

# Argo National Report 2019 – Finland

## 1. Status of implementation

The Finnish Argo program is run by the Finnish Meteorological Institute (FMI). Since 2010 FMI has deployed altogether ten floats in the Nordic Seas. In addition of oceanic operations, 20 floats (starting 2012) have also been deployed into the shallow and low salinity Baltic Sea and one in Barent's Sea. Six of the Baltic float deployments have bio-optical sensor suite.

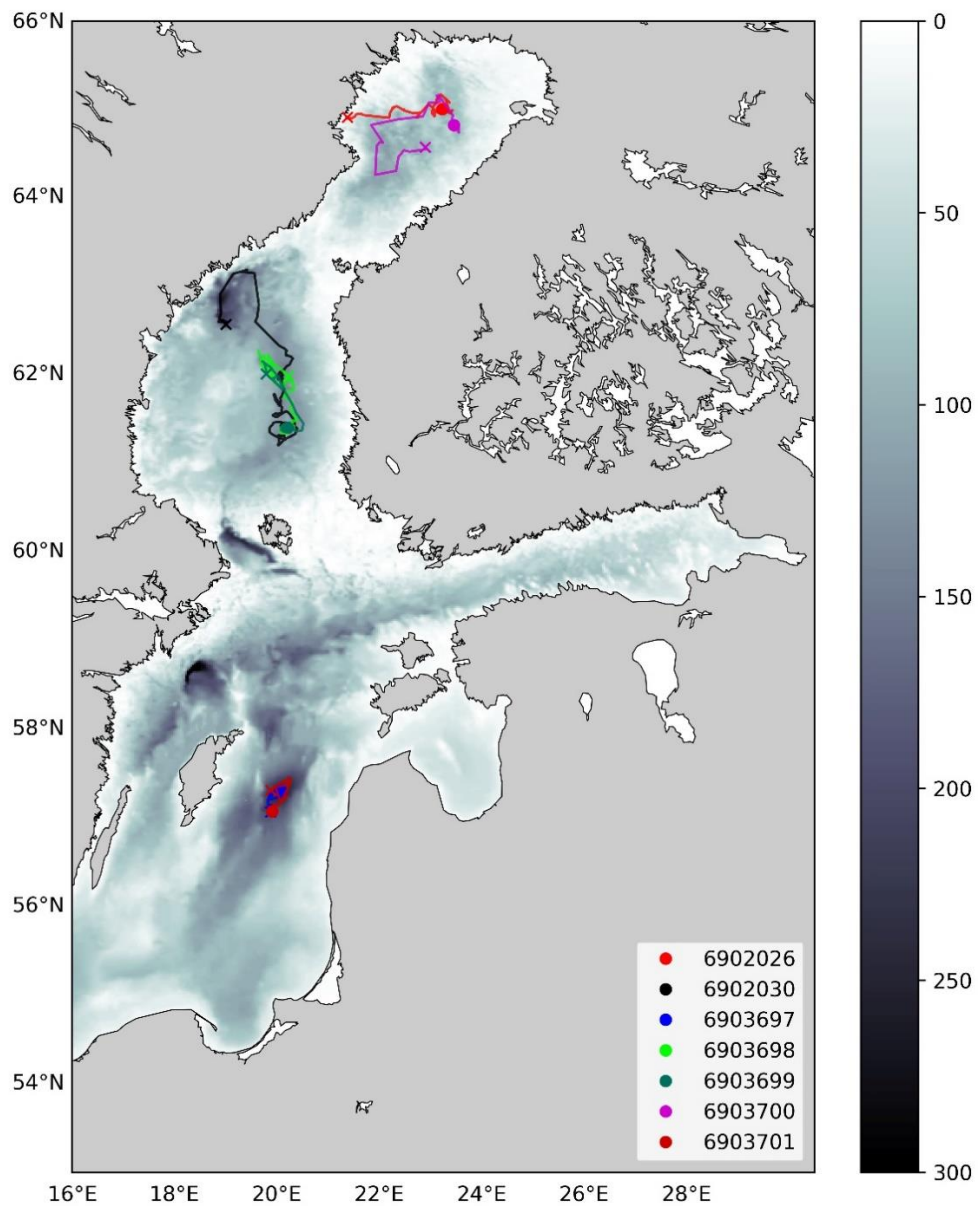


Figure 1, Routes of Argo floats which operated in the Baltic Sea in 2018-2019. The dot indicates the deployment location. Cross indicates the recovery point or latest measurement for each Argo float.

This year total of four floats were deployed on Baltic Sea, one of which was Arvor-I type, one standard Apex, one with additional oxygen sensor, and one with additional oxygen, fluorometer, and backscattering sensor.

## **2. Present level and future prospects for national funding for Argo including summary of human resources devoted to Argo**

FMI has committed to purchase and deploy three floats in a year, at minimum. Our main geographical operation area is the Baltic Sea. Currently we are further developing the operation of Argo floats in shallow, and ice-covered seas. First experiments with ice-avoidance on the Baltic Sea has been performed during winter 2015-2016. In 2018 one float (6802026) has been successfully under ice on Bay of Bothnia. In summer 2019 another float (6903700) was deployed in same area. A float deployed on Barent's sea (6903695) spent successfully nearly half a year under ice and transmitted its data in 2019.

## **3. Summary of deployment plans**

FMI plans to deploy total of 7 floats in 2020, of which one is an EU float from the EA-RISE project. Two of the floats will be deployed in new area on the Baltic Proper, three to the Bothnian Sea, and one to Gotland's deep. In addition, one float is deployed on Barent's Sea as continuation of our experiments with the ice avoidance, and extensions towards high latitudes.

## **4. Summary of national research and operational uses of Argo data**

Argo data sets gathered from Baltic Sea are used for validating the operational and research circulation models. Operating Argo floats in the Baltic Sea has been a research on the limits of usability of Argos in shallow seas. On this work three papers were published in 2018. (Haavisto et al. 2018, Roiha et al. 2018 and Siiriä et al. 2018) Ongoing research is done on assimilating Argo data in the operational Baltic Sea circulation models for enhancing their forecasting skills, further developing the operations in both shallow, and icy conditions, as well as quality control of the Baltic Sea Argo data.

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

Finland considers that more resources should be allocated for the environmental monitoring of the Arctic Ocean. The Euro-Argo could coordinate developments and deployments of ice-tethered Argos.

## **6. CTD data uploaded to CCHDO**

No data uploaded.

## **7. Bibliography**

Haavisto N, Tuomi L, Roiha P, Siiriä SM, Alenius P, Purokoski T. 2018. Argo floats as a novel part of the monitoring the hydrography of the Bothnian Sea. *Frontiers in Marine Science*. 5:324. <https://www.frontiersin.org/article/10.3389/fmars.2018.00324>.

Roiha P, Siiria SM, Haavisto N, Alenius P, Westerlund A, Purokoski T. 2018. Estimating currents from Argo trajectories in the Bothnian Sea, Baltic Sea. *Frontiers in Marine Science*. 5:308. Available from: <https://www.frontiersin.org/article/10.3389/fmars.2018.00308>.

Siiria S, Roiha P, Tuomi L, Purokoski T, Haavisto N, Alenius P. 2018. "Applying area-locked, shallow water argo floats in baltic sea monitoring. *Journal of Operational Oceanography*. 0(0):1–15. Available from: <https://doi.org/10.1080/1755876X.2018.1544783>.