ARGO National Report 2025: Bulgaria

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1. Status of implementation

The BulArgo programme is a component of the MASRI project – Infrastructure for Sustainable Development of Marine Research and Participation in European Infrastructure (Euro-Argo) (http://masri.io-bas.bg), which is part of the National Roadmap for Scientific Infrastructure (2020–2027) of the Republic of Bulgaria.

Focus area for BulArgo programme is the Black Sea and it is implemented by a consortium of three scientific institutions: the Institute of Oceanology (IO-BAS), Sofia University "St. Kliment Ohridski", and the National Institute of Meteorology and Hydrology.

Since 2011, IO-BAS has deployed a total of 19 floats under the BulArgo programme, which is the Bulgarian contribution to the Euro-Argo ERIC infrastructure. The floats have provided about 3300 profiles of which 2000 include DOXY measurements (Fig.1). By the end of 2025, 11 floats were active in the Black Sea, 9 of which were operated by Bulgaria.

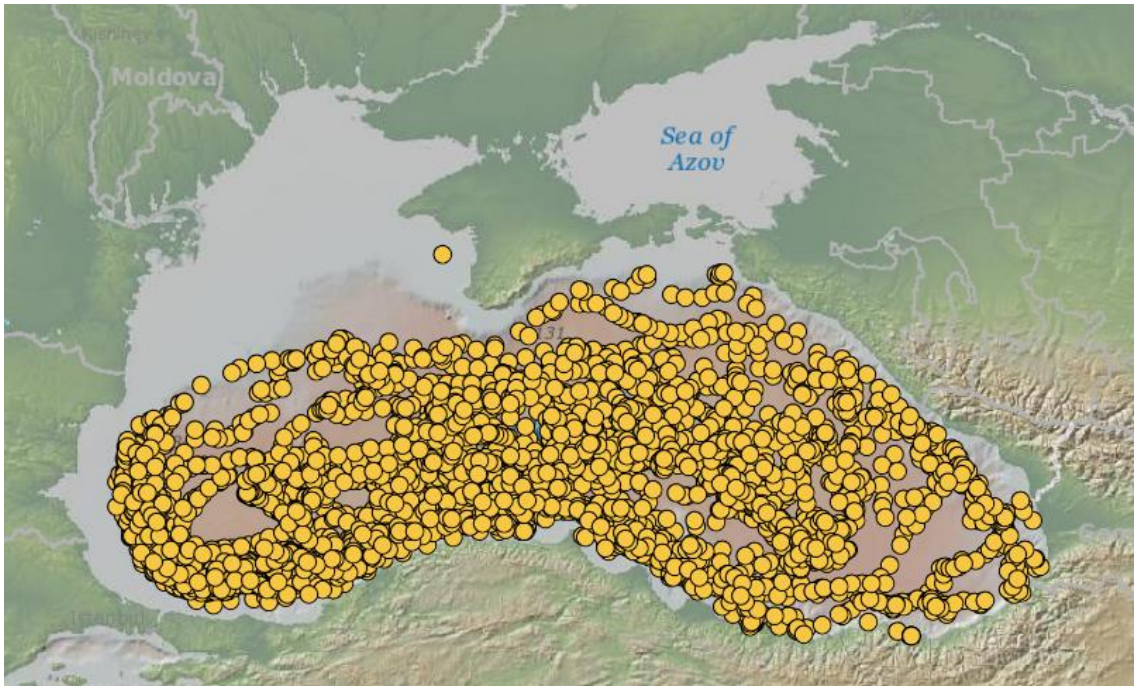


Figure 1. Profiles of the BulArgo programme (2011-2025)

a) Floats deployment and their performance

In 2025, two BulArgo floats were deployed in the Black Sea under the framework of the MASRI project. The floats were ARVOR-I and ARVOR-DO type, manufactured by NKE (France). The floats integrate an Iridium satellite telemetry system which provides a dual telecommunication capability, allowing real-time modification of their configuration.

Both floats were launched from Romanian R/V Mare NIGRUM operated by National Institute for Research and Development on Marine Geology and Geo-ecology – GeoEcoMar, during the STREAM-DANUBE cruise (MN280) funded by the HE AQUARIUS Transnational Access Call 1.

The first float (WMO 5907217) was deployed on 9 September 2025, followed by the second float (WMO 7902193) on 10 September 2025. Both floats were programmed to cycle between the surface and 2000 dbar every 5 days and to drift at the parking depth of 750 dbar. At present, both floats are operational. The status information for the Bulgarian floats deployed in the Black Sea in 2025 is summarized in Table 1.

Table 1. Status information for the floats deployed in the Black Sea during 2025

Model	WMO	Deployment date	Deployment time	Latitude, N	Longitude, E	№ of Cycles	Status
ARVOR-I	5907217	09/09/2025	12:58:00	42.8625	29.103	13	Active
ARVOR-DO-I	7902193	10/09/2025	12:33:00	43.1421	29.854	13	Active

Figure 2. Deployments of Bulgarian Argo floats from R/V Mare Nigrum as part of the STREAM-DANUBE cruise. ©IO-BAS

b) Technical problems encountered and solved

- The deployment of the Arvor-RBR float was postponed last year due to a technical issue identified by NKE in three other Arvor-RBR floats. As a precautionary measure, NKE recommended temporarily suspending the deployment of this float type. The issue is still under investigation.
- Since 2023, delayed and partial Iridium transmissions have been observed on several Argo floats operating in the Black Sea.
- Despite successful laboratory and onboard tests, nearly all floats deployed in the Black Sea since 2023 have switched to “end-of-life” mode immediately after deployment.

c) Status of contributions to Argo data management (including status of conversion to V3 file, formats, pressure corrections, etc.)

All BulArgo floats are processed at the DAC in the Coriolis Centre. After each deployment, detailed technical information was provided to the Euro-Argo ERIC Office and uploaded to the OceanOps website. The BulArgo program is aware of the changes in technical and metadata formats and ensures the necessary information is provided.

d) Status of delayed mode quality control process

The BulArgo programme does not have the human resources and capacity to implement delayed mode quality control for the floats. The delayed mode quality control of the T/S data from BulArgo floats is carried out by the MedArgo data center (OGS, Italy).

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

In 2025 Bulgaria continued to be a committed member of the Euro-Argo ERIC. For 2025 national funding covered float procurement and operation costs. Three staff members from IO-BAS were engaged with Bulgarian Argo programme activities. They perform these duties in addition to their other responsibilities at IO-BAS.

3. Summary of deployment plans (level of commitment, areas of float Deployment, low or high resolution profiles, extra sensors, Deep Argo) and other commitments to Argo (data management) for the upcoming year and beyond where possible)

In 2026, Bulgaria plans to deploy two Arvor DO floats in the Black Sea. However, given the evolving geopolitical situation in the Black Sea, the deployment plan may be subject to changes or delays.

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.

4.1. Operational and scientific use of Argo data

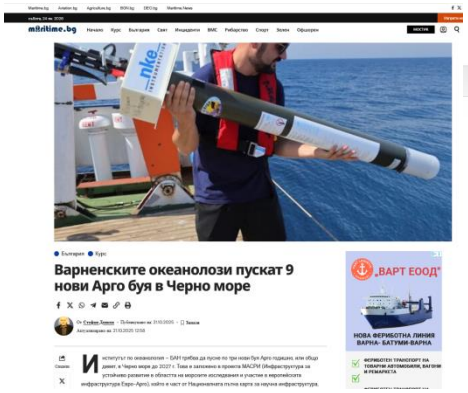
BulArgo focuses on both research activities and marine climate monitoring of the Black Sea. Argo data are routinely assimilated into the BS-MFC operational Black Sea forecasting system of the Copernicus Marine Environment Monitoring Service (CMEMS). Researchers from the Black Sea riparian countries widely use Argo data to advance understanding of the Black Sea physical and biogeochemical dynamic.

The BulArgo program website (https://bulargo.io-bas.bg/) serves as a platform to showcase and promote the activities of Argo, Euro-Argo, and BulArgo. The site is regularly updated with the latest information, offering data access for all floats operating in the Black Sea and highlighting Bulgarian Argo activities, news, and data from Argo floats. The website is continuously updated, with additional images and videos documenting float deployment activities.

5. Outreach and communication:

In 2025, the BulArgo team conducted several dissemination activities, including:

- Several interviews in national media (radio, TV and electronic newsletters)



- Within the framework of the Black Sea Blue Academy 2025, a sponsorship contract between OMV Petrom and IO-BAS supported the printing of 2,500 copies of the comic book *Ocean Observers*, which were disseminated during dedicated events held in Varna, Burgas, and Sofia.
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6. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo.

There are no issues to report.

7. **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.**

At all deployment locations a deep CTD station was taken. The ship-data will be sent to the Argo Reference Database.

8. **Does your National Program have any deployment plans for RBR floats in the next couple years?**

It is planned for 2026 if the RBR sensor issue is resolved.