments, and blue businesses alike. CMEMS data and products, freely available to anyone, are extensive and constantly evolving. The Copernicus Marine Week ran in September in Brussels (Belgium) and gathered people from the wide community involved in CMEMS, including members of the Copernicus EU Earth ; CMEMS researchers & experts, and members of the blue economy. The importance of *in situ* observations for operational oceanography and the Copernicus Marine Service was highlighted. Argo appeared as the

Figure 16: Irish Argo activities were presented during the SeaFest in Galway (Ireland) in summer 2017.

main example of *in situ* observations. The Euro-Argo strategy for the next decade was presented and seen as an example to be followed by other *in situ* observing networks to be able to develop a multiplatform implementation plan and identify gaps that would need additional funds (in complement to national funding). One conclusion of the meeting and message to the European Commission is that *in situ* and satellite data are equally important for CMEMS products quality.

Figure 17: Sylvie Pouliquen presenting the link between Argo/Euro-Argo and CMEMS during the Copernicus Marine Week, October 2017.

8th EuroGOOS international conference

The 8th edition of the EuroGOOS international conference entitled *Operational Oceanography Serving Sustainable Marine Development*, included talks spanning the marine information value chain, from data collection to processing and modelling, as well as services to users and policy advice. The future of Argo in Europe with a polar focus was presented by Claire Gourcuff (ERIC). Fruitful informal discussions were also held during the week, with people involved in the INTAROS project about possible future collaborations in the Arctic Ocean. Two side events were also organized where the Euro-Argo ERIC was represented by Sylvie Pouliquen: the ENVRIplus side event (*on Marine monitoring and data capture for multidisciplinary research and the ENVRIplus approach*) and the Jerico- Next side event (*on Assimilating technical best practice improvements to optimize network data flow*).

International Cooperation in Marine Scientific Research in the Black Sea

The scientific and practical seminar "International Cooperation in the Field of Marine Scientific Research – an Important Factor in the Development of Black Sea Regional Projects of the Intergovernmental Oceanographic Commission of UNESCO and European Union" aimed to discuss the prospects for joint scientific operations and investigations of the Black Sea, as well as other parts of the World Ocean. Representatives and leading scientists of the institutions and organizations of Ukraine (the National Academy of Sciences, the Ministry of Education and Science, the Ministry of Ecology and Natural Resources), and foreign guests, including Dr Pierre-Marie Poulain (OGS, Italy, chair of the Euro-Argo ERIC Management Board at that time), have participated in the seminar. P.-M. Poulain presented a talk on Euro-Argo with focus on Black Sea activities. Ukraine who has only a shallow part of the Black Sea (50 m depth) - but very interesting from an ecosystem point of view - is willing to cooperate with Euro-Argo, for instance to deploy a float off Odessa.

Figure 18: EMSO meeting attendees in Rome, October 2017.

EMSO meeting in Rome

EMSO (European Multidisciplinary Seafloor and water-column Observatory) is a large scale, distributed, marine Research Infrastructure of fixed-point observatories. The "EMSO ERIC all regions workshop *EU seafloor and water-column observatories Challenges and Opportunities towards integration*" took place in Rome in October 2017, bringing together members of the marine science and industry communities to exchange knowledge and best practices related to the advances in the framework of the EMSO mission and objectives. Euro-Argo was represented at this conference by Dimitris Kassis (HCMR, Greece) and Diarmuid O'Conchubhair (Marine Institute, Ireland). Dimitris Kassis made a talk presenting the potential links between EuroArgo and EMSO in a session dedicated tocoordination with other ERICS. He presented also a poster, which allowed very fruitful discussions among the workshop participants on the opportunities for Euro-Argo and EMSO ERICs to work together. The general fee back of this workshop was very positive for Euro-Argo, with interesting potential collaborations in perspective for the years to come.

Arctic ROOS annual meeting

Euro-Argo was invited to participate in the Arctic ROOS (Regional Ocean Observing System) annual meeting in Bergen (Norway) on 27 November. Grigor Obolensky (ERIC office team) presented the Euro-Argo strategy for extending Argo measurements towards high latitudes, including the Arctic Ocean and discussed the possibility for Euro-Argo to integrate the Arctic ROOS as a full member.

French Science Fest

Science is celebrated each year in France in October, involving many researchers, teachers, engineers, associations, etc. Workshops and other initiatives are organized everywhere in France during one week, where citizens can discover science. This year, Argo was featured at French Science Fest in "*La Cité des sciences et de l'industrie*" in Paris. Ifremer, the Ministry of Higher Education, Research and Innovation and 15 other french scientific institutes joined forces to offer the "Science En Direct" (*Science Live*) initiative that consisted in two days of non-stop science, free and open to everyone. Guillaume Maze, researcher representing France in the Euro-Argo ERIC Management Board took an active role in the event. Together with Pascale Lherminier (Ifremer), he spent 3 days explaining the ocean currents and Argo floats to a huge number of visitors.

Figure 19: Argo was featured in 2017 at French Science Fest in Paris, especially thanks to animations proposed by Guillaume Maze (Ifremer, member of Euro-Argo Management Board).

2. PROJECTS WHERE EURO-ARGO WAS INVOLVED IN 2017

2.1 MOCCA (2015-2020)

The MOCCA project (Monitoring the Oceans and Climate Change with Argo, DG-MARE EASME/EMFF) started in June 2015 and is scheduled for a 5-year period. With a EU contribution of 4M€, the ERIC with its members added an additional 20% (i.e. 1M€) that generated a total of 5M€, allowing three actions:

- Procurement of 150 T&S Argo floats (core) during 2015-2016,
- Arrangement for their deployment in 2016-2018, including at-sea monitoring,
- Data processing in real-time and delayed mode, during the period 2016-2020.

In 2017 MOCCA activities were organized around 3 actions: coordination (ERIC Office), deployments & at-sea monitoring (ERIC Office with MOCCA partners) and Data Management (BSH, BODC, OGS and Ifremer).

2.1.1 Float deployments

After a first set of 67 floats deployed in 2016, another batch has been deployed this year for a total of 126 floats among the 150 planned, leading to about 5000 float CTD profiles acquired by the MOCCA fleet so far. MOCCA deployments locations were well in line with the Euro-Argo strategy, with a focus in 2017 towards the Southern Ocean (South-Atlantic, Drake Passage, South-Indian) and European marginal Seas (Adriatic, Aegean and Baltic Seas). Deployment platforms consisted in a mix of research vessels (Atlantic Meridional Transect cruise, SEAmester cruise, etc.) and ships of opportunity (passenger vessel M/V PLANCIUS, CABLESHIP Pierre de Fermat fromOrange Marine, etc.). Globally floats are operating well and only two floats were lost without any evident reason after few cycles, and another one after 74 cycles in the Mediterranean Sea. Some floats were recovered (June, R/V KRISTINE BONNEVIE, Nordic Seas, cause: faulty CTD; September, R/V OCEANIA, Baltic Sea, cause: drifting onshore) and will be redeployed after factory check.

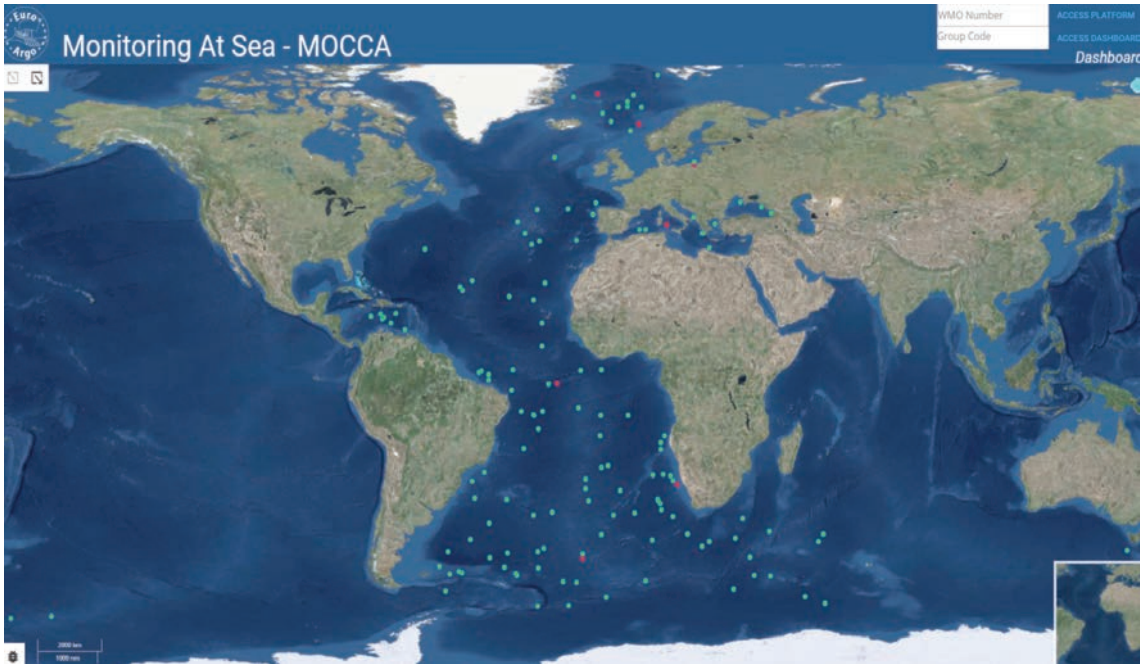


Figure 20: Last positions of deployed MOCCA floats. Green dots indicate active floats and red dots dead or recovered Argo floats. (© ERIC Office – February 2018).

2.1.2 At sea monitoring

A core activity within MOCCA in 2017 was the development of the monitoring tool. A webpage has been set up (http://*www.ifremer.fr/argoMonitoring/floatMonitoring/*) that allows to display main information (metadata, CDT profiles, float trajectory on a map) on each Argo float identified by its WMO number. This work has started in the MOCCA project and will be enlarged to cover most of the European fleet. One can also monitor a batch of floats (identified by a group code) and access to a dashboard with important last cycle information. Several alerts and warnings regarding technical parameters have been implemented. This work is currently ongoing and will be enhanced with the expertise of Euro-Argo national float experts and feedbacks from users.

Figure 21: Launch of a MOCCA float in the Agulhas Current in August 2017 (© G.Tutt & T.Lamont -Department of Environmental Affairs, South Africa).

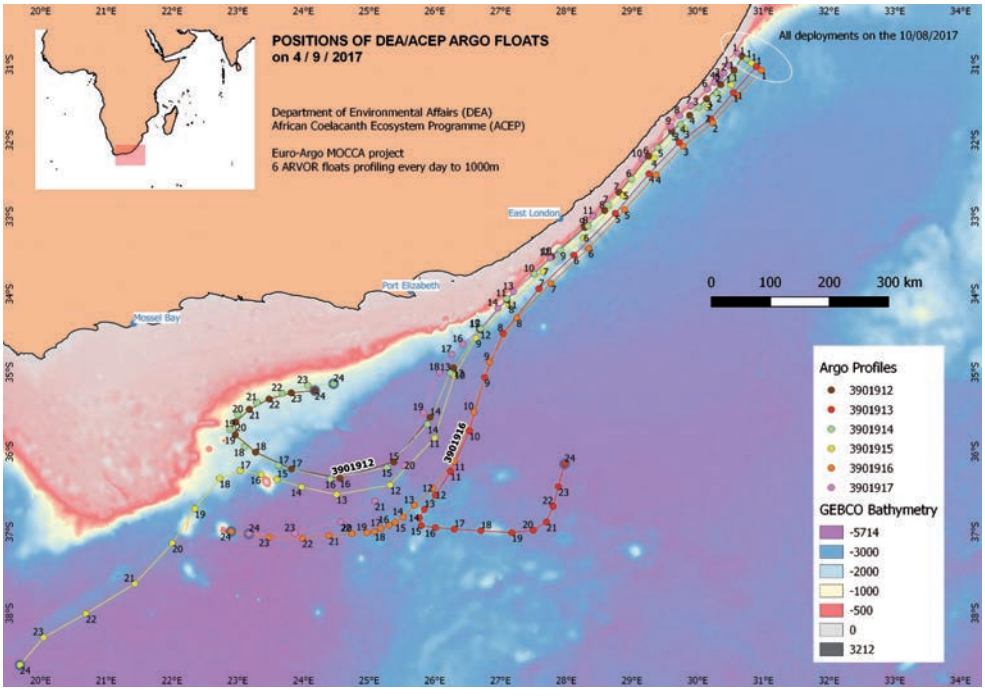


Figure 22: Position of DEA/ACEP Argo floats on 4 September 2017; two of the Argo floats have been moving around a Natal Pulse (cyclonic eddy on the inshore edge of the Agulhas Current), south of Port Elizabeth.

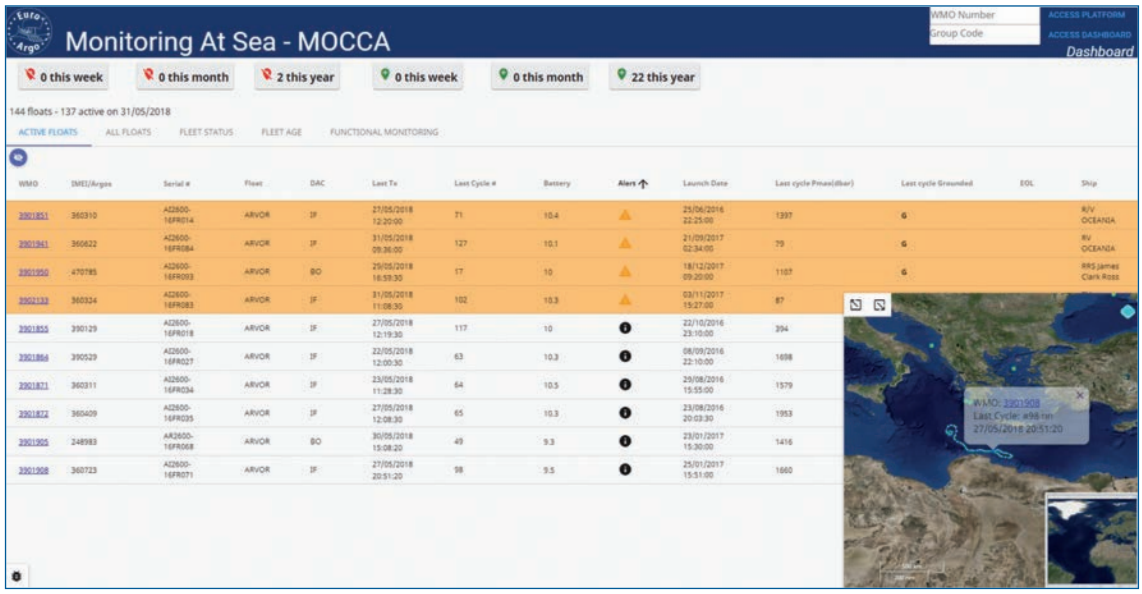


Figure 23: New at-sea monitoring tool with map corner, dashboard with predefined alerts and basic statistics of a batch of floats (here: MOCCA project).

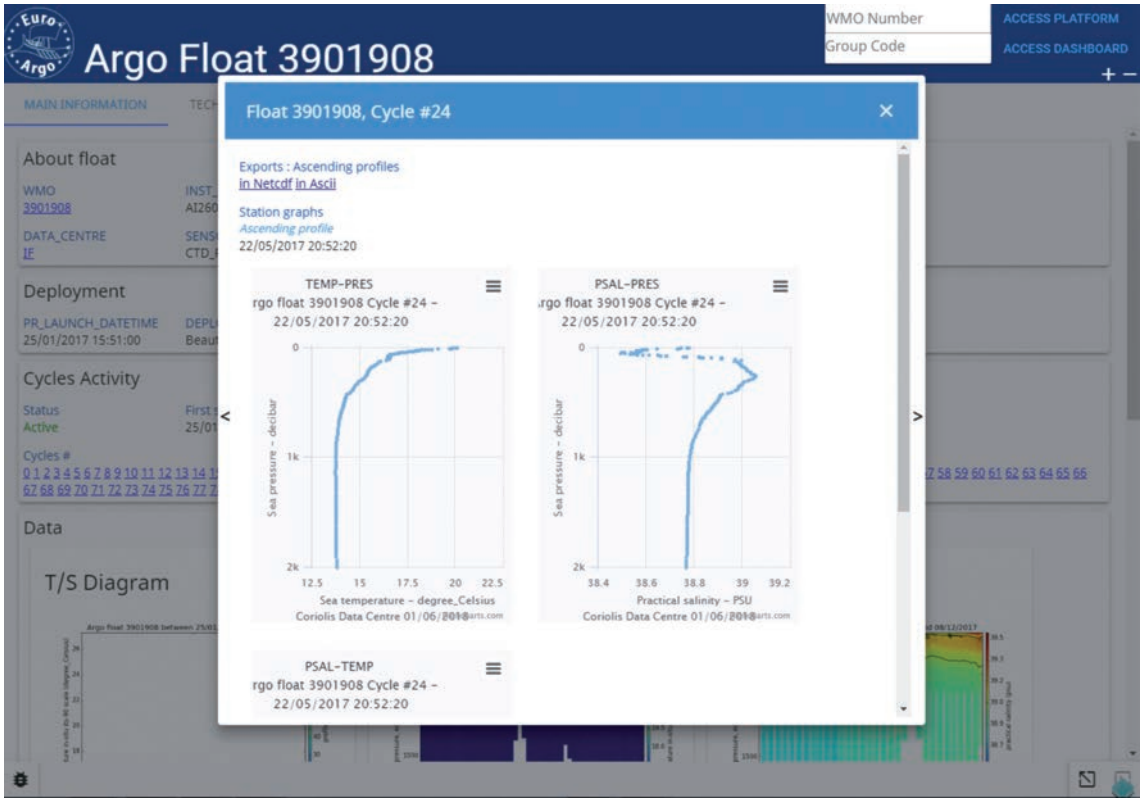


Figure 24: Individual float webpages have been redesigned and enhanced with new functionalities: on the fly CTD values, timeseries of crucial float technical parameters (e.g. battery voltage), etc.

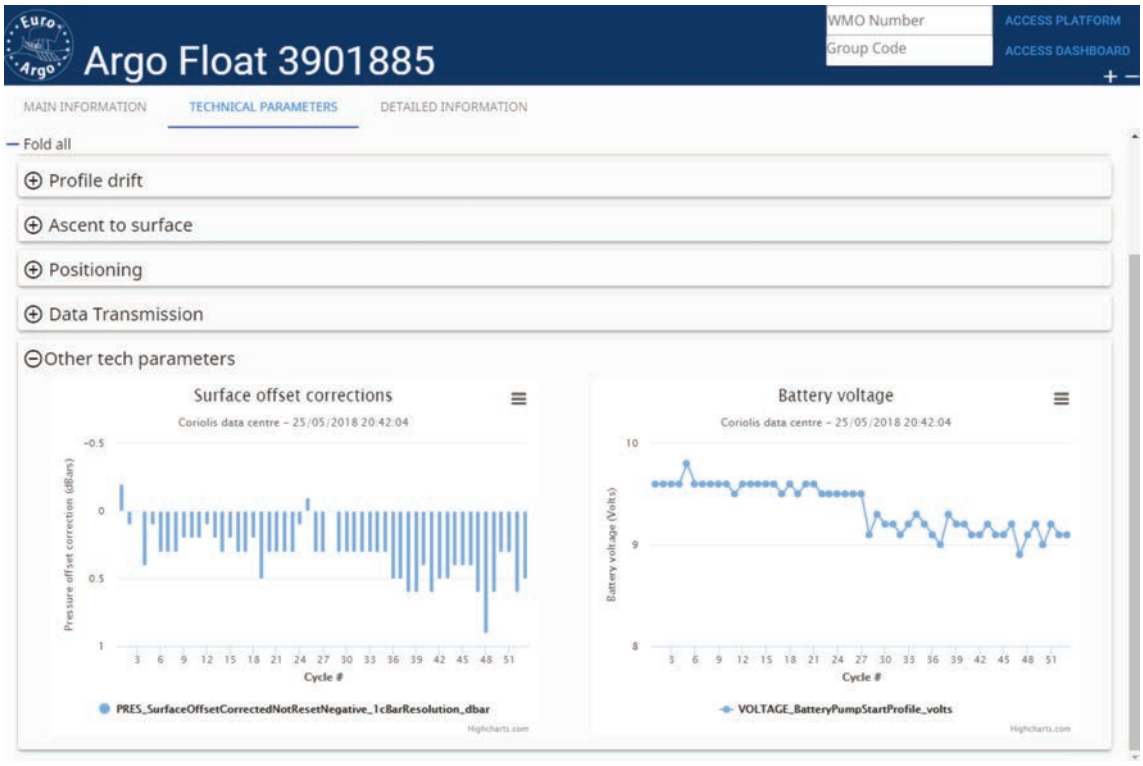


Figure 25: Detailed information on a float.

Real-Time processing is going on at both BODC and Ifremer and data are delivered in a timely manner. Delayed-Mode processing has been allocated among each partner (OGS for Mediterranean Sea, BSH for Nordic and North Atlantic Sea, Ifremer for South East Atlantic and BODC for the Southern Ocean, including South West Atlantic). DMQC has already started for some of the MOCCA floats.

As part of the project, a 1st DMQC Workshop at EU level will be organized by the ERIC in April 2018 to share best practices and train new teams to this activity. Regional data quality assessments (e.g. SOARC) and thematic studies (e.g. determination of ice-sensing algorithms thresholds for deployments in the Nordic Seas) are also planned within MOCCA.

MOCCA website
http:/www.euro-argo/EU- projects-Contribution/MOCCA

2.2 ENVRIplus (2015-2019)

The ENVRIplus H2020 project aims at bringing together Environmental and Earth System Research Infrastructures, projects and networks together with technical specialist partners to create a more coherent, interdisciplinary and interoperable cluster of Environmental Research Infrastructures across Europe. ENVRIplus has 37 partners from 13 European countries.

The Euro-Argo ERIC is involved in 2 of 6 themes ("Technological innovations" and "Data for Science") with some activities in communication/outreach. It is also member of the BEERI (Board of European Environmental Research Infrastructures) which is the advisory body for the ENVRIplus coordination.

ENVRI+ website
http:/www.envriplus.eu/

The Euro-Argo ERIC contributed to the organization of the 1st EU Environmental Research Infrastructures-Industry Joint Innovation Partnering Forum that was held at the end of the 4th ENVRI-week in May in Grenoble, which has been an excellent opportunity for European environmental RIs and private industries to explore opportunities for joint innovation projects. Side to the 5th ENVRI week (Malaga, Spain, November), Claire Gourcuff from the Euro-Argo ERIC office participated to a Joint workshop of ESFRI Environment Strategy Working Group and ENVRI community on Landscape of Environmental Research Infrastructures and moderated discussion on "International activities and role of Environmental RIs" where the importance of Europe in the sustainability of Research Infrastructures with a global coverage was highlighted.

Figure 29: The ERIC is involved in 2 of 6 ENVRIplus themes

2.3 AtlantOS H2020 project (2015-2019)

Contributing to the AtlantOS H2020 project (2015-2019), coordinated by the GEOMAR, Kiel (Germany), the Euro-Argo ERIC leads task 3.1 from WP3 activities. With contributions from Ifremer, LOV, GEOMAR and its partners, the Euro-Argo ERIC aims at contributing to the progressive extension of the Argo core mission towards the deep ocean and Biogeochemistry, and develops long-term plans:

- Deploy 7 deep-oxygen and 6 BGC-Argo floats in the North-Atlantic,
- Work on improving BGC-Argo float capabilities, especially to adapt new biogeochemical sensors, and integrating a pCO2 sensor on autonomous platforms,
- Refine DMQC processing and achieve the objective to deliver a consistent Argo and BGC-Argo dataset for the Atlantic,
- Work on the long-term sustainability issues for BGC-Argo and Deep-Argo after the AtlantOS pilot project.

In 2017, six Biogeochemical Argo floats purchased by Euro-Argo under the AtlantOS project were received at Euro-Argo ERIC premises during the summer and successfully tested by the Euro-Argo technical team in the Ifremer tank (Figure 26). Four AtlantOS BGC floats have been deployed during the AMT-27 (Atlantic Meridional Transect, UK) in September: two floats in the Guinea dome, two floats in the South Atlantic Gyre. The two remaining AtlantOS BGC floats will be deployedin the south eastern part of the Atlantic duringa UK-GOSHIP cruise along 24S from RV JAMES COOK in early 2018.

In 2017, 7 deep floats were delivered and have been intensively tested in Ifremer pressure tank (400 bar hyperbaric chamber) and cycled in the Ifremer's basin. The correction of hardware issues has been supervised by the Euro-Argo technical team, and finally the seven floats have been fully accepted at the end of year 2017. Deep floats deployments are planned for 2018.

In November, in Gran Canaria (Spain), Euro-Argo participated to the 3rd AtlantOS General Assembly as coordinator of the Argo task within the "Autonomous Platforms" workpackage. Euro-Argo contributes for the Argo network to the vision of a sustained Atlantic observing system for 2030 also called Atlantic Blueprint that will lay out the principles and plans for sustained ocean observations in the North and South Atlantic.

Figure 26: Testing phase of AtlantOS floats (pictured: Biogeochemical) by the Euro-Argo technical team in the Ifremer tank during summer 2017.

AtlantOS website
http:/www.atlantos-h2020.eu/

AtlantOS

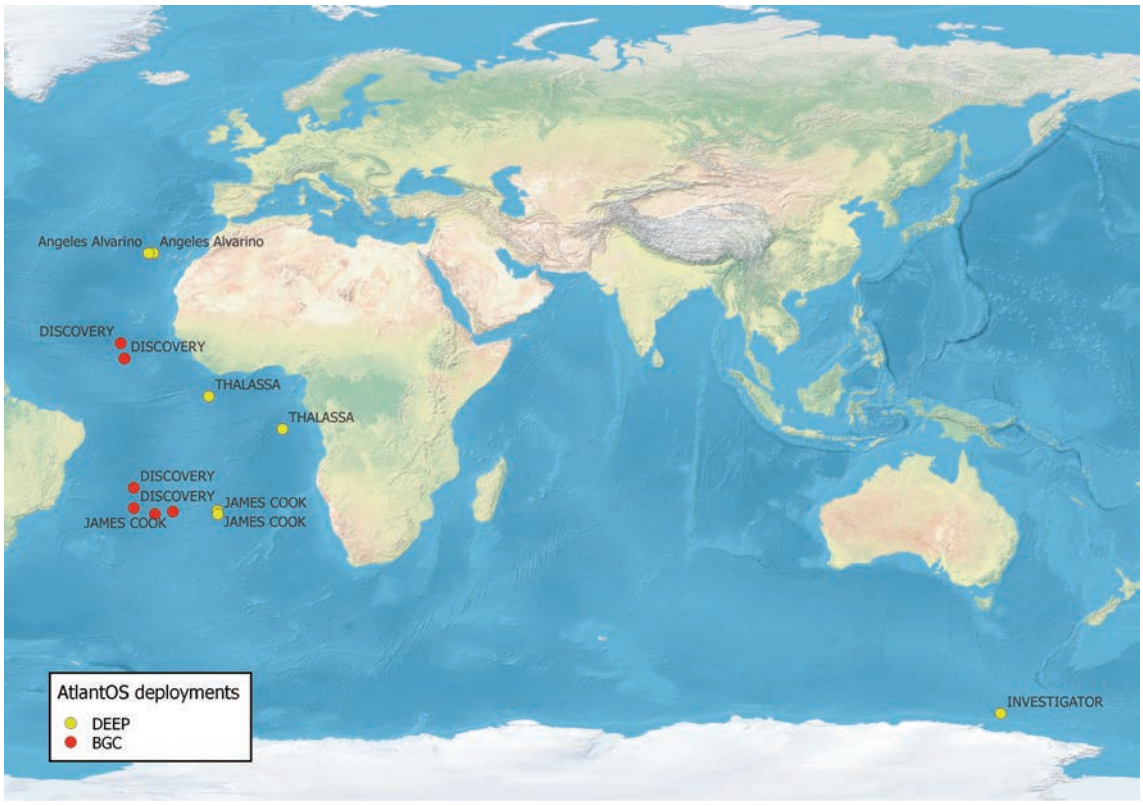


Figure 27: 2017-2018 deployments of the 13 AtlantOS floats.

Figure 28: unboxing a BGC AtlantOS float ON board the RRS Discovery in Southampton (© Francesco Nencioli).

3. SCIENTIFIC HIGHLIGHTS

In 2017, Argo data have been used by many researchers in Europe to improve the understanding of ocean properties (i.e. circulation, heat storage and budget, mixing and convection), climate monitoring and application in ocean models. The Euro-Argo community reached its target with 109 papers published (that is 30% of the total Argo bibliography).

To further enhance these research activities conducted by the Euro-Argo community, a selection of 5 scientific results were highlighted on the website at: http://*www.euro argo.eu/Main-Achievements /European-Contributions/Scientific-Results,* classified into 4 categories according to the scale ocean circulation and topics that they address: Global core-Argo, Argo extension to marginal seas, Argo extension to high latitudes, and BGC and Deep Argo extensions.

Thereafter, we detail two of those significant results.

3.1 The Heat and Fresh water content in the Norwegian Sea the last 15 years using Argo Data

By Kjell Arne Mork, Institute of Marine Research and Bjerknes Centre for Climate Research, Norway

The Nordic seas (Norwegian, Greenland and Iceland Sea) is the major region of water mass transformation in the northern loop of the global thermohaline circulation. Atlantic Water is here transformed, through intense cooling, into a water mass that is dense enough to feed the lower North Atlantic Deep Water. (Figure 30).

Argo data from the Coriolis Global Data Assembly Centre are used to monitor and describe the climate variability in the Norwegian Sea, on time scales ranging from monthly to decadal. (http://*www.coriolis.eu.org*/).
The climate variability was investigated in terms of ocean heat and freshwater contents, and in Mork et al. (2017) both air-sea heat fluxes and advective mechanisms responsible for the variability were explored. The World Ocean Atlas 2013 was used as climatology in which anomalies of the heat and freshwater contents were calculated from.

Time series of the heat and fresh water content anomalies (HCA and FwCA, respectively) reveal interannual and pentadal time scales overlying the seasonal variability (Figure 31). In average, the HCA are larger in the Lofoten Basin than in the Norwegian Basin and opposite for the FwCA, meaning that in the last 15 years Lofoten Basin is warmer and saltier compared to the Norwegian Basin relative to the climatology. The timing of maximum HCA is different within the two basins (Norwegian Basin: 2014, 2016; Lofoten Basin: 2009/2010, 2015) while timing in minimum FwCA is similar for both basins (2010-2011). Noteworthy is that the Lofoten Basin has become warmer and fresher since 2011 while this is less evident for the Norwegian Basin. The variability of the heat and freshwater contents in the upper 200 m follow those in the upper 1000 m depth for the Norwegian Basin and less for the Lofoten Basin.

A reasonable number of Argo floats can resolve seasonal variation in the Norwegian and Lofoten Basin. Reliable results for shorter time scales would require a higher number of floats to reduce the contribution from meso-scale eddies. On seasonal and interannual scale the two basins in the Norwegian Sea should be covered separately when climate variability is studied or monitored as they are influenced differently by the various processes and upstream sources. The warming and freshening during 2012-2016 in the Lofoten Basin may have been caused by, at least partly, fresher inflowing Atlantic Water from the south and a positive air-sea heat flux anomaly (less ocean heat loss to the atmosphere).

Reference:

Mork, K.A., Ø. Skagseth, B. Berx, H. Søiland, and H. Valdimarsson. Heat and freshwater content in the Norwegian Sea (to be submitted).

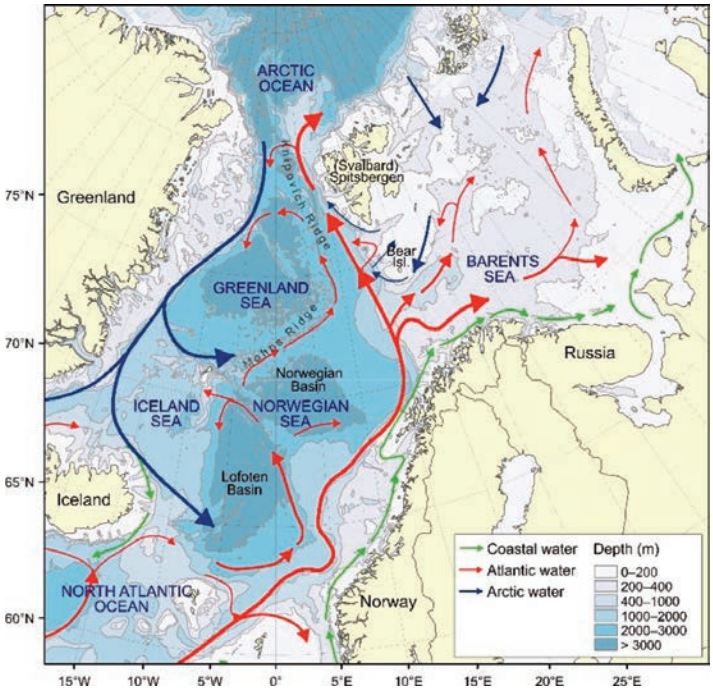


Figure 30: The major surface currents in the Nordic Seas. From Mork et al. (2017).

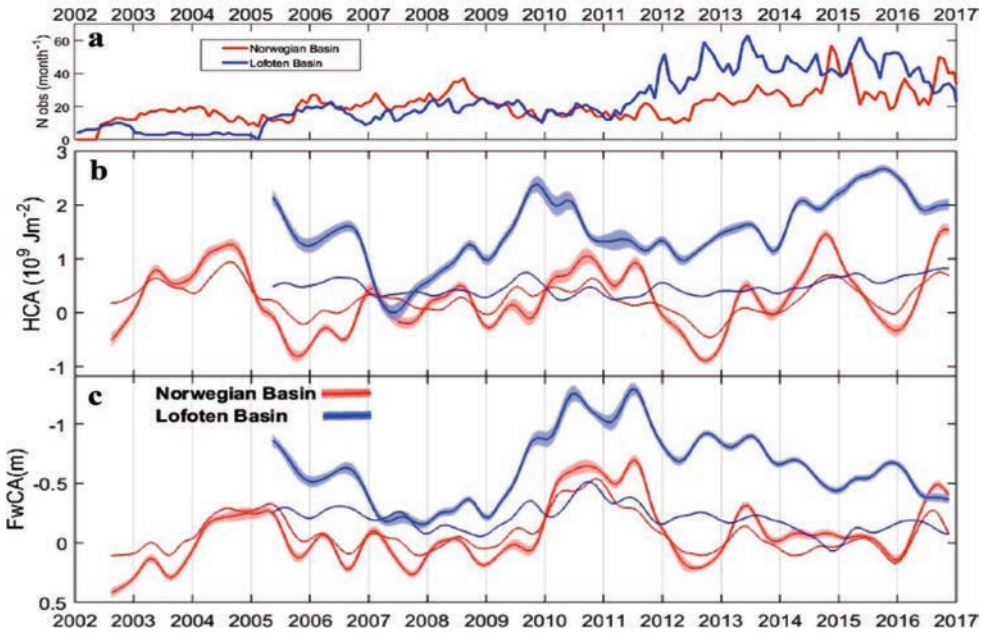


Figure 31: Figure a) Number of Argo profiles per month in the Norwegian and Lofoten Basin. b) Time series of heat content anomaly HCA (0-1000 dbar) with standard error (shaded area) for both the Norwegian (red line) and Lofoten Basin (blue line). The thin lines are HCA (0-200 dbar). c) Similar as in b) but for the fresh water content anomaly

3.2 Salinity intrusions in the Bay of Bengal from a highly resolved Argo float array

By Alejandra Sanchez-Franks, National Oceanography Center, Southampton, UK

A joint India-UK field experiment called BoBBLE ("The Bay of Bengal Boundary Layer Experiment") took place in summer 2016 in the Bay of Bengal during the South Asian summer Monsoon. The purpose of the experiment was to understand the evolution of the nearsurface stratification and air-sea exchange, in order to understand and improve monsoon predictability (Figure 32).

Five Seagliders, seven Argo floats and multiple drifters were deployed during the campaign. Salinity measurements from CTD, gliders and Argo floats are shown in Figure 33. India provided the research vessel Sindhu Sadhana and gathered shipboard CTD measurements, while the UK provided profile data from gliders and seven Argo floats. Four of the Argo floats were equipped with SeaBird near surface temperature and salinity sensors (STS) and three carried radiometers to show the depth at which incoming solar radiation is being absorbed. The floats cycled daily while the research vessel was nearby, and reverted to a standard Argo 10-day mission after an initial intensive observing period ended.

Data from the BoBBLE floats have been combined using Optimal Interpolation with data from other Argo floats in the region, plus gliders and shipboard CTDs, to produce maps of the distribution of temperature and salinity.

The OI gridded time series (Figure 34) enables analysis of the evolution of the salinity and temperature variability in the surface (top 500m) layer of the southern Bay of Bengal. Salinity profiles indicate the observed salinity maxima are likely salinity intrusions advected from the Arabian Sea via the Southwest Monsoon Current.

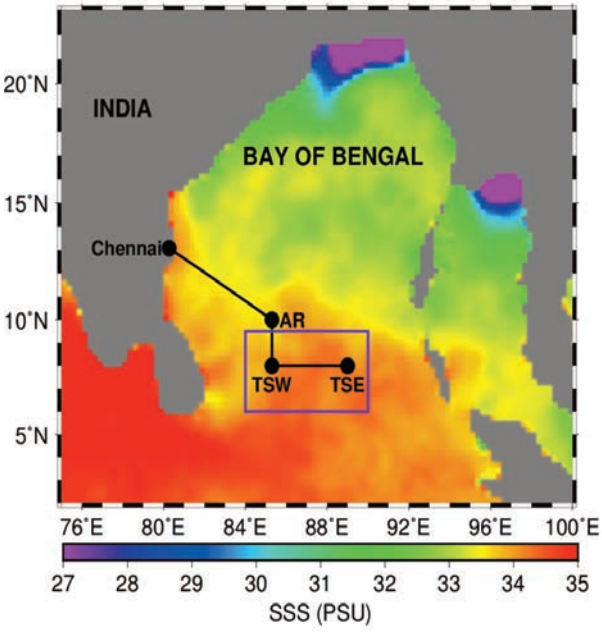
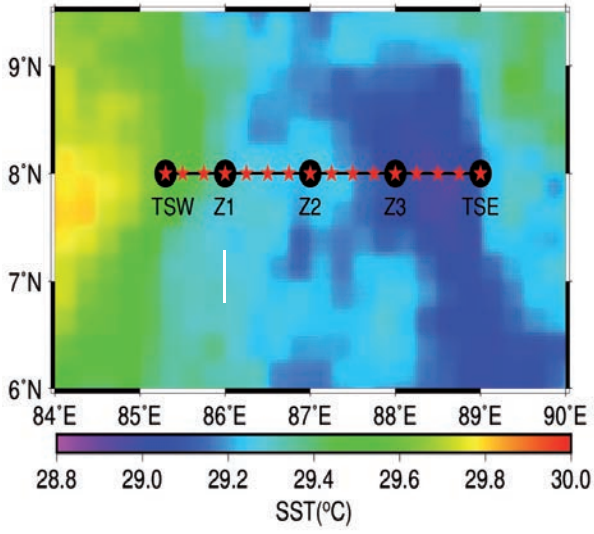


Figure 32: (top): Map of the cruise track of the BoBBLE field programme. Shading is SSS from SMAP. (bottom): black circles represent glider and Argo float deployments, IOP, radiometer and VMP profiling as wellas water sampling locations. Red stars indicate additional CTD profiles locations during the return leg ofthe cruise. At TSE, additionally, CTD profiles weremeasured from 4 to 15 July 2016. Shading indicates SST from AMSR-E.
From Vinayachandran et al., 2018.



These results suggest that during the summer monsoon, the heat and freshwater budgets are not locally driven. Elevated salinity is also observed in the uppermost (top 50 m) surface layer, generally corresponding in time to the salinity intrusions at depth. The elevated surface salinity events have a duration of 2-3 days and occur every few weeks (and do not appear to be restricted to the southwest monsoon). The combination of datasets from the BoBBLE field campaign has provided an important ocean observing system that will be critical in determining seasonal and interannual heat and freshwater variability inthe Bay of Bengal.

References:

Sanchez-Franks A, Kent E.C., Matthews A.J., Webber B.G.M., Peatman S.C.,

Vinayachandran P.N. (In review): Intraseasonal Variability of Air-Sea Fluxes overthe Bay of Bengal during the Southwest Monsoon, Journal of Climate.

*Vinayachandran, P., et al., 2018: BoBBLE (Bayof Bengal Boundary Layer Experiment): Ocean– atmosphere interaction and its impact on the South Asian monsoon. Bull. Amer. Meteor. Soc. doi:10.1175/BAMS-D-16-*0230.1, in press.

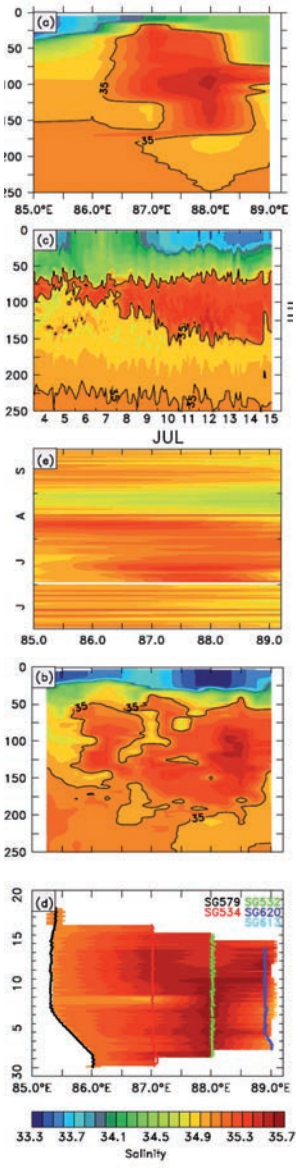


Figure 33: (a) Vertical section of CTD salinity along 8°N, measured during 30 June – 4 July 2016. (b) Same as (a) but with higher resolution (stations located a quarter degree longitude apart). (c) Time-depth section of salinity measured at TSE (see Figure 32) during 4-15 July 2016(salinity contour 35 in black). (d) Time-longitude section of salinity averaged between 90-130 m using glider data. (e) Same as (d) but with Argo data. From Vinayachandran et al., 2018.

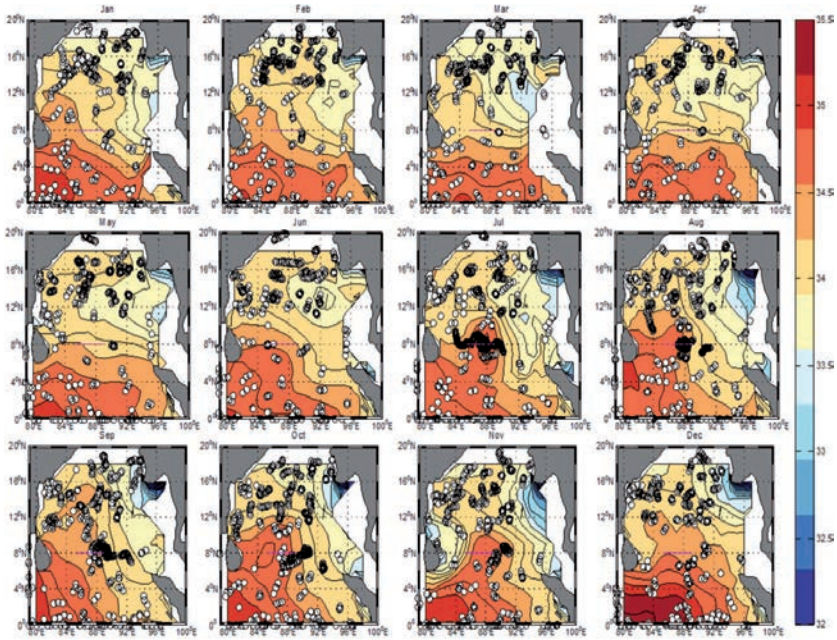


Figure 34: Argo OI averaged monthly surface (10 to 190 m) salinity for 2016. White circles indicate location ofexisting Argo profiles. Magenta line is the BoBBLE cruise transect.

4 KEY PERFORMANCE INDICATORS

The Euro-Argo ERIC Office team is also working on Key Performance Indicators (KPIs) to document European contribution to the international network. The novel and enhanced role of the EU in the international Argo programme and the enhanced Europewide visibility of the research is monitored each year through two types of indicators: KPIs on floats and KPIs regarding users.

4.1 KPIs regarding floats

The overall objectives of the Euro-Argo ERIC in terms of float deployments are to provide, deploy and operate an array of around 900 floats contributing to the global array - a European contribution of ¼ of the global array with enhanced coverage in the European regional seas.

During 2017, the deployment plans were reviewed for 2017 and 2018. In 2017, 284 European floats were deployed including 23 floats on the extension to biogeochemical and deep oceans (see Table 2). This is still below the target of 350 new floats/year, but significantly higher than 2016, and above the 25% mark (see Figure 35) of the global effort.

In December 2017, a total of 797 Euro-Argo floats were active out of a total of 3878 floats (Figure 36).

Figure 37 describes the evolution of the European contribution to the network in terms of active floats. The number of European Argo floats has been increasing since the beginning of the project, and a pic appears in the early 2000s on the percentage of European floats (dashed line), which is due to the Gyroscope EU project. The percentage of European floats has slowly increased from around 15% in 2008 to more than 20% in 2017.

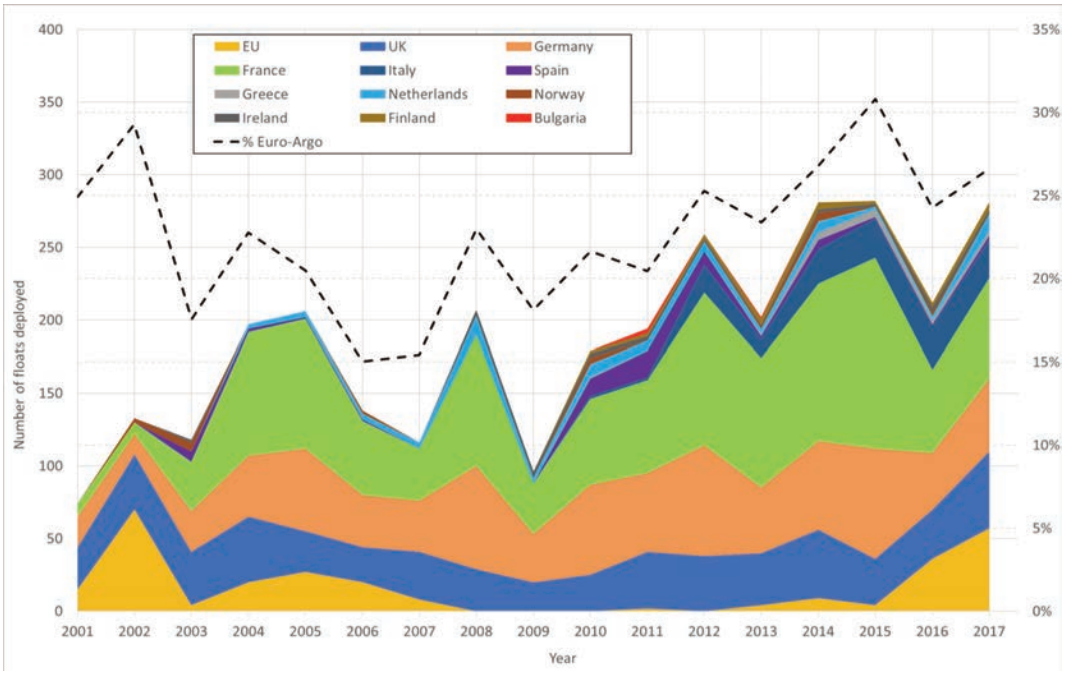


Figure 35: Evolution of European float deployments in float number (colors, left axis) and as a percentage of the international effort (dashed line, right axis). (© JCOMMOPS/AIC).

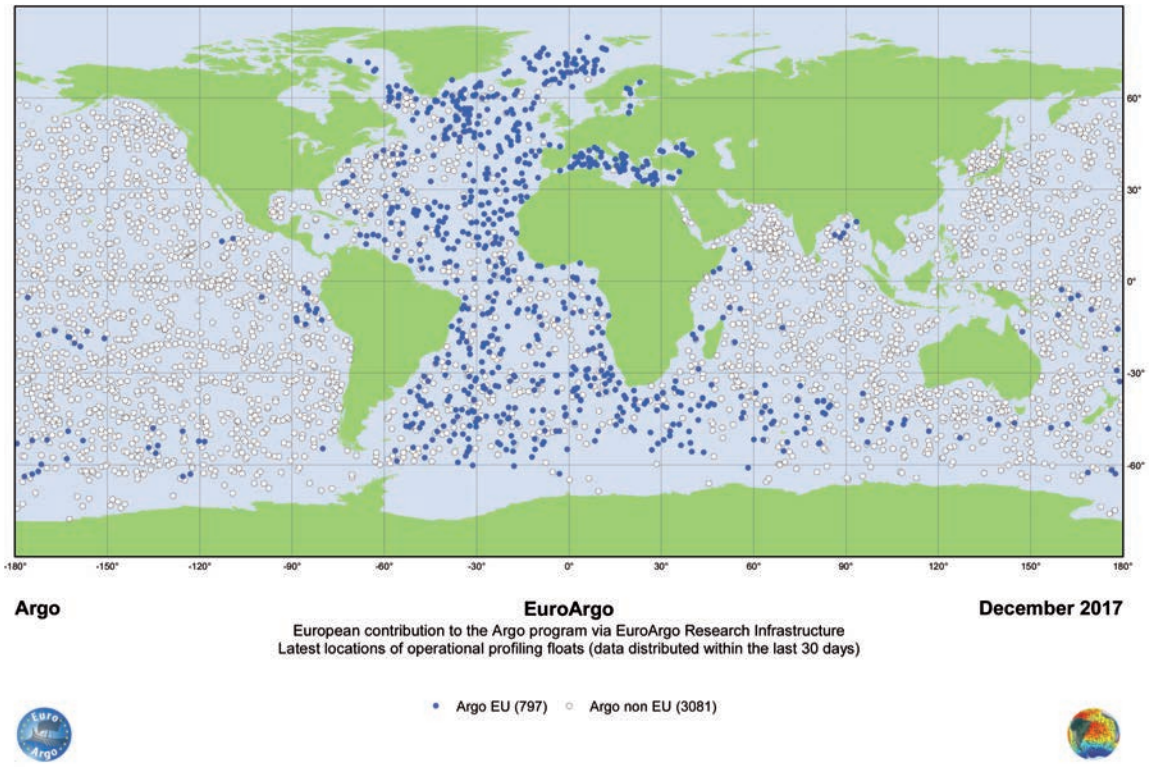


Figure 36: Argo (white points, 3081 floats) and Euro-Argo (blue points, 797 floats) active profilers in December 2017 (© JCOMMOPS/AIC).

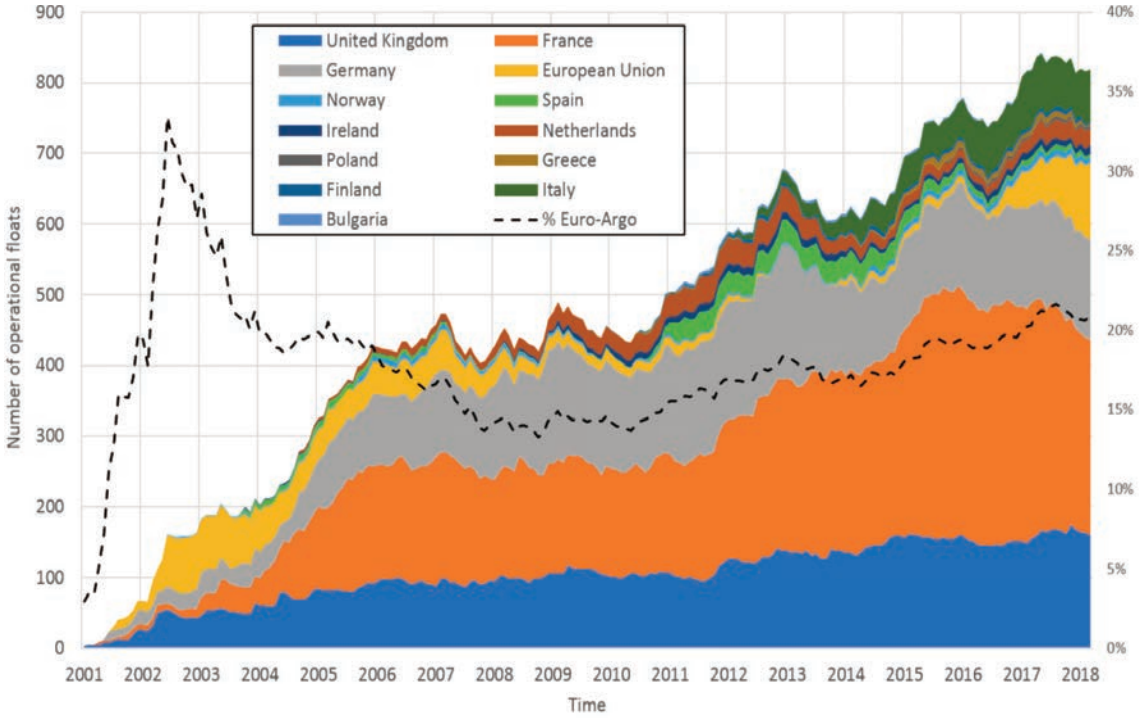


Figure 37: Euro-Argo partners contribution to the global Argo network in number of operational floats (color, left axis) and in percentage of the total number of active floats (dashed line, right axis) (© JCOMMOPS/AIC).

In terms of float performance, as shown in Figure 38, the life expectancy of European floats is improving and the target of 4 years – around 150 cycles – has been achieved in average. The survival rate is presented in Figure 39 by float model (for the period [2008-2017]), highlighting the good behaviour of recent floats (Arvor).

Compared to the rest of the Argo fleet, the number of profiles acquired per float by the Euro-Argo fleet is improving (Figure 40). The percentage of floats reaching the 50 cycles target shows that on recent deployments the Euro-Argo fleet has a similar and even better score than the rest of the fleet. On the 100 cycles target the score of the Euro-Argo fleet has nearly reached the level of Argo fleet and shows impressive progress in past years.

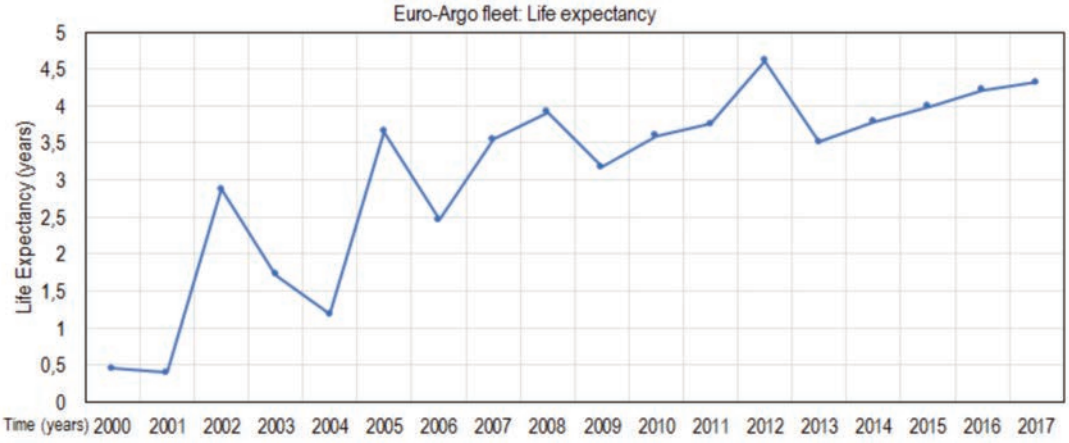


Figure 38: Life expectancy of the Euro-Argo fleet (© JCOMMOPS/AIC).

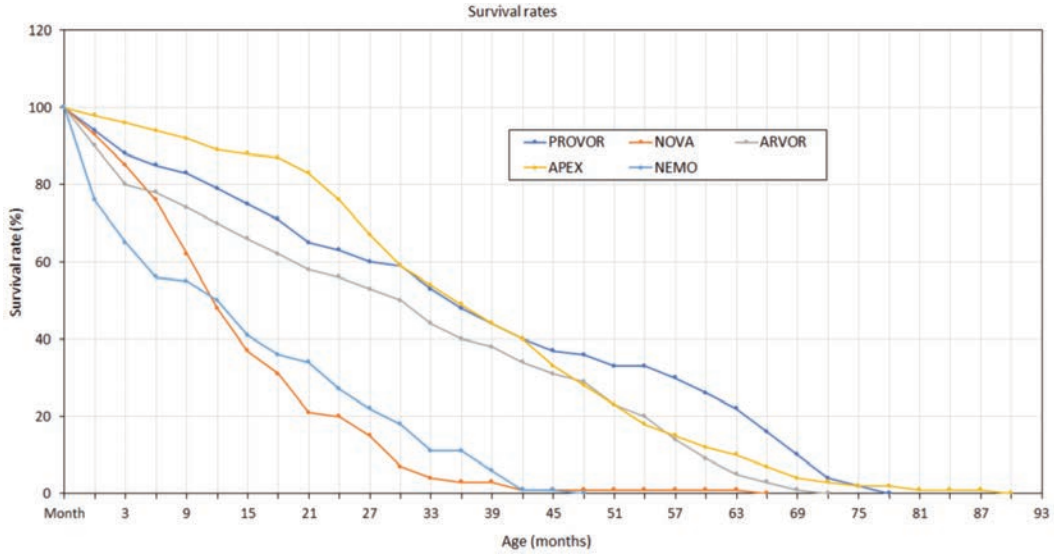


Figure 39: Survival rate for the Euro-Argo fleet per float type (© JCOMMOPS/AIC).

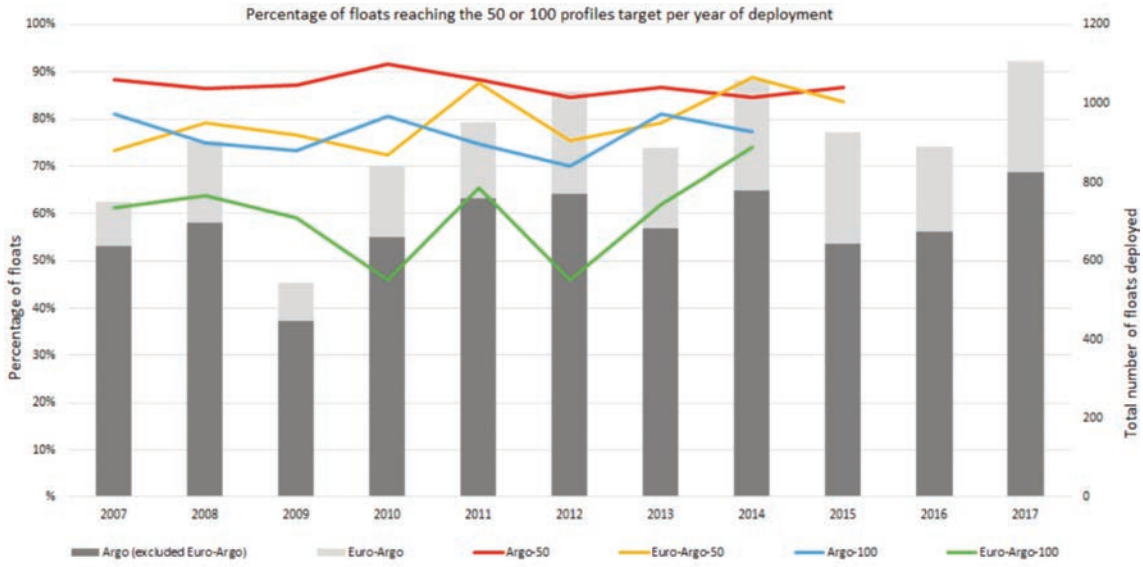


Figure 40: Percentage of floats from the Euro-Argo fleet reaching the 50 cycles or 100 cycles target compared to the rest of the Argo fleet (colored lines, left axis). In grey, the total number of floats deployed for Euro-Argo and the rest of the fleet (right axis) (© JCOMMOPS/AIC).

4.2 KPIs regarding users

One of the overall objectives of the Euro-Argo ERIC is to provide quality-controlled data and access to the data sets and data products to the research (climate and oceanography) and operational oceanography (e.g. Copernicus Marine Service) communities.

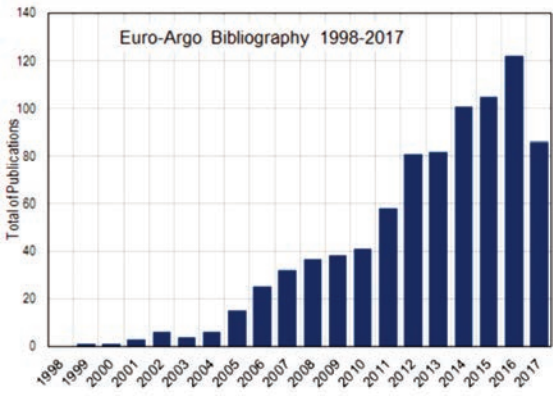


Figure 41: Number of Argo publications from Europe per year since 1998.

4.2.1 Euro-Argo bibliography

Euro-Argo monitors each year the number of publications using Argo observations from EU users. Table 5 and Figure 42 represent the partition by year and by country respectively. France is in the top 3 countries contributing to the Argo bibliography with 312 papers, together with UK which ranks 5th thanks to 215 papers. Just below, Germany, Italy and Spain contribute with about 65-115 papers since 1998.

A total of 317 Argo papers were published in 2017. As for Argo international, Argo publications from the Euro-Argo ERIC community reach a plateau with 86 papers published in 2017. However, since 1998, the European contribution has been about 28.9 % of the total number, which is better than the initial target of 25%.

	Total	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
FINLAND	3																1			2	
FRANCE	312		1		1	3	1	2	3	6	8	15	17	13	23	30	30	47	40	41	31
GERMANY	112					2		1	3	4	3	7	5	4	9	9	11	8	15	22	9
GREECE	10												1	1	1			3	2	1	1
IRELAND	1													1							
ITALY	82									5	6	4	4	6	5	7	5	5	9	17	9
NETHERLANDS	14														1	2	2	1	1	6	1
NORWAY	28											3		1	3	4	3	4	2	5	3
POLAND	2																	1	1		
NORWAY	28											3		1	3	4	3	4	2	5	3
SPAIN	65							1	3	4	1	1	3	6	3	5	6	4	8	13	7
UK	215			1	2	1	3	2	6	6	14	7	8	9	13	24	24	28	27	15	25
TOTAL EURO-ARGO	844	0	1	1	3	6	4	6	15	25	32	37	38	41	58	81	82	101	105	122	86
ARGO Bibliography	2921	2	3	7	13	19	20	26	53	80	93	102	120	191	208	256	284	350	384	393	317
% EU vs Argo	28,89	0,0	33,3	14,3	23,1	31,6	20,0	23,1	28,3	31,3	34,4	36,3	31,7	21,5	27,9	31,6	28,9	28,9	27,3	31,0	27,1

Table 5: Number of publications using Argo from EU users, and percentage versus Argo publications, per year since 1998.

4.2.2 Access to Data

Over the 12 months period from September 2016 to August 2017, 30 367 profiles from 788 active floats were collected, controlled and distributed by Coriolis DAC. Compared to 2016, the number of profiles increased by 1%, the number of floats increased by 2%. The 788 floats managed during that period had 56 versions of data formats from 4 families.

Coriolis DAC provides data for 357 BGC Argo floats from 5 families and 51 instrument versions. They performed 46 460 cycles.

The number of users that access, visualize and download Argo data sets is monitored each year from the Coriolis GDAC portal. Coriolis hosts one of the two global data assembly centres (GDAC) for Argo that contains the whole official Argo dataset. The Argo GDAC ftp server is actively monitored by a Nagios agent (see http://*en.wikipedia.org/wiki/Nagios*). Every 5 minutes, a download test is performed. The success/failure of the test and the response time are recorded. There is a monthly average of 449 unique visitors, performing 4552 sessions and downloading 3.3To of data files. In November 2017, 131308 BGC Argo profiles from 863 floats were available on Argo GDAC. This is a strong increase compared to 2016: +65% more profiles and +54% more floats.

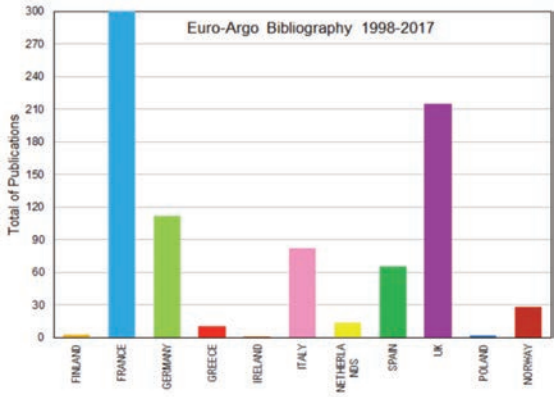


Figure 42: Number of publications by Euro-Argo participating countries since 1998.

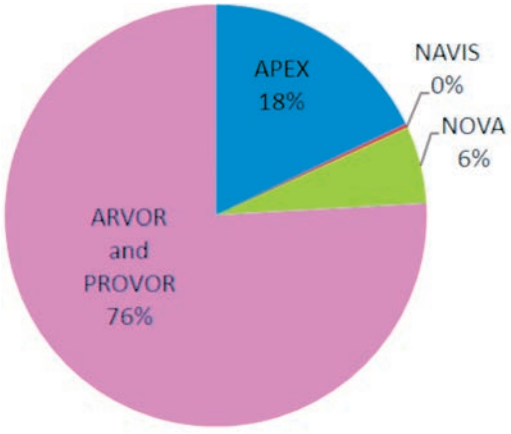


Figure 43: Repartition of active European float types in 2017.

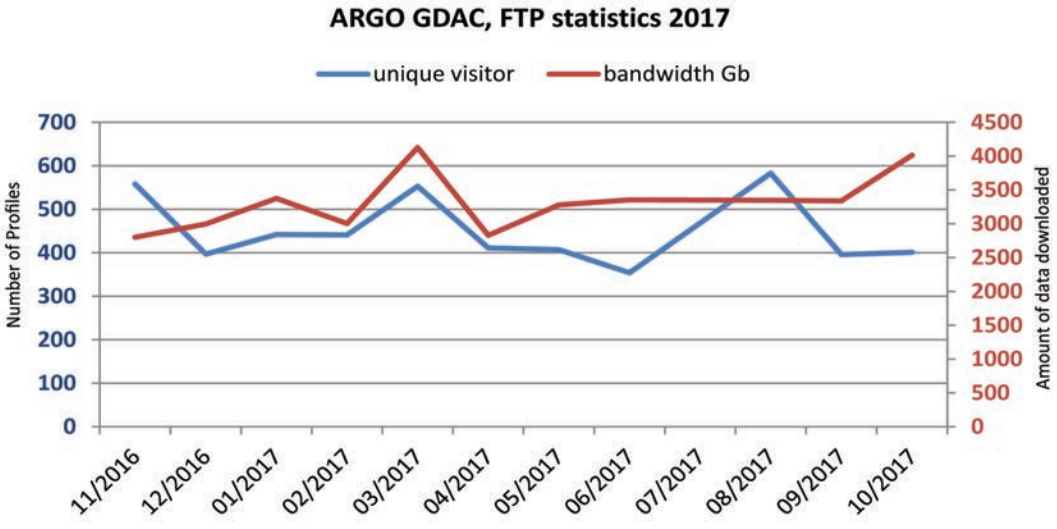


Figure 44: Statistics on the Argo GDAC server between Nov. 2016 to Oct. 2017.

5. FINANCIAL STATUS

There is a positive balance of about 83K€ in Euro-Argo ERIC 2017 budget execution. This is due, in part, to the contribution of about 177K€ that the ERIC received in 2017 for staff funding from the EU projects. The central ERIC income in 2017 reached 290K€ (+30K€ compared to 260K€ planned) as Spain became a full member. Salary expenses is around 251K€ (74K€ on ERIC and about 177K€ on projects) and other expenditures of 80K€. A positive balance of 83K€ (107K€ on the ERIC, the rest on projects) is reached at the end of the year 2017. As far as projects are concerned, the budget execution is as planned for MOCCA, AtlantOS and ENVRIplus, and incomes following the project reporting period justification are expected mid-2018. An exceptional Ifremer in-kind contribution to Euro-Argo reached 100K€ as part of a CPER Britany region Euro-Argo project. This new funding was used to develop further the Euro-Argo website and the at-sea monitoring web tools.

Type	Code	Debit	Credit	Solde
Initial Balance				402 020
SG: Sales of goods	SG		404 413	404 413
GC: Grants & Contracts	GC		823 065	823 065
MF: Membersschips fees	MF		290 000	290 000
II: Interest income	II		0	0
VA: VAT reimbursement	VA		0	0
PG: Purchases of Goods	PG	404 414		-404 414
PE: Personnel costs	PE	251 290		-251 290
TV: Travel costs	TV	51 733		-51 733
MA: Matérials costs	MA	1 634		-1 634
AC: Accounting fees	AC	6 242		-6 242
BS: Bank services	BS	268		-268
SC: Other subconstracts	SC	159 092		-159 092
DP: Depreciation	DP	560 196		-560 196
Total flows		**1 434 869**	**1 517 478**	
END BALANCE				**484 629**

	ERIC	ATLANTOS	MOCCA	ENVRI	JERICO	TOTAL
Purchases of goods for resale	404 414					404 414
Insurance premiums			6 060			6 060
Personnal	73 953	7 513	122 732	45 441	1 651	251 290
Studies	30 000					30 000
Business travel	11 124	12 003	15 215	10 950	2 441	51 733
Telecommunication cost	5 000	6 583	41 483			53 066
Others costs	68 392	6 271	1 899	1 548		78 110
Depreciation	2 767	152 746	404 684			560 196
Sales of goods for resale	404 414					404 414
Operating Grants		232 148	506 674	72 423	4 091	815 336
Subscription members and observers	290 000					290 000
Others income	7 729					7 729
Accounting result	106 493	47 032	-85 399	14 484	0	82 609

Country	Floats purchased	Floats deployed	Full Time Employee
Finland	3	5	0.21
France	68	65	10.20
Germany	32	38	2.50
Greece	0	3	0.42
Ireland	3	3	0.38
Italy	18	27	1.00
Netherlands	4	12	0.08
U.K.	20	51	3.15
Norway	0	0	0.40
Poland	3	3	0.42
Spain	3	3	0.50
Total	**154**	**210**	**19.26**

ANNEX 1: GLOSSARY

AOML: Atlantic Oceanographic and Meteorological Laboratory
ARC: Argo Regional Centre
BEERI: Board of European Environnemental Research Infrastructure
BGC: Biogeochemical
BSH: Bundesamt für Seeschifffahrt und Hydrographie
CMEMS: Copernicus Marine Environment Monitoring System
CPER: Contrat de Plan Etat-Région
CSIRO: Commonwealth Scientific and Industrial Research Organisation
DA/GDAC: Data Assembly Centre / Global Data Assembly Centre
DFO: Department of Fisheries and Oceans
DMQC: Delayed Mode Quality Control
EASME/EMFF: Executive Agency for SMEs / European Maritime and Fisheries Fund
EGU: European Geophysical Union
EMSO: European Multidisciplinary Seafloor and water column Observatory
EOOS: European Ocean Observing System
ERIC: European Research Infrastructure Consortium
ESFRI: European Strategy Forum on Research Infrastructures
EuroGOOS: European Global Ocean Observing System
GEOMAR: Helmholtz-Zentrum für Ozeanforschung Kiel (Helmholtz Centre for Ocean Research Kiel)
HCMR: Hellenic Centre for Marine Research
IEO: Instituto Español de Oceanografía
IFM-HH: Institut für Meereskunde Hamburg, Universität Hamburg
IMR: Institute of Marine Research
INTAROS: Integrated Arctic Observing System
IO-BAS: Institute of Oceanology - Bulgarian Academy of Sciences
JCOMMOPS: Joint technical Commission for Oceanography and Marine Meteorology in situ Observations Programme Support Centre
LOV: Laboratoire d'Océanographie de Villefranche
MI: Marine Institute
MOCCA: Monitoring the Oceans and Climate Change with Argo
NOC: National Oceanography Centre
OGS: Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (National Institute of Oceanography and Applied Geophysics)
OW: Owens and Wong
ROOS: Regional Ocean Observing System
SOARC: Southern Ocean Argo Regional Centre
SOCIB: Sistema d'Observació i predicció Costaner de les Illes Balears (Balearic Islands Coastal Observing and Forecasting System)
TWR: Teledyne Webb Research

ANNEX 2: PARTNERS OF EURO-ARGO ERIC

Country	Statute	Representing Organisation
Finland	Member	FMI
France	Member	Ifremer
Germany	Member	BSH
Greece	Member	HCMR
Ireland	Member	MI
Italy	Member	OGS
Netherlands	Member	KNMI
United Kingdom	Member	Met Office
Spain	Member	SOCIB, IEO
Norway	Observer	IMR
Poland	Observer	IOPAN
Bulgaria	Candidate	IO-BAS

ANNEX 3: EURO-ARGO ERIC GOVERNANCE BODIES

Euro-Argo ERIC Members	
Council Members	**Position**
Jean-Marie FLAUD	*Chair* - MESR France
Alessandro CRISE	*Vice-Chair* - OGS Italy
Bernd BRÜGGE	BSH Germany
Vasilios LYKOUSIS	HCMR Greece
Sybren DRIJFHOUT	KNMI Netherlands
Mikko STRAHLENDORFF	FMI Finland
Jon TURTON	Met Office United Kingdom
Mick GILLOOLY	MI Ireland
Dariusz DREWNIAK	Ministry of Science and Higher Education Poland
Odd Ivar ERIKSEN	Research Council of Norway
Joaquin TINTORÉ	SOCIB Spain
Pierre-Yves LE TRAON	Special Advisor to the French representative
Management Board Members	
Birgit KLEIN	*Chair* - BSH Germany
Diarmuid O'CONCHUBHAIR	*Vice-Chair* - MI Ireland
Jari HAAPALA	FMI Finland
Gerasimos KORRES	HCMR Greece
Pedro VÉLEZ-BELCHI	IEO Spain
Guillaume MAZE	Ifremer France
Kjell Arne MORK	IMR Norway
Waldemar WALCZOWSKI Waldemar	IOPAN Poland
Andreas STERL	KNMI Netherlands
Matt DONNELLY	NERC-BODC United Kingdom
Pierre-Marie POULAIN	OGS Italy
Euro-Argo ERIC Central Research Infrastructure	
Sylvie POULIQUEN	*Programme Manager* - Ifremer France
Francine LOUBRIEU	*Administrative Assistant* - Ifremer France
Grigor OBOLENSKY	*Programme Engineer* - CNRS France
Romain CANCOUËT	*Operational Engineer* - Euro-Argo ERIC
Claire GOURCUFF	*Science Officer* - Euro-Argo ERIC
Scientific & Technological Advisory Group (STAG)	
Glenn NOLAN	EuroGOOS - EOOS
Susan WIJFFELS	CSIRO Australia - Argo International
Johnny JOHANNESSEN	NERSC Norway - Copernicus Marine Service
Arne KÖRTZINGER	GEOMAR Germany - Research
Magdalena BALMASEDA	ECMWF UK - Seasonal Prediction
Euro-Argo ERIC expert assisting the STAG	
Hervé CLAUSTRE	LOV France - Bio-Argo

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