German Data Management Report 2023 (Period 1.11.2022 to 30.10.2023)
Submitted to ADMT 24, October 2023

By BSH (Federal Maritime and Hydrographic Agency), Germany

1. Real Time Status

Please report the progress made towards completing the following tasks and if not yet complete, estimate when you expect them to be complete. Please remember to include information on all Argo missions (including BGC, Deep and core) as well as pilot data from the RBR CTD.

- Data acquired from floats
  In 2023, there are/were 246 active/operational German floats which belong to BSH except for 15 associated to AWI, and 6 to ICBM, 1 to GEOMAR and 1 to IOW.
  Of all the active floats, 14 floats are equipped with biogeochemical sensors, 6 floats belong to BSH, 6 to ICBM, 1 to IOW and 1 to GEOMAR. 2 more floats were deployed by IOW and ICBM in the Baltic sea, unfortunately, one was dead on deployment, the other one died after 17 cycles.
  Data from all presently active floats are available from the GDACs.
- Due to logistical delays with deployment cruises only 29 BSH and 2 ICBM floats have been deployed in the reporting period 1.11.2022 to 30.10.2023. 16 more are either on their way to deployments already or will be shipped soon, and 5 floats are stored in South Africa with the Weather Service and now at SAEON (South African Environmental Observation Network) to be used on the SANAE/Goodhope/Crossroads cruises by South African colleagues in the coming months.
- From the 16 floats still to be deployed in 2023, 3 Provor BGC floats with an oxygen and a pH sensor were purchased and will be deployed in December of 2023 in the Labrador Sea.
- Data issued to GTS
  All German floats are processed in real-time by Coriolis and immediately inserted into the GTS
- Data issued to GDACs after real-time QC
  All profiles from German floats are processed by Coriolis following the regular quality checks and are routinely exchanged with the GDACs.
- Delayed mode data sent to GDACs
  The D-files are submitted by email to Coriolis together with the diagnostic figures and a short summary of the DMQC decision taken and are inserted into the GDAC after format testing.

2. Delayed Mode QC status

Please report on the progress made towards providing delayed mode Argo data, difficulties encountered and, if possible, solved. Please remember to include information on all Argo missions (including BGC, Deep and core) as well as pilot data from the RBR CTD.

For the core mission the overall percentage of D-files from all German programs is remaining at a quota of above 90%. BSH had adopted floats from all German universities and research institutions.

German Floats/ Program Name	Number of profiles	Number of D-files	D-files pending
Argo BSH	81413	74171	3724
Argo AWI	8721	3926	4781
Argo GEOMAR	13474	13407	67
Argo U. HH	3347	3258	89
Argo Denmark with U.HH	371	360	11

The most important remaining issue still is the dmqc of the AWI floats. The analysis of the salinity time series of AWI floats in the Weddell gyre showed initial asymptotic adjustments from fresh start cycles in the order of <0.005 psu (Fig. 1). These consistent but small adjustments seem to be abundant in the quiet environment of the Weddell gyre.

The asymptotic adjustment is not only a feature of floats deployed by AWI but common to floats from the area deployed by other national programs. The analysis of 207 floats within the center of the Weddell gyre from all participating national programs has been presented during the international Argo dmqc operator meetings. The analyis showed an asymptotic behavior in 119 cases and no such signal in 88 floats.

Because of the pending decision on the initial adjustment and how to flag the concerned cycles at the moment 9419 profiles are available from the 216 AWI floats and but only 45% are available as D-files. For all other floats in the German program (949 floats) the DMQC quota is at 96%. Cycles from some older floats appeared in the audit requests during the year and corrected d-files have mostly been submitted. For a few legacy floats with cycles still in file format V2.2 need updates from Coriolis which are presently discussed.

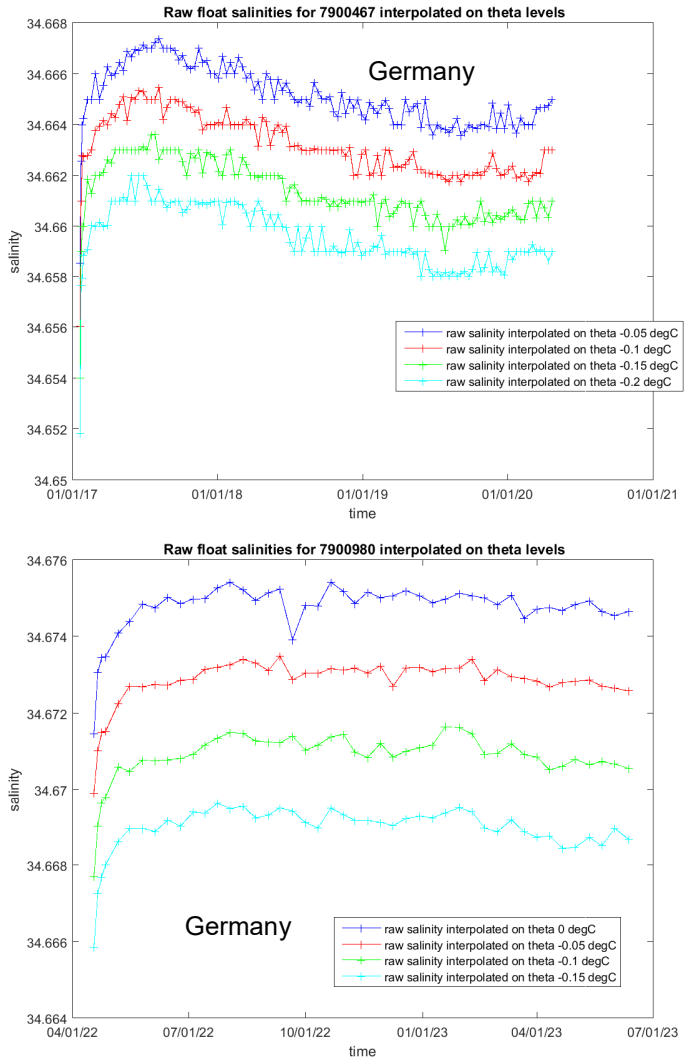

Fig.1: Examples of initial asymptotic adjustment from AWI floats.

The data from 5 RBR floats which were part of the pilot swarm experiment of 10 floats in 2021 are due to be d-moded with priority, now that all floats have left the eddy in which they have been deployed. RBR pilot data is being received from 5 floats deployed in October 2023, the deployments were made pairwise at 5 locations in the South Atlantic together with a float equipped with a SBE CTD. The next 5 Arvor floats with RBR sensors (reporting high frequency data) will be deployed in the North-East Atlantic, near to the Azores in the end of 2023 or beginning of 2024.

BSH has also adopted some floats from Finland (10 non Baltic floats), the Netherlands (100 floats), Norway (30 floats) and Poland (13 floats) for DMQC

and is performing DMQC on parts of the MOCCA fleet (44 floats) from the European Union. The progress in these programs providing D-files is generally good. Since Argo-Norway has received fundings from the national research council to increase the number of Norwegian floats deployed per year, the program has gotten more involved in the dmqc activities. Floats deployed from 2019 onward have been covered by Norwegian DMQC operators. The same is true for Argo-Poland which also has performed DMQC on their own floats from 2019 onward.

Adopted floats/ Program Name	Number of profiles (selection)	Number of D-files (selection)	D-files pending (selection)	Comments
Argo Poland (13 floats out of 35)	1503	1467	2	Arctic and Baltic floats handed over
Argo Finland (10 floats out of 49)	798	795	3	Mostly Baltic and Barent Sea floats handed over
Argo Netherlands (100 out of 112 floats)	12511	11593	282	RBR floats still pending
Argo Norway (30 floats out of 92)	5011	4817	117	Cut in 2019
MOCCA (45 floats out of 119)	11635	8452	2995	Baltic floats pending
US Navy (10 floats)	1908	1901	7	Overlooked new cycles from one float
NAAMES/US (E. Boss) (13 floats)	2724	2622	102	One float missing

Investigations of fast salty drifters were continued and consolidated with the entire European fleet. Information is now available in a shared in a spreadsheet. Efforts have been made since last year to make sanity checks on the manually entered entries into the table and afterwards to perform statistical analysis from the data holdings at the GDACs. Delphine Dobler from Ifremer has undertaken this work. DMQC operators have been asked to update their entries into the table prior to ADMT24.

https://docs.google.com/spreadsheets/d/1TA7SAnTiUvCK7AyGtSTUq3gu9QFbVdONj9M9zAq8CJU/edit#gid=974650348

Seabird has agreed to issue certificates for 5.25 CTDs for the identified fast salty drifter in the recall range from the German program, which have not yet arrived

Starting in 2023 a full term position for dmqc of BGC parameters has been filled at BSH and has started to establish the structure for dmqc procedures for German BGC floats and collaboration with the institutes on their floats. This should be integrated well in the European structures. The dmqc for BGC parameters is supported by the research institutes: GEOMAR will collaborate on pH, IOW will provide background for nitrate and O2 and ICBM will oversee the

bio-optical sensors from the radiometers. Software structure and programs are being set up, due to internal organization the DMQC of BGC is starting slowly. The focus is on oxygen, other parameters will follow.

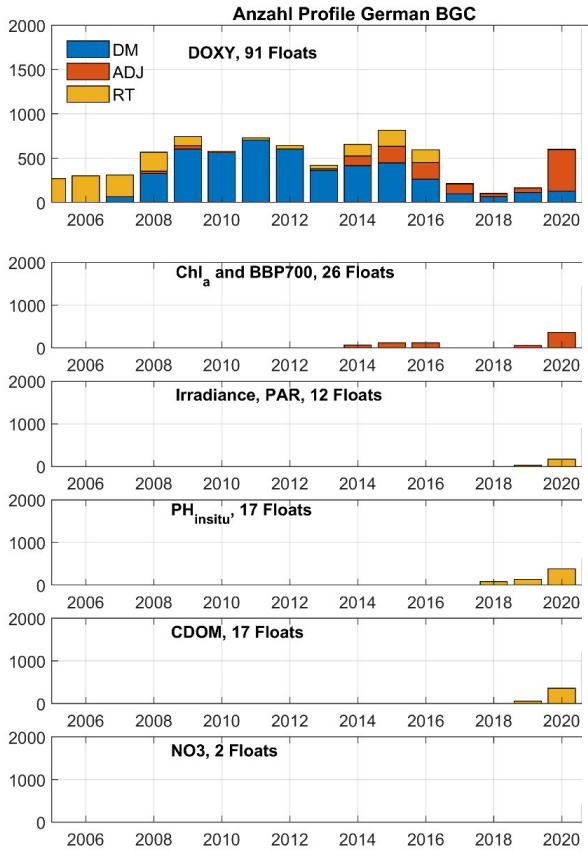

Figure 3: Number of Profiles gathered during the last 17 years for the different biogeochemical parameters. Color shading shows the status of the profiles in blue (DM): full DMQC carried out, red (ADJ): adjusted profiles, yellow (RT): profiles in real time mode.

All 91 floats gathered about 12000 oxygen Profiles in the last 2 decades. Most profiles were dmqc-ed (blue), the profiles from the last 2 to 3 years have to be done.

The German BGC floats gathered 2000 to 4000 profiles. Most of these BGC data profiles are not dmqc-ed, some are adjusted (red), others are in the real time status (yellow). Each parameter has its own reasons why the DMQC is late.

3. Value Added items

- List of current national Argo web pages, especially data specific ones
  BSH is maintaining the new Argo Germany Web site at https://www.bsh.de/DE/THEMEN/Beobachtungssysteme/ARGO/.
  It provides information about the international Argo Program, the German contribution to Argo, Argo array status, data access and deployment plans. It also provides links to the original sources of information.

- Statistics of National Argo data usage (operational models, scientific applications, number of National PIs…)
  Currently no statistics of Argo data usage are available. The German Navy uses Argo data on a regular basis for the operational support of the fleet and uses their liaison officer at BSH to communicate their needs. The SeaDataNet portal uses German Argo data operationally for the Northwest European Shelf. Based on the feedback from the national user workshop

(in June 2023) Argo data are routinely assimilated in the GECCO reanalysis, which is used for the initialisation the decadal prediction system MiKlip. They are also routinely assimilated into the Earth-System-model of the Max-Planck Society in various applications reaching from short term to decadal predictions and are used for model validation. At BSH the data are used within several applications such as EArise and Expertennetzwerk BMDV. Data are also used in various research groups at universities.

- Products generated from Argo data that can be shared
- Publicly available software tools to access or qc Argo data

4. GDAC Functions

If your centre operates a GDAC, report the progress made on the following tasks:

- Operations of the ftp server
- Operations of the www server
- Operations of a user friendly interface to access data
- Data synchronization
- Statistics of Argo data usage : Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …

5. Regional Centre Functions

If your centre operates a regional centre, report the functions performed and any future plans.

BSH is part of the SOARC consortium and is working continuously on updating the CTD reference data base for the Weddell gyre.

In continuation of work performed in the European projects MOCCA and EArise we are presently working on reference data for the Baltic Sea, Nordic Seas and Arctic proper and revising dmqc methods. A workshop was held in Sopot (Poland) in April 2024 and will be followed by a workshop in Bergen (Norway) in October 2024.

6. Other Issues

Please include any specific comments on issues you wish to be considered by the Argo Data Management Team. These might include tasks performed by OceanOPS, the coordination of activities at an international level and the performance of the Argo data system.