



Argo-Poland National Report 2019

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1. The status of implementation.

In 2019 Poland deployed 2 floats from the board of *r/v Oceania*. The Argo floats (WMO 3902107, 3902108) were deployed in the Nordic Seas at the end of June 2019 (Fig.1). All instruments are the ARVOR floats with Iridium transmission system. The parking depth was set at 1000 dbars and the profiling depth at 2000 dbars. They have cycles of 10 days. Both floats were operated for the whole of 2019 and have sent about 20 complete sets of hydrographic data by the end of the year.

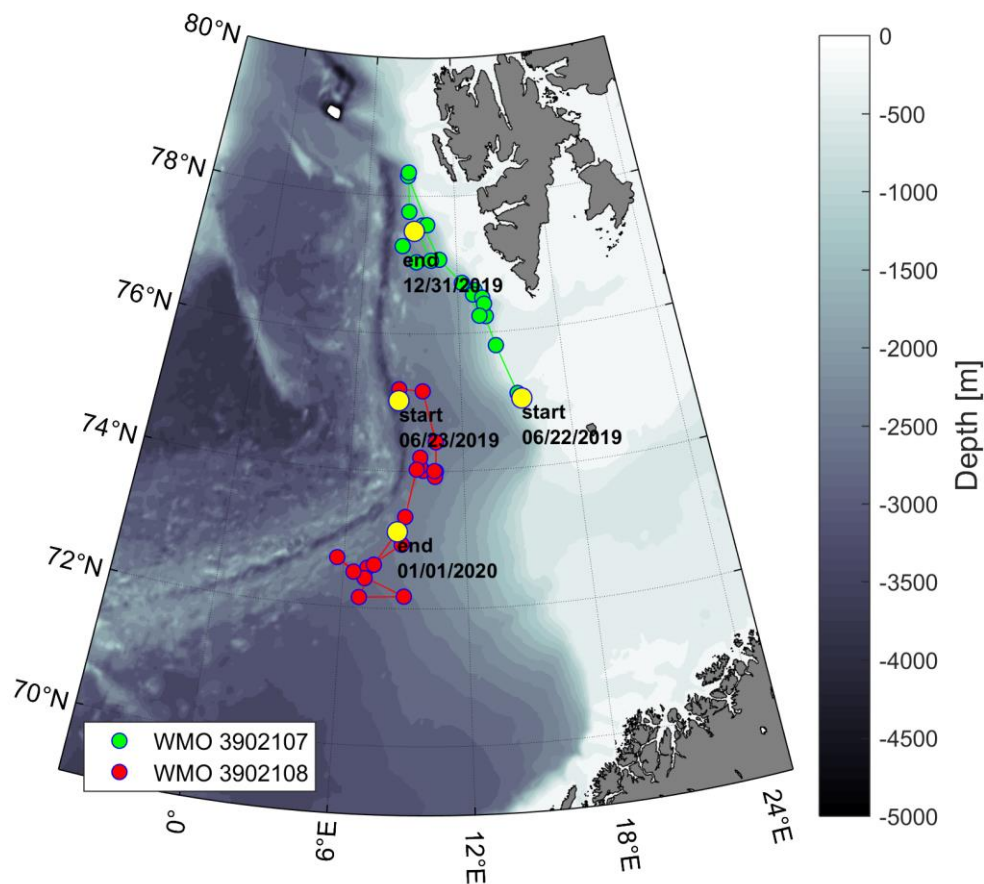
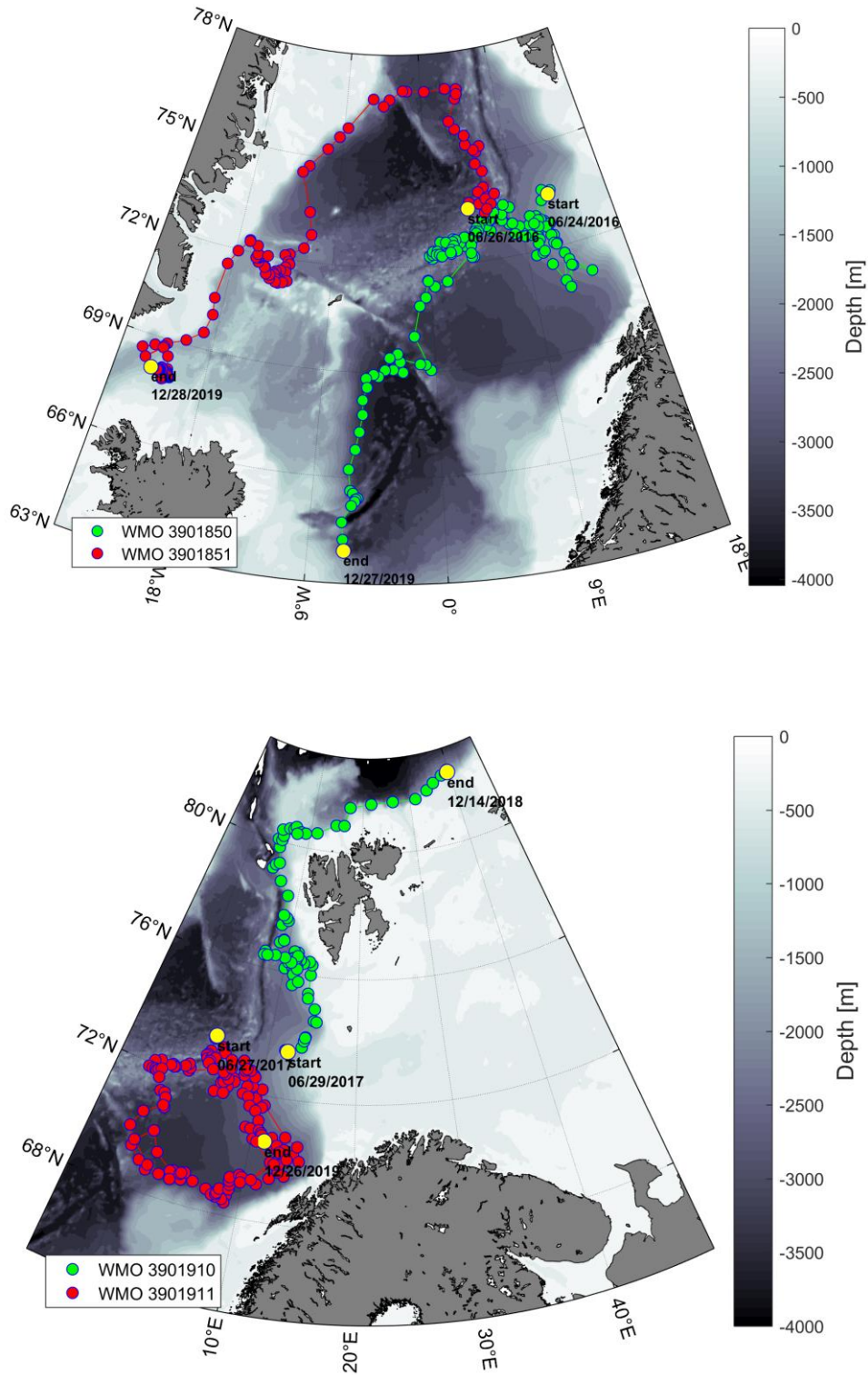


Fig. 1. Positions deployment and trajectories of two Argo floats deployed in the Nordic Seas by Argo Poland program in June 2019.

Two floats launched in June 2016 (WMO 3901850, 3901851) (Fig. 2) and one float deployed in June 2017 (WMO 3901911) (Fig. 3) were also active during the 2019 year. During their whole operating time, the floats have sent 129 (WMO 3901850, 3901851) and 131 (WMO 3901911) sets of hydrographic data.



Figs 2, 3. Track of the Arctic floats deployed in June 2016 (upper) and June 2017 (lower).

Also, two floats deployed in June 2018 (WMO 3902102, 3902103) were active during the 2019 year and have sent 55 complete data sets. One float deployed in June 2018 (WMO 3902105) stopped transmission in September 2019. The float has sent 52 sets of data (Fig. 4).

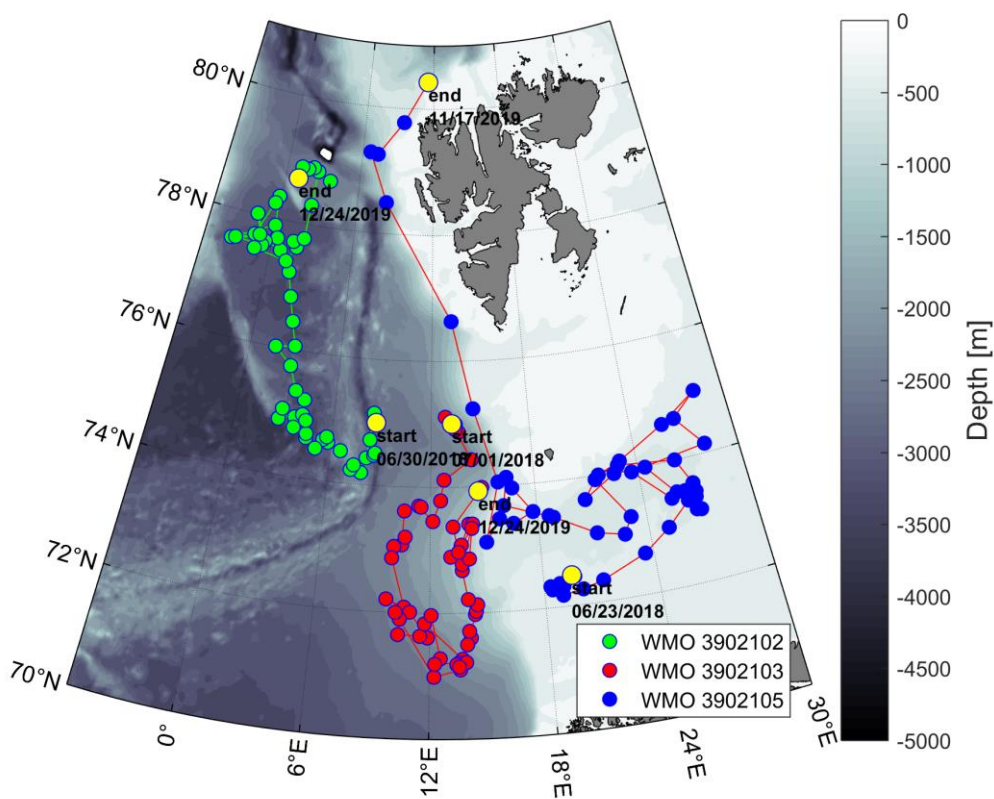
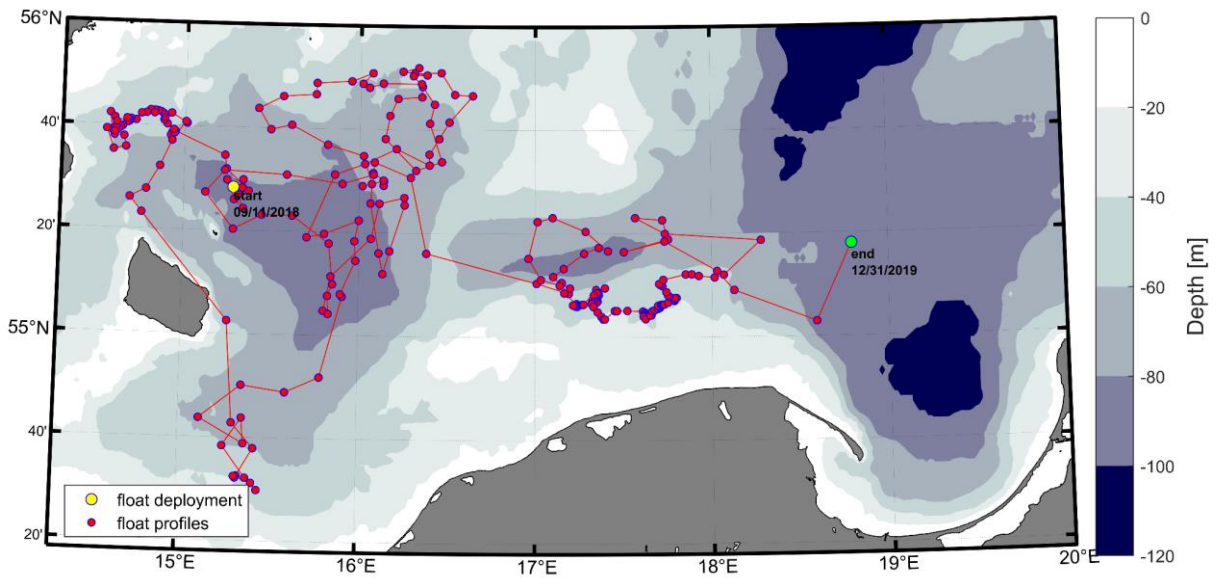
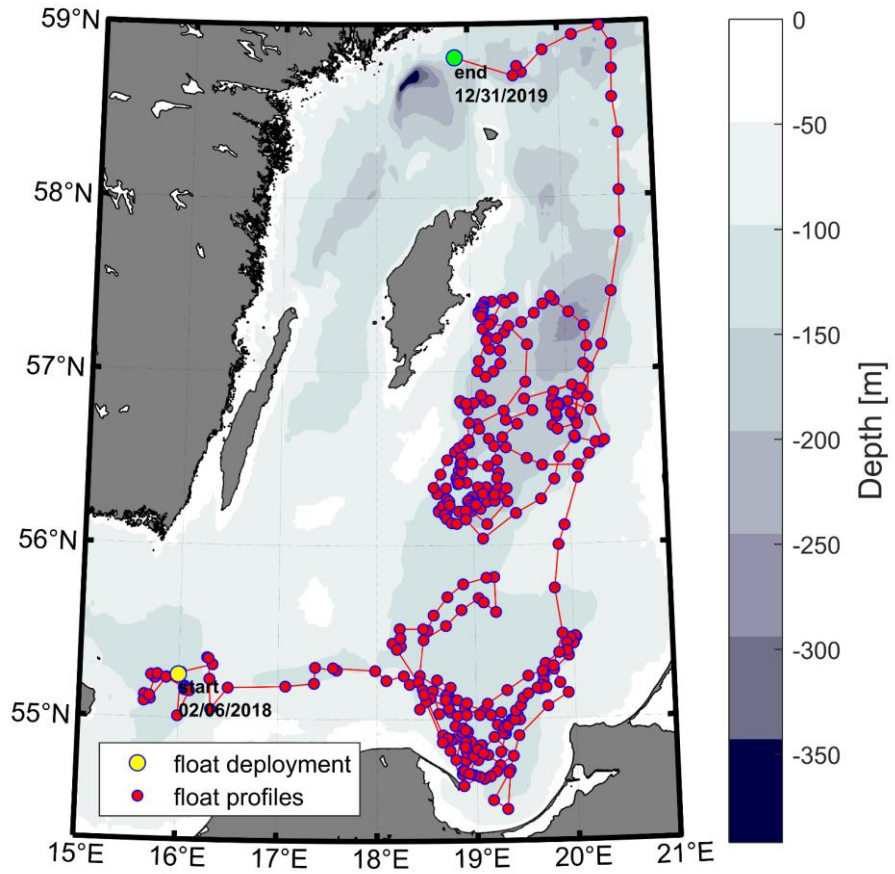


Fig. 4. Track of the Arctic floats deployed in June 2018.

This year, we did not launch Argo floats at the Baltic Sea, but two floats deployed in 2018 (WMO 3902101, 3902106) (Figs 5, 6) are still active and by the end of 2019 have sent 348 and 248 sets of hydrographic data, respectively.



Figs 5, 6. Track of the Baltic floats deployed in February 2018 (upper) and September 2017 (lower).

The Polish floats were deployed under the Argo Poland program, which is Polish contribution to the Euro Argo ERIC infrastructure. The data from floats is provided to the Ifremer Argo Center and processed in the Center. All data is available online. All floats were deployed by Institute of Oceanology Polish Academy of Sciences (IOPAN) from the board of the Institute research vessel 'Oceania'. There were no technical problems with floats.

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 Argo Poland program is financed by the Ministry of Sciences and Higher Education, grant DIR/WK/2016/12. The current financing allows us to buy 2-3 floats/year, launching, covering costs of the data transmission. Additionally, we have funds for conducting innovative works. The grant covers part of the IOPAN employees' work, in total approx. 7 man-months. We also support PhD students.

This level of funding is guaranteed until the end of 2020.

3. Summary of deployment plans.

Poland is going to continue deployment of 2 floats in the Nordic Seas region during the yearly expedition of *r/v Oceania*, AREX. Additionally, we are going to deploy 1 CT/O₂ Argo float at the Baltic Sea in 2020. In the end of 2020 or beginning of 2021 Argo Poland plans deployment of the BGC float at the Baltic Sea.

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.

Data from the Arctic are used in the dissertation written by PhD student Malgorzata Merchel. The Baltic Argo data are used (together with the synoptic data from *r/v Oceania* cruises) for investigating the North Sea water inflows to the Baltic Sea and transports of this water mass in the Southern Baltic. After 3 years of using floats at the Baltic Sea, Argo data is an important source of information about the deep-water dynamics. The significant part is dissolved oxygen data - two floats are equipped with oxygen sensors. The paper about oxygen conditions at the Baltic sea utilizing Argo data was submitted. Both, Arctic data and Baltic Sea data are provided to Ifremer Argo Data Center.

Baltic Argo data are also provided to the SatBaltic system:

<http://www.satbaltyk.pl/en/>

Additional IOPAN contribution is CTD/O₂ profiles from the launching, synoptic data from the Nordic Seas. At the Baltic Sea, during synoptic cruises (4 times per year) we make CTD/O₂ profiles in the region of the last Argo float data transmission.

The Argo Poland webpage:

<https://www.iopan.pl/hydrodynamics/po/Argo/argo.html>

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

We have no suggestion at the moment.

6. CTD data

In 2019 two Polish floats were deployed during IOPAN Arctic cruise AREX, when 203 CTD profiles have been done. The CTD stations were also performed just before the floats deployment. IOPAN can provide the data from these stations to compare it with Argo floats.

Rest of the data from the Nordic Seas are available via IOPAN database. Contact point: Waldemar Walczowski, walczows@iopan.pl.

7. The Argo bibliography

There is a PhD thesis using the Argo data in progress.

We also submitted a research article:

1. Walczowski W., Merchel M., Wieczorek P., Rak D., Argo floats – drones in the service of oceanography, Sea and underwater drones – Unidentified Sea Objects, Gdynia, Poland, 14.11.2019 – oral presentation.
2. Walczowski W., Goszczko I., Merchel M., Wieczorek P., Rak D., Argo floats - an important element of oceanographic observations in the Southern Baltic Sea, 7th Euro-Argo Science Meeting, Athens, Greece, 22-23.10.2019 – oral presentation.
3. Merchel M., Walczowski W., Temporal variability of the Nordic Seas intermediate and deep water properties based on Argo floats data in 2008-2017 period, 7th Euro-Argo Science Meeting, Athens, Greece, 22-23.10.2019 – poster presentation.
4. Walczowski W., Merchel M., Wieczorek P., Rak D., Argo floats - a modern monitoring tool of the Baltic Sea, II Scientific Conference of Polish Sea Researchers, Gdynia, Poland, 24-25.09.2019 – oral presentation.
5. Walczowski W., Merchel M., Wieczorek P., Beszczynska-Möller A., Goszczko I., An increasing role of Argo floats in Arctic oceanographic observations, II Scientific Conference of Polish Sea Researchers, Gdynia, Poland, 24-25.09.2019 – poster presentation.
6. Walczowski W., Goszczko I., Merchel M., Wieczorek P., Rak D., An increasing role of Argo floats in Baltic Sea oceanographic observations, Baltic Sea Science Congress (BSSC), Stockholm, Sweden, 19-29.08.2019 – oral presentation.
7. Rak D., Merchel M., Walczowski W., Goszczko I., Wieczorek P., Argo floats at the Southern Baltic Sea, Baltic Operational Oceanography System (BOOS) workshop, Rostock, Germany, 12.06.2019 – oral presentation.

8. Walczowski W., Merchel M., Goszczko I., Wieczorek P., An increasing role of Argo floats in Arctic oceanographic observations, ASSW - Arctic Science Summit Week, Arkhangielsk, Russia, 22-29.05.2019 – poster presentation.
9. Walczowski W., Merchel M., Wieczorek P., Beszczynska-Moeller A., Goszczko I., An increasing role of Argo floats in Arctic oceanographic observations, EGU General Assembly, Vienna, Austria, 7-12.04.2019 – poster presentation.
10. Walczowski W., An increasing role of the Argo floats in Arctic oceanographic Observations, St Petersburg, 5-7 December 2019. IX International Forum Arctic - today and the future, oral presentation
11. Jakacki J., Muzyka M., Konik M., Przyborska A., Stramska M., Baltic Sea sea ice extent, concentration and thickness in winter 2017/2018 – comparison of observational data and model simulations, MDPI.
12. Walczowski W.,, Argo floats in the Southern Baltic, Oceanologia, submitted