



## Argo-Poland project



- August 10, 2022 - AGREEMENT No. 2022/WK/04 for the implementation of a project under the program "Support for the participation of Polish research teams in international research infrastructure projects,, (Ministry of Education and Science)
- Ongoing purchase and launch of 3 Core floats per year;
- Purchase, launch and operate at least one BGC float every two years;
- Launching fjord floats;
- Systematic DMQC of Arctic data;
- Development of DMQC for the Baltic data;
- Use of data from Argo floats in research and operational work;
- Obtaining the status of a permanent member of Euro-Argo ERIC.



## Argo-Poland

Partners :

- Partner 1. Institute of Oceanology PAS
- Partner 2. Polish Naval Academy
- Partner 3. Institute of Geophysics PAS



## Baltic Sea Argo floats – specific features

Strong density gradients → float needs to be balanced to match the expected densities of the target area.

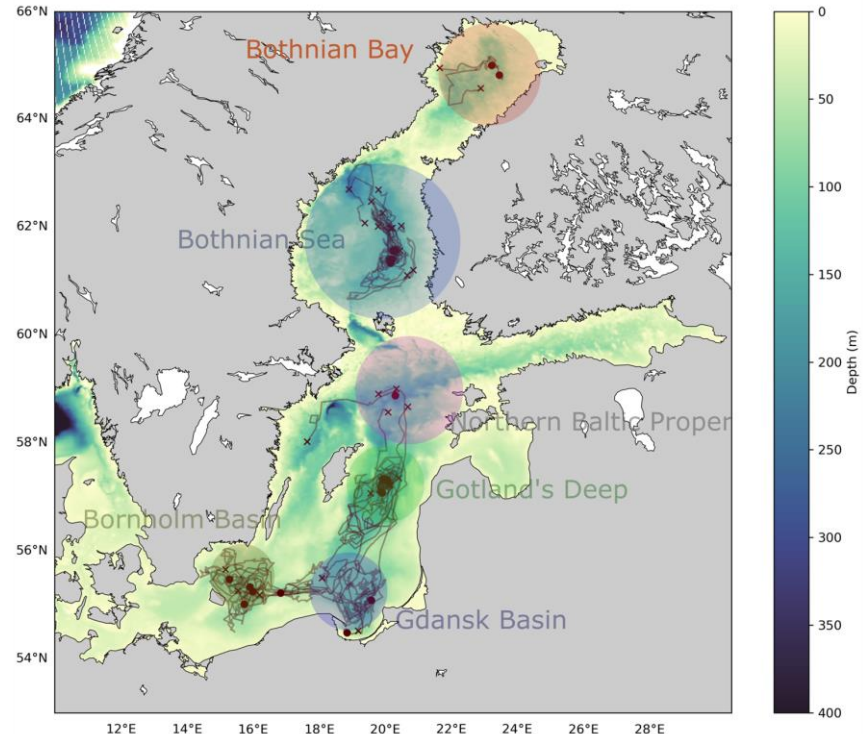
Heavy marine traffic → risk of collision

Seasonal ice cover → ice avoidance algorithms needed

Shallow depths → Possibility of bottom contact

Proximity to coast → Floats can be recovered and redeployed after maintenance

Special DMQC procedures





## FINLAND (FMI)

Since 2012

31 floats, 3850 cycles

## POLAND (IOPAN)

Since 2016

7 floats, 2117 cycles

## GERMANY (ICBM, BSH)

Since 2021

6 BGC floats, 1083 cycles







## Argo-Poland profiles in the southern Baltic



First Argo-Poland float was deployed in Bornholm Basin in November 2016

Since then, we obtained:

5500 CTD profiles, including

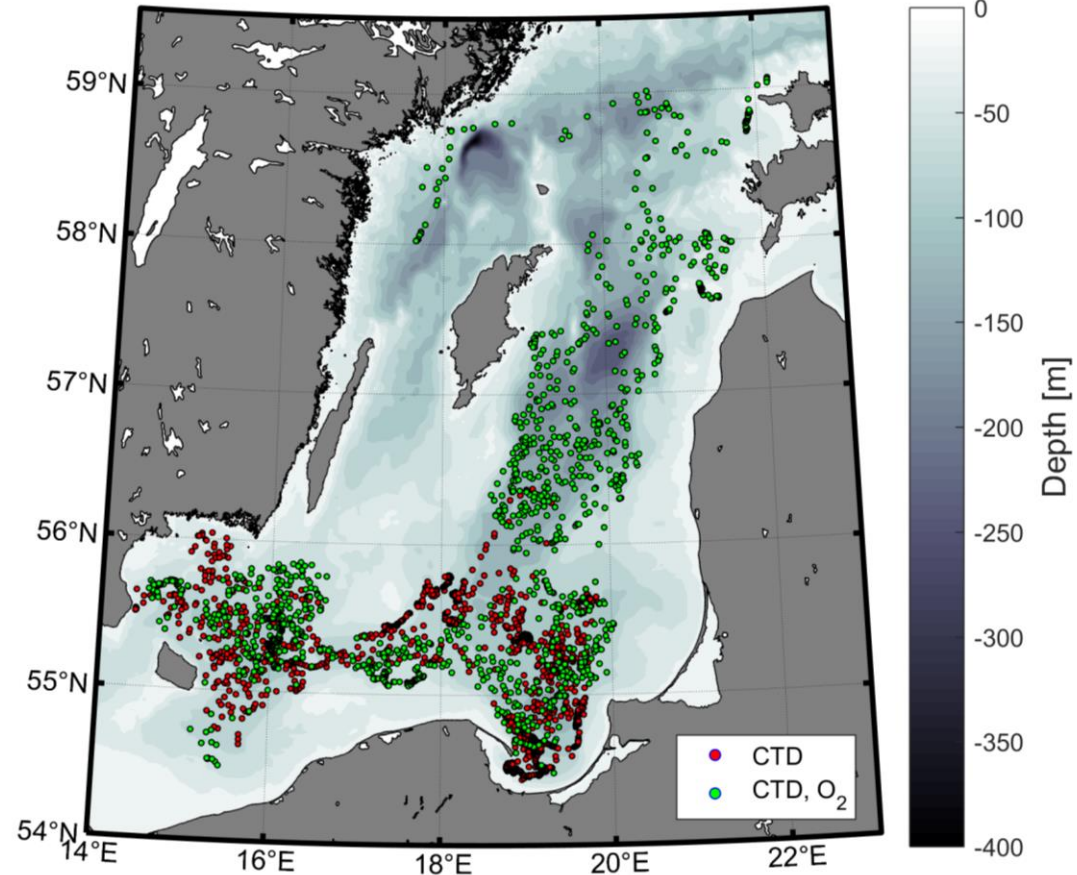
2759 O<sub>2</sub> profiles

Measurements cover deep basins:

Bornholm Basin

Gdansk Deep

Gotland Basin.

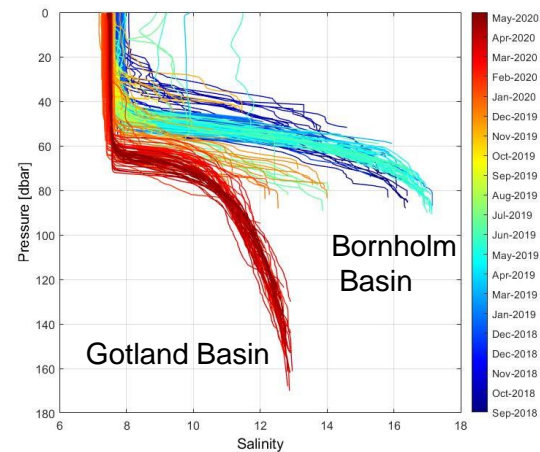
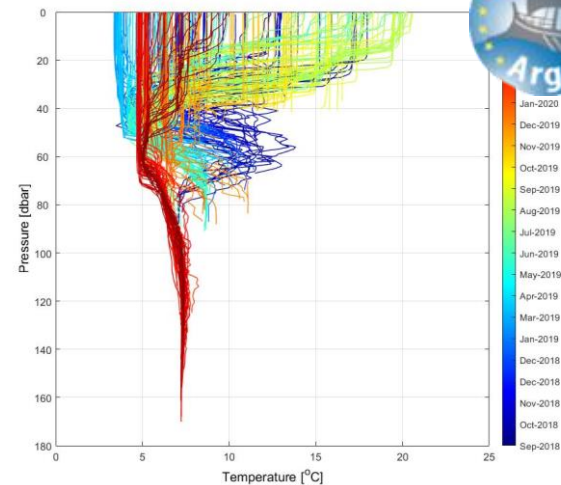




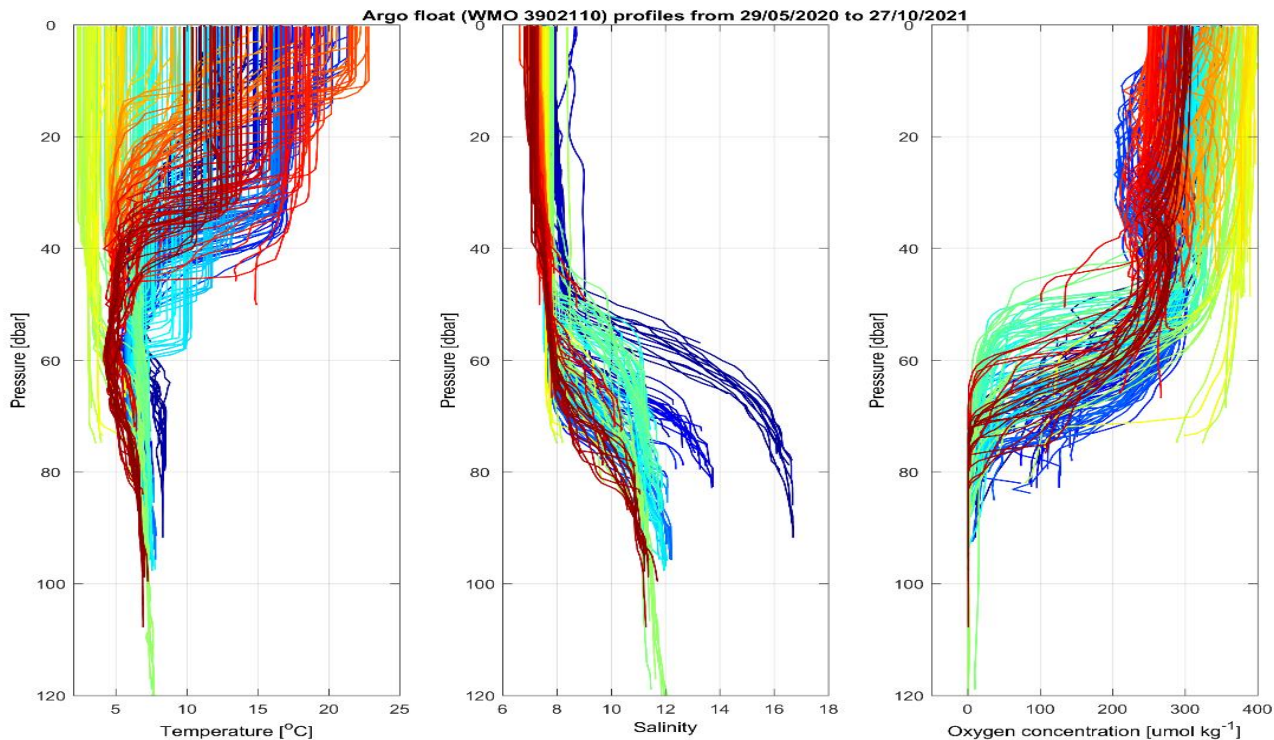
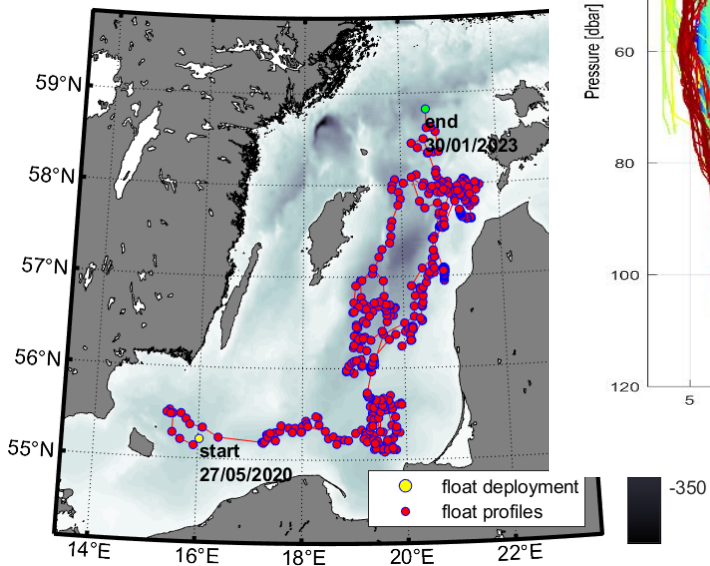
Float 3902106

February 2018 – May 2020

324 CTD/O<sub>2</sub> profiles

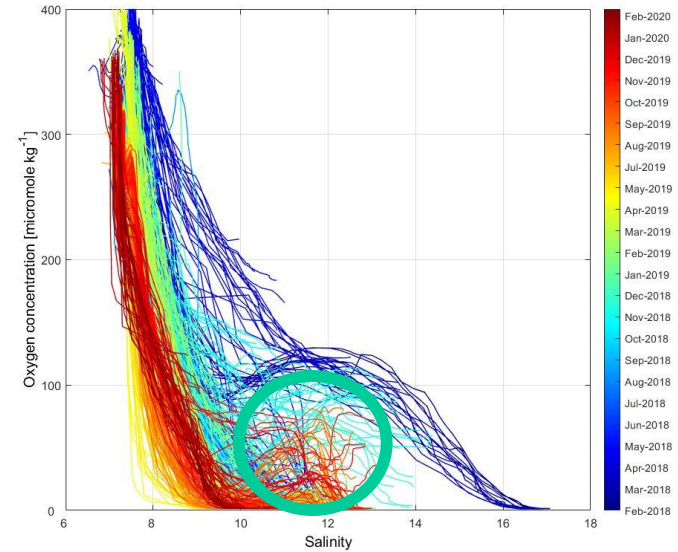
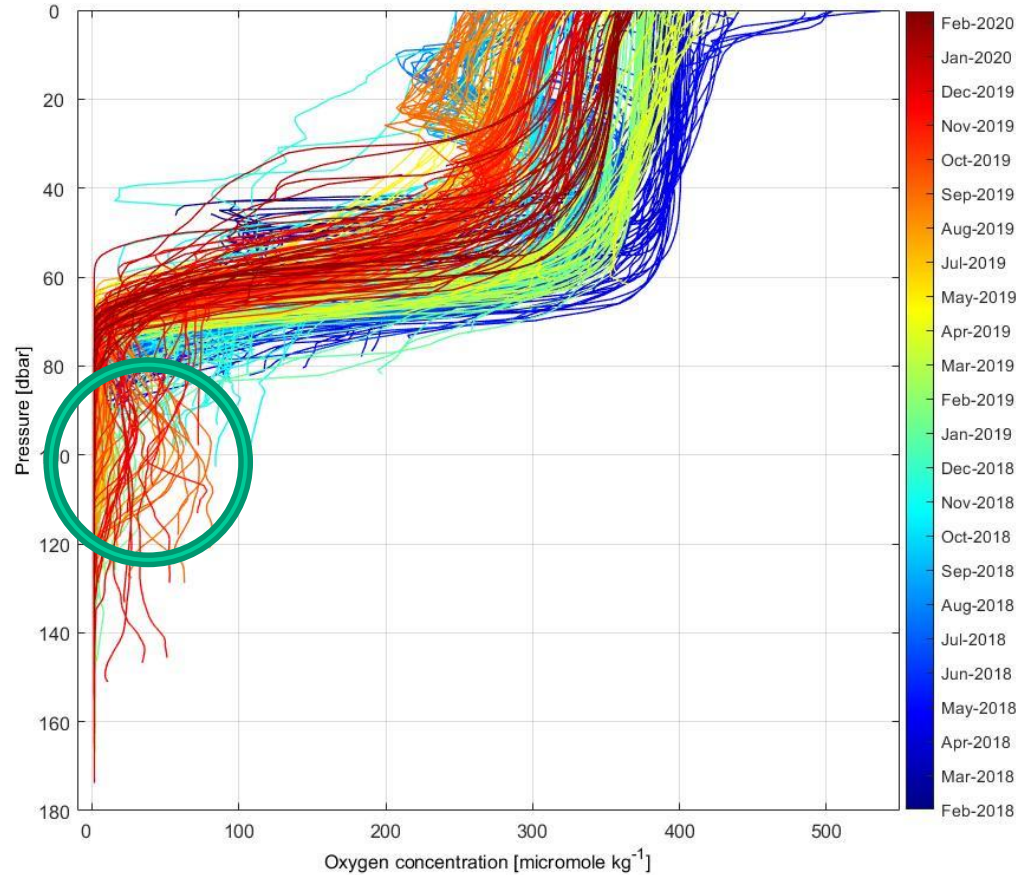


## Temperature, Salinity and Oxygen concentration along the float WMO 3902110 trajectory





Dissolved oxygen data



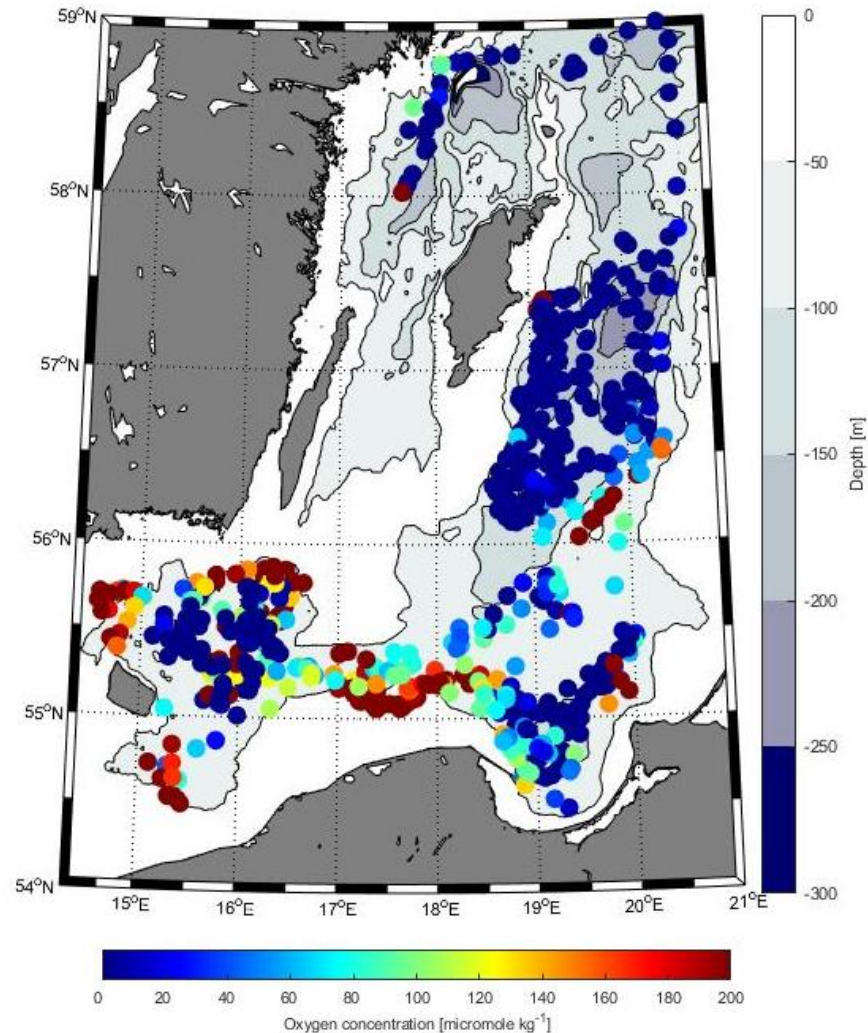


## *Dissolved oxygen concentration near the bottom*

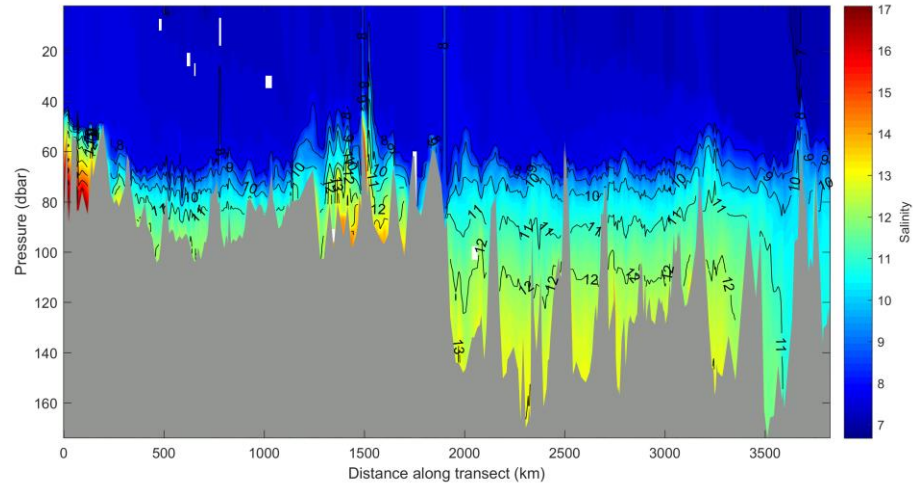
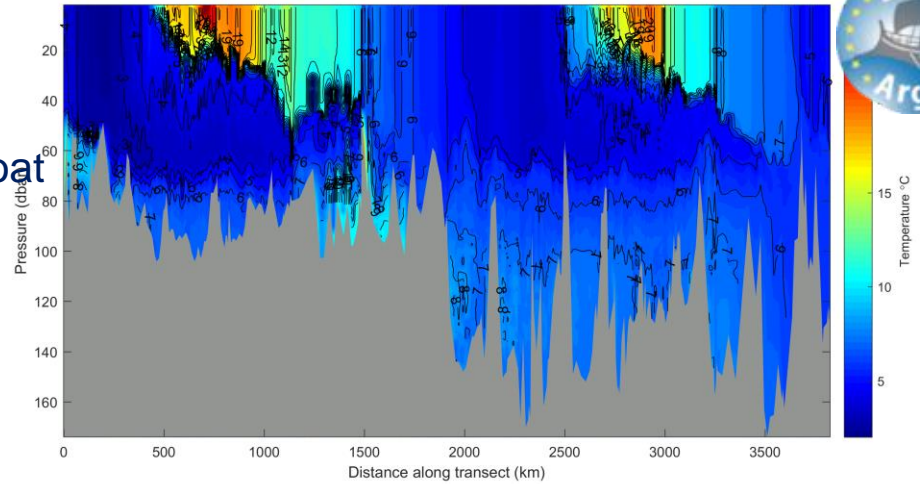
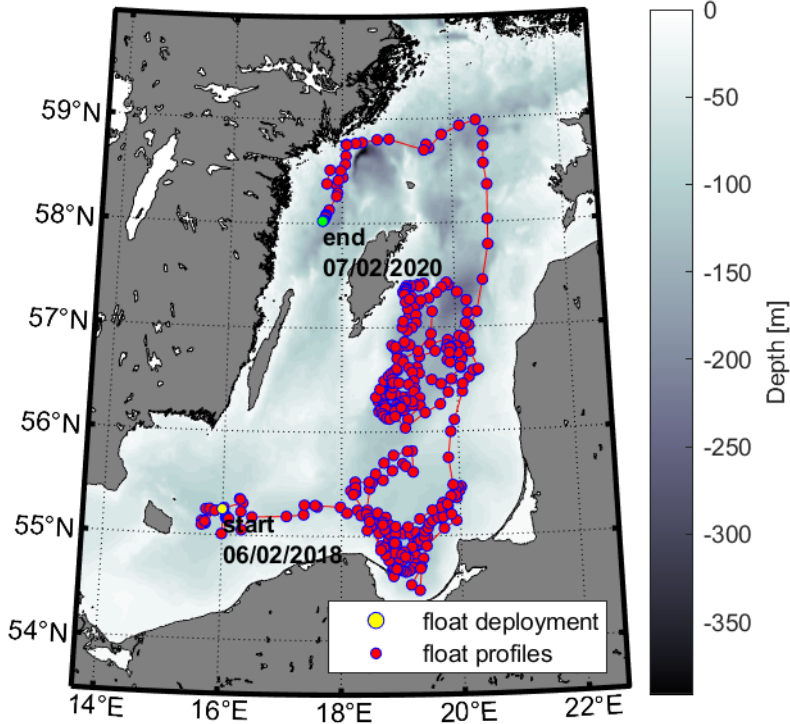
*Float 3902101 373 cycles  
February 2018 – February  
2020*

*Float 3902104 51 cycles  
May 2018 – September 2018*

*Float 3902106 324 cycles  
September 2018 – June 2020,  
active*



## Temperature and Salinity along the float WMO 3902101 trajectory



## ARGO-POLAND

### Trajectory of float deployed in the southern Baltic

Free drifting float deployed in the Bornholm Basin (parking depth 45 m, period of measurements 48 hours)

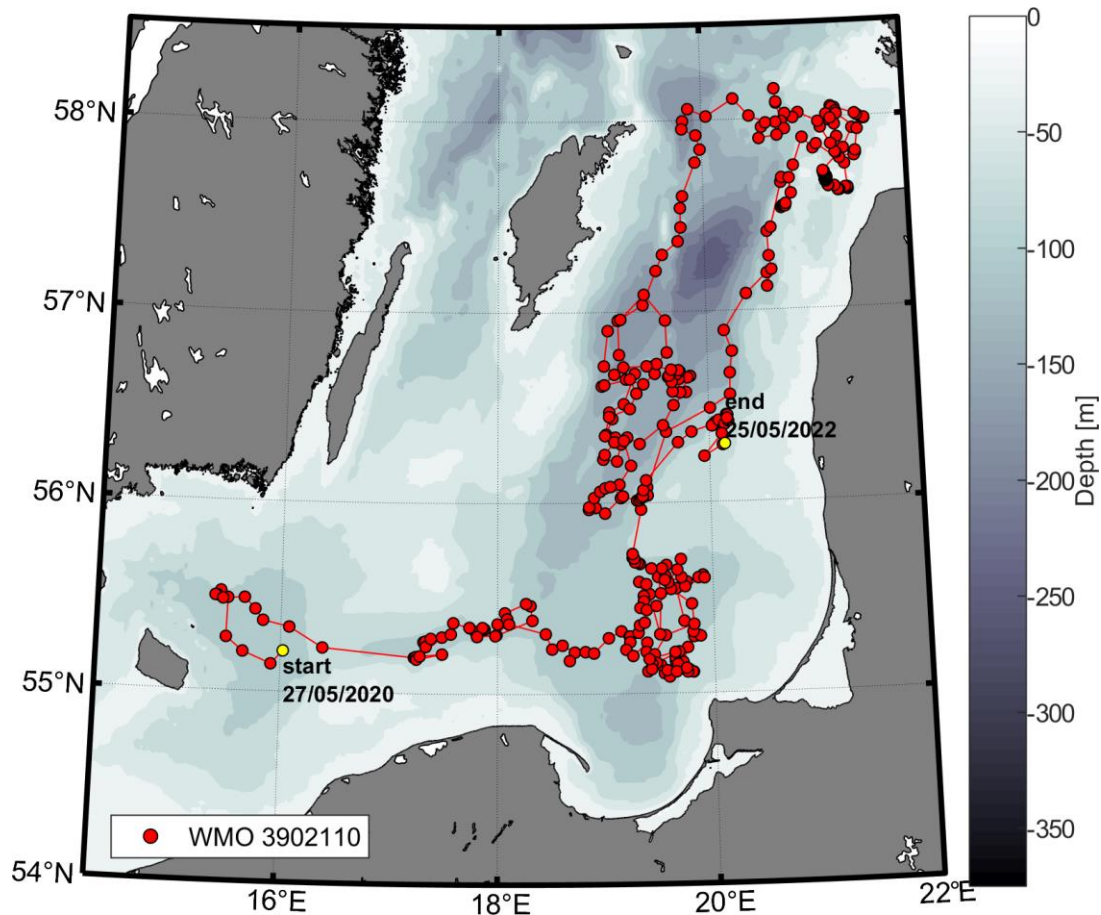
After deployment, the float circulates in the Basin and then crosses the Słupsk Sill and drifts to the east

Circulation in the Gdansk Deep

Large loop in the Eastern Gotland Basin

Two years of work, 364 T/S/O<sub>2</sub> cycles

Float is still active

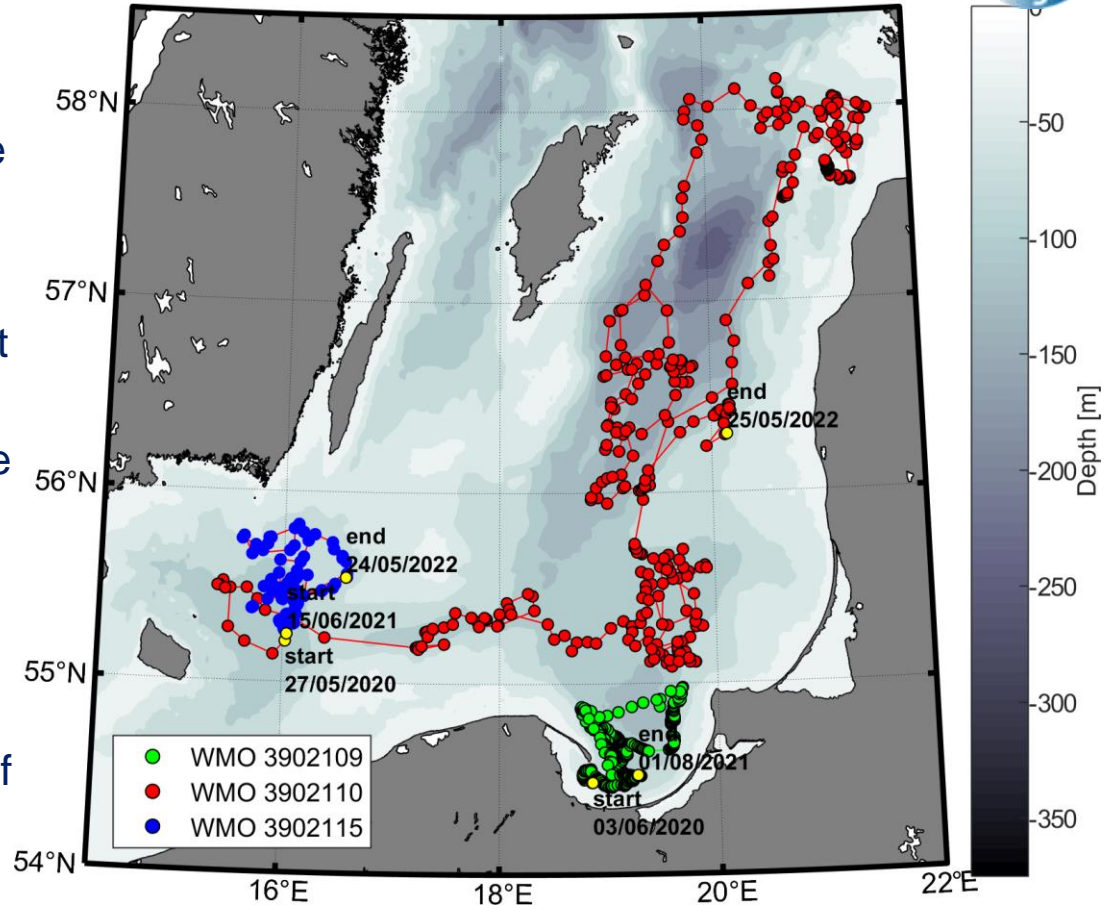




The aim of the test is to keep the float in a limited area, so that it performs the function of ‘virtual mooring’.

To obtain expected effect, the parking depth was set below the water depth at that place. After each profile float is grounding. Various profiling periods are tested.

Experiment show very promising results: floats circulated in region with a 30 km radius. Float’s movement velocity is much lower than velocities of ‘free’ floats drifting in the southern Baltic.



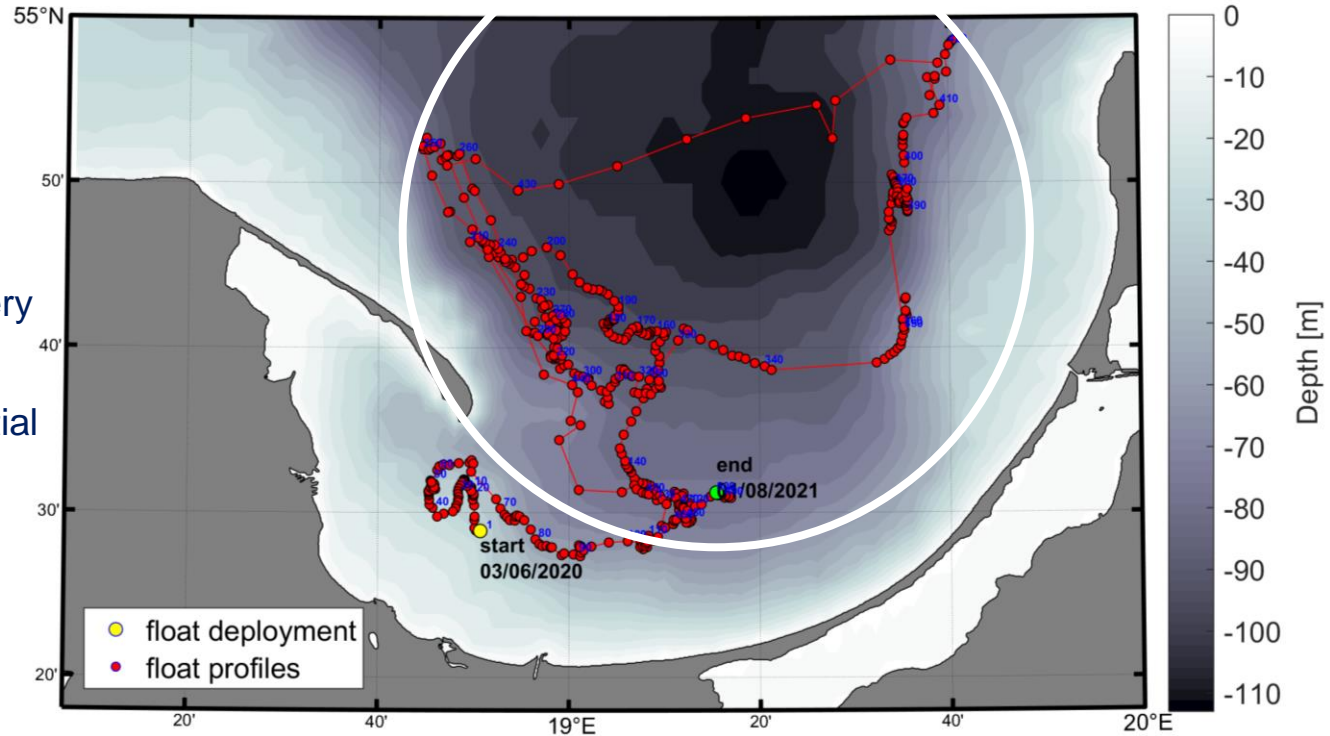


## Argo profiles in Gdansk Bay, Jun. 2020- Aug. 2021

Profiles used to analyze the variability for 2020-2021 are located in a circle with a radius <30 km

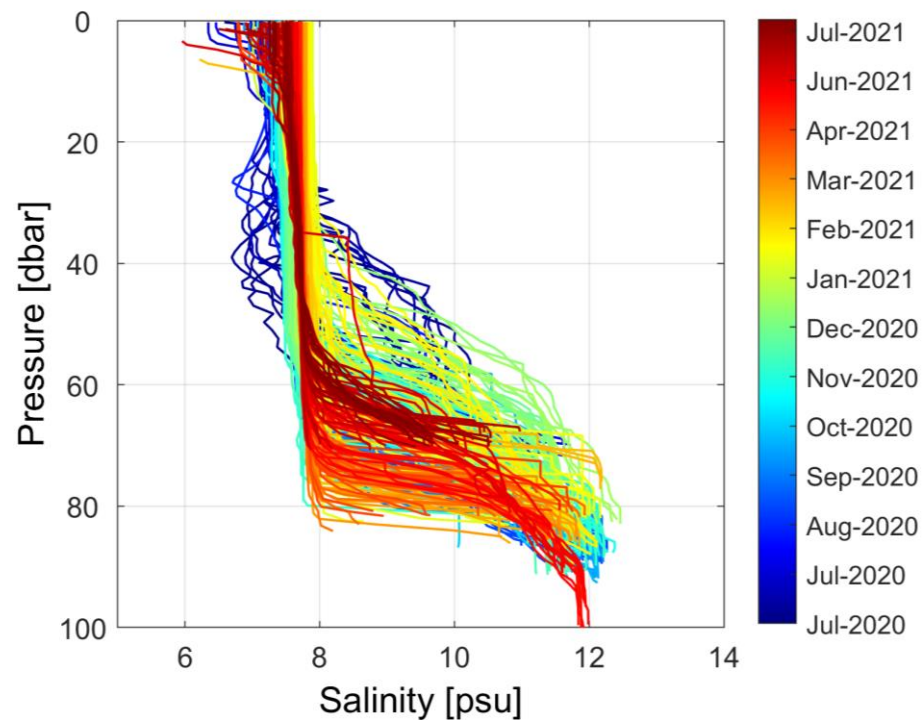
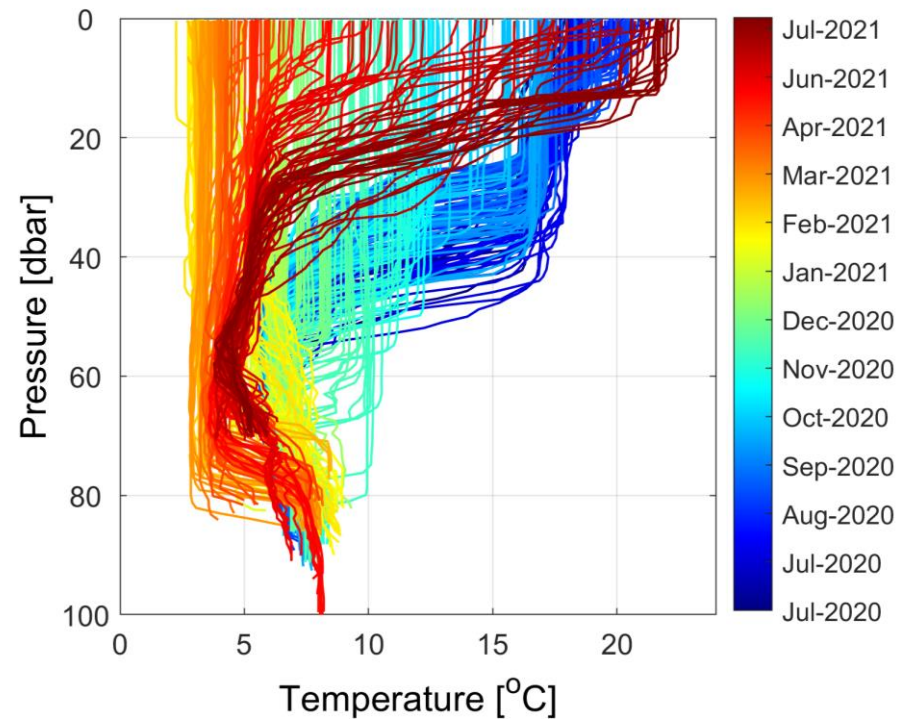
The start and end of drift are very close to each other

This reduces the impact of spatial variability on the studied phenomenon

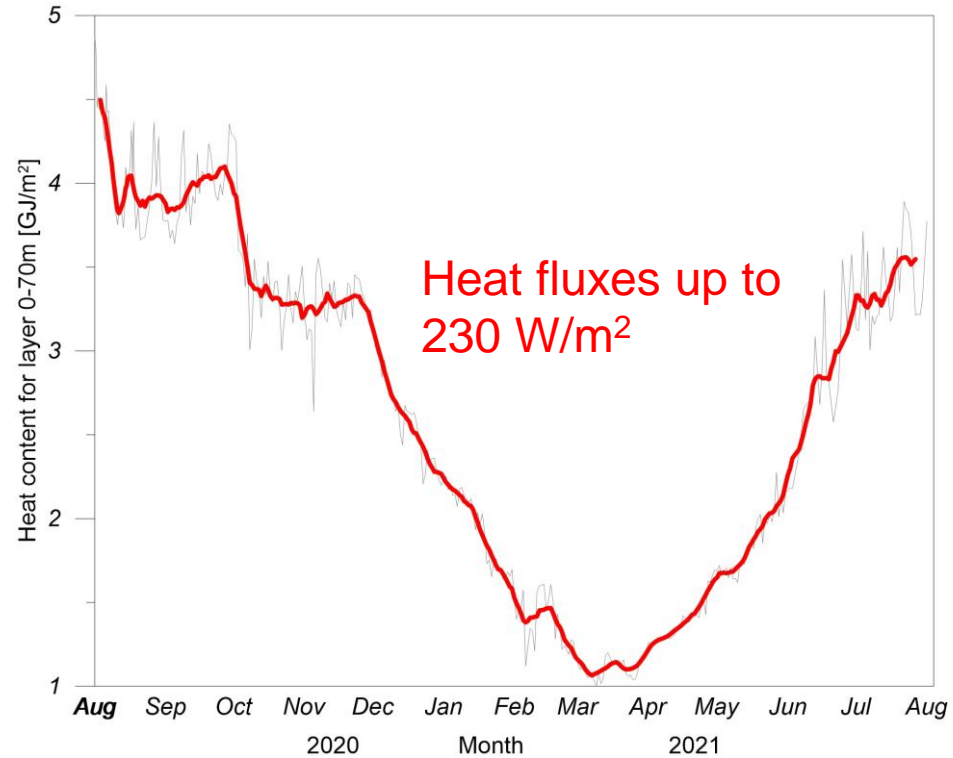
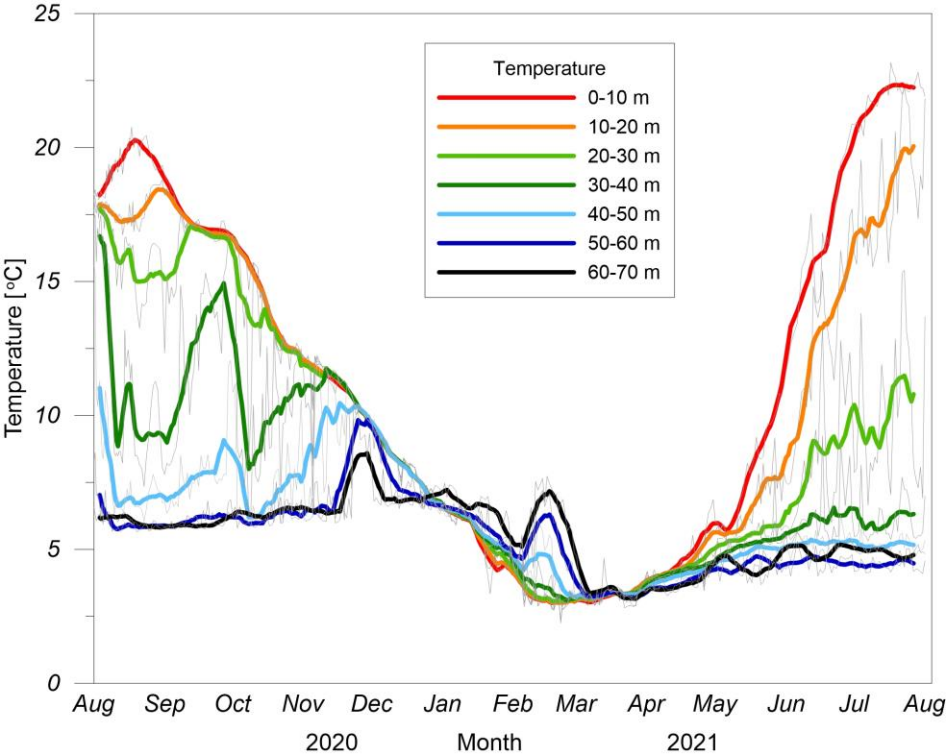




# Gdansk Bay, Jul. 2020- Aug. 2021 profiles of temperature and salinity



# Gdansk Bay, Jul. 2020- Aug. 2021. Temperature and heat content in the layer 0-70





## Conclusions

- Argo floats may be used as part of a comprehensive Baltic monitoring system.
- Various sources of data, such as floats, cruises and moorings, can provide extensive, complementary data for the better monitoring of the Baltic Sea, the improvement of numerical models and validation of satellite observations.
- Minimum seven continuously working floats should be adequate for the basic monitoring of Baltic deep waters
- The use of 'parking at the bottom' significantly reduces the movement of the float between deep basins of the Baltic Sea
- The data obtained from the created 'virtual mooring' are easier to DMQC and can give results useful in monitoring seasonal and interseasonal changes of the studied regions.
- Unlike the deep ocean, the small dimensions of the Baltic Sea make the recovery of floats cost-effective, especially in the case of expensive BGC floats.