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An increasing role of Argo floats in Arctic oceanographic observations

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The Argo system has proved its utility in oceanographic observations by providing already more than 2 000 000 casts collected by profiling floats. The spatial coverage in the open ocean is satisfactory and the marginal seas, even so shallow as the Baltic Sea are slowly getting covered by the network of floats. The largest gaps in the Argo system are still found in the Arctic regions, where the network of floats is poorly developed. Scientific institutions are usually reluctant to deploy floats in the Arctic Ocean and even the Nordic Seas are weakly covered. This can be explained by the fact that the float life time in the midlatitudes can reach up to 4 years while in the northern regions event two years are considered as very optimistic estimate. For a standard Argo float, the close approach to the ice edge is usually mortal.

However even limited information from the Argo floats can provide extremely valuable contribution to the ocean observation system in the Arctic and sub-Arctic regions with capability to complement other observing methods and fill the gaps due to their limitation. The advantage of an Argo float is that it works year-round while the ship-borne measurements are performed usually during the spring to autumn season. The second important feature is that profiling Argo floats cover the whole water column from the surface down to 2000 m and deliver a continuous profile of measured variables. Mooring-based measurements provide discrete data and in the Arctic regions where the sea ice is a risk factor, the surface layer is usually not covered. Fast-paced development of the Argo float technology, including the implementation of new biogeochemical sensors and progressing efforts on ice-sensing and ice-avoidance methods, increases robustness of Argo floats in the harsh Arctic environment and make them a promising source of the most demanded biogeochemical and biological data. The closer collaboration between the Argo and Euro-Argo programs and other Arctic-oriented research and infrastructure projects is of a highest importance, particularly in the context of shrinking sea ice cover and growing areas of open water where Argo floats can be fully operational. The Argo network can soon become an important part of the integrated Arctic Observing System, complementing a well-proven, yet expensive and limited in coverage network of ice-tethered instruments.

Here we present new results from oceanographic observations obtained by Argo floats deployed by the Institute of Oceanology PAN in the eastern Nordic Seas. We compare Lagrangian measurements along the northward and westward float trajectories with Eulerian observations at the selected deep ocean moorings and quasi-synoptic ship-borne hydrographic surveys of key ocean variables in the entrance to the Arctic Ocean.