EGU21-13135, updated on 21 Apr 2021
https://doi.org/10.5194/egusphere-egu21-13135
EGU General Assembly 2021

Lagrangian measurements in the West Spitsbergen Current by Argo floats

Waldemar Walczowski, Agnieszka Beszczyńska-Möller, and Małgorzata Merchel
Institute of Oceanology PAN, Physical Oceanography Department, Sopot, Poland (walczows@iopan.gda.pl)

Almost 4000 operational Argo floats covering the world's ocean provide near-real-time data on its state. The Arctic is less covered than other waters, but observations collected by Argo floats are gaining in importance. By delivering year-round measurements from the water column down to 2000 m (or to the bottom) along float trajectories, they complement and enhance the synoptic data collected during ship campaigns or by fixed moorings. However, oceanographic measurements with autonomous platforms are significantly limited in the Arctic regions by the presence of sea ice.

Here we present results obtained by Argo floats deployed in 2012-2020 by the Institute of Oceanology Polish Academy of Sciences (IOPAN) during summer campaigns of RV Oceania. In most years, the Argo floats were launched in the eastern branch (core) and in the western branch of the West Spitsbergen Current (WSC) within the Atlantic water inflow towards the Arctic Ocean. Floats deployed in the WSC core drift predominantly northward over the shelf break and upper slope west of Svalbard. After passing Fram Strait the floats usually turn eastward and continue over the northern Svalbard shelf brake, being advected with the Svalbard Branch of the Atlantic inflow into the Arctic Ocean Boundary Current. The easternmost position reached by the IOPAN Argo float was 39.6°E. Ultimately all deployed floats submerge under the sea ice north of Svalbard or farther to the east and die under the ice. Argo floats deployed in the western WSC branch over the underwater ridges, usually recirculate to the west and continue southward with the East Greenland Current. The float WMO 3901851 that drifted to the Labrador Sea, reached the southernmost latitude of 52.5°N and have been working until now for 4.5 years, which is unusual in the Arctic conditions.

The measurements collected in the Marginal Ice Zone are particularly interesting for studying the ocean-atmosphere-ice interactions at the boundary between open and ice-covered ocean as well as they can be used for developing the ice avoidance algorithms for the Argo floats and other under ice sensors and platforms. A number of profiles obtained by Argo floats under the sea ice provide unique measurements in the upper ocean layer that is usually inaccessible from other platforms (e.g., moorings). In 2020 several profiles were collected under the ice cover by Argo floats north of Svalbard and transmitted after the float emerged in the polynya. The eastward flow of warm (up to 4° C at 80 m depth) Atlantic water was observed along the float trajectory over the shelf break. Measurements by Argo floats, revealing the dynamics and transformation of the

Atlantic water entering the Arctic Ocean, are compared with ship-borne observations collected during the IOPAN long-term observational program AREX and year-round data from IOPAN moorings deployed north of Svalbard under the A-TWAIN and INTAROS projects.