



The Euro-Argo research infrastructure organizes and federates European contribution to Argo (www.euro-argo.eu); it is part of the European ESFRI roadmap on large research infrastructures. The Euro-Argo ERIC (European Research Infrastructure Consortium) and its governance structure (Council, Management Board and Science and Technological Advisory Group) was set up by the Commission Implementing Decision (2014/261/EU) of May 5, 2014, with 9 funding members. The Research Infrastructure is made up of a central office based in France (Ifremer, Brest) and distributed national facilities (Figure 1). The distributed national facilities operate with direct national resources. As part of the Euro-Argo Research Infrastructure, they agree to a multi-annual commitment of resources (in particular in terms of floats to be deployed and for the data system), and to coordinate their activities through the Euro-Argo ERIC. The Euro-Argo ERIC delegates some of its activities to the national facilities who have the relevant expertise (e.g. data management and quality control, float deployment), and according to their areas of responsibility.

In 2019, the Euro-Argo ERIC involves 13 countries: **11 Members**, **1 Observer** and 1 Candidate.

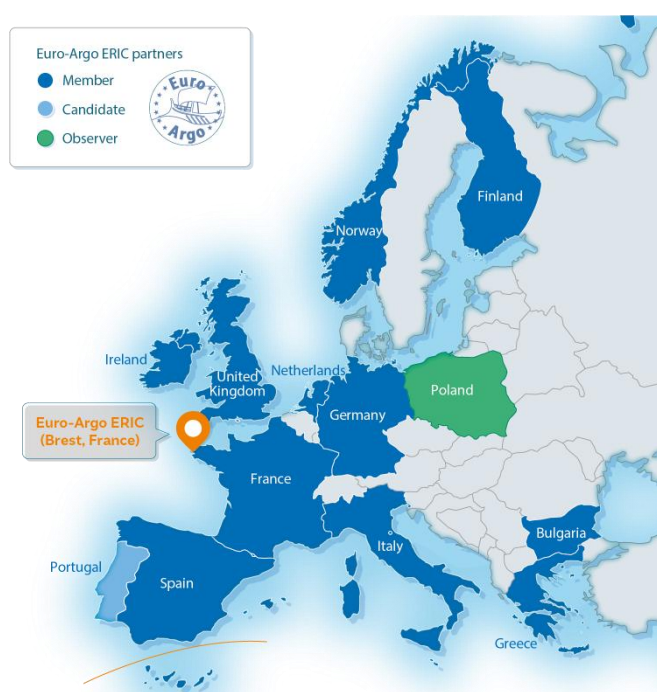


Figure 1. Euro-Argo ERIC membership in 2019

The Euro-Argo ERIC coordinates the European contribution to Argo and monitors it with the aims of maintaining $\frac{1}{4}$ of the Argo array.

This report presents the contribution of EU funded Argo activities as well as the integrated view of EU plus national European contributions.

1. The status of implementation (major achievements and problems in 2019)

- floats deployed and their performance
- technical problems encountered and solved

In 2019, 3 EU-funded floats were deployed: one BGC float funded under the EU H2020 AtlantOS project, deployed in the Mediterranean Sea, and two floats in the framework of the EU H2020 Euro-Argo RISE project, in the Mediterranean (BGC) and Black (T/S) Seas, aiming at evaluating Argo possibilities in shallow water coastal areas. These floats come in addition to the 186 floats deployed by the members. The table below shows the total number of floats deployed, both as number of measurements per variable and per type of float.

Table 1. European floats deployed in 2019, per parameter measured (blue, 7 first columns) and per type of float (green, 5 last columns).

	T&S	O2	Chla	BBP	NO3	Irradiance	pH	Deep	Bio	BGC	core	Total (floats)
<i>EU funded</i>	3	1	2	2	1	2	0	0	1	1	1	3
Member states	186	43	18	18	5	16	6	4	36	3	143	186
total	189	44	20	20	6	18	6	4	37	4	144	189

The decrease compared to previous years (189 floats deployed in 2019 vs 281 in 2018) is mainly due to delays in deployments of EU-funded floats and UK floats, as well as Deep French floats: the EU-funded floats encountered delays in float purchase, UK was impacted by the Seabird CTD recall (some floats missed their deployment opportunities due to repair/turnaround time at TWR) and France encountered technical issues during Deep float testing, that prevented the planned deployments.

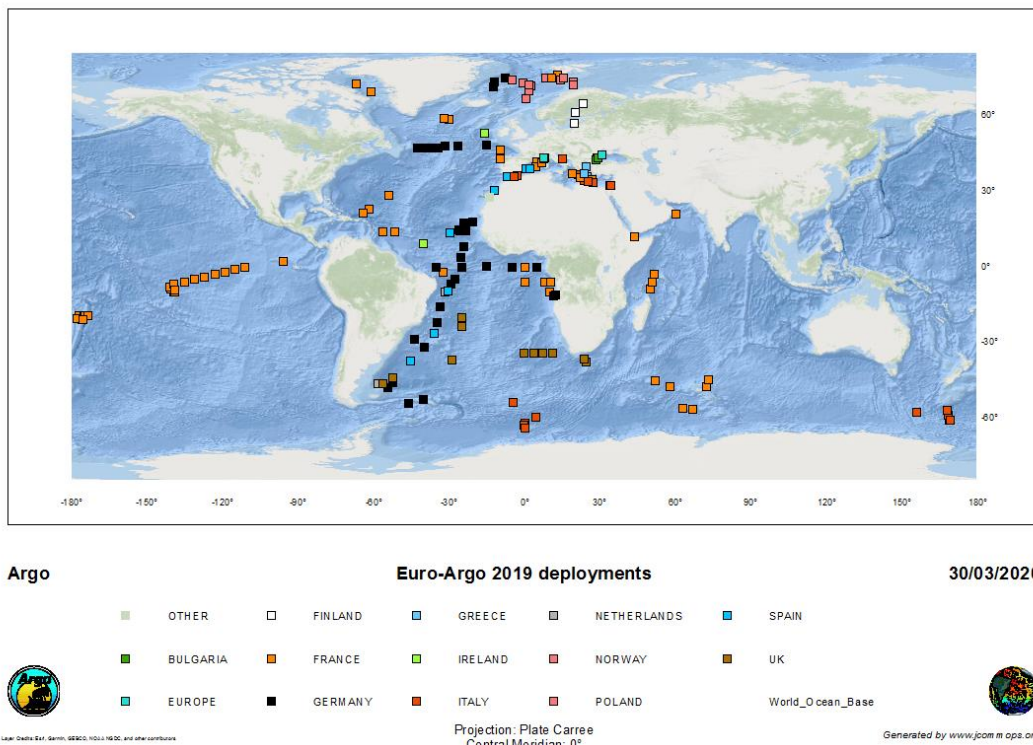


Figure 2. Position of European floats deployed in 2019

- status of contributions to Argo data management (including status of high salinity drift floats, decoding or production difficulties, etc)
- status of delayed mode quality control process

All European floats are processed by Coriolis and BODC DACs (respectively 78% and 22% of the global European fleet), and DMQC is currently shared between four institutes (BSH, OGS, Ifremer, BODC). The percentage of EU-funded floats processed in Delayed Mode (for floats deployed up to the end of 2019) amongst eligible floats is 79%, and 73% if we consider the whole European fleet (EU-funded + National).

The European fleet is impacted by the high salinity drift on SBE sensors (more than 10% of the MOCCA EU-funded floats) and Euro-Argo has started to investigate this issue from a DMQC point of view. Details on this work can be found on the Euro-Argo github public Forum:

<https://github.com/euroargodev/publicQCforum/issues/11>.

2. Present level of and future prospects for national funding for Argo including a summary of the level of human resources devoted to Argo.

The Euro-Argo ERIC coordination Office is a team of 5 permanent and 3 project persons in 2019. This team supports European countries to sustain and optimize the European contribution to the Argo International programme. In 2019, the Euro-Argo ERIC performed an evaluation of its first 5 years activities (*Euro-Argo ERIC, 2019a*) and elaborated its plan for the next 5 years (*Euro-Argo ERIC, 2019b*), with commitments from the 12 countries to support this 5-year plan. Both documents are available at: <https://www.euro-argo.eu/Outreach/Euro-Argo-general-documents>

The Euro-Argo RISE EU project (Euro-Argo Research Infrastructure Sustainability and Enhancement), that has started in January 2019 and involves all the Euro-Argo ERIC members except Netherlands for a 4 years duration (December 2022), has been granted 4M€, including funds for float purchase (**12 floats in total including Deep and BGC floats**) and a total of more than **100 men months per year** dedicated to Argo activities in all aspects (technological development, science, data management, outreach, legislation, etc.). Euro-Argo RISE is coordinated by the Euro-Argo ERIC.

Euro-Argo is also involved in the **EuroSea EU project** that will fund **5 Deep floats and 5 BGC floats** to be deployed in the coming years as well as the organisation of workshops, and in the **ENVRI-FAIR EU project** in which Euro-Argo is funded to work on improving **FAIRness** (FAIR: Findable, Accessible, Interoperable, Reusable) of **Argo data**, through the involvement of the two European Argo DACs (BODC & Ifremer).

3. Summary of deployment plans (level of commitment, areas of float deployment, Argo missions and extensions) and other commitments to Argo (data management) for the upcoming year and beyond where possible.

Table 2 summarizes European deployment plans for year 2020, per variable, type of float and region. Amongst the 236 floats that should be deployed in total, 10 are EU-funded.

Table 2. European deployment plans for 2020: total EU-funded + national (EU-funded in brackets). "BGC" stands for floats equipped with the sensors able to measure the 6 BGC variables, and "Bio" stands for other floats equipped with only some of the BGC sensors.

	T&S	O2	Chla	BBP	NO3	Irr	pH	Deep	Bio	BGC	core	Total
Nordic	18	13	8	8	3	8	3	4	3	6	5	18
Med Sea	27 (3)	11	1	1	1	1	1	2	2	7	16 (3)	27 (3)
Black Sea	5	2	0	0	0	0	0	0	0	2	3	5
Baltic	11 (2)	7	5	5	3	3	3	0	3	4	4	11
Southern	16	0	0	0	0	0	0	0	0	0	16 (2)	16
Arctic	4	0	0	0	0	0	0	0	0	0	4	4
Global	155 (7)	48 (5)	7	7	7	7	7	24	7 (5)	18	106 (2)	155 (7)
Total	236 (12)	81 (5)	21	21	14	19	14	30	15 (5)	37	154 (5)	236 (10)

Data from all the European floats will be processed in Real Time by Coriolis and BODC DACs, and in DMQC by European teams in their national institutes.

In addition to the data processing, European institutes are continuing their R&D work for improving data quality, through the development of new DMQC methods, both for T/S and for BGC parameters. Collaboration at European level is being enhanced and this will continue in the coming years, thanks to work carried out in Euro-Argo RISE & ENVRI-FAIR projects. BGC data management is also being organised at European level and this work will continue in the coming years.

European Research teams are also involved in technological activities, in particular regarding ice avoidance systems and tests of alternative sensors (RBR, TRIOS, etc.), and work carried out in current EU projects also includes outreach and training activities, as well as community strengthening.

4. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centres. Please also include any links to national program Argo web pages to update links on the AST and AIC websites.

Argo data and/or products derived from Argo data are used for operational oceanography within the Copernicus Marine Environment Monitoring Service (<http://marine.copernicus.eu/>), for satellite calibration and validation and for research carried on by the Euro-Argo ERIC partners (see national reports for details).

Within the Euro-Argo RISE EU project, European contribution to Argo ARCs will be reinforced, in particular in the Southern Ocean ARC (see UK national report).

5. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo. These might include tasks performed by the AIC, the coordination of activities at an international level and the performance of the Argo data system. If you have specific comments, please include them in your national report.

Here is a list of several items that Euro-Argo would like to be addressed at AST level:

- Increase coordination at basin scale level to take into account the development of deep and BGC pilot array and adjust CORE+DEEP+BGC deployment to fill gaps.
- Coordinate priorities in term of SBE delivery to partners taking into account cruise plan/projects milestones and network gaps rather than letting SBE decide on their own.
- Evaluate the impact in term of data lost due to SBE high salty drift failure. Compensation from SBE should be studied.

6. To continue improving the quality and quantity of CTD cruise data being added to the reference database by Argo PIs, it is requested that you include any CTD station data that was taken at the time of float deployments this year. Additionally, please list CTD data (calibrated with bottle data) taken by your country in the past year that may be added to the reference database. These cruises could be ones designated for Argo calibration purposes only or could be cruises that are open to the public. To help CCHDO track down this data, please list the dates of the cruise and the PI to contact about the data.

See national reports

7. Keeping the Argo bibliography (<http://www.argo.ucsd.edu/Bibliography.html>) up to date and accurate is an important part of the Argo website. This document helps demonstrate the value of Argo and can possibly help countries when applying for continued Argo funding. To help me with this effort, please include a list of all papers published by scientists within your country in the past year using Argo data, including non-English publications.

There is also the thesis citation list (http://www.argo.ucsd.edu/argo_thesis.html). If you know of any doctorate theses published in your country that are missing from the list, please let me know. Finally, if you haven't already sent me a list of Argo PIs in your country, please do so to help improve the statistics on how many papers are published including an Argo PI vs no Argo PIs.

The Euro-Argo ERIC maintains a summary of the European bibliography at <http://www.euro-argo.eu/Bibliography> and has been advertising publications at <http://www.euro-argo.eu/Main-Achievements/European-Contributions/Scientific-Results> for several years. Work is currently in progress to enhance these sections of the website: it is planned to present the bibliography in a “sortable” table (similar to BGC-Argo bibliography) and to reduce the number of “Scientific results” summaries, as they are thought to be unappropriated (not understandable by large public). Instead, only 3 papers will be highlighted per year, through their abstract in “Plain Language”. Euro-Argo also plans to advertise European scientific publications related to Argo on a regular basis through Twitter.

References:

Euro-Argo ERIC (2019)a, Euro-Argo ERIC Activity Report 2014-2018, <https://doi.org/10.13155/71339>

Euro-Argo ERIC (2019)b, Euro-Argo ERIC Five-year plan 2019-2023, <https://doi.org/10.13155/71936>