



Bulgarian Argo Activities

Present status and further plans

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BulArgo programme is a component of the project MASRI – Infrastructure for Sustainable Development of Marine Research and Participation in the European Infrastructure (Euro-Argo). (<http://masri.io-bas.bg/>), a part of the National roadmap for scientific Infrastructure (2020-2027) of Republic of Bulgaria. The BulArgo comprises a consortium of three scientific organizations: Institute of Oceanology (IO-BAS) in Varna, Sofia University “St. Kliment Ohridski” and National Institute of Meteorology and Hydrology in Sofia.

1. The status of implementation

During 2020, five Argo floats in total were deployed in the western Black Sea. Three under the framework of BulArgo activities and two under the Italian Argo programme and EA-RISE project. The BulArgo floats were ARVOR-I and ARVOR-DO type and were purchased by Institute of oceanology-BAS through the EA- ERIC tender procedure. The floats were deployed by the Bulgarian Argo team in the western Black Sea from the board of R/V Akademik. All floats integrate Iridium satellite telemetry system which provides a dual telecommunication capability allowing modification of the configuration in real-time.

The BulArgo (WMO 6903866 and 6903867) floats were deployed on November 17th and 22th in Bulgarian EEZ at depths 1500m and 1450m, respectively. The floats were programmed to cycle between the surface and 1500 dbar every 5 days and to drift at the parking depth of 750 dbar. Both floats are still active. The BulArgo float with WMO 6903868 was launched at the sea on 11th of December 2020 but due to very bad weather and sea state conditions immediately after its deployment the float went under the vessel hull and was destroyed by the ship's propellers. The status information for the Bulgarian floats deployed in the Black Sea during 2020 is presented on Table 1. Surface positions of the BulArgo active floats are shown on Figure1.

Table 1. Status information for the Bulgarian floats deployed in the Black Sea during 2020

Model	WMO	Deployment date	Deployment time	Latitude	Longitude	№ of Cycles	Status
Arvor-I	6903866	22/11/2020	21:14	42.5006	29.155	19	Active
Arvor-I-DO	6903867	17/11/2020	21:33	43.1745	28.64	20	Active
Arvor-I-DO	6903868	11/12/2020	23:47	43.16665	29.16707	N/A	Inactive



Figure 1. Trajectories of the active BulArgo floats deployed in the western Black Sea during 2020 (WMO 6903867 -grey line and WMO-6903866 –red line)

Additionally, Bulgarian Argo team deployed on 23th July an Italian ARVOR-I float (WMO 6903782) in the western Black Sea from the board of R/V Akademik. The float has a parking depth at 200 dbar and maximal profiling depth at 1500 dbar. In the frame of EA-RISE project, Institute of oceanology -BAS deployed an Euro-Argo RISE Argo float (model Arvor – I, WMO 6903865) on 24th of July 2020 off the Bulgarian Black Sea shelf at 50 m depth to test its potential as a virtual mooring using a fishing line with neutral buoyancy. Since 15th of November 2020 the float has stopped transmissions.

- a) status of contributions to Argo data management (including status of pressure corrections, technical files, etc)

The data management for the BulArgo floats was done by the Coriolis GDAC. Metadata and data are available through the Coriolis web site in near real-time.

- b) status of delayed mode quality control process

At present the standard procedures for delayed mode data processing and quality control of BulArgo data are performed at the IO-BAS.

2. Present level of and future prospects for national funding for Argo



On April 5th, 2018, Bulgaria has become a regular member of Euro-ARGO ERIC and as such has the obligation to ensure deployment of at minimum of 3 Argo floats per year. The funding covers float procurements in the period 2019-2023 (expected to be extended till 2027), deployment and communication cost.

For 2021 the Bulgarian Ministry of Education and Science provided funding to buy 3 Argo floats with dissolved oxygen sensors. The Ministry is committed to provide funding in order to sustain the Bulgarian contribution to Argo beyond 2021 as a member of the Euro-Argo Research Infrastructure Consortium.

3. Summary of deployment plans

The Bulgarian Argo deployment plan for 2020 is detailed in Table 2. The area of floats deployment is western Black Sea.

Year	Month	Programme/Project	Float type	Quantity
2021	Aug - Dec	BulArgo	Arvor DO-I	3

4. Summary of national research and operational uses of Argo data

BulArgo focuses on both research topics and marine climate monitoring of the Black Sea.

All Argo data are routinely assimilated into the BS-MFC operational Black Sea forecasting system of the Copernicus Marine Environment Monitoring Service (CMEMS).

Argo data are being used by the researchers from the Black Sea countries to improve the understanding of Black Sea physical and biogeochemical properties. A list of bibliography is available at the end of this report.

5. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo.

At the moment we have no suggestion.

6. Number of CTD cruise data added to the Argo reference database

The CTD casts were performed just before the floats deployment. The CTD profiles were provided to EA-ERIC office.

7. Bibliography

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