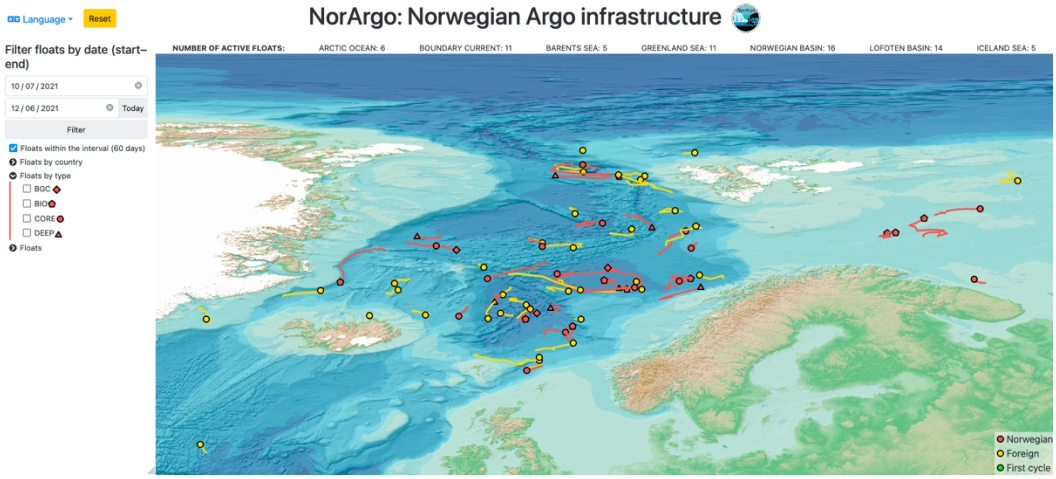
18 January 2022

NorArgo News Briefs #2

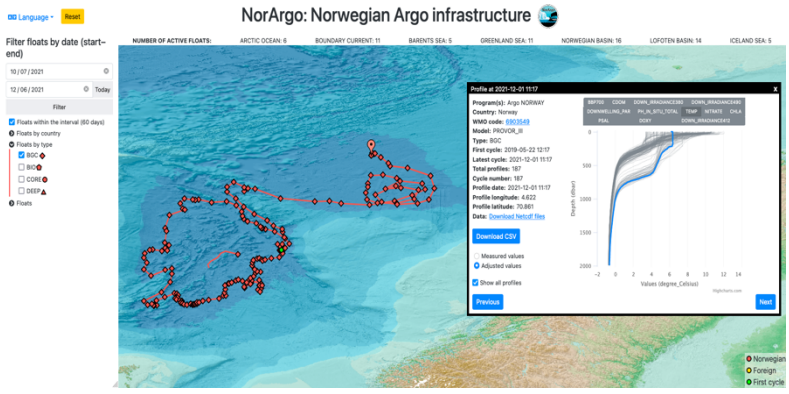
The aim of these news briefs is to provide updates on NorArgo activities. Please contact us if you are interested in more information or would like us to share Argo related information in a future Newsletter.

Release of new operational NorArgo web site

We are pleased to announce the launch of our updated NorArgo operational website! The new link is https://norargo-map.hi.no



With this web site one can easily monitor the NorArgo floats in the Arctic, and floats from other countries in the same area as well.

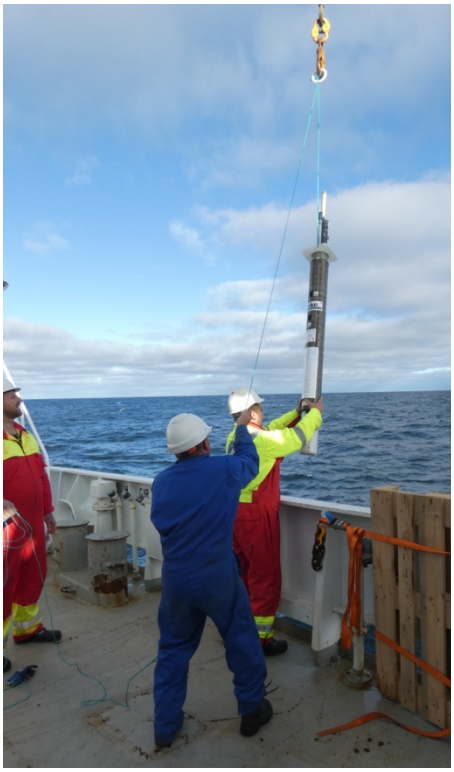


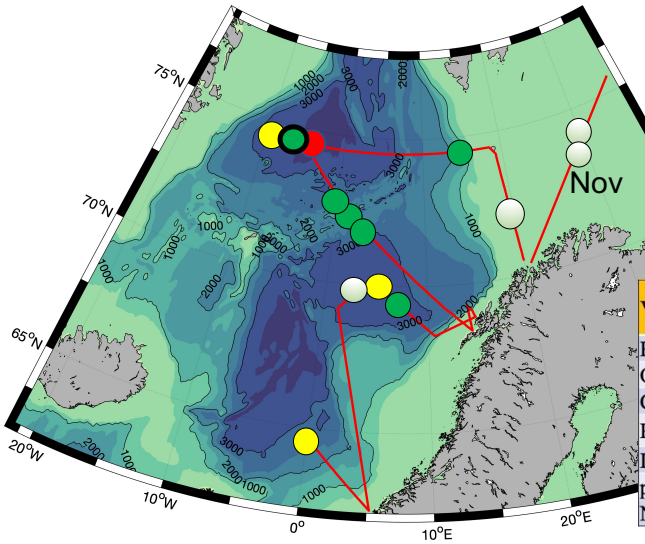
The vertical profiles of all variables for each float can be visualized in real-time, and the Argo data can be downloaded without any restrictions. The data are daily updated.

Deployments of Argo floats in 2021

During two research cruises 14 Argo floats were deployed in 2021. On the cruise with R/V Johan Hjort, 11 April – 9 May (cruise leader: Henrik Søiland, IMR), 12 Argo floats were deployed in the Nordic Seas where representatives from the Institute of Marine Research (IMR) and Univ. of Bergen participated in the deployment mission. During a

cruise with R/V Kronprins Haakon, 6-17 November (cruise leader: Angelika Renner, IMR), two more floats were deployed in the Barents Sea. The deployed floats in 2021 included 1 BGC float, 3 bio floats, 1 deep float and 9 core floats (four with oxygen sensor). The BGC-float include CTD, dissolved oxygen, fluormeter, backscatter, nitrate, pH, and irradiance sensors, while the bio-floats include all the BGC-sensors except the pH and nitrate sensors. BGC, bio and core floats do vertical profiles down to 2000 m depth or to the bottom when shallower than 2000 m, while the deep float, which includes dissolved oxygen sensor, takes profiles in the whole water column down to the bottom.





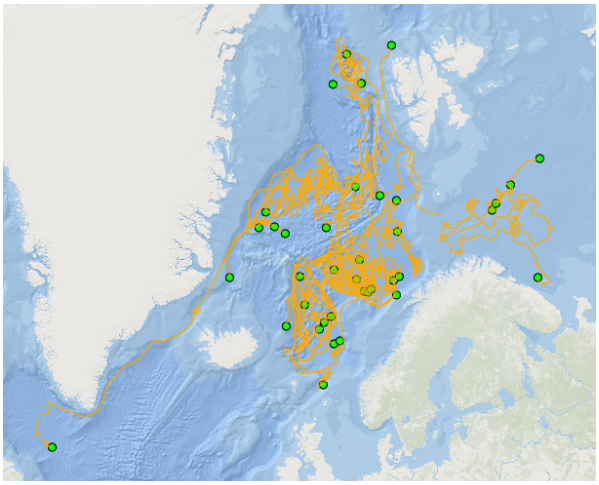
Variables / Sensors	Core	Core*	Bio	BGC	Deep
Press, temp., salinity	X	X	X	X	X
Oxygen		X	X	X	X
Chlorophyll-Fluor.			X	X	
Particle conc. (backsc.)			X	X	
Irradiance, PAR			X	X	
pH				X	
Nitrate				X	

Cruise track and location of Argo float deployments in 2021. Deployment of a deep Argo float (upper right figure, photo: Tor de Lange).

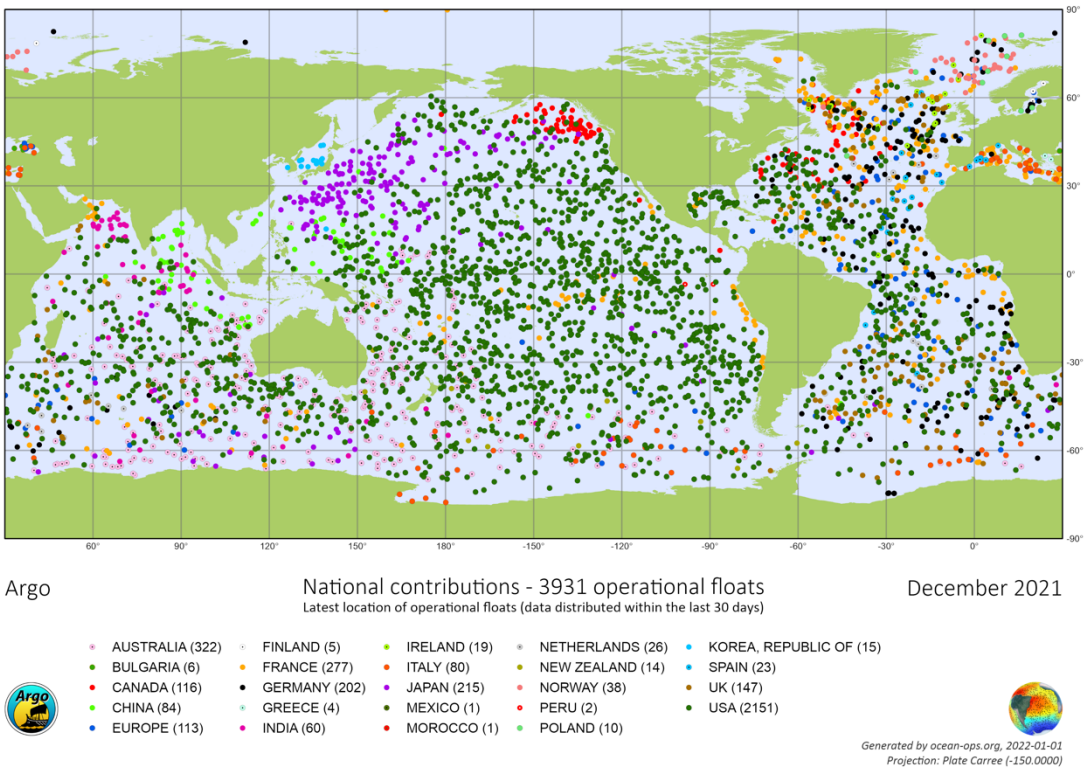
Status of NorArgo floats

Since the start of the NorArgo2, a Research Council infrastructure project, 46 Argo floats have been deployed in the Nordic Seas, Barents Sea and north of Svalbard since 2018.

At present there are 38 active NorArgo floats, while there are more than 3900 active Argo floats in the world oceans.



Last registered positions of the active floats from NorArgo with trajectories from deployment locations



Locations of all active Argo floats (updated December 2021) where colors indicate national contributions.

Annual meeting in NorArgo2

The third annual meeting in the infrastructure project NorArgo2 was held in Bergen 2. December 2021. Due to the COVID-19, it was possible to attend physical or digital. 13 persons attended in person while ten persons attended remotely. The project status was presented and several presentations on the use of Argo data were held. Representatives from the partners, advisory group and the Research Council of Norway attended. The advisory group also gave their comments and recommendations.

Some highlights of the presentations are given below:

Using biogeochemical Argo for model improvement (Caglar Yumruktepe, NERSC)

The objectives of Argo-GMF were to construct a modeling framework that utilizes the BGC-Argo's data in the Nordic Seas to overcome the limitations of biogeochemical models stemming from uncertainty in physics, and to validate and improve the model formulation and parameters using the observed biogeochemical variability. Modeling experiments were carried out using 9 different BGC-Argo buoys located north of 50°N, an example along-track experiment is provided in Fig. 1. The framework takes advantage of BGC-Argo buoys in various ways using temperature and salinity data to correct model physics, buoy trajectory to construct realistic high resolution atmospheric forcing and environmental conditions, and biogeochemical data to validate and improve model formulation and parameterization. With a series of simulations, the

reference simulation (1) chlorophyll-a was improved by correcting the physics and further improved by redefining model chlorophyll-a dynamics and parameterization. BGC-Argo chlorophyll-a data was used to validate model results and estimate model error which was significantly reduced with the final simulation (3). The framework was built using GOTM as the physics model and FABM as the biogeochemistry coupler. The framework was designed to be generic employing GOTM-FABM, thus any biogeochemistry model coupled to FABM can use the same configuration.

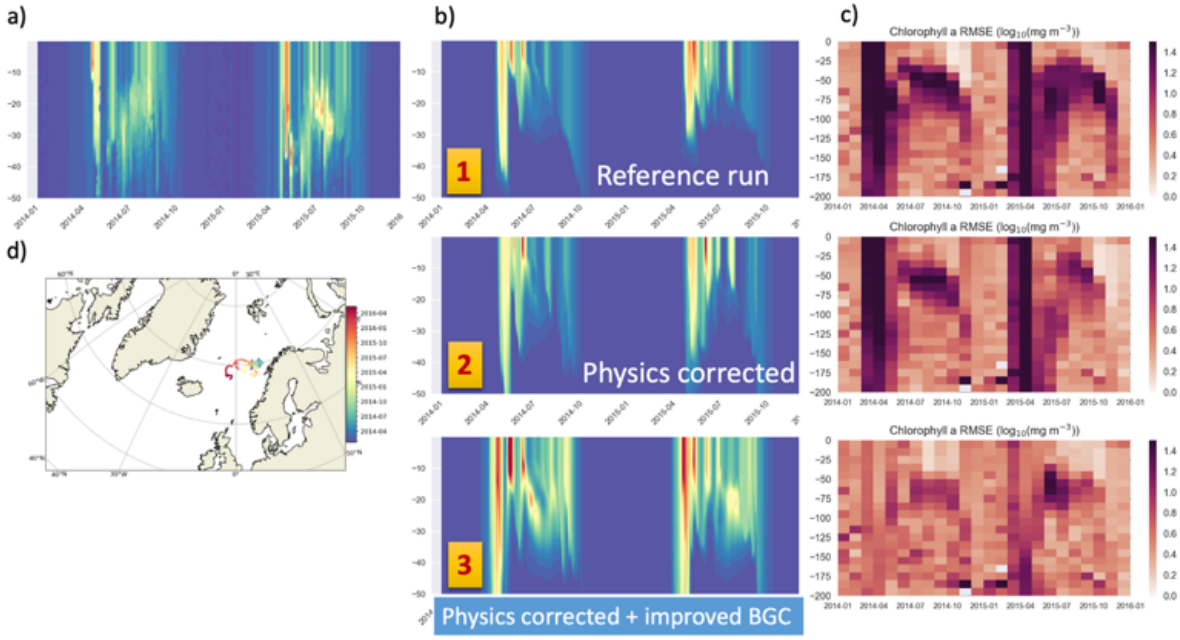


Fig. 1) Along-track Argo modeling framework applied to an example BGC-Argo trajectory (6902547). (a) BGC-Argo chlorophyll a (mg m^{-3}), (b) modeled chlorophyll-a along-track BGC-Argo (mg m^{-3}), (c) model chlorophyll-a error against BGC-Argo data (log_{10}(mg m^{-3})), d) BGC-Argo trajectory

Impact of NorArgo in MET Norway's assimilative model (Ann Kristin Sperrevik, met.no)

The impact of Argo observations in the operational model, NorShelf, has been evaluated. The model has a moderate warm bias below ~300 meters, while it is slightly too warm above (Fig.2). The RMS deviation is slightly increased in the mixed layer during the summer months. The evaluation also reveals that the model is slightly too fresh in the upper ocean. A problem with regards to the quality control of salinity observations, causing too many observations to be rejected during assimilation, was identified, and corrected. The observation errors assigned to the Argo observations for data assimilation have been analyzed using the methods presented in Desrozier et al. (2005). The results suggest that the errors for temperature should be decreased (Fig. 3).

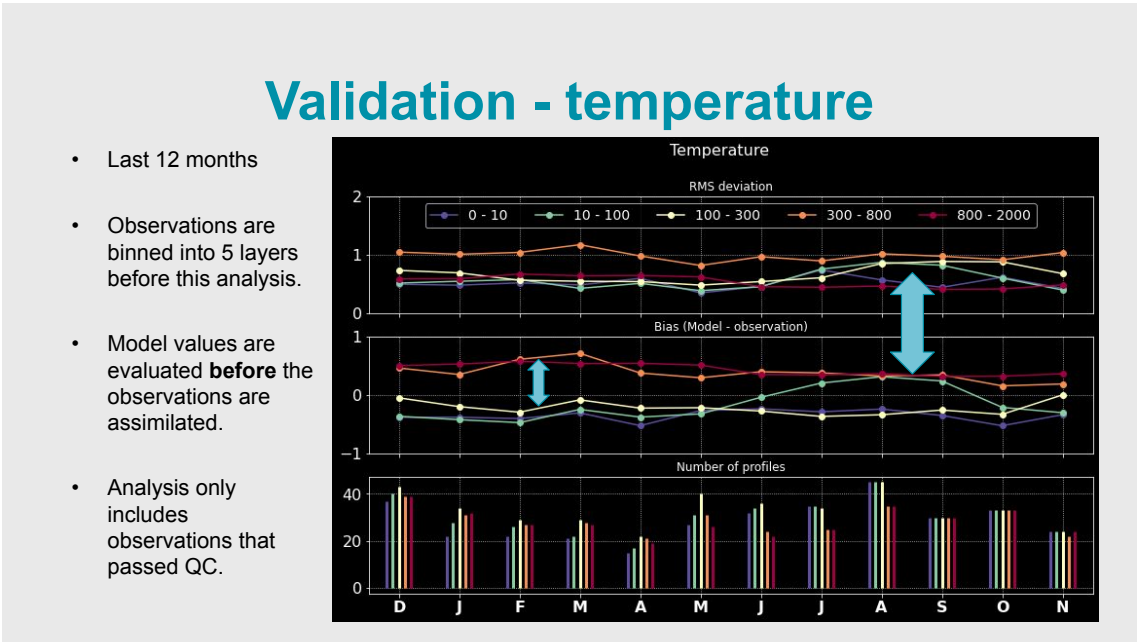


Fig. 2)

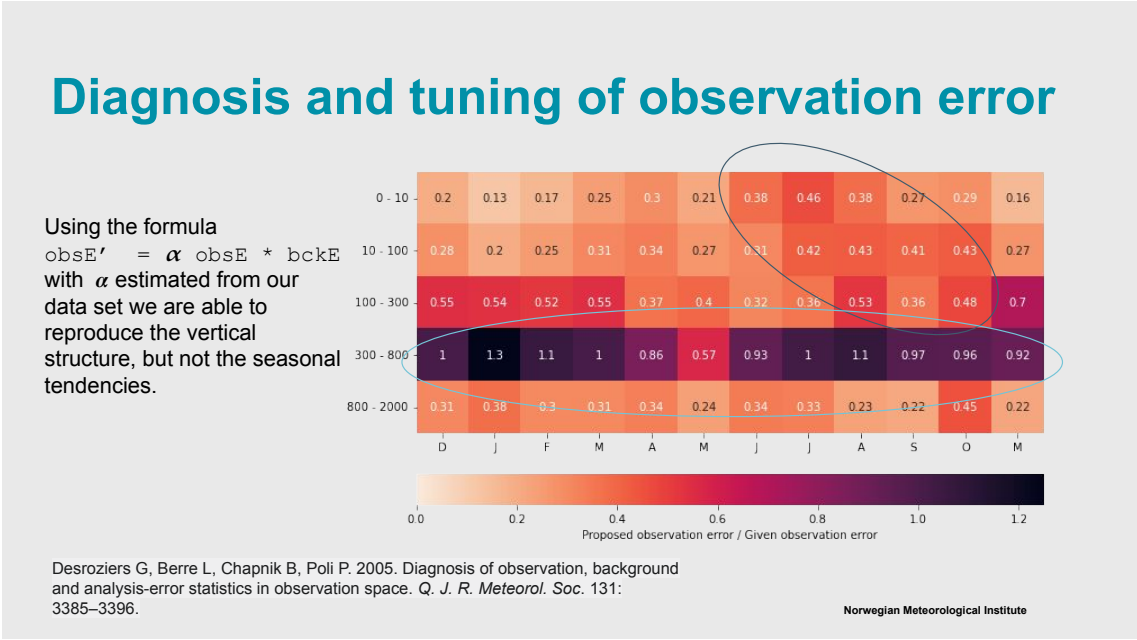


Fig. 3)

Reference:
Desroziers G, Berre L, Chapnik B, Poli P. 2005. Diagnosis of observation, background and analysis-error statistics in observation space. Q. J. R. Meteorol. Soc. 131: 3385–3396.

Upcoming events

- NorArgo2 User group meeting in winter/spring 2022.
- Deployment of Argo floats in the Nordic Seas with R/V “Johan Hjort” 24 May – 21 June 2022.
- A joint Euro-Argo Science meeting and international Argo Science workshop will take place on October 2022 in Brussel.

How to acknowledge

To acknowledge NorArgo/NorArgo2:

"*This study was supported by the Research Council of Norway (NorArgo2, #269753)*

For more information and contacts: https://norargo.hi.no