Test processor to implement QC real time and delayed methods in the data system

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EXECUTIVE SUMMARY

The deliverable groups procedures that are presently used to perform processing, real-time and delayed mode quality controls on the biogeochemical parameter in Europe. It also reports some figures to give an overview of the status of the BGC parameters at the end of the Euro-Argo RISE project.

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Acronyms

ADMT	Argo Data Management Team
BBP	Particulate Backscattering coefficient
BGC	Biogeochemical
BR files	Files containing biogeochemical parameters (with PARAMETER_DATA_MODE "R" real time and/or "A" Adjusted in Real time)
BD files	Files containing biogeochemical parameters with, at least, one parameter with PARAMETER_DATA_MODE "D" Delayed Mode)
CHLA	Chlorophyll concentration
DAC	Data Assembly Centre
DM	Delayed Mode
DOXY	Dissolved oxygen concentration
GDAC	Global Data Assembly Centre
NITRATE	Nitrate concentration
QC	Quality Control
RT	Real Time

1 Introduction

We present in the introduction the complete Argo data workflow (Figure 1.1) and the three steps of the Argo quality control (Figure 1.2). Biogeochemical (BGC) parameters are completely included in the Argo network in the framework of OneArgo. The Euro-Argo RISE project has allowed to foster the Real-Time quality control procedures and develop delayed mode procedures for the BGC parameters.

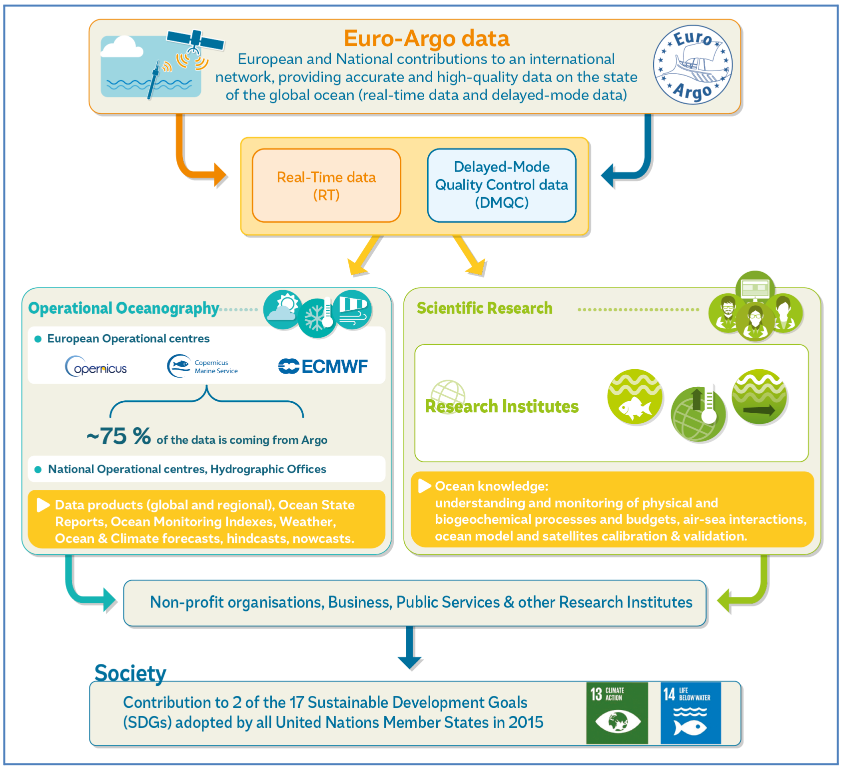


Figure 1.1 : Argo data workflow: real-time data for operational oceanography, delayed mode data for ocean knowledge, a global program for society

Argo has two distinct but complementary data flows:

- Real Time: performed within less than 12 hours after observation, with automatic Quality Control tests, dedicated to operational applications.
- Delayed Mode: performed within 12 months after observation, with detailed time series analysis and corrections, dedicated to ocean & climate science applications.

An additional analysis is performed yearly at basin scales (Argo Regional Centres) to check that data coming from distinct providers are consistent.

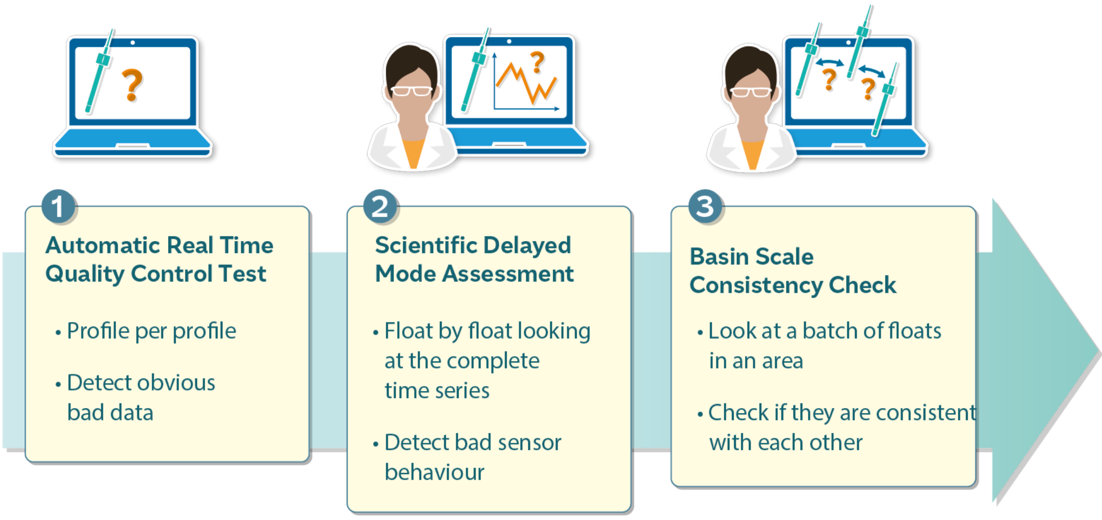


Figure 1.2: The three steps of Argo floats data processing

The Argo floats send their measurements to DACs*, where raw data are processed and sent to the 2 GDACs*. There are 2 GDACs : Coriolis/France & Fleet Numerical/USA that aggregate the full Argo dataset. The Argo data comes from 11 DACs worldwide. There are 5 Argo Regional Centers to check the overall consistency at basin level (Arctic, Pacific, Atlantic, Indian, Antarctic oceans).

The Argo Information Centre (AIC) at OceanOPS is in charge of floats registration (IOC resolution XX-6) and metadata information. OceanOPS also monitors and reports on the status of the global ocean observing system and its networks to use its central role to support efficient observing system operations, to ensure the transmission and timely exchange of high quality metadata, and to assist free and unrestricted data delivery to users across, operational services, climate and ocean health. As such, they act as a focal point for Argo to distribute the warnings raised by some of the quality control procedures to concerned people.

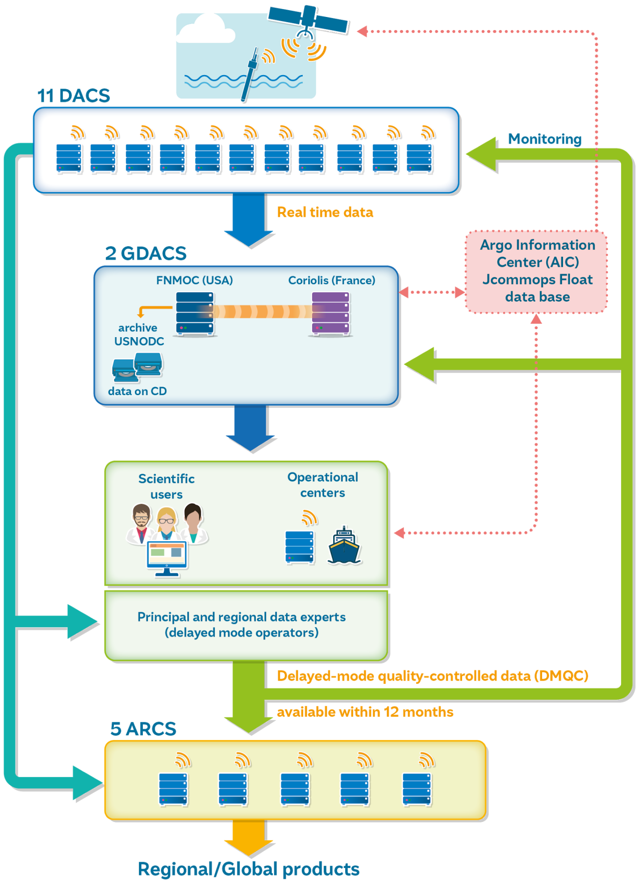


Figure 1.3: The Argo data system

Argo Data system was developed for Temperature/Salinity/Pressure. It is now extended to manage BGC-Argo parameters (Oxygen, Chlorophyll, Backscatter, Nitrate, pH, Irradiance), with Euro-Argo RISE support at European level.

This extension funded by Euro-Argo RISE have 5 priorities:

- Extension of Argo vocabularies
- Enhancement of Argo data format
- Development of Real-Time Quality Control for the 6 variables and implementation at DACs
- Development of Delayed mode process Control for the 6 BGC-Argo variables
- Sharing of tools on collaborative platforms

The BGC-Argo data system requires additional manpower and expertise to reach the Ocean health and climate challenges. The delayed mode data processing needs to be funded and organised at international level.

The real time data stream for BGC-Argo is more challenging than the core-Argo P/T/S. There are very few P/T/S that need adjustment in real time at the early stage of their lifetime. More or less all of the BGC data needs to be adjusted in real time. The automated Real-Time adjustment for all BGC variables is still under development as we need enough BGC data at sea to build robust procedures to be implemented at DACs.

2 Decoding processing and real time quality control chain

2.1 Decoding processing and real time quality control chain

The decoding of Argo floats data inputs are meta data provided by the float operator and iridium messages sent by the float. The Iridium messages are decoded, merged with metadata and formatted. Then a real-time QC is applied to the floats observations (date, position, parameters).

The result is a set of 4 NetCDF files per float : the data (vertical profiles), the metadata, the trajectory and the technical files.

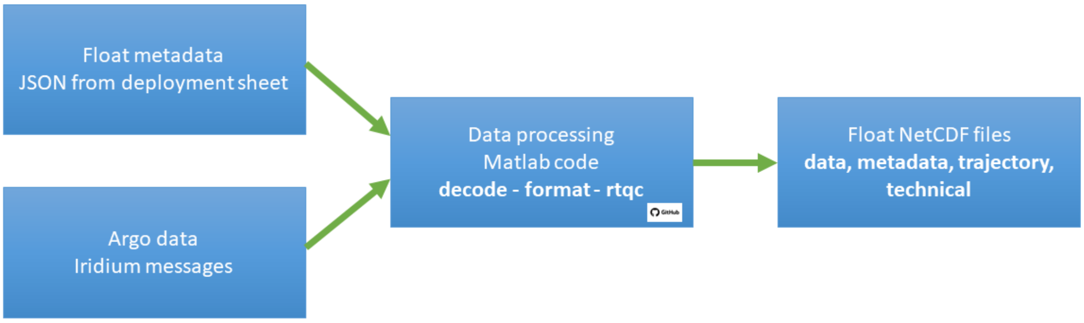


Figure 2.1: The Argo data processing chain

2.2 Coriolis data processing chain

The Coriolis Argo floats data processing chain is continuously improved (a monthly release), we now manage 82 versions within 5 families (Apex, Navis, Nemo, Nova, Provor).

FAIR data: Coriolis Argo data processing chain is now on GitHub. Every major release or minor patch is exposed in GitHub. A total of 52 major releases with more than 300 tags (releases + patches) are now exposed on the Internet.

GitHub is an open infrastructure used by millions of software developers and IT managers (Information Technology).

- https://github.com/euroargodev/Coriolis-data-processing-chain-for-Argo-floats


README.md

Coriolis-data-processing-chain-for-Argo-floats

Coriolis data processing chain for Argo floats

The Coriolis Argo floats data processing chain decodes, processes, formats and performs quality control on floats data. This repository contains the successive versions and intermediate patches of the decoder and configuration files.
The major versions are also available from:

- https://doi.org/10.17882/45589

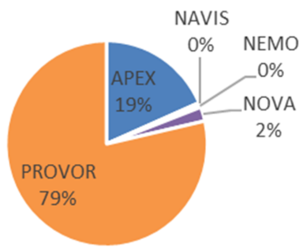
Figure 2.2 : The Coriolis data processing chain now on GitHub

2.2.1 BGC-Argo data : processing and real time QC

The BGC-Argo floats are advanced types of floats performing bio-geo-chemical (BGC) measurements. Coriolis DAC manages 677 BGC-Argo floats (+9% compared to 2021) from 5 families. As of November 2022, they performed 90,115 cycles[1] (+14%).

Table 1: The five families of floats decoded at Coriolis with BGC parameters

BGC-Argo floats processed by Coriolis DAC				
Float familly	**nb versions**	**nb floats**	**nb profile**	**nb cycles**
APEX	33	125	22 489	16 456
NAVIS	1	3	644	644
NEMO	1	2	297	297
NOVA	1	15	1 236	1 210
PROVOR	46	532	198 417	71 508
Total	**82**	**677**	**223 083**	**90 115**



The general characteristics of Coriolis BGC-Argo floats are:

- Iridium sbd or rudics bi-directional communication or Argos
- Fourteen sensors can be fitted on the floats
- Eleven BGC parameters reported

[1] Cycle vs profile: The standard Argo float mission is a 10-day cycle, with most of the float's time spent drifting along with deep ocean currents, followed by taking a series of measurements (for BGC: chlorophyll, oxygen, nitrate…) as it moves back up (profiles) to the ocean surface.

Table 2: The 13 types of sensors that can be mounted on Coriolis BGC-Argo floats and number of profiles done

Coriolis BGC-Argo floats s	nb floats	nb profiles
AANDERAA_OPTODE	599	85 539
SATLANTIC_OCR504_ICSW	228	180 440
SUNA_V2	95	17 874
SEAFET	45	4 907
C_ROVER	25	5 045
UVP6-LP	13	773
RAMSES_ACC	8	868
ECO_FLBB	4	888
CYCLOPS-7_FLUOROMETER	2	106
OPUS_DS	2	792
SEAPOINT_TURBIDITY_METEI	2	106
HYDROC	1	120
9AXIS_IMU	1	24

Table 3: The 10 main BGC parameters reported by Coriolis as a GDAC (all DACs) BGC-Argo floats and number of profile files (nb files)

BGC parameter	nb files
DOXY	258 079
CHLA	108 988
BBP700	106 473
NITRATE	59 180
CDOM	50 144
DOWN_IRRADIANCE490	48 344
DOWNWELLING_PAR	47 117
PH_IN_SITU_TOTAL	37 968
TURBIDITY	2 514
BISULFIDE	1 352

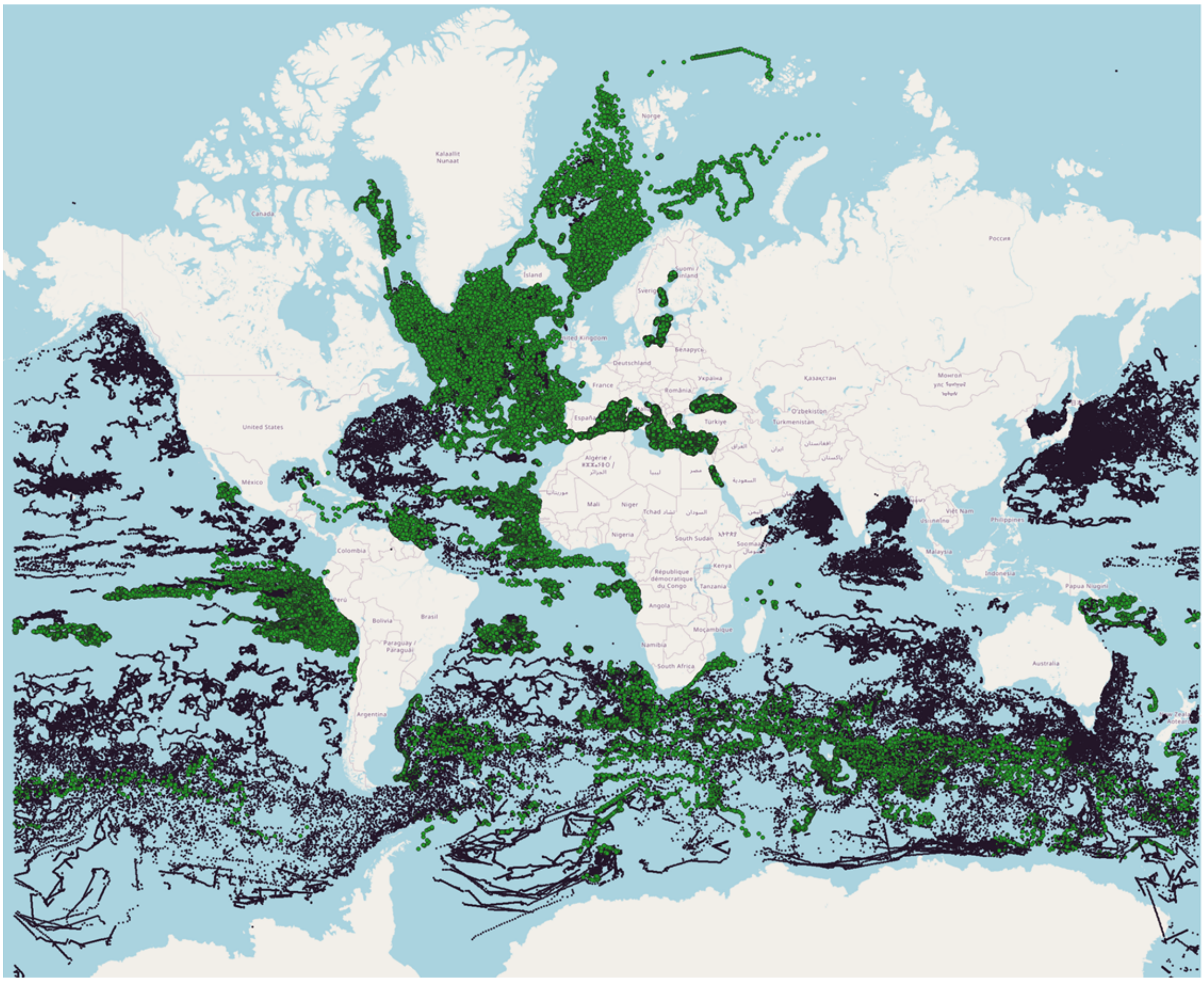


Figure 2.3: Map of the BGC-Argo floats. The positions of the 677 BGC-Argo floats managed by Coriolis DAC (resp. Other DACs) are illustrated by green dots (resp. grey dots) . They measure parameters such as oxygen, chlorophyll, turbidity, CDOM, back-scattering, UV, nitrate, bisulfide, pH, radiance, irradiance, PAR.

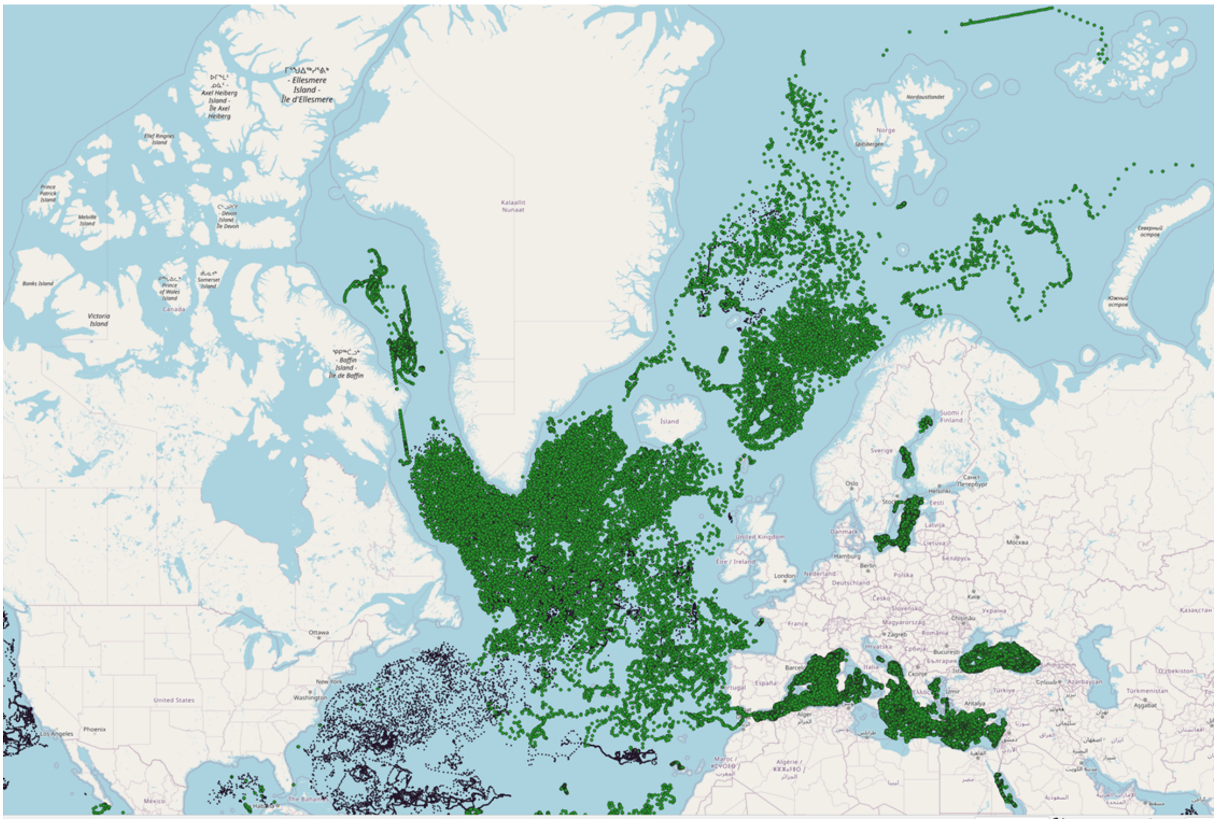


Figure 2.4 : A zoom on North Atlantic of the BGC-Argo floats managed by Coriolis DAC (grey dots: the others DACs bio-Argo floats). The coverage of marginal seas is improving (Mediterranean, Baltic, Baffin, Red, Black seas).

At a global level, Ifremer GDAC aggregates and distributes 270,819 BGC-Argo profiles from 2023 floats.

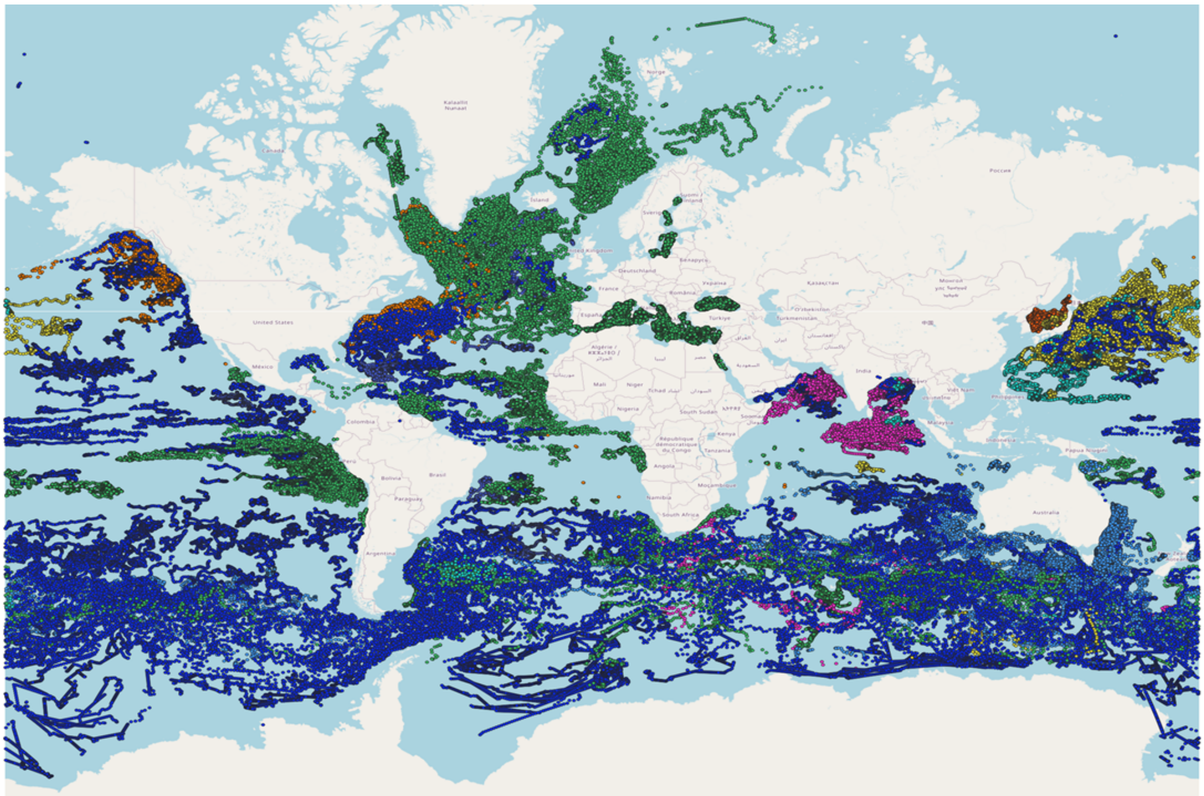


Figure 2.5: Map of the 270,819 positions of BGC-Argo profiles from the 2023 BGC floats (Green : Coriolis DAC, Deep Blue : Aoml DAC, Violet : Incois DAC, Yellow: Csio DAC, Steel Blue: Csiro DAC, Brown : Meds DAC, Cyan : Jma DAC, Orange : Kordi DAC)

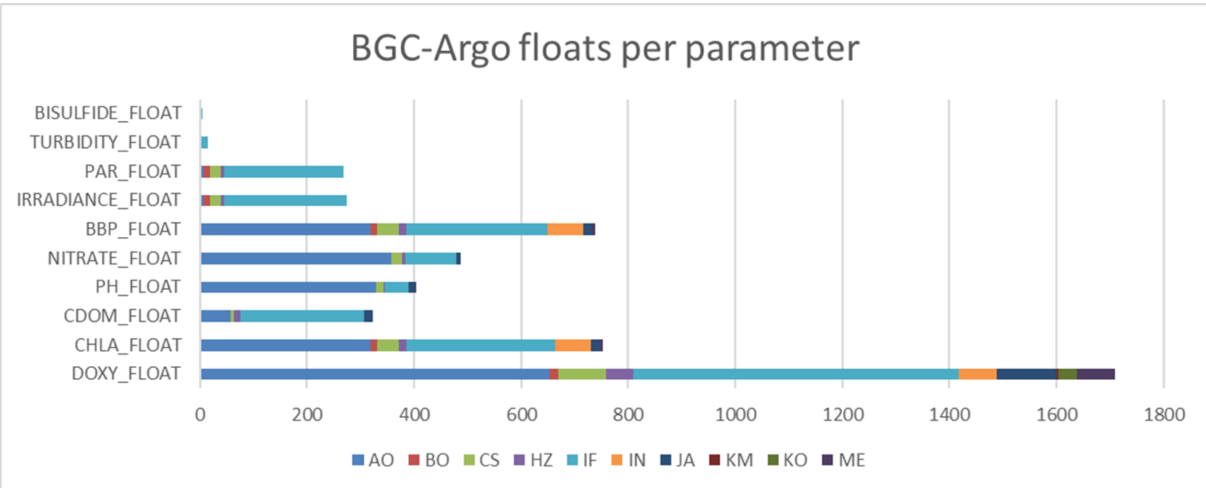


Figure 2.6 : The 10 major parameters measured by BGC-Argo floats. There is a majority of floats measuring oxygen (1700 floats), followed by chlorophyll , BBP and nitrate.

2.2.2 BGC-Argo Real Time Quality control present status

As shown in Figure 1.3 by the blue arrows, the real time quality controls are performed by the DAC and completely integrated in the "decoding" chain. Regarding the biogeochemical parameters, at the beginning of the Euro-Argo RISE project, several real-time quality control procedures were already in place in the DAC processing chains. During the project, the quality control procedure of CHLA was updated (D4.2), the quality control procedure for NITRATE was drafted in documentation (D4.5 and NITRATE QC DOCUMENT) and the real time quality control for BBP was entirely rebuilt (D4.3, Dall'Olmo et al., in review, https://github.com/euroargodev/BBP_RTQC (Jupyter Notebook)). All the details of the tests and improvements are reported in the Euro-Argo RISE deliverables and the official Argo documentation is being currently updated to reflect these improvements (Table 4).

Table 4: links to the documentation (Euro-Argo RISE deliverables) reporting RT QC improvements and BGC-Argo official documentation

Parameter	Documentation (Euro-Argo RISE deliverables) reporting some RT QC improvements	Argo official documentation
DOXY		DOXY QC DOCUMENT
NITRATE	(D4.5) https://doi.org/10.5281/zenodo.7369098	NITRATE QC DOCUMENT
pH		pH QC DOCUMENT
Radiometry		RADIOMETRY QC DOCUMENT
BBP	(D4.3) https://doi.org/10.5281/zenodo.7369060	BBP QC DOCUMENT (in prep)
CHLA	(D4.2) https://doi.org/10.5281/zenodo.7369043	CHLA QC DOCUMENT

2.3 BODC processing chains

BODC retrieves data for all UK, Irish, Mauritius and assigned EU MOCCA floats from a number of sources and archives these for further processing. BODC currently processes data from floats with Argos communications, Iridium Rudics and Iridium Short Burst Data (SBD) from a diverse fleet of floats manufactured by TWR, SeaBird and NKE. BODC is just about to process SOLO floats.

Processing and delivery of incoming data is normally set up within one week of deployment where the capability already exists for a given float type.

BODC delivers core data in netCDF format to the UK Met Office four times a day, where it is subsequently issued to the GTS in BUFR format. Over 95% of the netCDF files are delivered within 24 hours of the data being available to BODC.

BODC continues to operate two parallel processing chains (Figure 2.7):

(1) the BODC-developed processing chain, which allows to deliver all UK Navis and Apex floats, and

(2) the Coriolis processing chain included in the BODC software stack, which allows to deliver UK NKE floats and Irish NKE floats.

The BODC Argo software is stored in the local GitLab repository (Figure 2.8).

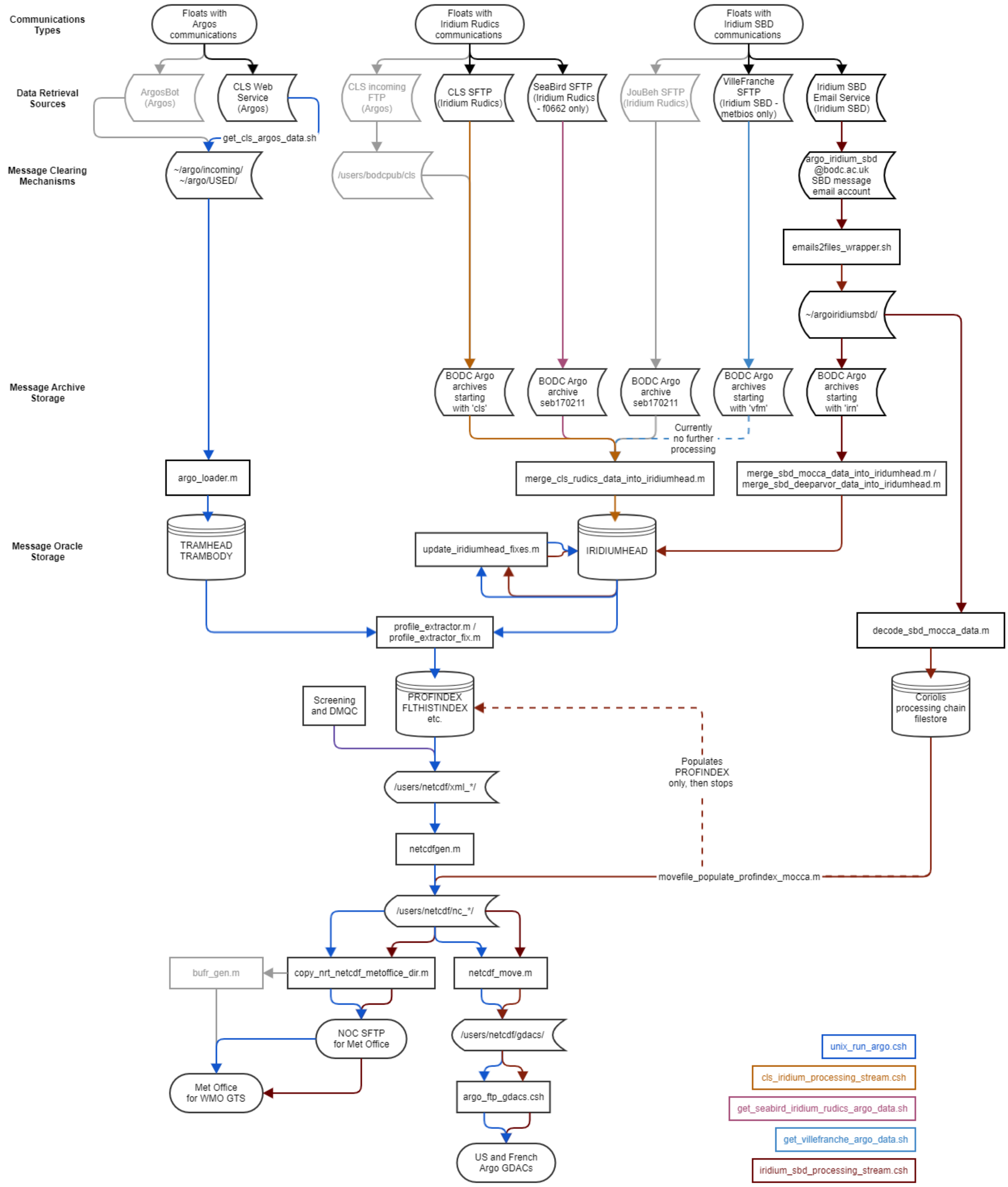


Figure 2.7: BODC Argo DAC System Diagram

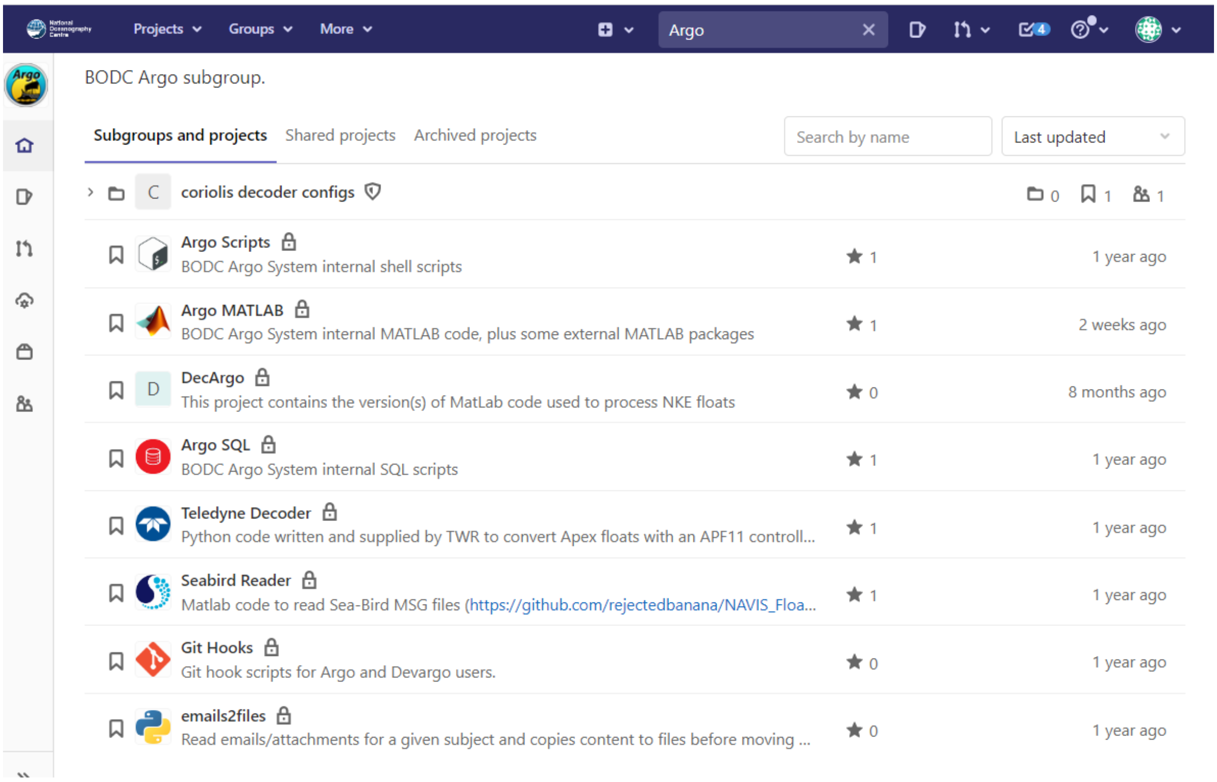


Figure 2.8: The internal software repository of BODC DAC Argo software

2.3.1 Implementation of the BODC processing chain

The BODC DAC has originally developed and operated their floats using their internal processing chain. BODC's processing chain software has been designed to process and deliver to GDAC a variety of Argo floats types, including all UK Navis and Apex floats coming from different manufacturers such as SBS and TWR. BODC updated its processing chain to manage BGC floats provided by NAXIS and TWR but had no processing chain for NKE floats and therefore considered the implementation of the Coriolis processing chain for NKE BGC floats.

The table 4 reports the different types and numbers of floats processed by the BODC DAC at the time of writing this report. In 2021, BODC has strongly improved the current functionality of their internal processing chain enabling delivery of two active Irish Arvor floats with oxygen parameters on board.

Additional developments were performed to improve the already existing functions and to upgrade the internal BODC processing chain. This upgrade was necessary to allow the delivery of BR files from non-NKE BGC floats. It is noteworthy that this upgrade involved coding derivation equations for all BGC parameters. A software for an infrastructure agnostic set of common BGC parameter derivation equation functions was developed: https://github.com/euroargodev/bgc_derivation. Finally, this upgrade was integrated within the BODC archiving and database systems. Currently, BODC is performing their finalising work allowing population of all BGC parameters into the BR netCDF file format. All of the above works will enable BODC to process Argo floats equipped with the BGC sensors.

2.3.2 Implementation of the Coriolis processing chain

BODC adapted a version of the Coriolis processing chain version for the first time in 2017 for NKE T&S floats. Since that time, the Coriolis processing has been continuously developed at Coriolis. In BODC, the Coriolis processing chain was updated in 2019 and 2020. Every update of the Coriolis processing chain was a very time consuming activity in BODC and associated with a number of additional processing issues in this software stack. These works involved significant developments including interactions with the internal BODC's .qxf format, storing and archiving procedures and database population.

During 2022, BODC DAC has developed a major upgrade to account for the newest version of the Coriolis processing chain (v41j). This upgrade was necessary to get ready for the ASBAN UK project. These frequent upgrades to the most updated version of the Coriolis processing chain are very time and resources consuming in BODC. This work is currently being finalised by BODC software developers. It will enable the BODC to resume delivery of all live MOCCA floats and will be necessary due to the expansion of the number of 6-parameters NKE float types that BODC will be processing in the next few years (CTS4 and CTS5). At the time of writing this report, BODC has started to deliver metadata of recently deployed 6-parameters BGC floats and the first tested floats including Oxygen data. The work to process and deliver the remaining parameters is the current focus in BODC.

Before the works involving the upgrade of the Coriolis processing chain, Coriolis has been providing the processing for 13 PROVOR BGC floats and delivering the core data to the GTS on BODC's behalf. Currently, there are still 3 active PROVOR floats processed by Coriolis on BODC's behalf.

The development works recently undertaken on upgrades of the Coriolis and BODC processing chains in BODC required collaborative work between the BODC Argo team and software developers. In order to successfully plan and manage the development works in a professional manner, the BODC Argo team participated in a Product Owner training to improve the efficiency of development phases in the BODC Argo system. Here, a "Product Owner" is the entity responsible for the project's outcome. As an outcome of this training, SCRUM, an Agile software development framework, was used to help the team to communicate and self-organise.

Table 5: Summary of all BODC managed BGC Argo floats.

Float type/controller	**Comms**	**Total no. of deployed floats**	**Total no. of active floats**	**Core + oxygen only**	**Core + other BGC**	**Total no. of BGC active floats being fully processed**
NKE Provor *	Iridium SBD	13	8	-	**8**	8
SBE Navis N1 with BGC	Iridium Rudics	4	-	-	-	-
SBE Navis N1 with oxygen	Iridium Rudics	8	8	**8**	-	8
SBE Navis N1 with radiometer	Iridium Rudics	3	3	-	**3**	3

TWR Apex APF9I with BGC	Iridium Rudics	4	-	-	-	-
TWR Apex APF11	Iridium Rudics	14	10	**2**	**6**	0
TWR Deep Apex APF11	Iridium Rudics	14	3	**1**	-	0
TOTAL		60	32	**11**	**17**	19

* = processing courtesy of Coriolis

2.3.3 Compilation of the RTQC procedures at BODC

BODC undertook design of the automated RTQC toolbox for core and BGC Argo variables (pH, DOXY, Nitrate, CHL-A, suspended particles and downwelling irradiance). BODC has reviewed currently available RTQC tests, highlighted limitations and suggested future recommendations.

This review helped theBODC to better understand how the RTQC works for BGC parameters and how the procedures can be implemented at the BODC DAC. It is also the occasion for the BODC to upgrade its documentation and procedures (implementation plan and test toolbox) to apply when adopting a new software release into the BODC processing chain. The future test toolbox is aimed to need minimal oversight and intervention from the DAC operator. It will consist of independent tests on QC routines, it will use the internal .qxf format in BODC to store data and flags before their export to NetCDF. BODC has already started the initial preparatory works (as per the Scrum framework) to do efficient and well-coordinated development works.

3 Delayed Mode

3.1 Workflow

The workflow of the delayed mode procedure is summarised in Figure 3.1. Some additional information is also reported in Deliverable D4.11 (under Review).

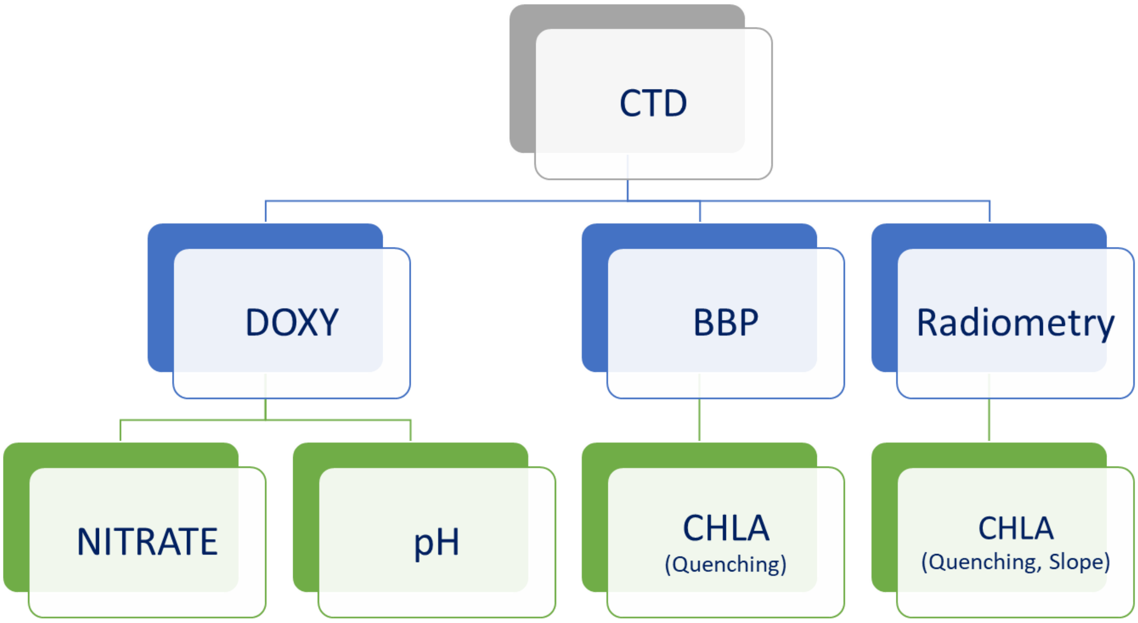


Figure 3.1 : Processing sequence of the Delayed Mode for a BGC float (Delayed mode CTD must be completed before DOXY, BBP and Radiometry Delayed Mode can be performed. Delayed Mode DOXY must be completed before Nitrate and pH Delayed Mode can be performed, etc.)

3.2 New methods: links to the documentation and tool repositories

All the procedures to perform the delayed mode quality control are set, except for the particulate backscattering (BBP). The links to the documentation (Euro-Argo RISE deliverables) and the tool repositories to get the routines are reported in Table 6.

We report here some additional information for some parameters.

DOXY:

A new method, taking into account the initial gain change, the carry-over effect from surface water residual on air measurement, the inadequate characterization of temperature response and the in-situ drift, is described in the deliverable D4.6. This method also suggests a decision path to choose and evaluate the optimal correction for a given time. This method will be presented and released at the first BGC-DMQC workshop in January 2023. It is presently installed on the DATARMOR facility at IFREMER and has been used by Coriolis DOXY DM operators, in addition to the SAGEO2 and LOCODOX methods.

pH:

The Euro-Argo RISE project has highlighted a couple of issues with the pH sensor. The first one concerns the reliability of the sensors, i.e. a large number of sensor failures. The second one arose when applying the recommended method (endorsed at ADMT) for delayed mode calibration when comparing the data corrected at the surface with in-situ measurements. These results are presented in the deliverable D4.7.

BBP:

No official method has been set (nor endorsed at ADMT) to push BBP data in Delayed Mode. However, at the Coriolis DAC level, following the recommendation of ADMT20 (Bellacicco et al., 2019) and as illustrated on Figure 3.6, some BBP profiles were pushed in delayed mode after a strict visual inspection.

CHLA:

All data pushed in Delayed Mode presently at the Coriolis DAC regarding the CHLA parameter are data from floats equipped with radiometers (following the method presented in Xing et al., 2011 to estimate the slope) and are located in the Mediterranean Sea. This method can be generalised to other floats not equipped with radiometers using machine learning methods (all the details are reported in the deliverable D4.2). Results at the global scale were presented in ADMT23 and the method will be applied in the coming months at the global scale.

Table 6: links to the documentation (Euro-Argo RISE deliverables) and repository of DM routines

Parameter	Documentation (Euro-Argo RISE deliverables)	Repository of DM routines
DOXY	(D4.6) https://doi.org/10.5281/zenodo.7369128	• SAGEO2 • LOCODOX
NITRATE	(D4.5) https://doi.org/10.5281/zenodo.7369098	• SAGE • CANYON-MED • CANYON-B
pH	(D4.7) https://www.euro-argo.eu/content/download/162915/file/D4.7_pH_QC_v2.0_under_EC_review.pdf	• SAGE • CANYON-MED • CANYON-B
Radiometry	(D4.4) https://doi.org/10.5281/zenodo.7369064	• Radiometry DM
BBP	(D4.3) https://doi.org/10.5281/zenodo.7369060	
CHLA	(D4.2) https://doi.org/10.5281/zenodo.7369043	• STEP 1 : DARK • STEP2 : QUENCHING • STEP3 : SLOPE

A set of routines was also created to fill into the Argo BD files (i.e. in Argo netCDF format) the relevant Delayed Mode information using the outputs of each of the BGC parameter DMQC tools. These routines are available on github (https://github.com/catsch/DM_FILLER). They presently work to fill BD files for DOXY, pH, CHLA, BBP and NITRATE, while the Radiometry DM procedure is a standalone procedure (filling the BD files by itself).

3.3 Achievements and current status of the DMQC of BGC parameters

3.3.1 Implementation of the BGC DMQC methods in Coriolis

In the following Figures, the green dots are representing the data pushed in delayed mode.

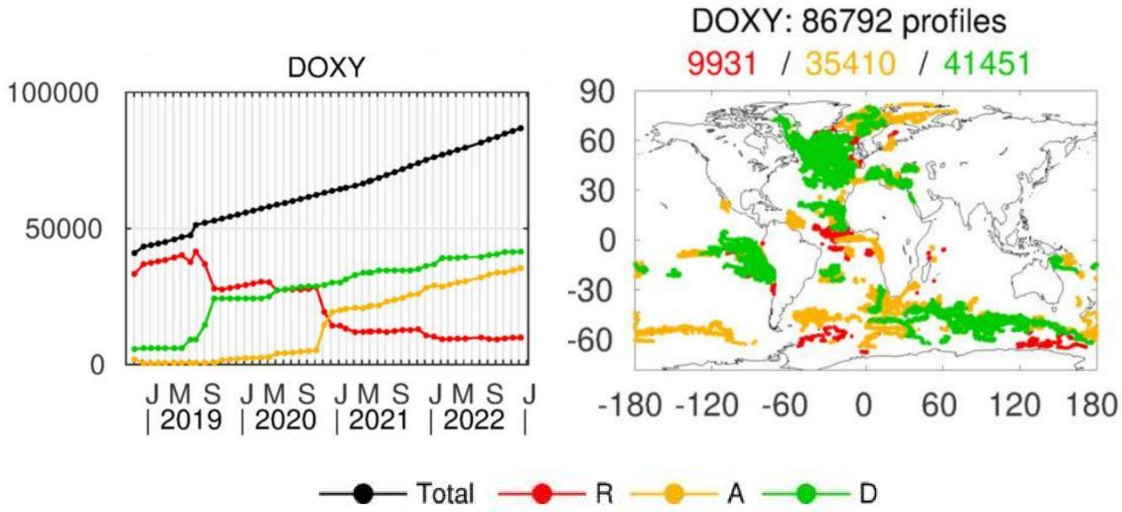


Figure 3.2 : Number, status and map of profiles of the DOXY parameter at the Coriolis DAC. R (Real Time), A (Adjusted in Real Time) and D (Adjusted in Delayed Mode) refers to PARAMETER_DATA_MODE.

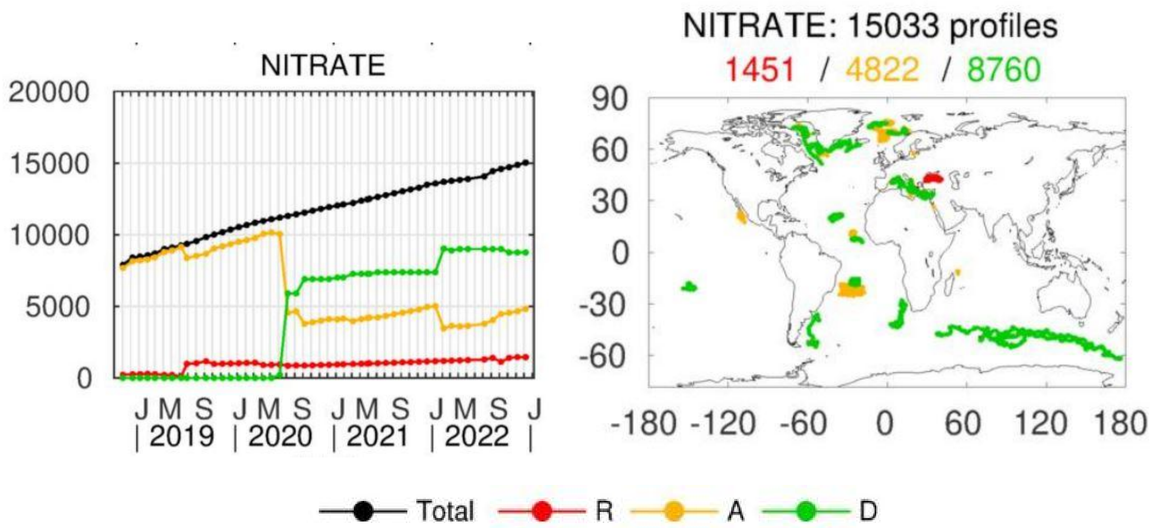


Figure 3.3 : Number, status and map of profiles of the NITRATE parameter at the Coriolis DAC. R (Real Time), A (Adjusted in Real Time) and D (Adjusted in Delayed Mode) refers to PARAMETER_DATA_MODE.

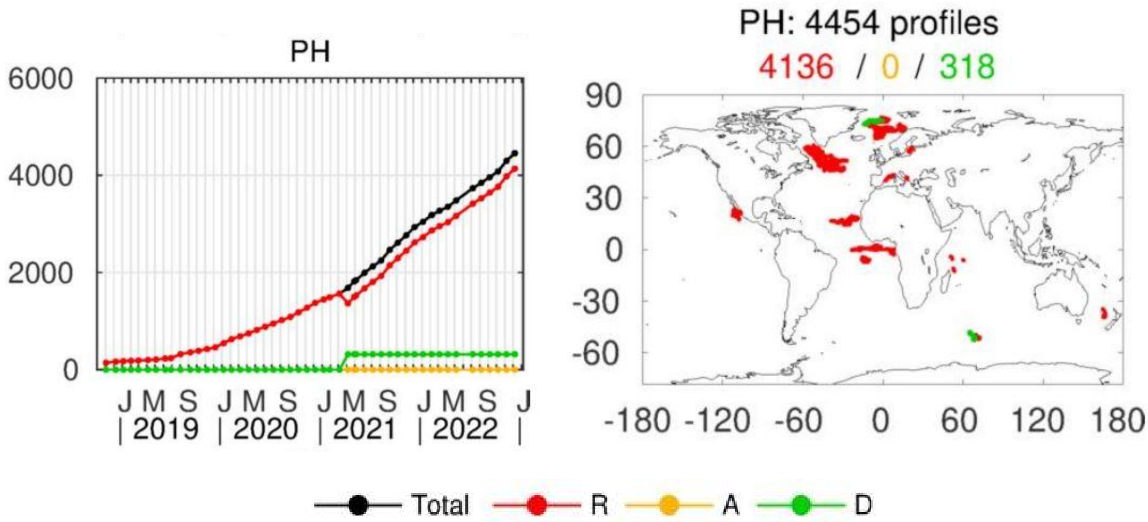


Figure 3.4 : Number, status and map of profiles of the pH parameter at the Coriolis DAC. R (Real Time), A (Adjusted in Real Time) and D (Adjusted in Delayed Mode) refers to PARAMETER_DATA_MODE.

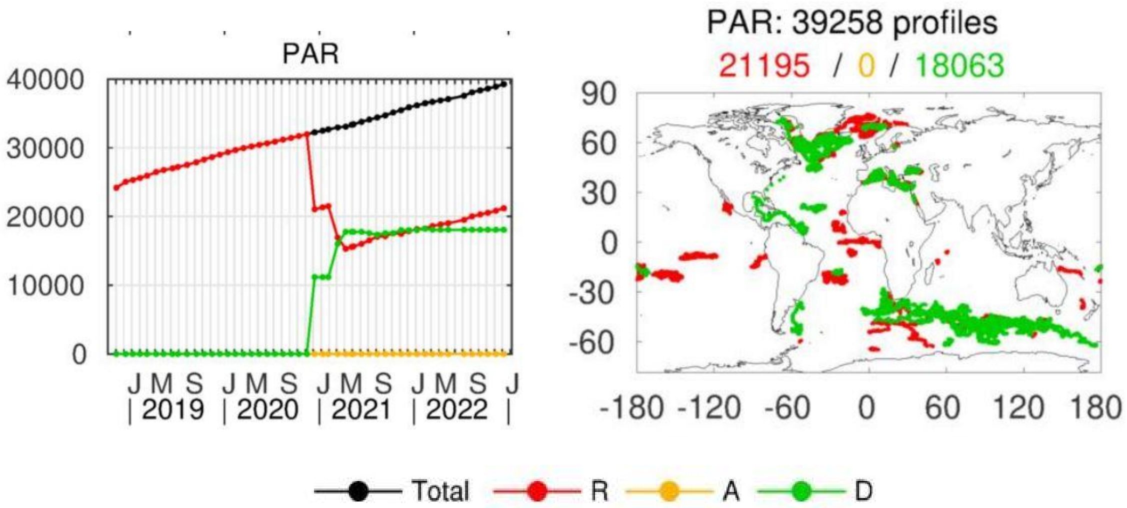


Figure 3.5 : Number, status and map of profiles of the radiometry parameters at the Coriolis DAC.R (Real Time), A (Adjusted in Real Time) and D (Adjusted in Delayed Mode) refers toPARAMETER_DATA_MODE.

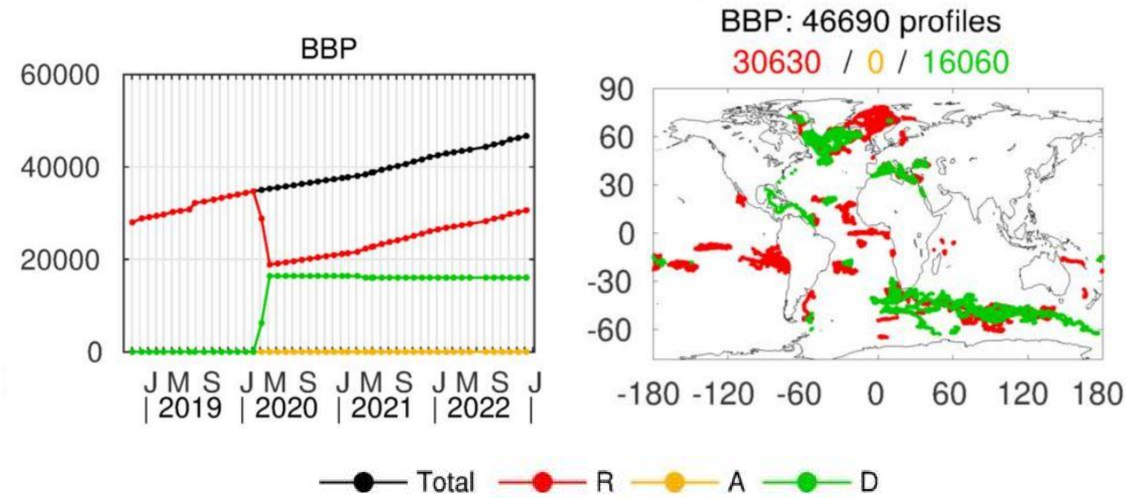


Figure 3.6 : Number, status and map of profiles of the BBP parameter at the Coriolis DAC. R (Real Time), A (Adjusted in Real Time) and D (Adjusted in Delayed Mode) refers to PARAMETER_DATA_MODE.

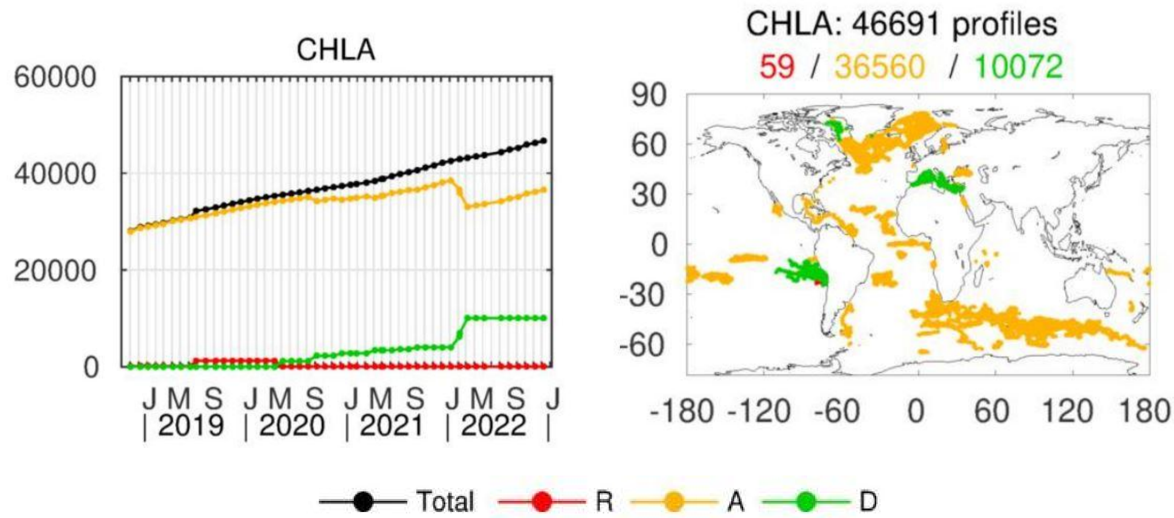


Figure 3.7 : Number, status and map of profiles of the CHLA parameter at the Coriolis DAC. R (Real Time), A (Adjusted in Real Time) and D (Adjusted in Delayed Mode) refers to PARAMETER_DATA_MODE.

3.3.2 Implementation of the BGC DMQC methods in BODC

Progress on BGC DMQC was started in December 2019 with UK Argo holding an oxygen and pH QC workshop between BODC DMQC operators and UK PIs. However, progress since has been limited by staff availability and put on hold due to lack of the functionality of the processing chains in BODC to produce the real time BGC data.

Despite this, the BODC Argo team has greatly expanded their knowledge of the DMQC analysis of BGC Argo floats through attendance at the BGC Argo workshop. BODC and NOC were strongly involved in the co-organisation of the BGC and 3rd Deep Argo workshop led by Ifremer, between 27th September to 1st October 2021. The objectives of the BGC part of the workshop were to review progress made in implementing best practice in the area of floats preparation, float deployment and data management; exchange with the user community (e.g. biogeochemical modellers, ocean colour) to listen to their needs and develop synergies.

BODC has started testing implementation of the DMQC BGC procedures workflow of the DOXY parameter for the BGC Argo floats. The initial output from the analysis has been generated and is planned to be submitted to the BGC expert for review and approval before its submission to GDAC. However, due to limited resources, and lack of fully developed infrastructure for DMQC processing of these floats in the BODC processing chain, BODC is currently not delivering the d-mode data of BGC data to the GDACs.

3.3.3 Collaborative framework and knowledge exchange

European Data Management Collaboration meeting

In May 2021 BODC participated in a European Data Management Collaboration meeting to improve the sustained collaboration between key European data management partners including specific EU-funded project work. Attendees included representatives from BODC and NOC (UK), Euro Argo ERIC, Ifremer, Coriolis, Sorbonne University and IMEV.

The vision from the BODC and Coriolis DACs were generally similar: to find ways to work together to progress more rapidly in thematics such as software development, DMQC, content and tools, agreed ways of working, outreach, contributing to the ARCs, data processing and roles in BGC Argo. A follow-up meeting was agreed to continue in the following years.

DAC workshops and surveys

BODC has collected responses from the recent DAC survey and is compiling a report which should be available in early 2023. Details of the second DAC workshop are yet to be finalised.

Collaboration with LOV (Oceanographic Laboratory in Villefranche)

More recently BODC expanded their knowledge by collaboratively working with the European BGC expert from the LOV in Villefranche (Catherine Schmechtig) to analyse Argo floats BGC parameters in delayed mode. This collaborative work was focused on knowledge exchange about the procedures for DOXY, CHLA, Nitrate, Radiometry, BBP, review and testing and implementing the available software e.g. Sage02, Sage, and sharing the codes. This collaborative work enabled BODC to compile the training materials, review the current limitations in the procedures and available software and also helped to adapt the training materials to both European and International variety of floats types and operator’s needs.

Figure 3.8 : Catherine Schmechtig (Coriolis, SU), Violetta Paba and Kamila Walicka (BODC), three days of collaborative work at Villefranche-sur-Mer (July 2022).

4 Perspectives

Now that all the procedures are defined both in Real Time and in Delayed Mode, we have to work on capacity building. At ADMT23, it has been decided to organise brief virtual workshops between DACs to work on very specific topics. That should allow the DACs to focus on a single point to improve. The first two topics for the year 2023 are, first, the deployment of the Real Time quality control for BBP and, second, the Real Time adjustment of the DOXY. More initiatives already on their ways are described below, they should pave the way to improve the BGC-Argo data quality at an international level.

4.1 DMQC workshop

The first BGC-DMQC workshop will be organised in Villefranche-sur-Mer in January 2023. Presently, 47 persons are registered (~10 nationalities).

The first two days of the workshop will focus on DOXY (Day 1: presentation of the sensors and on the different methods/tools, Day 2 : Training on the different tools to estimate DOXY adjustment and training on filling BD files). Day 3 will be devoted to biooptics (BBP, radiometry, CHLA) and Day 4 to pH and NITRATE.

4.2 FAIR-EASE project

The Coriolis DAC is involved in the European project FAIR-EASE, for which we are developing a demonstrator.

The aim of the demonstrator is to provide user-friendly access through a web portal to the three services (qualification/calibration/validation) focused on ocean biogeochemical observations measured essentially by sensors deployed on Argo floats, Glider or sea mammals. The demonstrator hopefully will simplify the access to a large set of different datasets (in-situ data, satellite data, model data…) required by the three services.

5 References

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