



## Argo-Spain National Report 2022

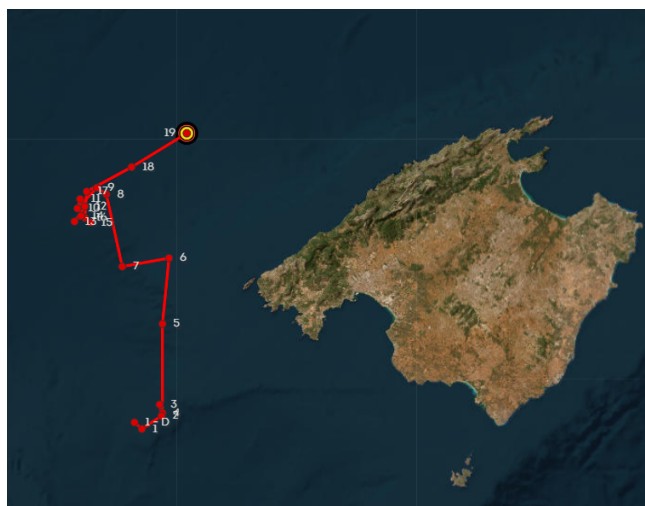
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### 1. The status of implementation of the new global, full-depth, multidisciplinary Argo array (major achievements and problems in 2022)

#### a. floats deployed and their performance

The contribution of Argo Spain to extend the international Argo network during 2022 was focused on the Western Mediterranean Sea, deploying a total of one float. This deployment mission was coordinated by the Balearic Islands Coastal Observing and Forecasting System (SOCIB) and the Spanish Institute of Oceanography (IEO-CSIC), and developed by SOCIB.

In November 2022, during the Canales Autumn 2022 oceanographic cruise, Spain launched one Core float from the deck of the vessel R/V SOCIB. The float (WMO 3902467) was deployed in the Mallorca Channel at coordinates 39° 16.30'N and 01° 59.22'E, as shown in Figure 1.



**Figure 1.** Position of deployment and trajectory of the WMO 3902467 deployed float in the Mallorca Channel in November 2022 (Source: Argo Fleet Monitoring, Euro-Argo).

The deployed float was an Arvor-I platform with an Iridium transmission system. The parking depth was set at 1000 dbar and the profile depth at 2000 dbar. The float works in a 5-day cycle. At the end of 2022 the float transmitted a total of 9 profiles.

In addition, twenty Spanish floats have been active during 2022 in the Western Mediterranean and Atlantic Ocean.

#### **b. technical problems encountered and solved**

SOCIB had planned to deploy three floats in 2022, but only one was successfully deployed and remains active as mentioned in the previous section. Unfortunately, the other two floats encountered problems both before and after deployment.

One Core float (WMO 4903635) was deployed during the Canales Summer 2022 oceanographic cruise on board the R/V SOCIB, but it didn't transmit any data since deployment. After 6 months without communication, the status of this float was changed to "closed" (considered dead upon deployment). NKE is taking care of it

The other Core float (WMO 3902466) experienced issues during the pre-deployment testing phase. It is now in the manufacturer's laboratory undergoing diagnostic testing, which has confirmed the need to refurbish the hydraulic group. Transmission testing has shown that it is fully operational, but they also found that the conductivity cell was contaminated and will need to be cleaned following the SBE application note to check if it can be restored to a good state.

The IEO-CSIC planned to send an NKE two Core iridium floats that experienced problems. One of them gave data transmission failures in the pre-deployment phase, while the other one was stranded on a beach; the sensors needed to be cleaned/checked.

#### **c. status of contributions to Argo data management (including status of high salinity drift floats, decoding difficulties, ramping up to include BGC or Deep floats, etc)**

After each deployment, detailed technical information is provided to the DAC in charge of the floats (Coriolis) and the AIC. The Argo-Spain program is aware of the changes in the technical and metadata data formats and is providing the necessary information.

#### **d. status of delayed mode quality control process**

Argo-Spain mainly deploys floats in the Atlantic Ocean and the Mediterranean Sea. In terms of DMQC, Argo-Spain manages its floats that operate in the Atlantic Ocean and the Instituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS) manages all the floats that operate in the Mediterranean Sea, including floats of Argo-Spain. The DMQC of the Argo-Spain floats that operate in

the Mediterranean Sea will be assumed by Argo-Spain itself at some point, subject to personnel availability. In successive meetings, a transfer of DMQC knowledge from the IEO-CSIC to the SOCIB will be scheduled so that SOCIB is in charge of the DMQC of the Argo Spain profilers deployed in the Mediterranean.

Argo-Spain fleet is composed of 98 floats deployed so far. A total of 62 floats have been deployed in the Atlantic Ocean and 29 floats deployed in the Mediterranean Sea.

In terms of DMQC, the efforts during 2022 were directed to process the data of 4 Deep Argo floats, according to the requirements of the Deep Argo community. Two of them belonged to Argo Spain (WMO 6901246 and 6901248), while the remaining two were managed by Euro-Argo (WMO 3902126 and 3902127).

## **2. Present level of and future prospects for national funding for Argo including a summary of the level of human resources devoted to Argo, and funding for sustaining the OneArgo mission: Core, BGC, Deep, Spatial (Polar, equator, WBCs)**

Spain has participated in the international Argo program since its inception and is currently a member of the European Research Infrastructure Consortium Euro-Argo (ERIC). Spanish participation in Argo began in 2002 through a first European project, and a total of 98 Argo profilers have been deployed in the North Atlantic and the Mediterranean Sea since then.

In 2022, the agreement was renovated between the Ministry of Science and Innovation, IEO-CSIC and SOCIB (<https://www.boe.es/boe/dias/2022/09/06/pdfs/BOE-A-2022-14622.pdf>), assuming the financial commitment that Spain participates as a full member of the ERIC Euro-Argo. The interest in such participation was demonstrated in the process of prioritizing Spain's participation in European research infrastructures, as detailed in the document on the Spanish Strategy for participation in scientific infrastructures and international organizations.

However, the Argo-Spain program does not have proper long-term funding for deployments of Argo floats. The contribution to the Euro-Argo ERIC is secured and sustained, based on IEO-CSIC's access to infrastructures calls from the Spanish Ministry of Science, Innovation, and Universities and from the SOCIB's contribution, which has ensured deployments of at least 3 floats per year since 2015. The IEO-CSIC funds the scientific coordination (1.5 person/month per year) and the transmission costs.

At the end of 2021, SOCIB received funding from NextGenerationEU/PRTR that ensured the purchase and deployment of three floats during 2022.

The personnel of Argo-Spain during 2022 consisted of the following individuals from IEO-CSIC and SOCIB:

IEO-CSIC:

- 1 technician working 50% of their time.
- 1 Principal Investigator (PI) working 50% of their time.

SOCIB:

- 1 full-time technician working on the EA-RISE project
- 1 technician working 15% of their time
- 1 scientific advisor working 15% of their time
- 1 PI working 10% of their time

**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.**

Here is a [link](#) to the commitments table at OceanOPS (if the link isn't working, visit [OceanOPS](#) and choose 'commitments' from the farthest right icon at the top of the page). If you cannot edit the online table, please send a list of deployment plans for each of the columns in the table as needed.

SOCIB aims to launch two Core floats in the Mediterranean Sea. To achieve this, a new float to be purchased in 2023 and the float that is currently being repaired at the NKE laboratory will be used.

The IEO-CSIC awaits the imminent reception of a total of twelve (12) new floats by the Ministry of Science and Innovation, which will be launched along different oceanographic cruises during 2023 and 2024. Two (2) of them will be part of the Deep Argo mission and another two (2) of the BGC Argo mission. The rest will be core floats with iridium transmission. The remaining eight (8) floats (iridium transmission system) will contribute to the core mission. Based on scientific requirements, the IEO-CSIC is currently in talks with different PIs, but the deployment areas will focus on the North Atlantic Ocean, with agreed locations such as the Canary Islands region, the Galician Bank or the Gulf of Cádiz. The use of vessels of opportunity to launch floats in the South Atlantic is also contemplated. These plans have already been communicated and registered in OceanOPS.

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

Argo is used by many Spanish researchers to improve the understanding of climate and ocean variability. Operational ocean forecast models also use Argo data for model assessments and model improvement through data assimilation (e.g. The Western Mediterranean OPERational forecasting system - [WMOP](#) -, the Atlantic-Iberian Biscay Irish-Ocean Physics Analysis and Forecast - [IBI-MFC](#) - and Mediterranean Sea Physics Reanalysis - [MedMFC](#) -). The web page of the Argo Spain program is: <http://www.argoespana.es>

- 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 OceanOPS, 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. Also, during the AST-24 plenary, each national program will be asked to mention a single highlight or issue via a very brief oral report.**

No issues.

- 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.**

A CTD cast is performed after most of the Argo-Spain deployments.

- 7. Keeping the Argo bibliography ([Bibliography | Argo \(ucsd.edu\)](#)) 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 ([Thesis Citations | Argo \(ucsd.edu\)](#)). If you know of any doctorate theses published in your country that are missing from the list, please let me know.**

Martínez, J., Gabarró, C., Turiel, A., González-Gambau, V., Umbert, M., Hoareau, N., et al. (2022). Improved BEC SMOS Arctic Sea Surface Salinity product v3.1. *Earth Syst. Sci. Data* 14, 307–323. doi: [10.5194/essd-14-307-2022](https://doi.org/10.5194/essd-14-307-2022).

Olmedo, E., Turiel, A., González-Gambau, V., González-Haro, C., García-Espriu, A., Gabarró, C., et al. (2022). Increasing stratification as observed by satellite sea surface salinity measurements. *Sci Rep* 12, 6279. doi: [10.1038/s41598-022-10265-1](https://doi.org/10.1038/s41598-022-10265-1).

González-Santana, J.A.; Thierry, V.; Amice, M.; André, X.; et al. ASSESSING THE EXTENSION OF THE ARGO ARRAY TOWARDS THE DEEP OCEAN: AN ANALYSIS OF THE LONG-TERM STABILITY AND ACCURACY OF THE SBE61, SBE41 AND RBR SENSORS (2022). Poster communication: [hdl.handle.net/10508/16167](https://hdl.handle.net/10508/16167)

Pelegrí, J.L., Hernández-Guerra, A., Vélez-Belchí, P. et al. SAGA: THE SOUTH ATLANTIC GATEWAY. Congress communication: <https://bit.ly/3IKYSMj>

**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.**

None.

- 8. How has COVID-19 impacted your National Program's ability to implement Argo in the past year? This can include impacts on deployments, procurements, data processing, budgets, etc.**

No problems with float's deployment and recovery.

- 9. Does your National Program have any deployment plans for RBR floats in the next couple years? If so, please indicate how many floats you will be buying in 2023 and 2024 (if known) and where they might be deployed.**

At the moment, this option is not contemplated in the short term.