

IOW press release – January 31, 2022

Looking beneath the surface of the changing oceans: IOW supports successful deployment of new Argo Float sensors

*As part of the **DArgo2025** project, Germany's [Federal Maritime and Hydrographic Agency \(BSH\)](#) coordinated the successful validation and deployment of new sensors on automated drifting buoys, so-called Argo floats. These sensors can now be deployed worldwide and thus provide information about current environmental changes in the oceans, such as increasing eutrophication, oxygen depletion, and acidification. In this context, the Leibniz Institute for Baltic Sea Research Warnemünde (IOW) evaluated novel nutrient sensors that were tested in the Baltic Sea. The project, which ended in December 2021, was funded by the Federal Ministry of Education and Research.*

Two thirds of the Earth's surface is covered with water. While satellites can keep a good overview of the oceans' surface, they are unable to investigate the depths of the sea. Automated drifting buoys, so-called Argo floats, now offer the possibility to look beneath the surface: After deployment, the floats sink to a depth of 1000 metres and drift there with the currents. Every 10 days they descend further down to about 2000 metres water depth, and then slowly rise from there to the surface. On the way up, they measure continuously – for instance water temperature and salinity. Once they have surfaced, the collected data are transmitted by satellite and made public almost in real time. Afterwards, the Argo floats sink down again to continue drifting.

The first generation of such Argo floats has contributed to improving global climate modelling and regional weather forecasts. The joint research project **DArgo2025** led by the BSH has now been able to expand the scope of the Argo floats by equipping 20 buoys with new sensor types for detecting eutrophication, turbidity, and ocean acidification and by validating them for worldwide use.

In this context, IOW researchers tested and validated new optical sensors for measuring the plant nutrient nitrate – an important eutrophication indicator. This was also the first time that a German contribution to the worldwide Argo observations was established in the Baltic Sea. “The special thing about the Argo Floats – apart from the three-dimensionality of their measurements – is their truly continuous and year-round measuring activity – in bad weather, storms and hail as well as in bright sunshine,” emphasises marine chemist Henry Bittig, who coordinated the IOW contribution to **DArgo2025**. “No research vessel is able to collect data with such large temporal and spatial coverage and such high regularity.”

The integration of new measuring systems into the sophisticated Argo float technology is a challenge in itself, which all the institutions involved in the collaborative project had to deal with and which required extensive evaluation of the newly equipped floats under the harsh field conditions of the open sea. “In the case of our system, an additional problem, we had to solve, is the Baltic Sea's high content of yellow colour compounds – tannins and such – and thus optical conditions, which normally only occur in great ocean depths. Naturally, this affects optical methods like ours for nitrate measurement and requires special attention,” Bittig continues.

In many of the IOW's research questions, the biological and chemical processes are of particular interest, in addition to the water body properties caused by temperature and salinity. "Together with the oxygen and chlorophyll measurements that now also have been performed by the newly equipped Argo floats, we were able to obtain a particularly comprehensive data set on the productivity and degradation of phytoplankton biomass in the central Baltic Sea, which is very promising and is currently being analysed," concludes Henry Bittig.

As part of the **DArgo2025** project, new sensors were also validated by the [Institute for Chemistry and Biology of the Marine Environment \(ICBM\)](#) of Oldenburg University (light field measurement, provides information on microalgae and other components in the water) and the [GEOMAR Helmholtz Centre for Ocean Research Kiel](#) (pH measurement, provides information on acidification of the ocean and its ability to absorb CO₂ from the atmosphere). The BSH, which coordinates the German Argo activities and is also significantly involved in the management and further development of EuroArgo, the European contribution to the Argo programme, evaluated a novel sensor system for measuring temperature and salinity.

The project's newly equipped drift buoys are now being operated as part of the international "Argo" observation programme, which currently comprises almost 4000 of these measuring platforms worldwide. Under the UN's Ocean Decade for Sustainable Development launched in 2021, the Argo floats are to be further developed so that they can survey the deep sea down to a depth of 6000 metres.

General information on the Argo programme:

https://www.bsh.de/EN/TOPICS/Monitoring_systems/Argo_floats/argo_floats_node.html

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