# UK National Report

Report to the 22nd Argo Data Management Team

## Authors

UK Argo data team at the British Oceanographic Data Centre, part of the National Oceanography Centre:

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- Other team members: Roseanna Wright

With contributions from the wider UK Argo team by:

- Jon Turton and Fiona Carse (Met Office)
- Brian King (National Oceanography Centre)
- Giorgio Dall'Olmo (Plymouth Marine Laboratory)

## General Status

### Data management team

The British Oceanographic Data Centre (BODC), part of the National Oceanography Centre (NOC), is the data assembly centre for UK Argo. It is funded primarily by the UK Natural Environment Research Council (NERC) and is responsible for data management of UK, Irish and Mauritian floats. In addition, UK Argo is a member of Euro-Argo and is continuing to manage some European Union floats as part of the now-ended MOCCA project. As part of the EU H2020 project ENVRI-FAIR, BODC is working towards hosting the Argo reference tables on the NERC Vocabulary Server (NVS). BODC is also the coordinator for the Southern Ocean Argo Regional Centre (SOARC).

| BODC Argo Team member | Contributions | Estimated contribution in past year as Full Time Equivalent (FTE) |
|---|---|---|
| Matt Donnelly | BODC Argo Lead<br>DAC lead<br>DMQC contributor<br>SOARC coordinating partner | 0.67 FTE |
| Clare Bellingham | DAC operator | 0.3 FTE |
| Kamila Walicka | DMQC lead | 1.0 FTE |
| Violetta Paba | Argo vocabularies lead<br>BGC QC lead<br>DAC operator | 0.4 FTE |
| Roseanna Wright | Metadata investigations | 0.05 FTE |
| | TOTAL | 2.42 FTE |

In addition to this, there was also just over 0.5 FTE of effort during the year from the software developer team, directly working on Argo system maintenance (e.g. Matlab upgrades) and development work (e.g. continuing OWC Python tasks).

The composition of the Argo team at BODC underwent some changes, with Katie Gowers leaving BODC in January 2021 and Violetta Paba returning from maternity leave on a part time basis for a portion of the year. A long term sickness absence has also hit the team, reducing the FTE

contribution by approximately 0.33 FTE. Justin Buck is the ENVRI-FAIR project manager, which includes BODC contributions to the FAIR agenda wider than just Argo. This project has also involved contributions from wider BODC including Gwen Moncoiffe and Alexandra Kokkinaki for NVS content management support, technical advice and training.

### General outlook

Core BODC Argo national capability funding from NERC remains static and is decreasing in real-terms. There is also additional funding from NERC associated with particular research projects and the floats they have procured, including from ORCHESTRA, ACSIS, BoBBLE and RoSES projects, but each of these draws to a close in the next year. BODC has secured set up funding for BGC floats purchased by NOC through NERC Capital funding. Efforts have continued to establish a clear plan for future funding to develop a more sustainable model of UK funding to support the UK contribution to the full-depth multi-disciplinary Argo array, but the funding situation remains challenging.

The Euro-Argo Research Infrastructure Sustainability and Enhancement (Euro-Argo RISE) project provides funding for developing core and deep DMQC (Delayed Mode Quality Control), management of BGC (Bio Geo Chemical) extensions and regional data quality assessments in the Southern Ocean. Additionally, BODC is funded under the EU H2020 project ENVRI-FAIR to introduce the NVS vocabulary server to support Argo vocabulary management.

BODC continues to seek additional sources of funding to support SOARC functions, but a long-term solution for sustained funding is yet to be identified.

## Status

### DAC functions

#### Data acquired from floats

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.

#### Near real-time data delivery

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. Since the last ADMT BODC has enabled capability to deliver two active Irish Arvor floats with oxygen and so the remaining outstanding floats for data delivery at BODC are two UK deep Arvor floats. Eight EU MOCCA floats ceased processing under the current version of the Coriolis decoder used at BODC for NKE floats and so processing has been temporarily transferred to Ifremer until we upgrade to the latest version.

Coriolis has been providing the processing for 13 PROVOR BGC floats and delivering the core data to the GTS on BODC's behalf.

The focus for the coming year is to enable the release of BGC profile data across TWR, SeaBird and NKE float models. Significant progress has been made towards building the infrastructure needed to deliver the near real-time BGC data from the UK floats. This is in preparation in part for the commencement of the ASBAN UK project.

### *Data issued to GTS*

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.

Recent updates to the retrieval scripts at the Met Office has meant that Argo oxygen data from floats processed through BODC is delivered to and available for use by the GTS.

### *Data issued to GDACS after real-time QC*

BODC delivers updated meta and tech files for all floats it processes alongside new core profile files to the GDACs as part of every processing run. Delivery of BGC profile data for most floats and many trajectory files are still pending.

During the past year BODC has tried to routinely address Altimetry QC and Objective Analysis reports shortly after receipt and made updates to the meta files following reports from the GDAC file checker.

### *Data issued for delayed-mode QC and sent to GDACs*

The BODC DAC function currently interacts with DMQC operators through two different modes of operation. The first is internal BODC DMQC operators who directly submit DMQC decisions to the BODC Argo System, and for which updated D-mode NetCDFs are automatically generated and submitted. For floats managed through the Coriolis processing chain instance deployed at BODC, both internal and external DMQC operators submit updated NetCDFs which are archived within BODC and submitted to the GDACs.

### *DAC collaboration*

In May 2021 BODC participated in a European Data Management Collaboration meeting where the aspiration was for improving sustained collaboration between key European data management partners including, but in addition to, 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 make more rapid progress together in ways such as software development, DMQC, content and tools of the NVS, agreed ways of working, outreach, contributing to the ARCs, data processing and roles in BGC Argo. A follow-up meeting was agreed for early 2022.

BODC has collected responses from the recent DAC survey and is compiling a report which should be available in early 2022. Details of the second DAC workshop are yet to be finalised.

## Web pages

NOC continues to maintain the UK Argo website (www.ukargo.net) along with a Facebook page (www.facebook.com/UKArgofloats/) and a Twitter account (twitter.com/ukargo). NOC also maintains the SOARC website (www.soarc.aq).

# Data use and data products

## Met Office

At the Met Office Argo data are used operationally:

- They are routinely assimilated into its FOAM (Forecasting Ocean Assimilation Model) suite which is run daily and produces 2 analysis days and a 7-day forecast. The FOAM suite now includes an improved resolution version of global FOAM with 1/12 degree horizontal resolution. This will continue to make use of Argo data to constrain the T/S fields in the same way as the original ¼ degree resolution system.

- Fields from global FOAM are also used to initialise the ocean component of coupled monthly-to-seasonal forecasts;

- Argo data are also used in the initialisation of ocean conditions in climate models run to make decadal predictions;

- A coupled ocean/atmosphere prediction system has been developed for weather forecasting timescales, and is now being run operationally, delivering ocean forecast information to the Copernicus Marine Environment Monitoring Service (CMEMS);

- Near-surface Argo data are used to validate the output from the Met Office's OSTIA (Operational Sea Surface Temperature and Sea Ice Analysis), where the OSTIA fields are used as a lower boundary condition in numerical weather prediction models run by both the Met Office and ECMWF.

- A coupled weather forecasting system which is initialised using coupled data assimilation, is running successfully in 'parallel suite' and is due for full operational implementation in early 2022. Once this is implemented operationally Argo data will directly contribute to operational weather forecasts as well as ocean forecasts. An assessment of the impact of Argo in a lower atmospheric resolution version of that coupled system was detailed in King et al., 2019.

Met Office research & development applications (non-operational) which have made significant use of Argo data:

- A paper was published on OSSEs to investigate potential impact of expanding the Argo array (Mao et al., 2020);

- David Ford has done some OSSEs looking at the impact of the planned BGC-Argo array of floats in a global physical-biogeochemical model where he assimilates synthetic versions of the BGC Argo profiles in conjunction with satellite ocean colour data (Ford, 2021);

- One other project where we made good use of Argo data was in the assimilation of satellite sea surface salinity data from SMOS, Aquarius and SMAP. The near-surface salinity data from Argo was used to bias correct the satellite salinity data and was crucial for the performance of the assimilation of SSS data. That work is written up in Martin et al., 2019.

- Another paper was published investigating impact in FOAM and the Mercator system of satellite SSS assimilation which used Argo for assessment (Martin et al., 2020).

In the Hadley Centre for Climate Science and Services, Argo data is used to make the following products:

- EN4 contains in-situ ocean temperature and salinity profiles and objective analyses. It is updated monthly using real-time Argo profiles and GTSPP data, and annually using delayed-mode Argo profiles (and WOD, GTSPP and ASBO data). EN4 is freely available for scientific research use (see http://www.metoffice.gov.uk/hadobs/en4/). The latest version is EN.4.2.2, which includes a fresh download of all the source data and a substantial update to the XBT/MBT correction schemes. EN.4.2.2 contains four ensemble members where previously there were only two. There is also a new product user guide (based on both the Argo Users' Manual and the HadIOD user guide), including FAQs and example code. EN4 is also forming part of a GEWEX EEI project - comparing Ocean Heat Content calculated from reanalyses, in situ data and satellite products (the project website is https://sites.google.com/magellium.fr/eeiassessment/dissemination/documents?authuser=0).

- HadIOD (Hadley Centre Integrated Ocean Database) is a database of in situ surface and subsurface ocean temperature and salinity observations supplemented with additional metadata including bias corrections, uncertainties and quality flags. The dataset is global from 1850-present with monthly updates. The current version is HadIOD.1.2.0.0, the chief sources of data are ICOADS.2.5.1, EN4 and CMEMS drifting buoy data. This product has been available to the public since mid-2020 via https://www.metoffice.gov.uk/hadobs/.

Met Office science uses of the EN4 product include OHC analysis, contributions to BAMS, Ocean Obs'19 White Paper and an Earth Energy Imbalance paper (von Schuckmann et al., 2020).

### National Oceanography Centre

Argo data are used widely within NOC, where the science applications include:

- measurement of evolution and drivers of mixed layer processes in the (Indian Ocean);
- inventory and evolution of heat and freshwater establishing controls on budgets (both regional and global);
- deep heat content (N Atlantic).

### Plymouth Marine Laboratory

PML have the lead for BGC Argo in the UK, where the data are used for:

- investigating different aspects of the biological carbon pump (e.g., mixed-layer pump, fragmentation);
- investigating export fluxes and efficiency in hypoxic ocean regions;
- providing a description of the physical environment in the framework of biological (e.g. mapping eel migration routes) and biogeochemical studies;
- developing techniques to generate 3D fields of biogeochemical variables by merging ocean colour and in-situ data;

- investigating mesoscale structures by combining altimetry and in-situ profiles with a special focus on Agulhas rings.

## Real Time Mode QC of BBP data

PML, funded by the H2020 Euro-Argo RISE project, has developed a set of new tests to quality control optical backscattering (BBP) data in real time. These tests have been implemented on all BBP profiles held at the Coriolis GDAC to understand the impact that they would have on the existing global dataset as well as on the datasets held at each separate DAC. Preliminary results were presented in two workshops open to all international Argo members interested in RTQC of BBP data. Feedback from these workshops was incorporated in the latest version of the tests that will be proposed at the next ADMT. A preliminary summary document has been made available for further comments (https://docs.google.com/document/d/1amf58gLxhwuIM_Y3XxUmGdVyJXrm5IU48A_SnOYAu_A/edit). The code has also been made available through the euroargodev GitHub page (https://github.com/euroargodev/BBP_RTQC).

## Delayed Mode QC

### Core Argo

**DMQC core progress**

The strategy adopted to deliver the support to national programmes focused on ensuring a high-quality approach and the progressive enhancement of expertise. This involved adopting the latest reference databases, improving BODC's internal processing chain and fixing various technical issues to be able to perform DMQC analysis of the iridium communication floats, which was not possible before. This allowed a significant reduction of the majority of BODC's backlog.

The DMQC analysis has been undertaken on floats deployed in four different regions: the North Atlantic, the South Atlantic, the Southern Ocean, and the Indian Ocean. The analysis has been undertaken in separate batches for each of these regions, with priority given to floats that had already ceased functioning and those with a large number of profiles. This approach provided the opportunity to gain a deeper understanding of the regional oceanography in each region, the variability in float behaviour over time, and the challenges this raises in DMQC.

This work has resulted in a significant improvement in the total amount of delayed-mode profiles delivered by BODC compared with available real-time mode data. From February 2021 until the time of writing, BODC has submitted more than 12,600 profiles. The most recent statistics provided by Ifremer, from October 2021, shows that BODC has delivered around 78.5 % of delayed-mode data from all available data at the DAC. This is a significant improvement compared to the status in December 2018 where only around 45 % of profiles had been through DMQC, and this situation is expected to improve further in the coming year.

DMQC support was offered to any national programme requiring assistance, where BODC has significant physical oceanography expertise. BODC focused on supporting the UK and Irish Argo programmes, data for which are managed by the BODC Argo Data Assembly Centre (DAC) function.

The entire BODC Argo fleet went through the international DMQC audit run by external partners from the DMQC core Argo group. The audit was motivated by the fact that a higher percentage of SBE CTDs are now experiencing sensor drifts, which may not be easily identifiable by only examining individual time series. All of the identified BODC floats were reviewed, any additional revisions or corrections have been completed and re-submitted to GDAC. Additionally, the floats assigned to BODC, but DMQC-ed by external partners have been also reviewed and corrected where it was required.

A combination of the strong focus on comprehensive training provided to BODC Argo team members and the diverse requirements of DMQC ensures future sustainability in providing DMQC analysis and regular delivery of Argo data in delayed mode to the Argo Global Data Assembly Centres (GDACs).

### DMQC core working groups

BODC (Kamila Walicka) actively contributed to activities related to the Abrupt Salty Drift (ASD) group, focusing on estimating the best practices, guidance and examples on how to treat salinity data that are affected by sensor drift to produce optimal adjustment in delayed-mode. This involved actively contributing to updating the shared list of floats affected by the salty drift and reviewing documentation related to the draft version of best practices for DMQC operators of core Argo floats. The final version will be incorporated into the QC Manual after the ADMT-22 meeting.

### Conversion of core Argo DMQC software OWC from Matlab to Python

BODC (Kamila Walicka and BODC software developers) has continued development works related to the conversion of the DMQC software (OWC package) from Matlab to Python. This initiative is closely associated with the results from a survey about the existing tool and methods used within the DMQC Argo community, which was evaluated as part of the Euro-Argo RISE project Work Package 2 (WP2) last year. The survey identified barriers and opportunities to improve the efficiency and capacity of the overall community effort. A decision was reached to assess the potential for converting the OWC (Owens, Wong, Cabanes) Matlab code used for DMQC analysis to free software, with the widely-used Python being the preferred language.

The converted code is fully functional and waiting for User Acceptance Testing. The international Argo community has been encouraged to perform further testing to detect any unusual code behaviour, occasional errors characteristic for floats from various regions, and to report any further suggestions to improve the functionality of the overall package. However, except for some initial interest from the Argo community, the code has been exclusively tested by BODC's DMQC operator.

The development version of the OWC Python 'pyowc' package is currently available from GitHub Euro-Argo repository argodmqc_owc. The final destination of the code will be in ArgoDMQC where the Matlab version of OWC software is placed. The development work carried out by BODC over 2021 was focused on improving the code performance, readability and fixing any remaining known issues that arrived during testing the floats. The next steps to finalise the project are to continue the User Acceptance Testing involving the broader Argo community, improve code readability and enhance functionality related to configuration and code design. As part of the development work, there has been close collaboration with Guillaume Maze from Ifremer/LOPS to continue the development of the pre-processing procedures of the OWC method.

Combined with the potential to fully parallelize the analysis code, the conversion of OWC Matlab to OWC Python marks a step-change in capability and sets a new standard in quality control software development for the Argo community.

## Deep DMQC

NOC (Brian King) was involved in the work of the Deep Argo team related to compiling the new update to the Argo Quality Control Manual for CTD and Trajectory Data, including the procedures for the Real-time QC flag shame and Real-time adjustments on Deep Argo vertical profiles. In April 2021, the Deep Argo team compiled the draft version of the procedures for DMQC of Deep Argo salinity data.

BODC has started development work on automatically applying the CpCor correction for pressure effects on conductivity data of deep Argo floats (>2000 dbar) in the Real-time QC process which was recommended by the Deep Argo team earlier in 2021. These corrections are needed in salinity data to remove the pressure-dependent salinity bias. This step is required to perform further analysis of deep Argo floats in delayed mode. Moreover, BODC is planning to implement the delayed-mode procedures for DMQC analysis of Deep Argo floats in the following year (2022).

BODC (Kamila Walicka) and NOC (Brian King) have been actively involved in the coordination and organisation of DMQC for deep ocean data as a part of the EuroArgo Rise WP3, Task 3.2. This involved organisation and coordination of the intermediate meeting with other European partners within the task and also providing a regular update of progress to the reporting body.

## BGC DMQC

BODC (Violetta Paba) has not been able to make progress with DMQC of the UK BGC floats. In November 2021, LOV (Catherine Schmechtig) offered to DMQC the oxygen and radiometry data from the UK Metbio floats on our behalf. If available, Catherine may provide DMQC training to Violetta in the new year, so that BODC can reach the position to take these floats back on.

With regards to the tasked Euro-Argo RISE WP4 deliverable of enhancing the current oxygen QC methods, BODC (Violetta Paba) reviewed a report written by GEOMAR detailing a new methodology they had developed.

## DMQC workshops participation and coordination

BODC (Kamila Walicka) and NOC (Brian King) were strongly involved in the co-organisation of the BGC and 3$^{rd}$ Deep Argo workshop led by Ifremer, between 27$^{th}$ September to 1$^{st}$ 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; and to foster interaction with other components of ocean observing system, including Deep Argo. The objectives of the Deep-Argo part of the workshop were to assess the progress of the Deep-Argo mission (from the scientific use of Deep Argo data to the technological ability of floats and sensors), to review end-users needs and to finalize the implementation plan of the global Deep Argo array. Additionally, BODC (Violetta Paba) presented the recent achievements and progress of BODC of the Argo metadata and NVS as a part of the ENVRI FAIR project. PML (Giorgio Dall'Olmo) presented the Real-Time QC tests for BBP data with regards to BGC floats. NOC (Brian King) demonstrated performance and issues of Deep Apex floats and CTD sensors of RBR floats. Moreover, Brian also gave a review presentation of how ocean circulation is being studied using Deep Float data.

NOC has committed to the preparation of hosting the 2nd European Argo/7th International Argo Delayed-mode Workshop for CTD data in Liverpool, UK. This workshop aimed to include the DMQC analysis for both core (2000 m) and deep (4000 m-6000 m) Argo floats, with the latter being a focus of the Euro-Argo RISE project WP3 on developing deep DMQC methods. The agenda and registration were advertised with the support of the Euro-Argo ERIC Office via *2020-DMQC-workshop.* The meeting was originally planned to happen from 12th May to 15th May 2020. However, due to the ongoing COVID-19 pandemic, this workshop has been postponed. The next DMQC workshop for deep Argo floats is planned for 2022 as an in-person event, on the condition of relaxation of international travel restrictions related to COVID-19.

# GDAC Functions

## NERC Vocabulary Server

Following on from ADMT-21, progress has been made on the EU H2020 ENVRI-FAIR work.

- BODC now hosts a GitHub space dedicated to the Argo Vocabulary Task Team (AVTT), where all NVS-related discussions and updates on Argo metadata tables can take place and be openly accessed: https://github.com/orgs/nvs-vocabs/teams/avtt
- BODC has provided the material to update the 'Argo vocabulary server' web page on the Argo data management website: http://www.argodatamgt.org/Documentation/Argo-vocabulary-server
- BODC (Roseanna Wright) has investigated the yet unconstrained metadata fields used in the Argo NetCDF file, and produced a programme-wide assessment, evaluating issues and proposing solutions. From this stemmed her work to create a new NVS collection for the originally unconstrained PI_NAME NetCDF field, now live on the NVS.
- BODC (Violetta Paba) and Ifremer (Guillaume Alviset) have collaborated on the creation of NVS collections for the trajectory tables. These are now live under collection ID R15 (measurement codes), RTV (cycle timing variables) and RMC (trajectory measurement code categories). Mappings between these tables are being created.
- SENSOR_MODEL collection R27 has been completed, and mappings between it and R26 (SENSOR_MAKER) have been created.
- BODC (Clare Bellingham) is working on creating NVS collection R28, which will capture the CONTROLLER_BOARD_TYPE vocabulary.
- Talks have been initiated with float manufacturers, specifically Teledyne, to improve the sharing and standardisation of metadata. BODC (Violetta Paba) is collating feedback from the ADMT community as to what requirements DACs may have.
- Moreover, a mappings mindmap between Argo NVS collections and beyond has been created to be used as a roadmap for future work.

# Southern Ocean Argo Regional Centre

## Developing SOARC Partnership

BODC continues to provide the coordinating role between the SOARC partners. This has led to a growth in the partnership to include another partner from the SIO, USA in the SOARC group. BODC (Matt Donnelly) liaised with various organisations improving the partnership and further collaborations:

- Began engaging with the Polar Collective, who are an outreach organisation trying to link scientists within the Southern Ocean (SO). They might be a good partner to sustain links with IAATO.
- Together with other SOARC members, reviewing the OceanOPS activities that may influence and help the SO deployment coordination which led to the draft proposal for regional coordination of Argo floats.
- Began engaging with the UK's Net Zero Oceanographic Capability (NZOC) project regarding improving awareness of Argo's under-ice capabilities.
- Putting the Kent Scouts ReQuest 2021 project, who are undertaking an expedition on Bark Europa, in touch with the Dutch programme manager Andreas Sterl to rekindle float deployments from the ship. Bark Europa is a member of IAATO. Matt created a Google Map of suggested priorities to deployments of their floats in the SO.

## Regional data quality assessments

As part of the Euro-Argo RISE project WP5, Task 5.3, BODC (Kamila Walicka) and NOC (Brian King) have been working to establish a method of regional data quality assessment in the SO.

BODC has started a review of the currently available reference data which could be potentially used to support the quality assessment in the SO. This included meeting with Matt Mazloff from SCRIPPS and BSH partners to better familiarize with the model-based reference data developed by Matt Mazloff to form the basis for establishing regional data quality assessments for core Argo in the SO and potentially other applications including future BGC data quality assessments and observing system design. This could be useful for both undertaking regional data quality assessments and also highlighting where we are lacking sufficient observations on a finer granularity than we currently have available to us.

BODC updated and set up the internal local mirror of the entire set of GDAC Argo profiles. This dataset is updated weekly on NOC's server and will be used as a source of Argo data for regular quality assessment of all floats from the SO.

BODC reviewed and tested the tool for characterisation of Southern Ocean Argo float profiles that was developed by the University of Bristol https://github.com/argosoarc/soarc_floatchar. This code characterises profile location into zones according to core profile data in accordance with literature-based criteria of the ACC fronts and zones. This method reduces the impact of selected reference data from other zones in the SO during the quality checks of salinity data of Argo floats.

BODC (Kamila Walicka) and NOC (Brian King) organised a meeting with Andrea Garcia Juan from Ifremer to familiarise with the newly developed tool for the reference data characterisation. The code is based on the machine learning methods and was developed in Ifremer as a part of the Euro-Argo RISE WP2 package, related to improving tools of quality control of core Argo floats. BODC is going to review this code and assess the possibility of the future use of the code in Argo floats and reference data classification approach to improve the regional quality assessment of Argo floats in the SO.

BODC has started the review of the assessment method of the DMQC-ed floats used by Coriolis ARC in the North Atlantic to identify if some elements of this method could be used in the assessment in the SO.

Another step is to review the quality and identify any common patterns of analysis of already DMQC-ed floats from the SO from various DACs. Moreover, the work in reviewing other potentially useful reference databases and review of the assessment method used in Atlantic ARC will be continued. BODC will also review the currently available machine learning techniques to classify ocean vertical profiles for DMQC, developed in Ifremer as a part of the Euro-Argo RISE WP2 project, to determine a base for further cooperation and potential use of this technique in quality assessment in the SO.

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