ANNUAL ACTIVITY REPORT 2016

EURO-ARGO
Research Infrastructure

Annual Activity Report 2016

CONTENTS

PREFACE

Welcome to the 2016 annual report of the Euro-Argo ERIC! In its third year of operation, the Euro-Argo ERIC continues to implement a substantial long-term contribution to the international Argo programme. Long-term and quality in-situ observations, by means of Argo floats, are crucial to better quantify climate change, understand and predict the role of the oceans and seas on climate, and help decision-makers to wisely act in mitigating and in adapting to climate change. Since the turn of the Century, the data provided by Argo floats have made an outstanding contribution to ocean and climate change research and to operational oceanography. The sustainability of the Argo network, and its evolution, i.e. to respond to new operational and scientific needs, are, however, important challenges. The main goal of the Euro-Argo ERIC is to address these challenges and to play a prominent and unified European role in the Argo international programme.

The Euro-Argo Office has welcomed two new staff members to the team in 2016, Romain Cancouët and Claire Gourcuff. The STAG extends a warm welcome to the new team members and wishes them success in their endeavours.

In 2016, a revised science strategy was developed for the Euro-Argo ERIC and approved by the STAG. A major milestone was reached during 2016 in terms of Europe's overall contribution to the global network reaching 24% in December 2016. The EC funded MOCCA project oversaw the purchase and test of 150 new floats, half of which are already deployed. The remainder will be deployed in 2017.

Data management is a major cornerstone of Euro-Argo and a large-scale reprocessing of historical data has taken place in both UK and France. Enhancements to delayed mode processing have also been implemented for the North Atlantic, Mediterranean and Southern Ocean this year.

European scientists continue to use Argo data in their scientific studies with 109 new studies published in 2016.
The Euro-Argo ERIC welcomes a new member in 2016, Ireland, and looks forward to many years of collaboration with our new partners.

Overall, the Euro-Argo ERIC is on a positive track having enhanced the array, expanded the technical team and membership, developed a broader strategy for the coming years and enhanced the uptake and use of data by both scientific and non-scientific users. We hope you will enjoy learning more about the detailed activities of the Euro-Argo ERIC in this report.

Glenn Nolan
Chair, Scientific and Technical Advisory Group

EXECUTIVE SUMMARY

In 2016, Euro-Argo welcomed its first new member since the creation of the ERIC in May 2014; Ireland entered the Consortium in April 2016.

The ERIC office team also enlarged, with two new arrivals; Romain Cancouët started to work as an operational engineer in April and Claire Gourcuff as a science officer in October. Two Council meetings were held, in April (Brest, France) and November (Paris, France), and three Management Board meetings, in March (Athens, Greece), June (Helsinki, Finland) and October (Trieste, Italy).

The Euro-Argo strategy document, first released in 2015 was revised after the review by the Scientific and Technological Advisory Group and an updated version was published late 2016 (v3.1). This reference document describes the European strategy for float deployments and developments, and details the strategy for the implementation of the new phases of Argo (extensions of the programme towards Biogeochemistry, abyssal ocean, polar and marginal seas).

Euro-Argo continued to increase the European contribution to the global network, with a percentage of floats deployed by Europe reaching for the first time 24% of the total number of floats deployed in 2016.

Regarding data management activities, the reprocessing of Argo data in the new format was pursued, with priority given on active floats. Reprocessing of historical data has also started in 2016 both in France and UK centres who process all the European floats. This report details Delayed Mode processing enhancement performed by the 3 regional centres (North Atlantic, Mediterranean and Southern Ocean).

The Euro-Argo ERIC elaborated a communication plan in 2016, including a reorganisation of the website, the set-up of a newsletter and a Twitter account. Several concrete actions were also carried on, including participation of the ERIC to conferences and exhibitions.

In 2016, the MOCCA (Monitoring the Oceans and Climate Change with Argo) project entered its second phase, with all the 150 floats purchased and tested in Ifremer premises. Half of the floats were deployed as of December 2016, deployments of the second half being planned in 2017. The development of at sea monitoring procedures was also started in the framework of MOCCA, that will benefit the whole Euro-Argo community. The work carried on other projects in which Euro-Argo is involved such as AtlantOS and ENVRIplus is also detailed.

More than 10 studies using Argo data were published in 2016 by European scientists, among which two are summarised in this report: one study concerning water masses characteristics in the South Aegean Sea, and another one on seasonal variations of the South Indian tropical gyre.

In 2016, Euro-Argo started to work on the definition of new Key Performance Indicators (KPIs), regarding floats and data users. Some new KPIs are presented in the report, highlighting in particular the performance of European floats in terms of survival rates.

The financial status of the ERIC is also presented at the end of the report, including information not only on Euro-Argo expenses but also on partners' expenses in float procurements and man months.

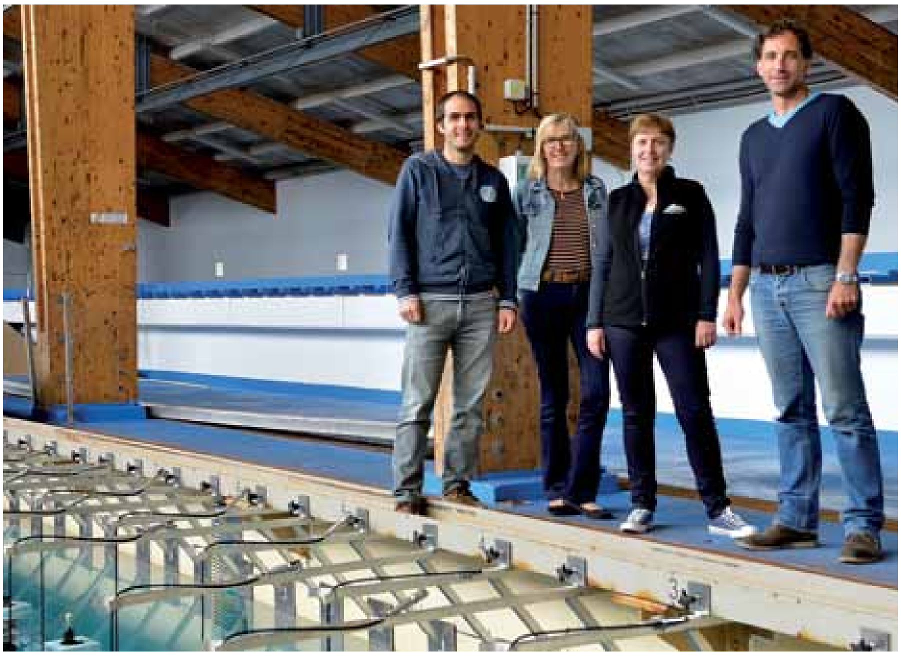

Figure 1: The Euro-Argo ERIC Office team at the test basin in summer 2016.

1 MAIN OPERATIONAL OUTCOMES IN 2016

1.1 What is the value-added of Euro-Argo Research Infrastructure

Euro-Argo develops and progressively consolidates the European component of the global Argo network with an objective of maintaining a network of about 800 floats deployed by European partners in operation at any time.

The Euro-Argo ERIC is in charge of the coordination of European float deployments, with deployment plans discussed at Management Board level, taking into account the Euro-Argo deployment's strategy detailed in a reference document *(Euro-Argo ERIC (2016)*[1], see section 3.5) and the international recommendations revised at annual Argo Steering Team (AST) meetings. This coordination effort ensures that certain areas are not overpopulated at the expense of others of the global array, and is eased by the proximity with the JCOMMOPS office that for instance provides the ERIC with up-to-date information regarding Argo global network gaps and deployment opportunities.

Figure 2 shows the increase of the global amount of float deployed by Europe between 2002 and 2017. The increase affects not only the total number of floats, including floats purchased with direct funding from Europe, but also the number of floats deployed by individual countries (e.g. Germany, Spain, Italy, etc.). Setting up the ERIC has already consolidated, and in some cases initiated or increased the national contributions of the ERIC partners.

It is expected that the coordination of Argo activities at European level will facilitate the development of the BGC-Argo and Deep-Argo global networks by encouraging other countries to step forward, based on pilot experiment sharing. This coordination also enables increased sampling in areas of specific European interests, such as the Baltic Sea and the southern European Seas. Poland started to deploy Argo floats in the Baltic Sea in 2016, stimulated by the successes of its Finnish partner's deployments in the area. In 2016, four floats were also deployed in the Black Sea, one Italian and three floats purchased with direct funding from the European Union, under the MOCCA project (section 4.1). Data acquired with these Argo floats are crucial for the understanding of circulation, thermohaline stratification and control of factors that govern the biogeochemical cycles in the Black Sea, which is the least monitored and scientifically studied marginal sea among the European ones. The involvement of Bulgarian and Romanian partners in the deployments of the European floats in the Black Sea will reinforce the collaboration with these countries for the years to come.

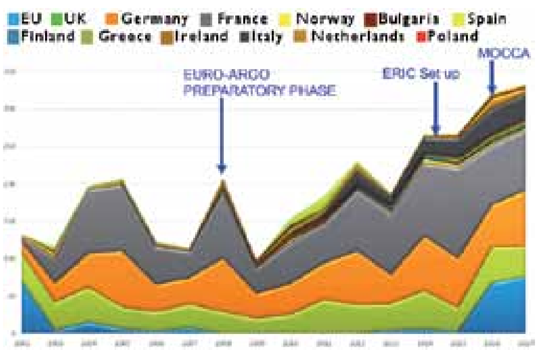

Figure 2: Increase of the European contribution to the international network.

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

The European ocean research community has a strong interest in high latitudes studies, and many of the Euro-Argo ERIC members and observers are involved in Argo activities in seasonally sea-ice covered regions (Nordic Seas, Southern Ocean). Thanks to recent technological developments, and although work still needs to be done, an extension of Argo towards the Arctic is also envisioned at European level in the next decade (section 3.5). The experience of scientific and technical staff of all European partners is gathered through the Euro-Argo ERIC, with discussions happening at Management Board level that allow for Argo technology dedicated to sea-ice conditions to continuously improve. The ERIC also provides a means to better interact with manufacturers, in a more convincing and concerted way.

In 2016, the MOCCA (T/S) and AtlantOS (Deep and BGC) floats purchased by Euro-Argo were successfully tested in the central facility at Ifremer by the ERIC technical team, and results were reported to the ERIC members for discussions at Management Board level. The Euro-Argo ERIC thus proved its capability to take on Argo float testing, a service that could benefit in the future to Euro-Argo members who do not have access to such facility for their national floats.

In the framework of the MOCCA project, the Euro-Argo ERIC has worked on the elaboration of at sea monitoring procedures that will be used more generally to monitor the European fleet. Mid-2016, a questionnaire was issued that was filled by Euro-Argo partners and associated institutions, providing feedback on the current needs and where to put efforts. The ERIC then started to work jointly with the AIC for deriving global statistics (age distribution, life expectancy, deployment maps etc.). Existing tools at Coriolis will be enhanced in 2017 based on the priorities drawn from this first step, especially considering technical aspects (reports on the cases of early failures of individual floats, monitoring of critical technical parameters defined by partners such as battery voltage or data transmission etc.). Dashboards and status tables will be available through a web interface, and the tools will benefit the whole Euro-Argo community.

Finally, in 2016, Euro-Argo started to develop a communication strategy (section 3.8.1), which includes the release of a newsletter, and a presence on Twitter. The Euro-Argo website is also regularly fed with news on Euro-Argo ERIC members and observers Argo activities. These communication tools, in addition to the Euro-Argo outreach materials significantly improve the general visibility of European Argo activities, in a centralised way.

1.2 Euro-Argo ERIC partners

During its 5th meeting held in Brest on 29 April 2016, the Euro-Argo ERIC Council enthusiastically welcomed Ireland as a new member of the Euro-Argo ERIC. Through the Marine Institute and facilitated by support from the Department of Agriculture, Food and the Marine (DAFM), Ireland has been granted full membership to the Euro-Argo ERIC. Michael Gillooly (Director Ocean Science and Information Systems at Marine Institute) will represent Ireland in the

Figure 3: Ireland became a new member of the Euro-Argo ERIC in 2016.

Council and Diarmuid Ó Conchubhair (Team lead of Marine Infrastructure Projects at Marine Institute) in the Management Board.

The Marine Institute's participation in the Euro-Argo ERIC allows Ireland to build national capacity in the ocean observation sphere and to leverage substantial opportunities in Horizon2020 and other EU research and infrastructure funding mechanisms. It also places Ireland at the centre of global efforts to model, project, mitigate and adapt to the potential impacts of climate change. A dedicated webpage exists to know more about Ireland activities in Euro-Argo *(http://www.marine.ie/Home/site-area/areas-activity/oceanography/euro-argo).*

1.3 Euro-Argo ERIC Office team

The ERIC Office team is now composed of five persons funded by the ERIC, with a Programme Manager (S. Pouliquen), an Administrative Assistant (F. Loubrieu), a Programme Engineer (G. Obolensky), and two new-arrived in 2016: an Operational Engineer (R. Cancouët) and a Science Officer (C. Gourcuff).

Romain Cancouët holds a master's degree in Ocean and Atmosphere physics from University of Brest. He also graduated from ENSTA-Bretagne Engineering School where he got specialized in Hydrography and Oceanography. He is familiar with mission planning and logistics, and has technical expertise in marine instrumentation and knowledge of sea environment and European projects. Romain joined the Euro-Argo ERIC Office team on 4 April 2016. Within the Euro-Argo ERIC Office team, he works with the Programme Engineer in organizing the management activities (acceptance tests, qualification and programming) of batches of profiling floats, from the earlier stage (procurement, handling and storing) to the latest ones (transport logistics, deployment, at sea monitoring and network survey).

Claire Gourcuff has been working in ocean science for 10 years. She holds a PhD in Physical Oceanography from University of Brest and has an expertise in ocean data, in particular in data management and Quality Control. Claire joined the Euro-Argo ERIC Office on 3 October 2016. She has been hired for 18 months to assist the team in fulfilling identified goals and outlines of the ENVRI+ project, in particular regarding Argo datasets preparation, dissemination and training activities. She will also be involved in European projects in which the Euro-Argo ERIC is participating, ensure scientific coordination with the Euro-Argo ERIC members and support the ERIC in the elaboration of proposals in response to European Commission calls.

1.4 Management of the Euro-Argo ERIC

In 2016, 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 ENVRI+).
- Communication and outreach.
- Continuing seeking for additional long-term support from the European Commission.

Two Council meetings were organized during the year:

- **The 5th Council meeting held on 29 April 2016 in Brest *(France)*** was dedicated to the approval of the 2015 financial and annual reports, to the feedback from the STAG (Scientific and Technical Advisory Group) meeting and recommendations, and to the preparation of a strategy for the evolution of Argo for the next decade.
- **The 6th Council meeting, on 28 November 2016 in Paris *(France)*** allowed the presentation of 2016 activities and budget execution, of progress on MOCCA activities, analysis of answers to STAG recommendations, information on G7 future

Figure 4: Romain Cancouët and Claire Gourcuff joined the Euro-Argo ERIC Office in 2016.

oceans initiatives, approval on status of ERIC personnel and salary issues, 2017 work plan and budget and information about new members or observers.

In 2016, three Management Board meetings were held:

- **The 6th MB meeting held in Athens *(Greece)* on 10 March 2016** was dedicated to the review of 2015 activities and budgets together with plans for 2016. A feedback on progress of EU projects (AtlantOS, MOCCA ENVRI+, MedOS). 2016 national deployments plan was also updated.
- **The 7th MB meeting held in Helsinki *(Finland)* on 16-17 June 2016**. It was dedicated to the update on EU projects, on 2016 national deployments, on the Strategy document. During this event, a feedback on Euro-Argo ERIC recruitment and a presentation of the idea of developing a communication/ outreach/training plan were discussed. A fixed term position for a research engineer on project funding was also adopted.
- **The 8th MB meeting, in Trieste *(Italy)* on 24-25 October 2016** was dedicated to discussions on progress on MOCCA and AtlantOS, discussions about the feedback from the STAG and the finalization of the strategy document, together with the consolidation of the deployment plans for 2016-2018. The communication plan of the Euro-Argo ERIC was also discussed during this meeting.

A **scientific workshop** was also organized in **Brest on the 28 April 2016**, following the **first STAG meeting** on the same day.

1.5 Euro-Argo Strategy for the ten coming years

One of the main challenges for Euro-Argo for the coming years is to implement the new phase of Argo with an extension towards biogeochemistry, the polar oceans, the marginal seas and the deep ocean. In 2016, Euro-Argo has revised the strategy for the evolution of Argo in Europe, in a new version of the document (Euro-Argo ERIC (2016)[1]). This reference document will be revised regularly to

Figure 5: Management Board in Trieste on 24 October 2016.

Figure 6: Management Board and STAG members in Brest (April 2016).

take into account both technological developments and the international Argo strategy. It provides recommendations on Argo floats deployments, including insights on the European contribution to the core-Argo programme, and sections dedicated to the Argo extensions.

The European partners aim at sustaining about ¼ of the entire Argo array which requires the capacity to procure and deploy about 350 floats 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.

The Atlantic Ocean is a region of great interest for the European research community, and float deployments will be continued in this ocean, with a specific attention on keeping the appropriate sampling in equatorial and boundaries regions.

On account of the strong interest of the European community for the monitoring of marginal seas, Euro-Argo plans to contribute an additional 50 floats per year for strengthened monitoring in these areas.

The **Mediterranean and Black Seas** are strongly affected by human activities and climate change, and defined by variability scales much smaller than the global ocean. The aim is to double the Argo sampling in these southern Europe Seas, with 60 active floats at all time in the Mediterranean Sea and at least 10 active floats in the Black Sea. Various cycling and sampling characteristics have been selected for monitoring the thermohaline variability of these marginal seas, which include cycles of 5 to 10 days and parking depths between 350 and 650 m for Mediterranean and between 200 and 1550 m for the Black Sea. However, continuous assessments of the chosen float parameters are necessary and will be performed.

Argo activity in the **Baltic Sea** started in 2011 by Finland. Since the early results showed that Argo floats are extremely good instruments in the Baltic Sea conditions too, more Baltic Sea countries have engaged to Argo activity which enabled to cover all major sub-basins. In particular, Poland started its first Argo float deployments in the Baltic in 2016, in order to investigate inflow of saline oxygen rich water from Southern Baltic to the Central Baltic, and water mass exchanges between the Baltic Sea sub-basins.

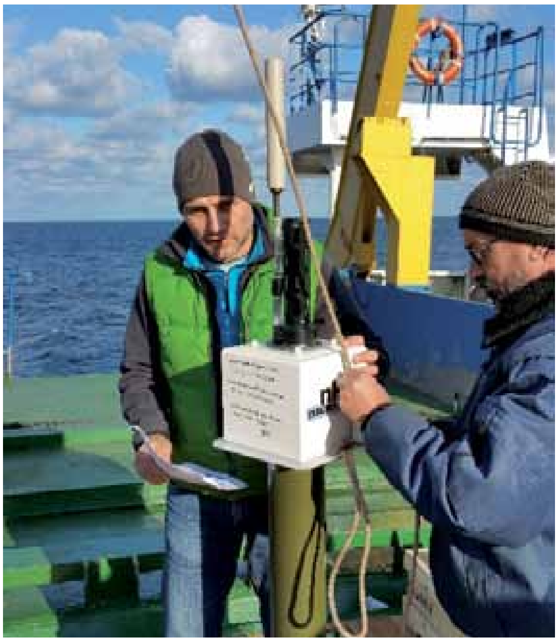

Figure 7: MOCCA float deployment in the Black Sea by Romania, December 2016 © Sorin Balan.

The recommendations for the Baltic Sea is to keep 7 active floats at all time: one float in the Bothnian Bay, two floats in the Bothnian Sea and four floats in the Baltic Proper. Recovering the floats on an annual basis is planned, with redeployment after laboratory calibration. The Baltic Sea with its seasonal sea ice cover could also serve as a test bed for the development of Argo floats operating in sea ice environments. The gained expertise could then be exploited in the development of floats for the Arctic Ocean.

Euro-Argo partners have long-standing experience in float deployments in **high latitudes**. At present, the use of floats in the polar oceans is seriously impeded by the presence of sea ice. Nevertheless, the high latitudes are key regions of the global climate system and thus need to be monitored. Ice-avoidance algorithms for Southern Ocean, first developed by AWI for NEMO floats, have been successful in reducing damage to floats deployed in the seasonally ice-covered Southern Ocean and have helped to increase float lifetimes. Due to the strong research interest of European scientists in the Weddell Gyre and the already installed RAFOS array needed to locate the floats under ice, this area is one of the chosen places for a European enhancement of the global Argo. Euro-Argo aims at maintaining 50 active floats in the Weddell Gyre based on the nominal design density.

Although the ice-resilience of Argo floats has been increased in recent years, work still has to be done on the development of appropriate ice-sensing algorithms for the Arctic Ocean, the seasonally ice-covered regions of the Baffin Bay and the other areas of the Nordic Seas based on the respective hydrographic conditions. Presently, other direct methods of ice-sensing, especially based on optical measurements, are being tested for the ice-covered high latitudes in the Baffin Bay.

Using the core-Argo target, the Euro-Argo recommendations include that a total of 39 Argo floats should be active in the Nordic Seas, among which one fourth within the boundary currents, with a parking depth of 500m. With the ongoing technological development, a further extension of the global Argo array **in to the ice-covered areas of the Northern high latitudes - including Arctic** - is envisioned (at about 5 years) and also coverage of the more severely ice-covered areas in the Nordic Seas (e.g. the East Greenland Current).

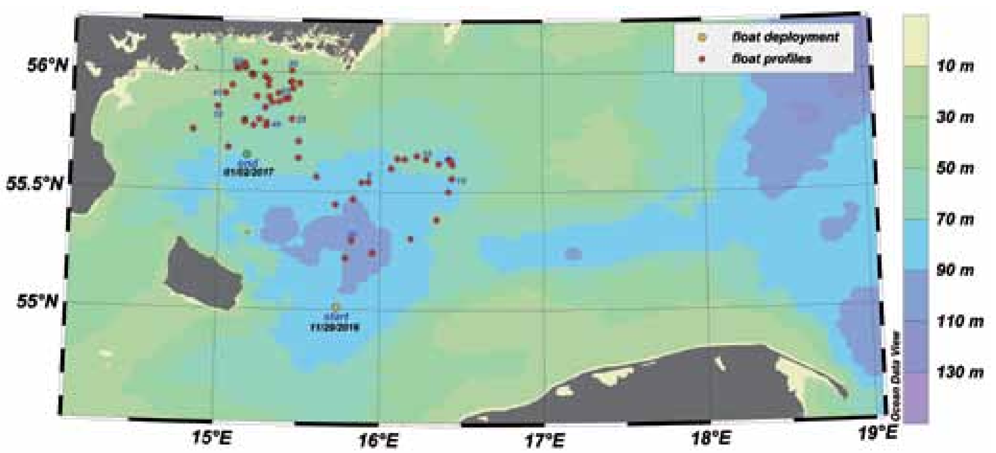

Figure 8: Surface position of Argo float deployed in the Baltic Sea in November 2016 (IOPAN).

While the deployment of sensors for **dissolved oxygen** on Argo floats has been ongoing since 2003, the progressive addition of new bio-optical (e.g. Chla fluorescence, backscattering, radiometry) and other chemical sensors (nutrients, pH) to the system starts to let **Biogeochemical-Argo (BGC-Argo) become a reality**. Looking at various assessments and indicators to scale the size and distribution of a global BGC-Argo network, a target size of 1000 fully equipped BGC-Argo floats with uniform regional distribution is anticipated for the global array, which corresponds to 25 % of all Argo floats. Euro-Argo aims at contributing to this global effort within the same proportion with an additional effort put on **providing half of the whole European fleet with oxygen sensors**. Regional refinement is proposed depending on the interest of the research community for biogeochemical monitoring in specific seas or regions (see details in *Euro-Argo ERIC (2016)*[1]) and it is expected that the European contribution will boost the BGC-Argo global network development.

Many recent studies have highlighted the crucial contribution of the intermediate, deep and abyssal oceanic layers to the global energy and sea level budgets. Pilot experiments have demonstrated the ability of floats to perform valuable measurements down to 4000m and 6000m depth. Sensor development is continuing as well as evaluation of the design of the Deep-Argo array proposed by *Johnson et al. (2015)*. On the long term, the target for the European contribution to the Deep-Argo array is about 20% of the international target, which, based on the *Johnson et al. (2015)'s* straw-plan would correspond to about 240 active floats.

The implementation of the core-Argo and the marginal seas, high latitudes, deep and BGC Argo extensions depends on the lifespan of the floats. This key indicator, that is expected to improve based in

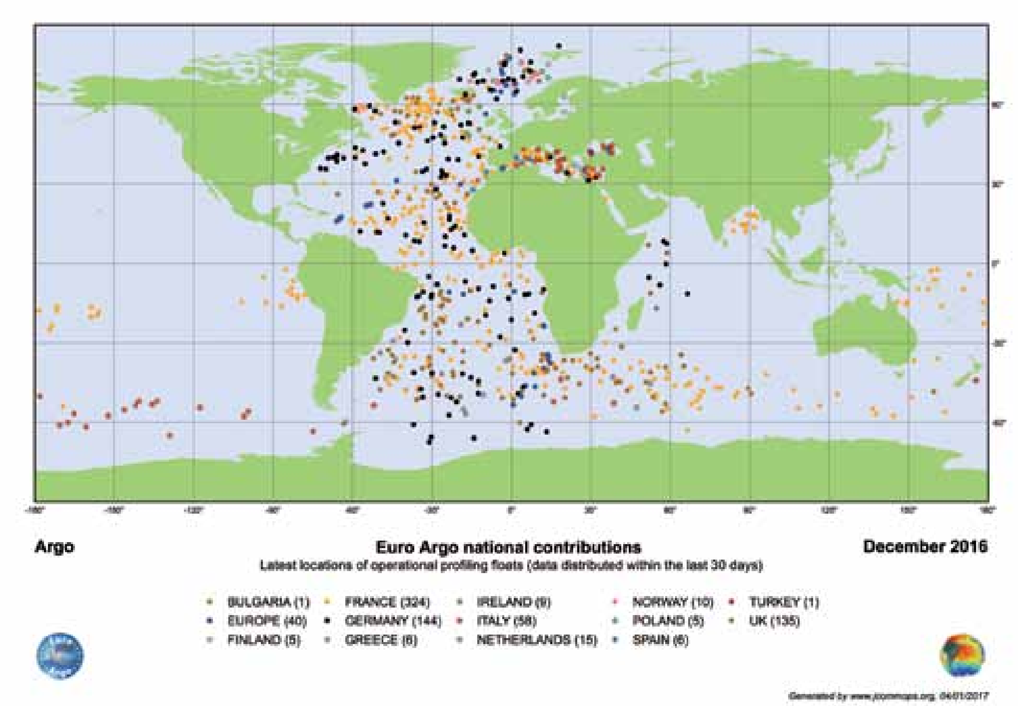

Figure 9: Euro-Argo national contributions per country: 759 active floats among the 3933 active floats, about 20% of the network (©: Jcommops/AIC, December 2016).

particular on technological achievements, will be assessed continuously. The detailed numbers of floats to deploy provided in *Euro-Argo ERIC (2016)*[1] to achieve the targets will thus have to be refined accordingly in the following years.

1.6 Float procurement and deployment: status and plans

The geographical repartition of Euro-Argo national contributions in 2016 is shown per countries in Figure 9, and European deployment plans for 2016 are compared to the global ones in Figure 10.

Figure 11 highlights the importance of the Euro-Argo fleet in the Atlantic and Southern Oceans as well as in the European Marginal seas (a float contributes more to the completeness of the network coverage when it's located in a red cell rather than a blue one). It highlights also the need to find opportunities to deploy floats in the central South Atlantic, in the Southern Ocean and also in the central west North Atlantic.

In 2016 a total of 215 floats were deployed (Table 1), slightly less than in 2015 (266), due to the fact that some floats purchased have been delayed to the end of 2016 which led to a shift in deployment that will happen early 2017 instead of 2016. The preparation of the floats, shipment and deployment was still organised at national level, with coordination regarding planning and deployment opportunities managed at Euro-Argo ERIC level. 130 additional floats were purchased by the ERIC (MOCCA project), and part of them deployed in collaboration with Euro-Argo partners during the year 2016. The deployment plans for 2016 and 2017 were also revised.

In March 2016, the Marine Institute (MI) deployed Ireland's first Argo float as a full member of the Euro-Argo ERIC, on Wednesday 23 from the RV Celtic Explorer, during the Blue Whiting Survey in the North Atlantic. Two other Argo floats were deployed in April 2016 by the MI, and an additional float was deployed in August 2016 via the EU funded MOCCA project.

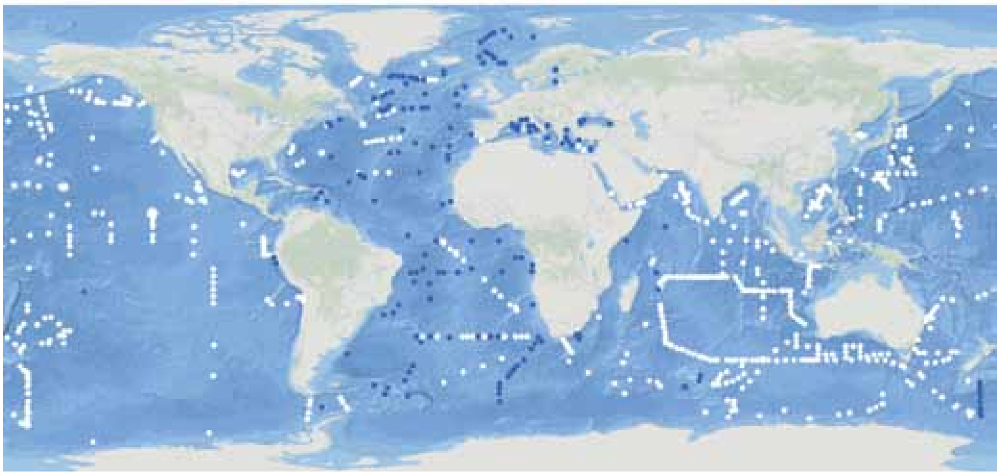

Figure 10: Euro-Argo partners' 2016 deployment plans in blue (215 floats among the 883 deployed in 2016), 24 % of the deployments in 2016 (©: Jcommops/AIC).

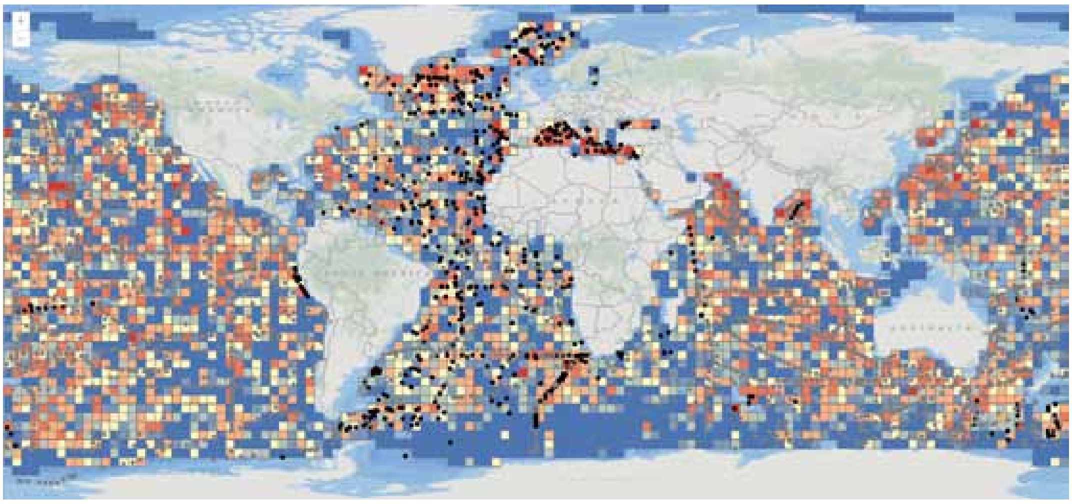

Figure 11. Deployment location of the Euro-Argo fleet (in black) and rest of the Argo fleet (in grey) on the Argo Coverage Map (© Jcommops/AIC).

Figure 12: Deployment by the Marine Institute of Ireland's first Argo float as a full member of the Euro-Argo ERIC, on 23rd March in the North Atlantic (53.11.915N; 15.59.997W).

	2014 deployed	2014 Argo extension	2015 deployed	2015 Argo extension	2016 deployed	2016 Argo extension	2017 estimated	2017 Argo extension	2018 estimated	2018 Argo extension	2019-2021 plans (per year)
European Union		7	2		36	0	90	15		0	
Bulgaria	0	0		1							
Finland		5		2		3		3		3	3
France	87	10	101	20	37	20	74	18	65	22	80
Germany	58	15	66		44		58	9	51	9	50
Greece				5		3		5		5	5
Ireland	2		2		3		3		3		3
Italy		21		26	25	2	15	20	30	5	35
Netherlands	4		2		3		11		5		7
Norway	2	4	3		2		1		9	20	20
Poland			3		2		2	1	2	1	3
Spain	1		1			1	5	3	9		5
UK	48	2	32		27	7	34	24	42	12	50
Total	**202**	**64**	**212**	**54**	**186**	**29**	**293**	**98**	**223**	**71**	**261**
	266		**266**		**215**		**391**		**294**		**261**

Table 1: Float procurement for 2014-2016 and plans for 2017-2019.

1.7 Data Processing

1.7.1 Argo Data Management

The Euro-Argo ERIC 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 7 European countries (Germany, Spain, Netherlands, Norway, Italy, Finland, Greece and Bulgaria). The UK DAC (BODC) processes all UK, Irish and Mauritian float data.
- **For the Delayed-Mode,** 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).

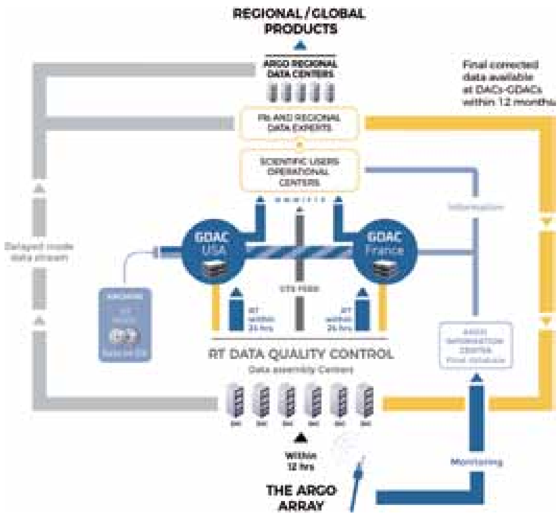

Figure 13: Argo Data Flow

Thanks to the Euro-Argo ERIC activity, the European Argo data system is strengthened to ensure it is able to process all European floats and deliver the data to users. It thus improved Europe's ability to meet its data processing commitments to the global Argo programme (Coriolis GDAC, North-Atlantic ARC, Mediterranean and Southern Ocean ARCs).

In 2016, 4803 active floats have been processed on Argo GDAC, which represents more than 171k profiles collected during the year (Figure 14).

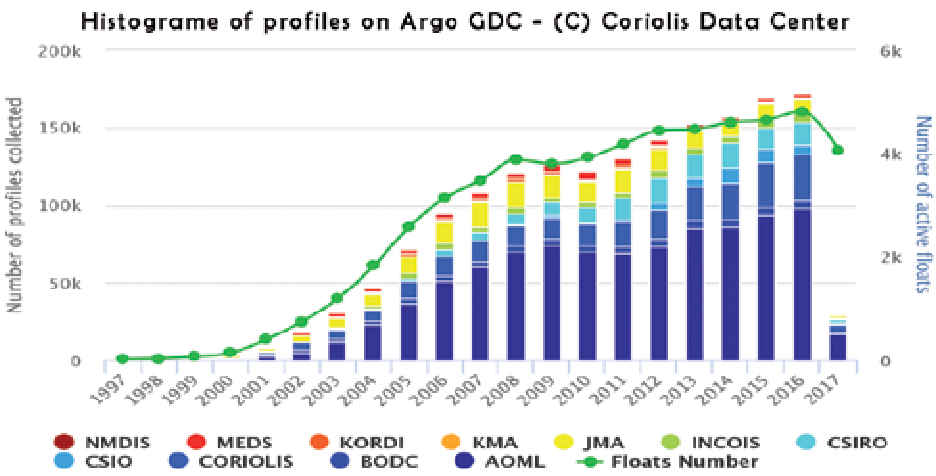

Figure 14: Histogram of active floats and profiles collected on Argo GDAC. Colors indicate the contribution of each National Data Centre (©: Coriolis Data Centre - 07/03/2017).

Transition to Argo NetCDF format 3.1

At the end of 2014, Argo decided to move to a new format called V3.1 that allows to properly manage Iridium floats and the BGC parameters. Upgrading to this format forces the DACs to upgrade their processing chain and to reprocess all the Argo data. The priority has first been put on the active floats.

NKE Instrumentation Provor floats:
In 2015, most Provor Argo float files were reprocessed into Argo NetCDF version 3.1. In 2016, the remaining delayed mode files were upgraded to V3.1.

TWR Apex floats:
In 2016, 10 versions of Apex floats were reprocessed into Argo NetCDF version 3.1. The delayed mode files from these are still under firmer version but they will be reprocessed by the delayed mode operators. The remaining 14 versions of still active Apex floats are gradually being converted. The 35 versions no more active will be converted to V3.1. afterwards.

OPTIMARE Nemo, MetOcean Nova, SeaBird Navis floats:
The schedule for V3.1 transition for these files is not yet defined and is planned for 2017.

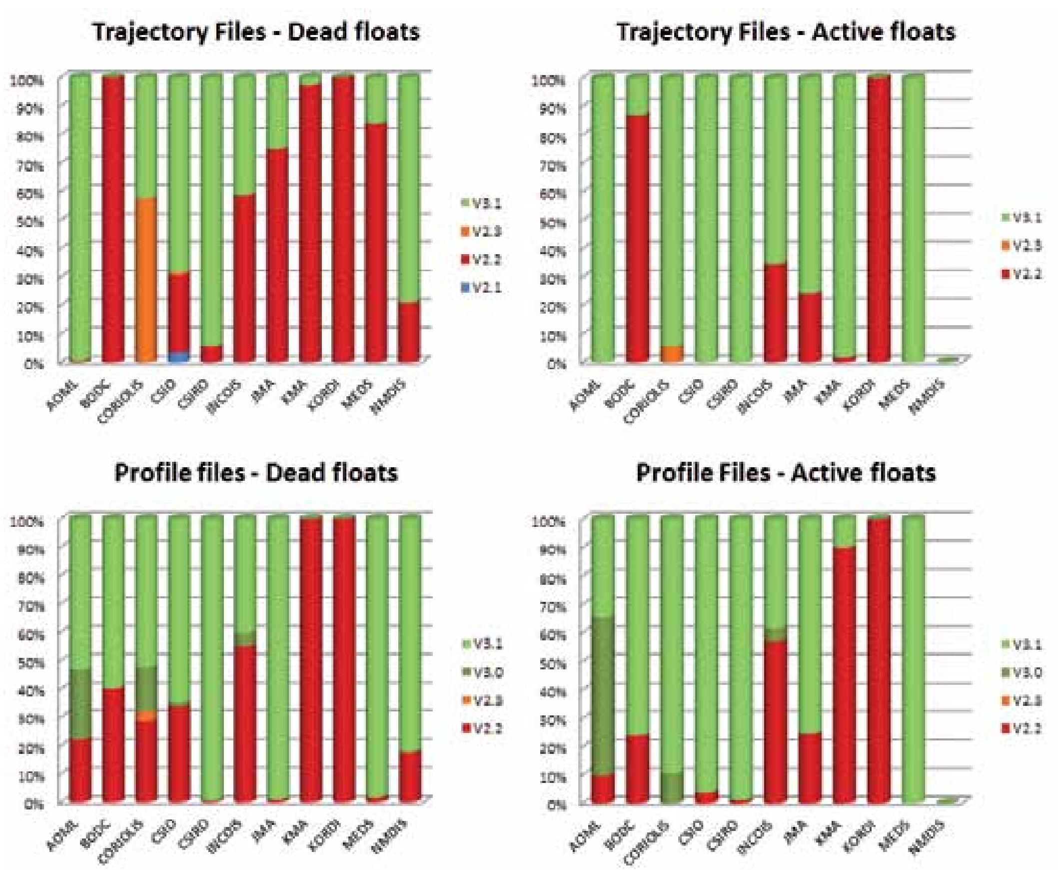

Figure 15: Percentage of files in V3.1 format for Euro-Argo DACs (Coriolis and BODC) for active and dead floats compared to the other Argo DACs. The situation on active floats is satisfactory and reprocessing of historical data is underway.

1.7.2 Regional Centres

1.7.2.1 The Atlantic ARC (NA-ARC)

France has taken the lead in establishing the NA-ARC, which is a collaborative effort between Germany (IFM-HH, BSH), Spain (IEO), Italy (OGS), Netherlands (KNMI), UK (NOCS, UKMO), Ireland (MI), Norway (IMR), Canada (MFO), USA (AOML), Greece (HCMR) and Poland (IOPAN). Coriolis coordinates the North-Atlantic ARC activities and in particular float deployments in Atlantic.

The NA-ARC website (http://www.ifremer.fr/lpo/naarc/) provides information about float data and status in the North-Atlantic Ocean. NA-ARC also provides a web API to access to metadata about Argo profiles in the North Atlantic region. All the floats that have been processed in delayed mode in the North Atlantic ARC, north of 20°S, were checked again using a modified *OW* method that has been published in *Cabanes et al. (2016)*. Among the 1514 floats checked, the NA-ARC founded 19 floats for which it may be necessary to revise the original DM corrections. Reports have been send to the PIs.

1.7.2.2 The Mediterranean and Black Seas ARC (Med-ARC)

MedArgo is the Argo Regional Centre for the Mediterranean and Black Sea. OGS Italy, who coordinates the MedArgo activities, established several collaborations with European and non-European countries (Algeria, Bulgaria, France, Spain, Greece, Germany, Turkey, Malta, Romania, Israel and Lebanon) to set the planning and the deployment coordination of floats. As part of this cooperation, the float data are transferred in near real-time to MedArgo and Coriolis GDAC where they are processed and made freely available.

During 2016, 31 new floats have been deployed in the Mediterranean (27 platforms) and the Black Sea (4 platforms). The first Arvor Deep was deployed in the Hellenic Trench area (Cretan Passage), a depression of about 4000m located in the deepest area of the Mediterranean Sea (see photos on Figure 18).

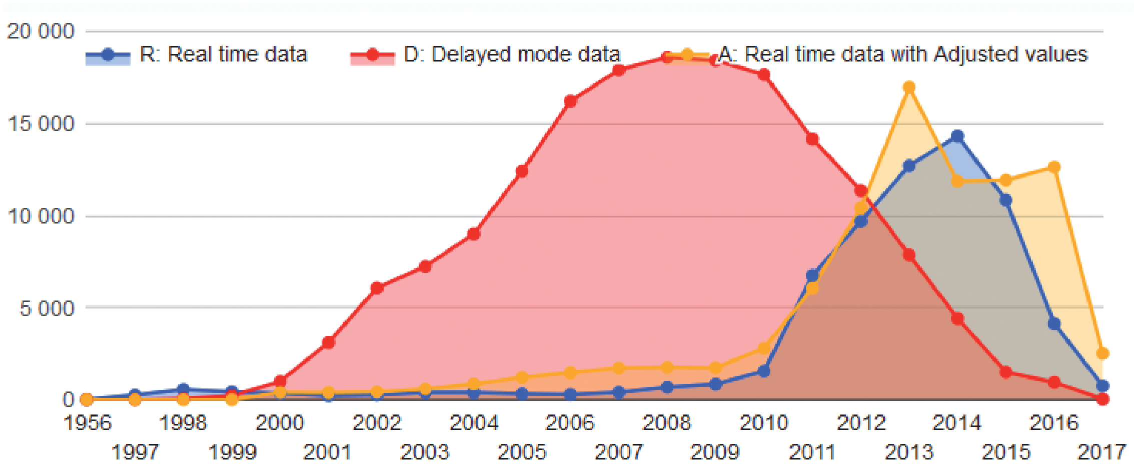

Figure 16: Data-Mode of Argo floats in the North-Atlantic (north 20°S) per year. (©Argo-NAARC - 2017/4/3).

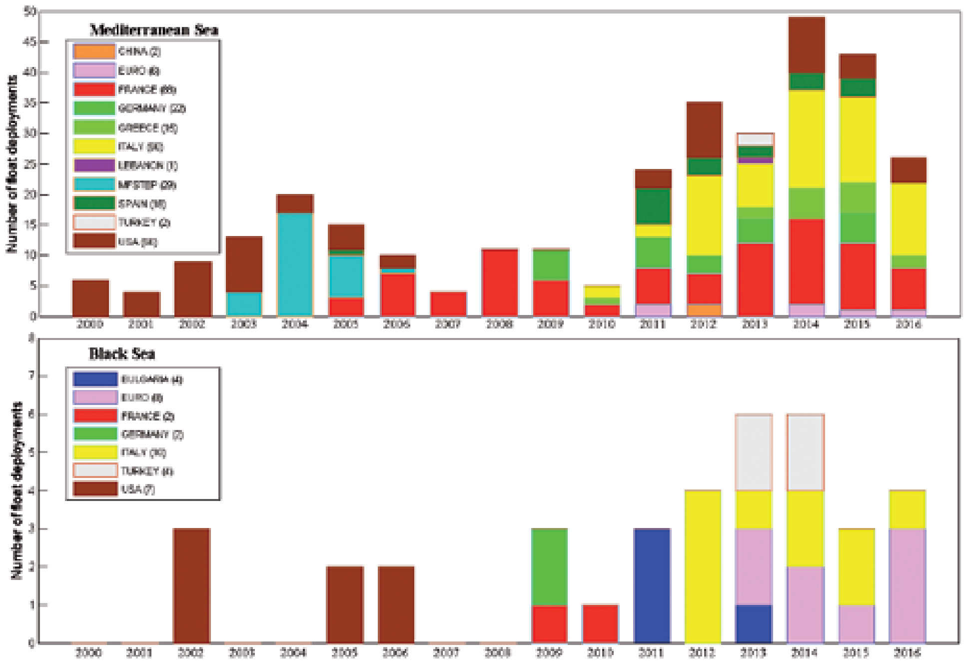

Figure 17: Histogram of float deployments by country in the Mediterranean and Black Seas between 2000 and 2016 (© MedArgo).

As of February 2017, there were 76 active floats in the Mediterranean Sea and 12 in the Black Sea, contributed by 7 countries and the EC. They included 1 deep float and 25 floats with biogeochemical sensors.

Country	Number of floats	Model of floats
FRANCE	7	3 Arvor, 2 Arvor-DO, 2 Provor-bio
ITALY	13	3 Arvor, 1 Provor-bio, 3 Apex, 2 NOVA, 2 DOVA, 2 Deep Arvor
EURO-ARGO RI	4	4 Arvor
GREECE	3	2 NOVA, 1 DOVA
USA	4	4 Apex
TOTAL	**31**	

Table 2: List of float deployments in the Mediterranean and Black Sea during 2016.

Figure 18: The Deep-Arvor Float deployment Operation at sea.

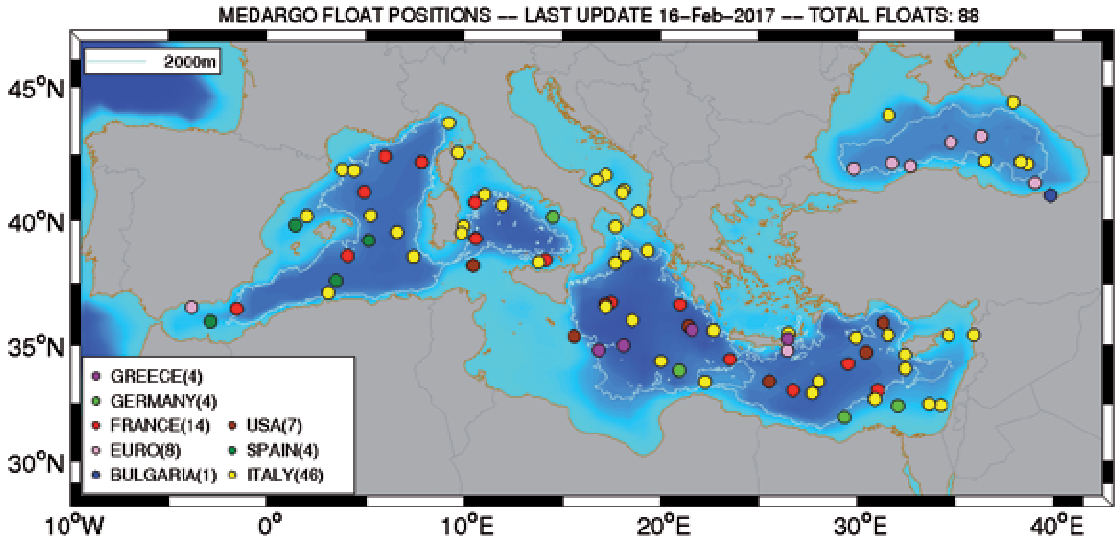

Figure 19: Positions of 88 active Argo floats in the Mediterranean and the Black Sea (© MedArgo, 02/16/2017).

1.7.2.3 The Southern Ocean ARC (SOARC)

BODC is the data centre for UK Argo funded by NERC and is responsible for data management of UK and Irish floats. BODC is also the lead for the Southern Ocean Argo Regional Centre (SOARC). Since November 2015, the SOARC partnership has expanded to include BSH (Germany) alongside BODC (UK) and CSIRO (Australia).

A new SOARC website has been in development during 2016 and will be launched in 2017. It will allow a distinct SOARC web presence, separate from UK Argo, and will provide focal point for SOARC partners and activity of the ARC. This new website will also provide portal for resources useful for DMQC, including links to other useful portals.

During 2016, the SOARC continued its investigations regarding techniques for improving Argo under-ice float positioning. Investigation of past work done on an f/H contour method for NRT positioning was revealed to have been only cursory, and is not currently being pursued. Other investigations for under-ice positioning are on-going, with a focus on file updates/corrections for RAFOS receiver-equipped floats in the Weddell Gyre led by BSH, and techniques for under-ice continental shelf positioning led by CSIRO.

Also during 2016, the SOARC helped in identifying orphaned floats requiring DMQC support (especially for 20 Argo Italian floats in the Southern Ocean). Action was also initiated to work with the CLIVAR and Carbon Hydrographic Office (CCHDO) and the Southern Ocean Observing System (SOOS) to assess the potential to improve the Argo reference database in the Southern Ocean by identifying and reducing any gaps in data availability. The need to develop a list of co-located CTDs-on-deployment was also identified. SOARC partners have also sought to identify additional sources of funding to support the work of the ARC and are actively pursuing a number of possibilities.

1.8 Communication and Outreach

1.8.1 Communication Plan Elaboration

In 2016 the Euro-Argo ERIC office worked at elaborating a new Communication Plan. It was important to define objectives, to identify the targeted audience (Euro-Argo members – internal communication, stakeholders/European authorities, partners-industry, RI/institutes, networks and the outside world) and to list some tools for improving the Euro-Argo communication strategy. There was an agreement on the following items:

- The website will be reorganised with clarifications and to target all kinds of public. The ERIC plans to transfer the NOC educational web site to the Euro-Argo ERIC one.
- The ERIC Office will set-up a short email newsletter to be released every 2 or 3 months. This newsletter will contain information on the Euro-Argo ERIC Office activities (meetings, conferences) and highlights from Euro-Argo members. The newsletter will also list new publications linked to Euro-Argo. It was first circulated internally late 2016, and will be released externally to the Euro-Argo general mailing list starting from 2017.
- Concerning communication materials, one demo-float will be purchased and an itinerant booth will be set up. Brochures and posters will be updated. The ERIC will provide templates for members to be able to create targeted and thematic leaflets, and public brochures will be translated into the members' languages.

Figure 20: Euro-Argo website – home page.

- Concerning social networks, it was decided to start with Twitter as it is commonly used in our stakeholder's community. Euro-Argo Twitter account was set up in July 2016, and addresses 90 followers at this moment. It is planned to include the Euro-Argo ERIC Twitter feed on the Euro- Argo web site homepage.

- DOI numbers will be assigned to Euro-Argo activity reports. Concerning DOIs, work is progressing on publications KPIs with Ifremer and this activity will be followed up in 2017. The analysis of Argo bibliography could also help identifying missing communities which could make use of Argo.

Figure 21: Euro-Argo Twitter account.

1.8.2 Promotion of Euro-Argo activities

1.8.2.1 Educational actions in Greese

A presentation of Greek Argo and Euro-Argo activities was made at the University of Aegean (Marine Sciences Department) in November 2016, to promote the use of Argo data acquired in the Ionian and Aegean Seas in particular, and available through the Greek Argo webpage [(www.greekargo.gr)](http://www.greekargo.gr). New educational material has also been released in 2016 and the school visit programme established since 2015 was pursued.

Figure 22: School visits and Argo demonstration in Greece (© HCMR).

1.8.2.2 EGU un Vienna, Austria

Euro-Argo was represented at the European Geophysical Union General Assembly in Vienna by Francine and Grigor who ran the Euro-Argo booth (17-22 April 2016).

Figure 23: Grigor explaining Euro-Argo to a visitor at the EGU 2016 General Assembly.

1.8.2.3 Argo exhibit at Seafest

In July 2016, as part of SeaFest - Ireland's national maritime festival (60 000 visitors), there was an Argo exhibit which included the Euro-Argo information video on-screen, Euro-Argo information brochures, JCOMMOPS deployment map and a TWR APEX float which generated much interest from the public.

Figure 24: Argo exhibit at SeaFest 2016 in Ireland's national maritime festival.

1.8.2.4 Science Docks at Brest 2016

Every 4 years, the city of Brest organizes its International Maritime Festival. This 7th edition was held on 13-19 July 2016 celebrating the sea and sailing, past and present. The visit of "Quai des Sciences" Village gave the opportunity to increase public awareness upon topics related to its main theme "observe the Ocean, better understand the climate change". Techniques to observe the ocean with various instruments (profiling floats, drifters, opportunity vessels, tide gauges, satellites,...) were shown and some phenomenon such as ENSO, the oceanic circulation or biogeochemical mechanism were explained to visitors (21 000 entries).

1.8.2.1 commOCEAN 2016, international Marine Science Communication Conference

In December 2016, C. Gourcuff and G. Obolensky participated to the 2nd international commOCEAN conference in Bruges (Belgium). During the 2-days conference some of the main challenges of marine science communication were discussed through two key questions:
What are the fundamentals of your science communication, reaching out to your public? How do you measure/maximize the impact of your communication and your website use? The event targets both marine scientists and marine science communicators working for marine institutes, governmental agencies or NGOs.

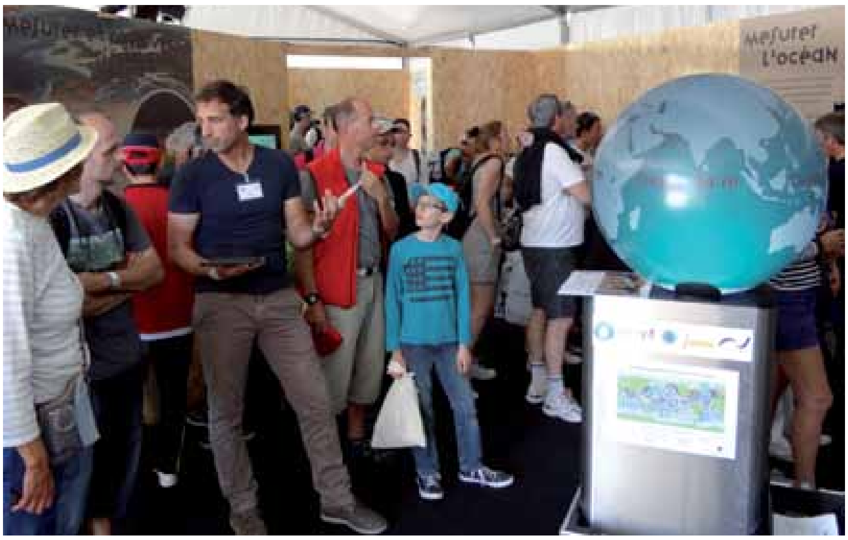

Figure 25: Euro-Argo exhibition at Science Docks, Brest 2016.

1.8.3 Science and technology ministers' communiqué to G7 Summit

In 2016, Euro-Argo welcomed the communiqué by the G7 science and technology ministers agreed at their meeting in Tsukuba, Japan, on 15-17 May. These recommendations include a strong emphasis on sustained and enhanced global ocean observing, data sharing and capacity building, critically required for the ocean future. For many years, Euro-Argo has been developing the ocean observing capacities at global and European scales and promoting synergy and cooperation across the actors involved both in Europe and globally. However, a high-level political commitment for sustained observations and free and open data sharing is a cornerstone to fully unlock the substantial economic value of ocean knowledge, and help for protection of the ocean health.

1.8.4 Awards: 2016 Price "Les Etoiles de l'Europe"

Pierre-Yves Le Traon received the 2016 Prize "Les Etoiles de l'Europe" from the French government for the E-AIMS project on the 5th of December 2016. This prize rewards and highlights the European engagement of researchers, illustrated by project successfully completed. E-AIMS (Euro-Argo Improvements for the GMES Marine Service) was a 2 years FP7 project, coordinated by Ifremer (France) gathering 16 partners from 9 European countries, that ended in December 2015. The main objective of the project was to conduct R&D activities on Argo float technology, Argo data centres and the design of the new phase of Argo to better answer existing and future needs of the Copernicus Marine Service.

Figure 26: Pierre-Yves Le Traon received the 2016 Prize "Les Etoiles de l'Europe" from the French government for the E-AIMS project.

2 PROJECTS WHERE EURO-ARGO IS INVOLVED IN 2016

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 2016-2017, including at-sea monitoring.
- Data processing in real-time and delayed-mode, during the period 2016-2020.

In addition to the future data management, ERIC activities for MOCCA are organized as follow:

2.1.1 Coordination

The Euro-Argo ERIC Office organizes the splitting of activities between the ERIC Office and the ERIC members, and reports to EASME. In 2016, 150 floats were purchased including 30 floats co-funded by members. A total of 87 floats have been shipped from the ERIC premises and were deployed in 2016, and 63 floats will be deployed in 2017. Figure 28 shows the deployment locations, coloured by sub-MOCCA program (co-funded floats).

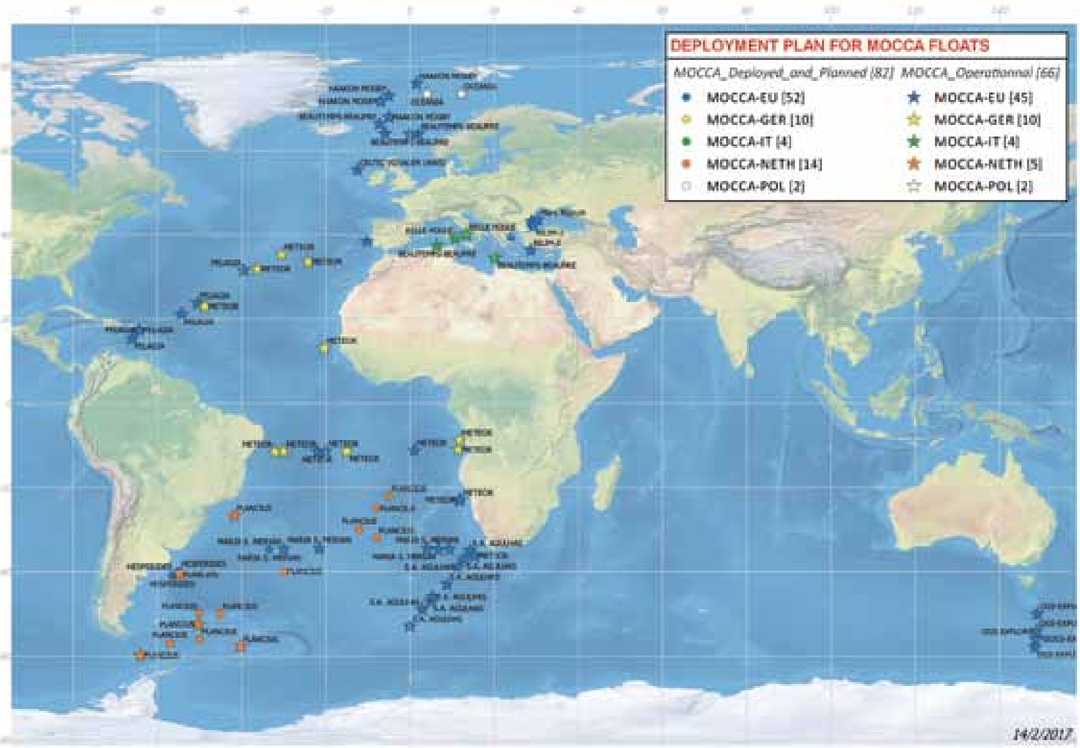

Figure 27: MOCCA floats deployment plan in 2016. Stars show floats already operational and dots the current plans for the end of 2016 and early 2017. (©ERIC Office – February 2017).

2.1.2 Float procurement

End of July 2015, the NKE Instrumentation French SME won the call for tender relative to float procurement. The 150 floats (130 with iridium and 20 with Argos satellite transmissions) have been received in the ERIC premises in 4 batches between April and September 2016.

Figure 28: Euro-Argo ERIC warehouse, with MOCCA floats waiting for acceptance tests and ship deliveries. Floats performing their ascent to surface during acceptance tests in Ifremer pool.

As part of MOCCA project activities, preparing and testing the floats before their shipment to deployment ships is a core action of the ERIC Office. These acceptance tests have been performed in the Ifremer tank by the Euro-Argo technical team and consisted in checking all the float components: mission parameters, hydraulic pump and solenoid valve actions, T&S sensors with inter-comparison between floats measurements and satellite communications (2-way). Acceptance experiments were made possible by the availability of Ifremer test facilities (20m-deep pool, pressure test bank etc.) and bring great added-value to Euro-Argo partners, improving the reliability of floats (for instance a problem with some pressure sensors was detected during the MOCCA tests).

2.1.3 Float deployment

The Euro-Argo ERIC coordinates operations at sea and associated logistics. The succession of operations is as follows: elaboration of deployment plan, preparation of the floats, shipment, training of the team in charge of the deployment and preparation of metadata for real-time data float processing.
MOCCA deployment plan is elaborated by the Euro-Argo ERIC Office and members, taking into account the following elements: "Strategy for evolution of Argo in Europe" document, national plans, Argo density/age maps, cruises opportunities from partners and others and recommendations from the STAG. This lead to the following target deployment areas for the MOCCA floats: Southern Ocean (ice-free), Marginal Seas, Nordic Seas and Global Ocean. The first 3 MOCCA floats were deployed in June 2016 in the Subtropical Atlantic from R/V Meteor during opportunity cruise M127 (Figure 29).

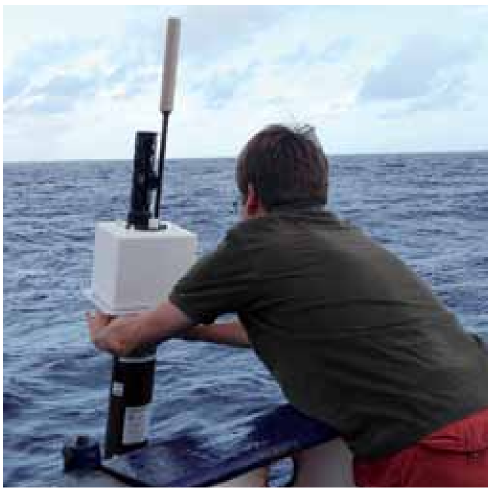

Figure 29: First MOCCA float deployment in the subtropical Atlantic Ocean. (© Sven Petersen, GEOMAR)

In November 2016, a physical oceanography research program was carried out from R/V Meteor cruise M131 along the South Atlantic transect 11°S and in the eastern boundary upwelling region off Angola and Namibia, during which 10 floats were deployed (Figure 30). The first Dutch co-financed MOCCA floats were successfully placed in the water from commercial ship m/v Plancius, off the South American coast on its way to Antarctica.
Finally, in winter 2016, marginal seas enhancement was a highlight with a deployment in the Rhodes Gyre (thanks to the Turkish project DEKOSIM which financed the cruise) and 3 floats launched in the Black Sea in November and December with the assistance of Bulgarian, Turkish and Romanian partners.

Real-Time processing of the MOCCA floats deployed in 2016 is performed by Coriolis and BODC data centres. Delayed-Mode Quality Control will be distributed among the 4 institutes involved (OGS, BSH, BODC and Ifremer), based on the areas of deployment. This activity will start in 2018, as a minimum of one year of data is needed before the DMQC can be performed. In 2017 and 2018 the at-sea monitoring procedures and tools will be extended in order to analyse the floats behaviour (in particular the failures) and provide a periodic report on the fleet status.

Dedicated website to MOCCA:
http://www.euro-argo.eu/EU-Projects-Contribution/MOCCA

2.2 AtlantOS H2020 project (2015-2019)

Contributing to the AtlantOS H2020 project (2015-2019), coordinated by the GEOMAR Helmholtz Centre for Ocean Research 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 Bio-Argo floats in the North-Atlantic,

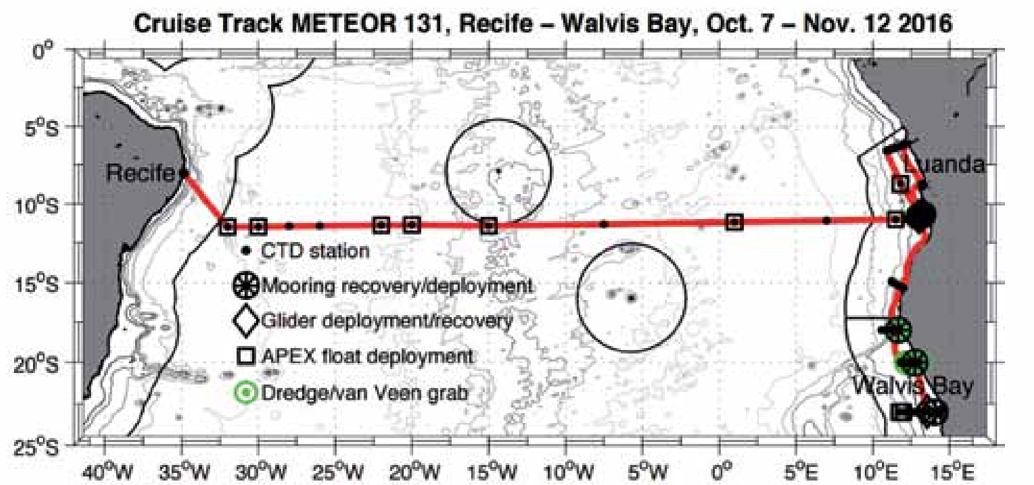

Figure 30: Bathymetric map with ship track of R/V Meteor cruise M131. Black solid lines mark exclusive economic zones of Brazil, Ascension, Saint Helena, Angola and Namibia. Credit Peter Brandt (GEOMAR).

- Work on improving Bio-Argo float capabilities, especially to adapt new biogeochemical sensors, and integrating a pCO2 sensor on autonomous platforms,Data processing in real-time and delayed-mode, during the period 2016-2020.
- Refine Delayed-Mode QC processing and achieve the objective to deliver a consistent Argo and Bio-Argo dataset for the Atlantic,
- Work on the long-term sustainability issues for Bio-Argo and Deep-Argo after the AtlantOS pilot project.

Task 3.1.1 - Deployment of Bio-Argo and O2-deep floats and improvement of the network capabilities

The procurement process for 6 biogeochemical floats and 7 deep floats started in November 2015 with the publication of a European call for tender is now achieved. The materials have been delivered to Euro Argo premises by the French NKE Instrumentation SME, acceptance and performance tests performed in the Ifremer test basin have been performed. The BGC floats are equipped with an ice-avoidance system, based both on ISA algorithm and on a software controlling the float buoyancy and communications rates allowing to assume that the float is stuck under sea ice while ascending to surface. The Deep Arvor floats are equipped with a Dissolved Oxygen Optode on a pole for in-air measurements, and an adapted software to enable a higher elevation above the sea level while measuring O2 in air. The performance tests for Deep floats in the Ifremer's pressure tanks have allowed the Euro-Argo team to propose some evolutions in the hydraulic systems to ensure an enhanced capacity to cycle in deep waters for a long term. All these floats will be deployed in 2017 by the task partners, mainly in Northern Atlantic. Deep floats are communicating through Iridium SBD system while BGC floats, due to the amount of data to be transmitted for additional measurements, are communicating through Iridium RUDICS system. A special development for enhanced capacity for RUDICS has been implemented by NKE Instrumentation in their floats, allowing the users to retrieve data with an over-the-full rate, thus reducing the surface time spent at surface, minimizing the risks for the materials and ensuring the quality for Real-Time data flow.

The development by GEOMAR/ KMCONTROS of a float dedicated pCO2 Optode is still ongoing. The consortium faced some delays due to technical issues to build a full float compatible sensor (short response time, low consumption and volume, depth rating) but efforts will be deployed in 2017 to achieve the preliminary phase and provide a prototype to be tested on a leading site in the Mediterranean Sea.
Finally, the new Autonomous System for Argo float Release (ASFAR) was successfully redeployed during the OVIDE-16 cruise, refitted with Iridium floats. Two batches of ASFAR floats were launched from the bottom of the Islandic Basin in September and November 2016, and the system operates nominally releasing one float every two months from the bottom. This deployment technique seems to be extremely promising to feed the network in hardly accessible areas, or for regions where the escape rate of floats due to ocean circulation is high.

Task 3.1.2 - Argo Dataset production: Real-time data-management and Delayed-Mode qualified dataset for O2, Chlorophyll a, backscattering and NO3

Data distribution and Real-Time processing is already organized following the International Argo Data Management Team recommendations. Delayed-Mode management should be refined with a working plan shared between the scientific partners. The production of a consistent Argo and Bio-Argo validated dataset will take place after the floats deployments. First discussions with the involved partners are planned in 2017 for the dataset specifications.

Task 3.1.3 - Organization of the post-AtlantOS Bio-Argo and Deep-Argo sustainability in the context of the Euro-Argo ERIC

From 2nd to 4th November 2016, Euro-Argo ERIC represented by Grigor Obolensky attended the AtlantOS-AORA joint workshop, held in the PLOCAN premises on Gran Canaria Island. The objectives of the meeting were motivated by an attempt to better integrate activities in AtlantOS across work packages, as well as to better involve international participants. Several countries from the Southern Atlantic borders (especially Brazil and Argentina) were represented, proposing some cruise opportunities and scientific synergies for inter-networks collaborations. The workshop was also devoted to technological discussions about new sensors developed within AtlantOS and to collaboration of autonomous platforms networks such as profiling floats and gliders with the moored observatories.

Dedicated website to AtlantOS:
https://www.atlantos-h2020.eu/

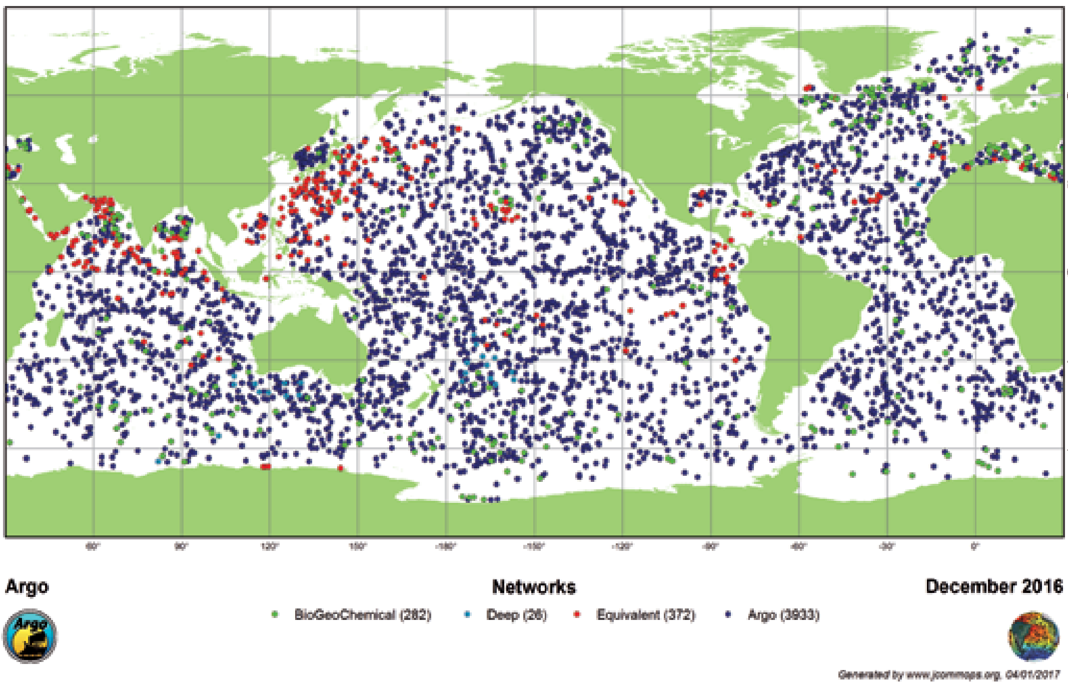

Figure 31: Global view of Argo networks in December 2016: Argo BioGeoChemical (282 floats), Argo Deep (26), Argo equivalent (372), total Argo (3933) (©jcommops – March 2017).

2.3 ENVRIplus

The ENVRIplus H2020 project aims at bringing together Environmental and Earth System Research Infrastructures, projects ad networks together with technical specialist partners to create a more coherent, interdisciplinary and interoperable cluster of Environmental Research Infrastructures across Europe. In partnership with Euro-Argo members, the 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. Euro-Argo ERIC opened a fixed research engineer position to fulfil the important goals of this transverse project. Claire Gourcuff joined the Euro-Argo team on the 3rd of October 2016.

The Euro-Argo ERIC participated to the two ENVRI-week meetings organised in Zandvoort am Zee in Netherlands mid-May 2016 and in Prague mid-November 2016. ENVRIplus goals and vision were presented in May to the ENVRI community that gathers not only the ENVRIPlus partners but also representatives of Research Infrastructures that are emerging and aims at joining the cluster when mature enough. The current landscape, RI needs, prospects and how ENVRIplus can involve and serve the entire community were discussed and priorities set up, in particular concerning technological developments, interoperability of data systems and communication and outreach.

During the meeting in Prague, Euro-Argo participated to 3 workshops:

- **Technological advancements:** Integration of a pCO2 Optode on Argo float was addressed and in particular the difficulties related to long time response for accurate and reliable measurements, and a high sensibility of the sensor's foil to H2S concentration, essentially encountered in the oceanic anoxic areas.

- **Communication workshop**: it aimed at sharing experiences and discussed future plans about effective communication methods and practices in ENVRI community. Experiences on good or inadequate communication tools were shared and contact were taken to adapt the ENVRI Serious Gaming to Euro-Argo purposes, in collaboration with the Ocean Gliders network. Plans for the common booth at next EGU conference (April 2017) were also discussed.

Figure 33: ENVRI week Copernicus workshop, Prague, November 2016.

- **COPERNICUS workshop:** in line with the ENVRI concept of sharing experience across the 22-RIs involved in the project, several RIs, across the different domains and at different level of maturity (ERIC, AISBL, ESFRI), exposed the current status of their interaction with Copernicus. Euro-Argo presented its interaction with Copernicus Marine Service in collaboration with EuroGOOS that was addressing the whole Marine RIs. It was shown that the interactions between Euro-Argo and CMEMS were very good but not formalized. For the time being, there is no mechanism to ensure that Copernicus is represented in Euro-Argo governance bodies and that Copernicus contributes to the long-term funding of Euro-Argo.Work on the long-term sustainability issues for Bio-Argo and Deep-Argo after the AtlantOS pilot project.

Dedicated website to ENVRI+ :
https://www.envriplus.eu/

2.4 MedOS

MedOS (Integrated Mediterranean Sea Observing System of Systems) proposal passed successfully the first phase evaluation.

The MedOS proposal (phase II) coordinated by OGS (A. Crise / P.-M. Poulain) was submitted in September 2016. With a duration of 3.5-year, the project planned to start in spring 2017. Euro-Argo was ensured to be represented in the Advisory board. OGS, HCMR and LOV were partners in MedOS and planned, in WP4, to carry on harmonization/integration activities to optimize Argo measurements in the Mediterranean. UPMC-LOV planned to buy a BGC float and HCMR a deep float, both to be deployed in the Mediterranean Sea. Euro-Argo would have also benefited from more reference CTD data for DMQC in the Mediterranean. Euro-Argo was also involved in WP9 of MedOS for training activities focused on Mediterranean countries. Unfortunately, this proposal was not accepted.

2.5 ArgoTRAIN

The Innovative Training Network Argonauts proposal was rejected by the H2020 evaluation committee but with a good score (Overall evaluation 88.80% / 100 (threshold 70%)). A new project called ArgoTrain was prepared and has been submitted in December 2016. Euro-Argo will be strongly involved in the training activities (organisation of events, ESRs white paper to be ready for Ocean'19 conference in 2019, networking expertise including the members' inputs) and for Data Management items.

3 SCIENTIFIC HIGHLIGHTS

In 2016, 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:

- Med-Argo data are currently used by a small group of researchers in Greece for studies of water mass characteristics of the different deep basins of the Mediterranean Sea and as a continuous record of T/S characteristics providing insight in the seasonal and inter-annual variability of the Mediterranean Sea and its sub-basins. A study by *Kassis et al.* (2016) reveals new hydrodynamic features of the South Aegean Sea as derived from Argo T/S and dissolved oxygen profiles in the area (section 3.1)
- A *study by Aguiar-González et al*. (2016) investigates the seasonal variation of the South Indian tropical gyre and its associated open-ocean upwelling system, known as the Seychelles-Chagos Thermocline Ridge (SCTR) (section 3.2).

3.1 Hydrodynamic features of the South Aegean Sea

The South Aegean basin is a semi-enclosed basin of the Mediterranean Sea and is considered as one of the most oligotrophic, with a complex hydrology and intrigue bathymetry and coastline. It is divided into three sub-regions namely the Myrtoan Sea at the NW part of the region, the shallow shelf of the Cyclades Plateau at NE part, and the deeper Cretan Sea basin at the southern part. The South Aegean operates as a heat, salt, and dissolved oxygen reservoir. The main factors controlling its characteristics are the intensive convective mixing of the water column along with the exchanges of water and mass (diluted, suspended, or near bed) between the Aegean Sea and the adjacent Levantine and Ionian Seas.

Bio-Argo floats were deployed in the area under the Greek Argo Research Infrastructure coordination. For the first time, in 2013, the acquired profiles cover an almost 2-year period (November 2013–July 2015) and are compared with previous Argo profiles and the reprocessed time-series data recorded from the E1-M3A POSEIDON observatory operating in the area since 2007.

An important inter-annual variability has been recorded in the Cretan Sea that affects the physical and the chemical properties of the water column. This is characterized by the decrease of both T and S, together with the increase in the Dissolved Oxygen (DO) concentrations in the intermediate layers (Figure 33), which indicates an outflow from the basin of the pre-existing Cretan Intermediate Water (CIW) and Levantine Intermediate Water (LIW), which are later partially replaced by Transitional Mediterranean Water (TMW) during the time period 2012–2013.

The Myrtoan basin is presented as a source of convection events, especially in its northern part. The increased but under saturated DO signals that propagate deeper through mixing demonstrate the potential usage of this property as a tracer for vertical mixing (Figure 34). Low and high DO values are mostly associated with a well-stratified water column while the intermediate ones can also demonstrate deep mixing and homogenization. This is also manifested in the relation of DO field and the Mixed Layer Depth (MLD), where the former's distribution seems to accurately describe the latter's variability, even in weaker mixing events. This would not be possible without the continuous profile sampling from the Argo floats since the biological processes would alternate these signals.

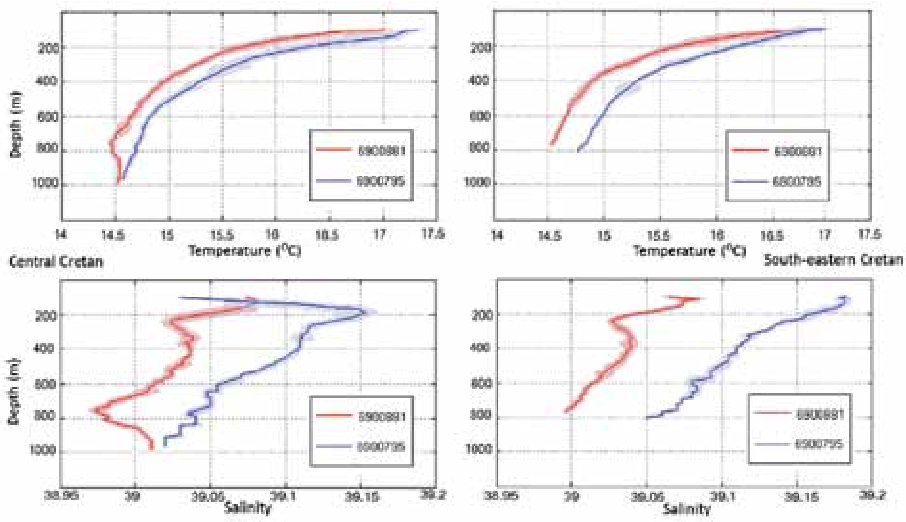

Figure 33: Comparison of the average T (top) and S (bottom) from the 2 floats (6900795 - blue line and 6901881 - red line) with the associated standard deviations (light blue and red) for the overlapped areas: central Cretan basin (Dec. 2011 vs Nov. 2013) (left) and south-eastern Cretan basin (May 2011 vs Dec. 2013) (right). Kassis et al. 2016 - Fig. 3.

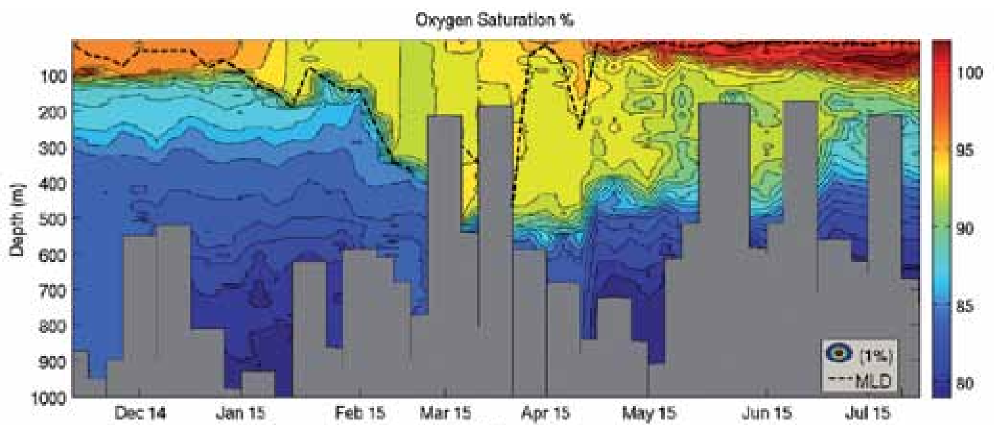

Figure 34: Dissolved oxygen saturation (%) distribution with the associated MLD (dashed line) from the profiles measured by 6901886 float during November 2014 – July 2015. Kassis et al. 2016 - Fig. 13.

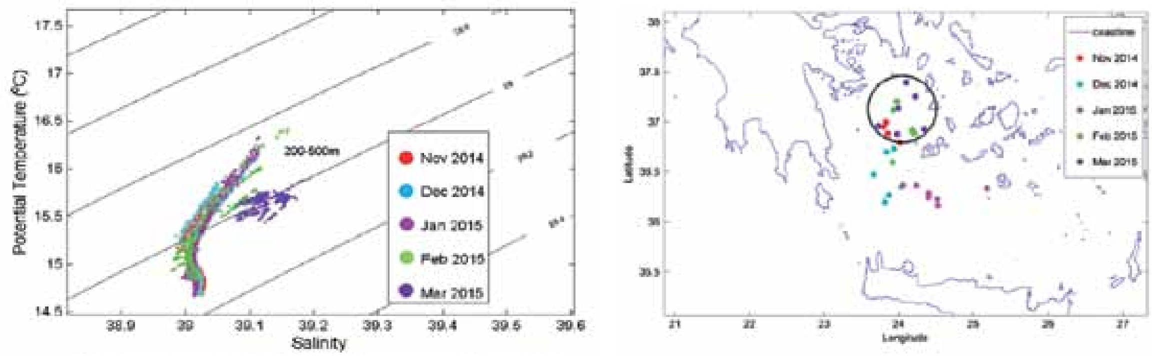

Figure 35: Theta-S diagram of the intermediate layers (200-500m) from 6901886 float profiles during Nov. 2014 – Mar. 2015 (top). The area (circle) where dense water formation is observed during Feb.-Mar. 2015 (bottom). Kassis et al. 2016 – Fig. 12.

The interaction between the two sub-basins (Cretan and Myrtoan) is also recognized as important due to the exchanges of water masses that are reflected in the floats' trajectories (Figure 35). Notably, in the beginning of 2015, intermediate water masses of high S and low DO are driven northwards from the Cretan to the Myrtoan basin, where deep water formation events dominate during the late winter–early spring period (Figure 35). The deep mixing process in the Myrtoan increases the DO concentration and the salt content of the underlying layers, resulting in densification and gradual homogenization of the water column. The southward flow that follows is the main mechanism of the northern Cretan basin's oxygenation in the intermediate layers playing also a key role in the ecosystem functioning. Moreover, the respectively high salt content in both Myrtoan and Cretan basins demonstrates the pre-conditioned status of the wider area.

The Argo-DO floats, aside from the comprehensive and detailed S and T fields, provide for the first time in the South Aegean the opportunity to follow the oxygen dynamics on a large scale in both space and time and with a frequency that was formerly unavailable.

Reference

Kassis, D., E. Krasakopoulou, G. Korres, G. Petihakis and G. S. Triantafyllou (2016). "Hydrodynamic features of the South Aegean Sea as derived from Argo T/S and dissolved oxygen profiles in the area." Ocean Dynamics 66(11): 1449-1466.

3.2 Seasonal variation of the South Indian tropical gyre

The South Indian tropical gyre expands south of the equator, and down to 18°S, from the east coast of Africa to the west coasts of Sumatra and Java (Figure 36). Concomitant to the cyclonic gyre there is an open-ocean upwelling system, known as the Seychelles-Chagos Thermocline Ridge (SCTR). The work presented here investigates the seasonal variation of the South Indian tropical gyre and the SCTR based on satellite altimeter data and an Argo-based global atlas of ocean temperature and salinity. Complexity of the Tropical South Indian Ocean is mainly a response to its unique location. On the one hand, it is influenced to the north by the semi-annual Indian monsoon and to the south by the persistent south-easterly trades; on the other hand, it is fed by an annual inflow of Pacific Water of remote origin, the Indonesian Throughflow (ITF).

Results provide an updated view of the Tropical South Indian Ocean where the ITF, among other forcings, is suggested to play a major role on the recirculation regime of the tropical gyre, resizing the longitudinal extent of the upwelling system seasonally.

The recent improvement on the estimates of altimeter-derived equatorial semi-geostrophic velocities provides us with an unprecedented opportunity to address the study of the South Indian tropical gyre based on synoptic long-term observations. For the study of the thermohaline distribution of the tropical gyre and the impact of buoyancy fluxes introduced by the ITF, a temperature and salinity annual mean and seasonal atlas is used, the CSIRO (Commonwealth Scientific and Industrial Research Organisation) Atlas of Regional Seas (CARS09). This atlas originates from different sources of quality-controlled vertical T-S profiles, including the Argo global archives up to May 2009.

The large-scale variability of the tropical gyre and the Seychelles-Chagos Thermocline Ridge is explored, based on a set of climatological fields of Absolute Dynamical Topography (ADT) (Figure 37). Assuming a geostrophic balance, altimeter-derived velocities can be derived from the ADT fields. Accordingly, a prominent low in ADT is suggestive of a cyclonic geostrophic circulation, and therefore of an upward displacement of the isotherms, which sustains the geostrophic flow and leads to an upwelling site. The black box in each panel delimits the full domain of the cyclonic tropical gyre as one would note from the altimeter-derived circulation (not shown).

Generally speaking, two large-scale features appear to dominate the basin-scale annual cycle: 1) the Seychelles-Chagos Thermocline Ridge (SCTR), shown as a year-round elongated low of ADT, which resizes throughout the year, suggestive of a simultaneously persistent tropical gyre and open-ocean upwelling system; and, 2) the westward propagation of a high of ADT exiting the Indonesian passages and leading to a zonal front when encountering the SCTR from winter to spring.
Figure 38 further explores these two features showing the monthly evolution of the upper ocean, zonally averaged between 7ºS-12ºS. The SCTR is highlighted by the 20ºC isotherm (black contour). From the encounter of the Tropical Surface Water (water saltier than 34.9 psu) and the Indonesian Throughflow Water (fresher than 34.7 psu – black contours) the emergence of an annual thermohaline front is observed, which is called the Indonesian Throughflow Front (ITFF).

When a new pulse of Indonesian Throughflow Water is discharged, the westward advance of the ITFF collocates with the westward advance of a southward flow of core velocities ranging from 5 to 10 cm s-1 (yellow contours) and reaching down to 150 m (see Figure 38; panels (g)-(r): June-December). The longitudes at which this meridional geostrophic flow resides are in agreement with the seasonal eastern shrinkage of the tropical gyre,

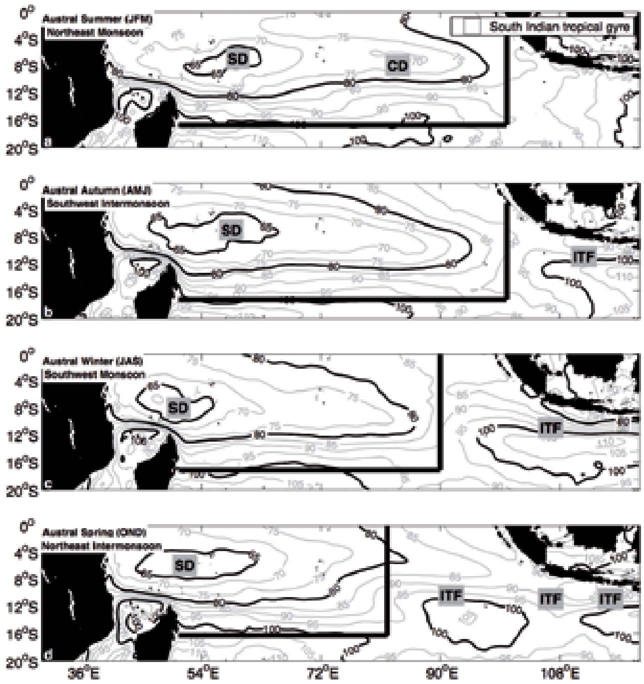

Figure 36: Climatology of absolute dynamic topography during (a) summer (January-February-March), (b) autumn (April-May-June), (c) winter (July-August-September)and (d) spring (October-November-December). Labels indicate the location of the Seychelles Dome (SD), the Chagos Dome (CD) and the Indonesian Throughflow (ITF).

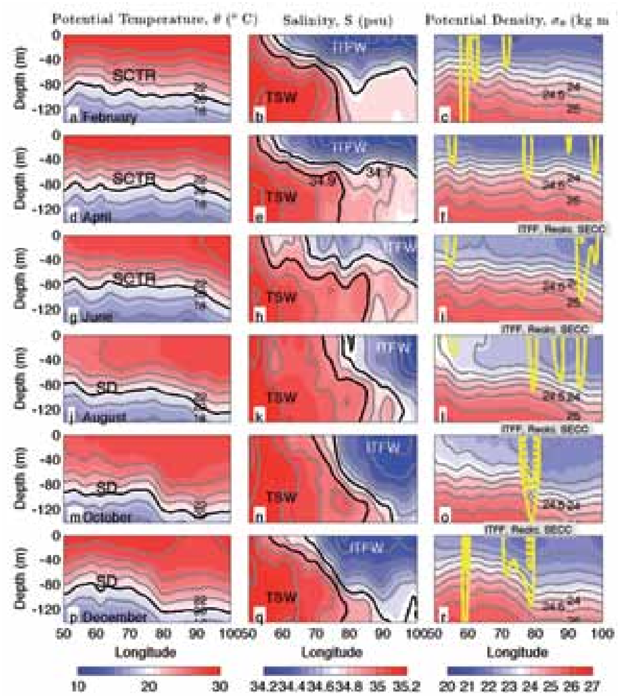

Figure 38: Zonal sections averaged between 7ºS-12ºS of potential temperature (first column), salinity (second column) and potential density (third column) showing the monthly evolution of the SCTR and the ITF Front. From top to bottom monthly means derived from CARS09 are presented for February, April, June, August, October and December. Labels indicate the Seychelles-Chagos Thermocline Ridge (SCTR), the Seychelles Dome (SD), the Indonesian Throughflow Front (ITFF), Tropical Surface Water (TSW) and Indonesian Throughflow Water (ITFW). Solid (dashed) yellow contours in the third panel indicate southward geostrophic velocities of 5 cm s-1 (10 cm s-1).

observed from winter to spring in Figure 38. Thus, this southward geostrophic flow is identified with the recirculation of the eastward South Equatorial Countercurrent (northern branch of the gyre) on feeding the westward South Equatorial Current (southern branch of the gyre). Furthermore, the Seychelles-Chagos ridge is shown to experience a relaxation in the east (Figure 38), evolving to a dome-like feature (the Seychelles Dome, SD) in the west as the ITFF advances.

As observed from satellite altimeter data, the most outstanding feature at basin scale is the seasonal shrinkage of the South Indian tropical gyre and the Seychelles-Chagos Thermocline Ridge, from late autumn to spring. A complementary inspection of the upper ocean thermohaline properties from an Argo-based climatology suggests that the eastern flank of the gyre migrates over 20º and collocates with the westward advance of a zonal thermohaline front, the Indonesian Throughflow Front. The ITFF emerges from the encounter between upwelled Tropical Surface Water and relatively warmer and fresher Indonesian Throughflow Water. We suggest this thermohaline front plays an important role as remote forcing to the tropical gyre, generating southward geostrophic flows that contribute to the early closure of the gyre in the east before arrival to Sumatra.

Reference

Aguiar-González, B., L. Ponsoni, H. Ridderinkhof, H. M. van Aken, W. P. M. de Ruijter and L. R. M. Maas (2016). “Seasonal variation of the South Indian tropical gyre.” Deep Sea Research Part I: Oceanographic Research Papers 110: 123-140.

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 Europe-wide visibility of the research will be 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 800 floats contributing to the global array - a European contribution of ¼ of the global array with enhanced coverage in the European regional seas.

During 2016, the deployment plans were reviewed for 2016 and 2017. In 2016, 215 European floats were deployed including 29 floats on the extension to marginal seas, biogeochemical and deep oceans (see Table 1). In December 2016, a total of 759 floats were active (Figure 38).

This is still below the target of 250 new floats/year and 800 operating floats for the core mission, but the number of European Argo floats has increased in recent years, as shown in Figure 39, where the percentage of European floats is approaching the 25% mark.

In terms of float operating lifetime, as shown in Figure 40, the survival rate of floats is improving and the target of 4 years - around 150 cycles - should be achievable by a significant part of the fleet, especially for the new float models as shown in Figure 41.

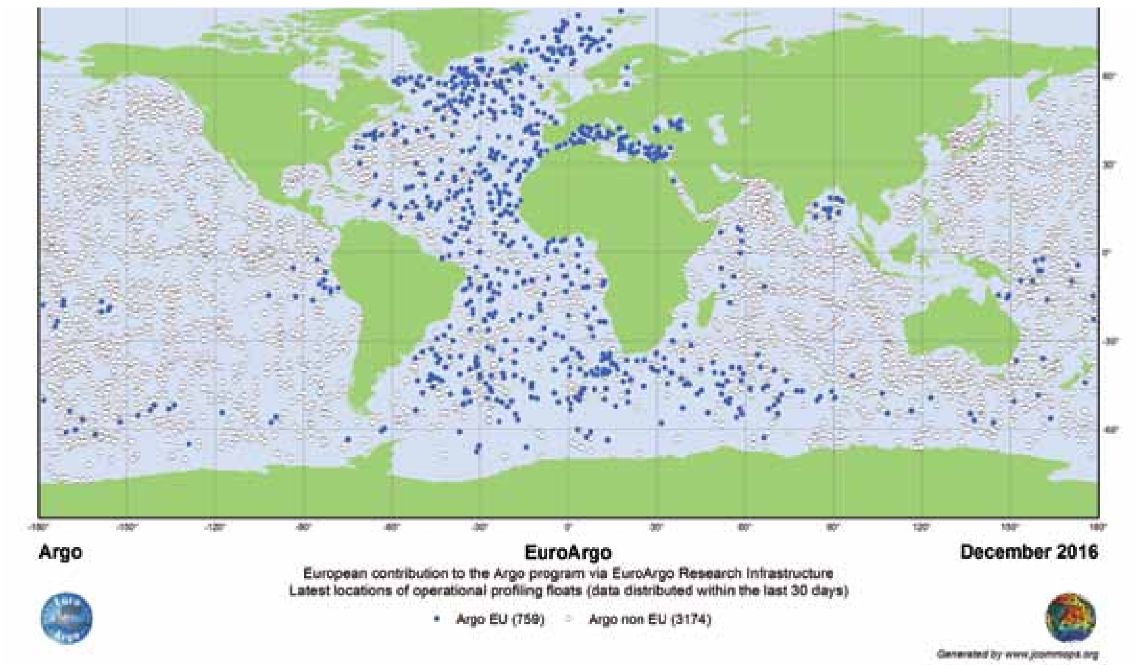

Figure 38. Argo (white points, 3174 floats) and Euro-Argo (blue points, 759 floats) active profilers in December 2016 (© Jcommops/AIC).

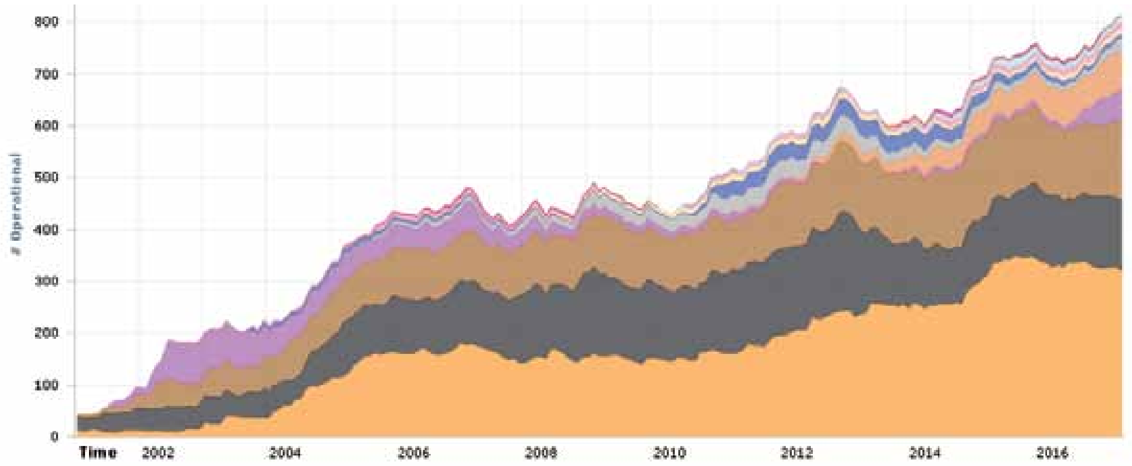

Figure 39: Euro-Argo partner contribution, progressing towards the initial target of 800 active floats 2016 (© Jcommops/AIC).

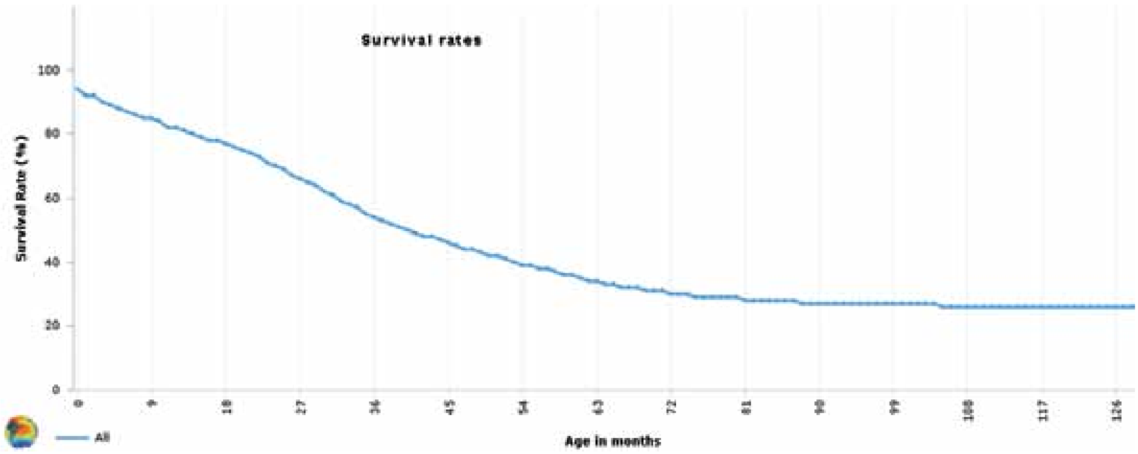

Figure 40: Survival rate for the Euro-Argo fleet (© Jcommops/AIC).

Compared to the rest of the Argo fleet, the number of profiles acquired per float by the Euro-Argo fleet is improving and becoming equal and even better than the international fleet for the recent years as seen in Figure 42.

Similar trend is also visible on Figure 43, on the percentage of floats reaching the 50 cycles target which shows that on recent deployments the Euro-Argo fleet has a similar and even better score than the rest of the fleet. However, on the 100 cycles target the score of the Euro-Argo fleet is still below the rest of the fleet due to important failure rate in 2010 and 2012 on some float models that have now been fixed. An improvement on this indicator should be visible in the coming years.

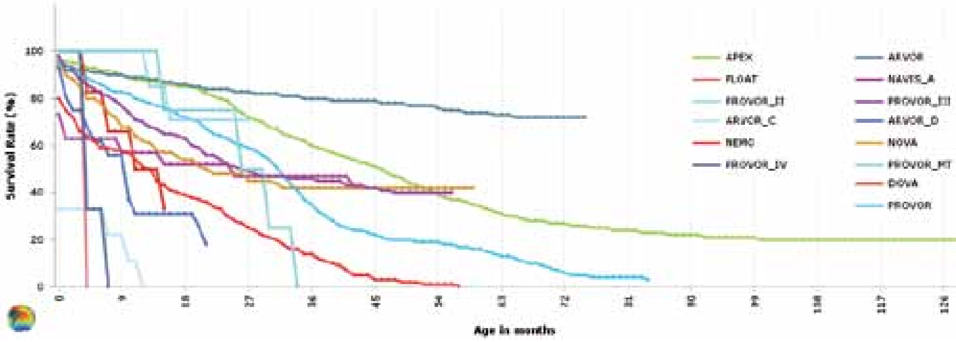

Figure 41: Survival rate for the Euro-Argo fleet per float type floats (© Jcommops/AIC).

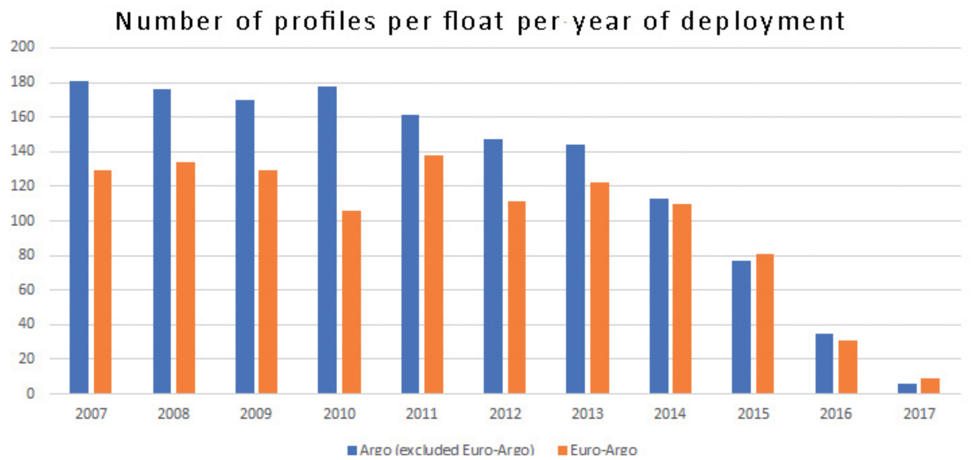

Figure 42: Mean number of profiles acquired by the Euro-Argo fleet and the rest of the Argo fleet per year of deployment (© Jcommops/AIC).

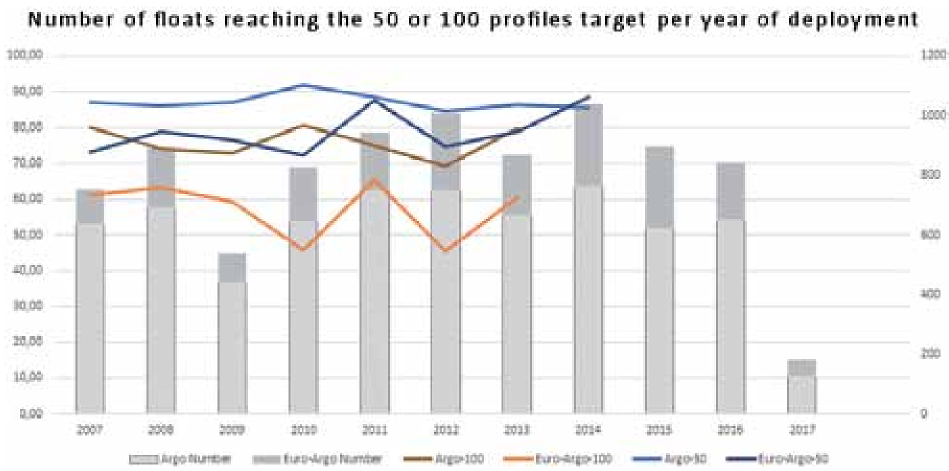

Figure 43: Percentage (left axis) of floats from the Euro-Argo fleet reaching the 50 cycles or 100 cycles target compared to the rest of the Argo fleet. In grey, the number (right axis) of floats for Euro-Argo and the rest of the fleet (© Jcommops/AIC).

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.

4.2.1 Euro-Argo bibliography

A new Euro-Argo bibliography has been created to monitor each year the number of publications using Argo observations from EU users. This bibliography was built on the base of the international Argo bibliography maintained by the Argo Project Office. It includes peer-reviewed articles and books that include Argo and Argo equivalent float data along with a few articles on floats that were precursors to Argo. Details from 1998 to 2016 are illustrated in Table 3.

Figure 44 and Figure 45 represent the partition by year and by country respectively. France and UK are the main European contributors to Argo publications and are in the top 7 countries contributing to the Argo bibliography, with over 200 papers each. Just below, Germany, Italy and Spain contribute with about 70-100 papers since 1998.

A total of 358 Argo papers were published in 2016. Argo publications from the Euro-Argo ERIC community reach a high with 109 papers published in 2016. Since 1998, the European contribution has been about 28.4 % of the total number, which is better than the initial target of 25%. As for Argo International, the number of publication seems to have reached a plateau.

	Total	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GERMANY	103					2	2	1	3	5	3	7	5	4	9	9	11	8	15	19
GREECE	9										0		1	1	1	0	0	3	2	1
FINLAND	3																1			2
FRANCE	279		1	0	1	3	1	2	4	7	8	15	18	13	23	30	30	47	40	36
ITALY	74						1			5	7	4	4	6	5	7	5	5	9	16
NETHERLANDS	12														1	2	2	1	1	5
NORWAY	23											3		1	3	4	3	4	2	3
UK	191			1	2	1	3	2	6	6	14	9	8	9	13	24	24	28	27	14
POLAND	2																	1	1	
IRELAND	1													1						
SPAIN	58							1	3	4	1	1	3	6	3	5	6	4	8	13
TOTAL EURO-ARGO	755	0	1	1	3	6	7	6	16	27	33	39	39	41	58	81	82	101	105	109
ARGO Bibliography	2656	4	4	8	16	20	21	26	53	82	93	102	120	226	229	259	299	355	381	358
% EU vs Argo	28,43	0,0	25,0	12,5	18,8	30,0	33,3	23,1	30,2	32,9	35,5	38,2	32,5	18,1	25,3	31,3	27,4	28,5	27,6	30,4

Table 3. Number of publications using Argo from EU users, and percentage versus Argo publications, per year since 1998.

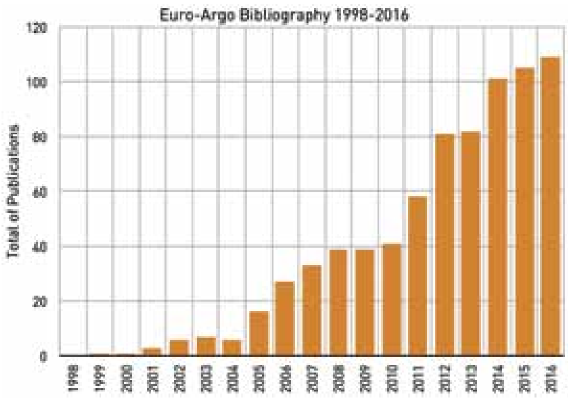

Figure 44: Number of Argo publications
from Europe per year since 1998.

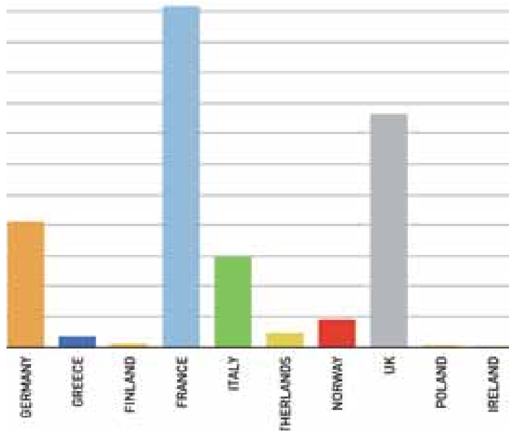

Figure 45: Number of publications by
Euro-Argo participating countries since 1998.

4.2.2 Access to Data

- USE OF GDAC PORTAL

Over the 12 months period from September 2015 to August 2016, 29 683 profiles from 740 active floats were collected, controlled and distributed by Coriolis DAC. Compared to 2015, the number of profiles increased by 16%, the number of floats increased by 1%. The increase in profile number is mainly explained by a better lifetime of active floats. The 740 floats managed during that period had 57 versions of data formats from 5 families.

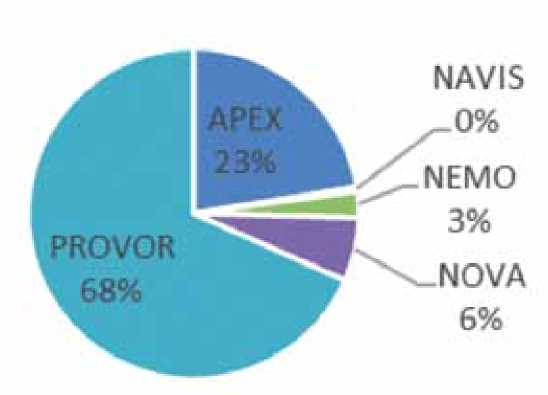

Figure 46: Repartition of active European float types in 2016.

Figure 47: Maps of the 29 683 profiles from the 740 active floats managed by Coriolis DAC in 2016. APEX – NAVIS – NEMO – NOVA - PROVOR (© Coriolis Data Centre).

Coriolis DAC provides data for 321 BGC-Argo floats from 5 families and 46 instrument versions. They performed 38 376 cycles.

The number of users that access, visualize and download Argo data sets is monitored each year from the Coriolis GDAC portal, as shown in Figure 48 and Figure 49.

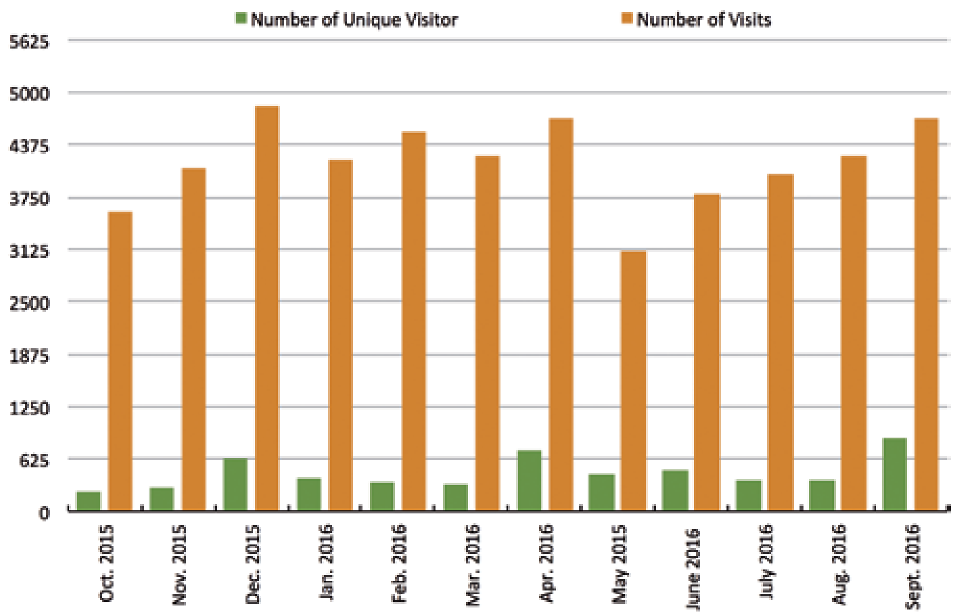

Figure 48: Number of Users and Visits on Coriolis GDAC between October 2015 to September 2016.

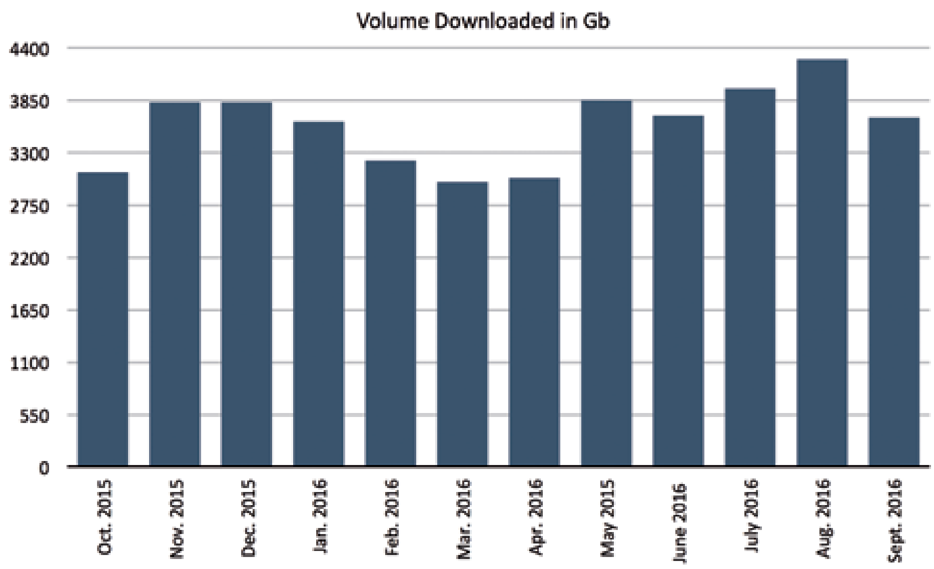

Figure 49 Volume of Data (in Gb) downloaded from Coriolis GDAC between September 2015 to September 2016.

• FTP SERVER MONITORING

The Argo GDAC ftp server is actively monitored by a Nagios agent (see *http://en.wikipedia.org/wiki/Nagios)*.

Every 5 minutes, an ftp download test and an Internet Google query are performed. The success/failure of the test and the response time are recorded. The FTP server is a virtual server on a Linux cluster (see Figure 50). There is a monthly average of 321 unique visitors, performing 4 229 sessions and downloading 3To of data files (Figure 48 and Figure 49). On the last 12 months (07/2015-07/2016), the weekly average ftp performance was 99.51%. The 0.49% of poor performances represents 36 hours and 38 minutes. Coriolis DAC faced 2 significant events these last 12 months :

- First week of March : 20 hours of FTP poor performances.
- Third week of May : 10 hours of FTP poor performances.

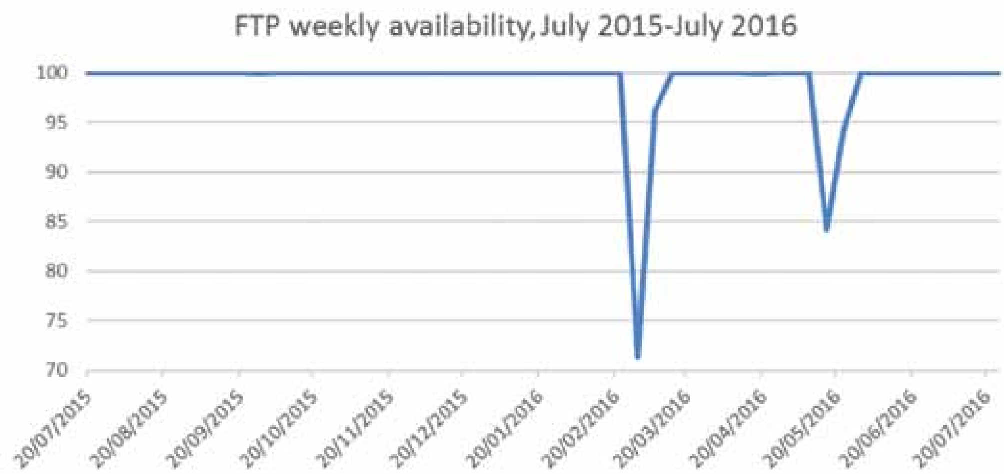

Figure 50: FTP monitoring at Coriolis GDAC between July 2015 and July 2016 (through Nagios software).

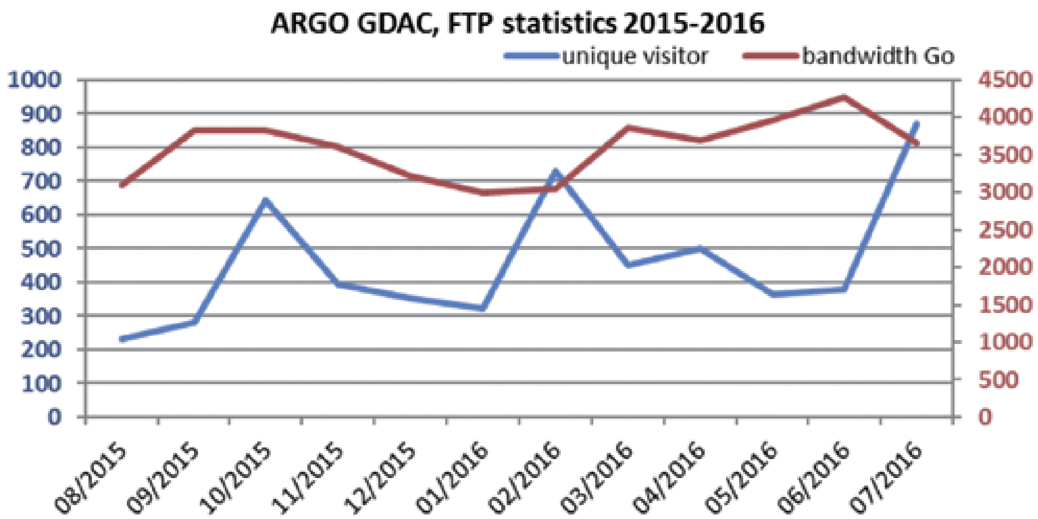

Figure 51: Statistics on the Argo GDAC server between September 2015 to September 2016.

5 FINANCIAL STATUS

The central ERIC income in 2016 reached 260 K€ (+20 K€ compared to 240 K€ planned) as Ireland became a full member. Salary expenses is around 194 K€ (84 K€ on ERIC and about 100 K€ on projects) and other expenditures of 80 K€. A positive balance of 132 K€ (97 K€ on the ERIC the rest on projects) is reached at the end of the year 2016. As far as projects are concerned, the budget execution is as planned for MOCCA. For AtlantOS, there is some delay in BCG float purchase and international workshop organization (will be done jointly with a Euro-Argo workshop in June 2017). For ENVRI+, there is a delay in execution due to the late Euro-Argo ERIC recruitment in October 2016.

An exceptional Ifremer in-kind contribution to the Euro-Argo ERIC reached 50 K€ in 2016, and 100 K€ in 2017 was agreed as part of a CPER Brittany region Euro-Argo project. This new funding was and will be used to develop new float storage capability for the Euro-Argo ERIC and develop further the Euro-Argo website.

Type	Code	Debit	Credit	Balance
Initial Balance				**269 186**
SG: Sales of goods	SG		431 832	431 832
GC: Grants & Contracts	GC		352 034	352 034
MF: Memberships fees	MF		260 000	260 000
II: Interest income	II		0	0
VA: VAT reimbursment	VA		0	0
PG: Purchases of Goods	PG	378 075		-378 075
PE: Personal costs	PE	194 623		-194 623
TV: Travel costs	TV	43 478		-43 478
MA: Materials costs	MA	2 648		-2 648
AC: Accounting fees	AC	5 728		-5 728
BS: Bank services	BS	216		-216
SC: Other subcontracts	SC	75 723		-75 723
DP: Depreciation	DP	210 541		-210 541
Total flows		**911 032**	**1 043 866**	
End balance				**402 020**

Table 4: Financial status - Summary 2016 – Grand Total.

	ERIC	ATLANTOS	MOCCA	ENVRI	JERICO	TOTAL
Purchases of goods for resale	0	0	369 000	0		**369 000**
Others Purchases of goods for resale	0	0	9 076	0		**9 076**
Insurance premiums	0	0	6 060	0		**6 060**
Personal	84 073	8 709	67 307	34 534		**194 623**
Subcontracts	30 000					**30 000**
Business travel	24 281	3 318	5 272	10 607		**43 478**
Telecommunication cost			24 605			**24 605**
Others costs	23 651					**23 651**
Depreciation	1 859	2 574	206 107			**210 540**
Sales of goods for resale	0	0	431 832	0		**431 832**
Operating Grants	0	18 026	276 807	56 203		**351 036**
Subscription members and observers	260 000					**260 000**
Others income	998					**998**
Accounting result	97 134	3 426	21 212	11 062	0	**132 833**
Depreciation	1 859	2 574	206 107	0		**210 540**
Operating grants in result 2016		18 026	276 807	56 203		**351 036**
Subsidy received		25 629				**25 629**
2016 investment	3 868	368 060	1 523 152	0		**1 895 080**
Cash flow	95 124	-354 458	-1 572 640	-45 141	0	**-1 877 115**
Additional payment delay (orders, tax and social charges,..)	45 174	288 260	-49 386			**284 048**
Cash Balance at 01/01/2016	350 972	423 544	1 716 626	69 210	4 835	**2 565 186**
Cash Balance at 31/12/2016	491 270	357 345	94 600	24 069	4 835	**972 119**
Treasury with all 2016 payments done	446 097	69 085	143 986	24 069	4 835	**688 071**

Table 5: Financial status - Analysis per project.

Country	Floats purchased	Floats deployed	Full Time Employee
Finland	3	3	0.21
France	101	52	9.83
Germany	34	41	2.50
Greece	3	3	0.42
Ireland	3	3	0.38
Italy	30	27	0.58
Netherlands	7	3	0,08
U.K.	34	34	3.33
Norway	0	2	0.38
Poland	2	2	0.42
Spain	1	1	0.50
Total	**218**	**171**	**18,63**

Table 6: Euro-Argo members and observers 2016 budget.

Annex 1 : 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, NERC-BODC
Norway	Observer	IMR
Poland	Observer	IOPAN
Spain	Candidate	SOCIB, IEO
Bulgaria	Candidate	IOBAS

** The listed institutes represent the Member States, but other institutes can also participate.*

Annex 2: Composition of EURO-ARGO ERIC governance bodies

Council Members	
Members	Profession/Position
Pierre-Yves Le Traon	*Chair* - Ifremer France
Jon Turton	*Co-Chair* - Met Office UK
Bernd Brügge	BSH Germany
Vasilios Lykousis	HCMR Greece
Sybren Drijfhout	KNMI Netherlands
Mikko Strahlendorff	FMI Finland
Alessandro Crise	OGS Italy
Mick Gillooly	MI Ireland
Dariusz Drewniak	Ministry of Science and Higher Education Poland
Odd Ivar Eriksen	Research Council of Norway
Management Board Members	
Pierre-Marie Poulain	*Chair* - OGS Italy
Hartmut Heinrich	*Co-Chair* - BSH Germany
Virginie Thierry	Ifremer France
Gerasimos Korres	HCMR Greece
Andreas Sterl	KNMI Netherlands
Justin Buck	NERC-BODC United Kingdom
Jari Haapala	FMI Finland
Diarmuid O'Conchubhair	MI Ireland
Walczowski Waldemar	IOPAN Poland
Kjell Arne Mork	IMR Norway
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 Wijfels	CSIRO Australia - Argo International
Johnny Johannessen	NERSC Norway - Copernicus Marine Service
Arne Kortzinger	GEOMAR Germany - Research
Magdalena Balmaseda	ECMWF UK - Seasonal Prediction
Two Euro-Argo ERIC experts assist the STAG	
Birgit Klein	BSH Germany - Research with Core-Argo
Hervé Claustre	LOV France - Bio-Argo

www.euro-argo.eu
euroargo@ifremer.fr

ERIC EURO ARGO
Technopôle Brest Iroise
1625, route de St Anne
ZI de la Pointe du Diable
29280 PLOUZANÉ
Tél. + 33 (0)2 98 22 44 83
E-mail : euroargo@ifremer.fr
www.euro-argo.eu