

National report of Norway (2021)

Submitted by Kjell Arne Mork, Institute of Marine Research (IMR), on behalf of Argo Norway (24.02.2022)



1. The status of implementation

Argo Norway (NorArgo, <https://norargo.hi.no>) is the Norwegian contribution to the Euro-Argo European research infrastructure (ERIC) and to the global Argo programme. The main focus area for Argo Norway is the Nordic Seas (Greenland, Iceland and Norwegian Sea) and Arctic.

a. Floats deployed and their performance

In 2021, Norway deployed in total **14 Argo floats**:

- 4 floats in the Greenland Sea
 - 1 BGC-Provor CTS4 floats (all six BGC-variables) ●
 - 1 BGC-Provor CTS4 floats with 4 BGC-variables (DO, fluor., bbp, irradi.) ●
 - 1 Deep Arvor floats (with DO) ●
 - 1 core Arvor float ●
- 7 floats in the Norwegian Sea
 - 2 BGC-Provor CTS4 floats with 4 BGC-variables (DO, fluor., bbp, irradi.) ●
 - 1 core/BGC Arvor float with oxygen ○
 - 4 core Arvor floats ●
- 3 floats in the Barents Sea
 - 3 core/BGC Arvor floats with oxygen ○

The deployment locations are shown in Fig. 1. All 14 floats have so far performed well and are today active.

At present, Argo Norway has 36 operative Argo floats.

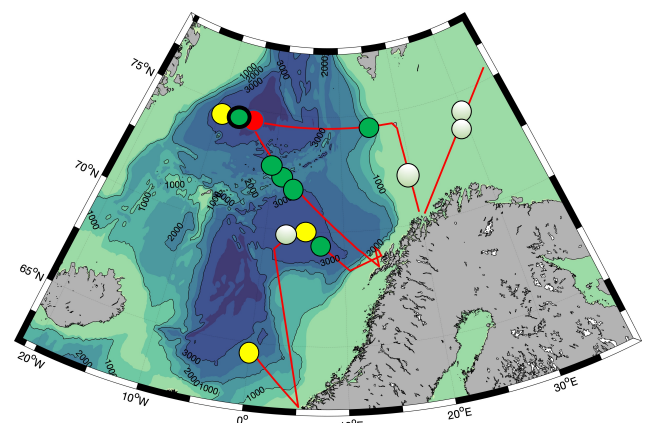


Figure 1. Locations of deployed Argo floats in 2021.

b. Technical problems encountered and solved

- One BGC (PROVOR-CTS4) float failed during self-test at sea and was not deployed. During self-test there was no response from the REM-A sensor. The float has been sent back to NKE Instrumentation for service.

c. Status of contributions to Argo data management and delayed mode quality control process

We do DMQC of our floats that were deployed in 2018 and later (see below, point d). Three of our floats have Fast Salinity Drift (6903556, 6903557, 6903562) that also are in the grey list.

d. status of delayed mode quality control process

We have recently started to do the DMQC of our floats that were deployed in 2018 and later (Argo Germany has done DMQC for our “older” floats). We do DMQC of core, bgc and deep floats. We have done DMQC of temperature/salinity for 20 core/bgc floats and 7 deep floats. For the Bio and BGC-floats we have done DMQC for oxygen (16 floats), nitrate (4 floats) and pH (1 float). DMQC-work of the other variables is ongoing and will be done within 2022. NORCE is responsible for the DMQC of oxygen and pH, while IMR is responsible for the DMQC of T/S, nitrate, chlorophyll, backscatter and irradiance.

2. Present level of and future prospects for national funding

Financial resources

The funding has been a combination of self-financed (i.e., funded by Institute of Marine Research) and funding from the Norwegian Research Council (NRC, Ministry of Education and Research) during 2012-2015.

For 2018-2023 we receive funding from the NRC for the extension of the national Argo infrastructure project (NorArgo2), approximately 600 k€ per year. Within this project we purchase and deploy approximately 13 floats per year in the Nordic Seas and the Arctic that include core, BGC and deep floats. To keep the target of having minimum 30 operative Argo floats beyond 2023, submission of a new project proposal to the NRC is planned.

Human resources

NorArgo2 has approximately 36 person months per year and more than 10 people contribute from six Norwegian institutes (IMR, Norce, NERSC, MET.no, Akvplan-niva, UoB).

National coordination

The Norwegian Argo Infrastructure (NorArgo, <https://norargo.hi.no>) is coordinated by Kjell Arne Mork, Institute of Marine Research, who also is the leader of the NorArgo2 project.

3. Summary of deployment plans

In May/June 2022 we plan to deploy **16 floats** in the Nordic Seas and Barents Sea. The floats include:

- 2 BGC-floats: PROVOR CTS4 with all 6 BGC-variables + CROVER + UVP6
- 4 BGC-floats: PROVOR CTS4 with all 6 BGC-variables
- 2 BGC-floats: PROVOR CTS4 with 4 BGC-variables (DO, Chl, bbp, irradiance)
- 3 Deep-floats (Arvor + DO)
- 2 core/bgc floats (Arvor) + DO
- 3 core floats (Arvor)

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

Argo Norway focuses on both research topics and marine climate monitoring of the Nordic Seas. There is an increasing interest in using Argo data in Norway, and two climate centres are now using the data operationally in climate models (NERSC and MET.no). For instance, the operational TOPAZ4 modeling system assimilates Argo data into the ocean model to provide forecast product for the Nordic Seas and Arctic Ocean under the EUs Copernicus Marine Environment Monitoring Services (CMEMS, <http://marine.copernicus.eu/>).

The present scientific topics are mainly within the Nordic Seas (Norwegian, Iceland and Greenland Seas) and Arctic, including:

- Heat and fresh water contents in the Nordic Seas are regular updated
- Water mass changes in relation with biological activities. This topic is also one of the reasons that we have included bgc sensors on the Argo floats.
- Studies that involve the mixed layer, primary production and carbon cycle.

Link to Argo Norway (NorArgo): <https://norargo.hi.no>

5. Issues we wish to be considered and resolved

6. Improving the quality and quantity of CTD cruise data

At all deployment locations a CTD station with water samples are taken. All ship CTD-data are sent regular to the ICES, EUs CMEMS, and World Ocean Database. The ship-data will also be sent to Argo (Reference Database).

7. The Argo bibliography

No new articles to add that are not included in the Argo bibliography.

8. The COVID-19 impact

Two BGC-floats and one deep float were delivered too late for the cruise with Argo deployments in 2021. Instead, these floats will be deployed one year later, in 2022. In addition, a cruise was shortened due to COVID-issues, and as a result some planned Argo deployments needed to be modified.

9. RBR CTD

We have no deployment plans for RBR floats.