ARGO

part of the integrated global observation strategy

25th Argo Data Management Team meeting

Trieste (Italy), 21-25 October 2024

ADMT25 meeting report

Links to Google drive:
https://drive.google.com/drive/folders/1f9lWWPEglxm-z4pcjaQdAvaV6Ds_3KUE?usp=drive_link

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1 OneArgo session – part 1

1.1 Introductory session

1.1.1 Local welcome (OGS President Prof. Nicola Casagli)

Professor Nicola Casagli welcomed everyone to Italy and OGS and stated that OneArgo is critical to ocean observation. He explained that OGS is part of the EuroArgo ERIC and runs the MED Argo ARC. He noted that OneArgo is a high priority for the Italian infrastructure and their main areas of interest are the Med Sea and the Southern Ocean. There is also interest in Deep Argo and BGC Argo, as well as the generation of physical and BGC products.

1.1.2 Welcome & Objectives of the meeting (ADMT co-chairs)

Megan Scanderbeg welcomed participants to the ADMT-25 meeting and thanked OGS for hosting the 80+ in person attendees and 60+ virtual attendees. Next, she congratulated the team on reaching three million profiles! After that, she noted that one theme of the week will be around modernization and how it relates to the real time processing chain, the GDACs and our internal communication. Another focus for the week is on data timeliness and quality for all Argo Missions. There will be discussions around BGC real time methods, Deep corrections for Cpcor and more. The final focus will be the continued need to communicate with our users.

1.1.3 Feedback from AST-25 (Susan Wijffels, Brian King, Breck Owens)

AST co-chairs reported on the status of the global implementation of OneArgo. Against OneArgo goals, global coverage is being sustained at around 81%, Deep coverage is at 16% and BGC has grown from 29 to 34%. At this point BGC and Deep floats now provide a significant fraction of core coverage, thus underpinning the need to have equivalent data delivery.

Over the past few years, Core float lifetimes have remained static at around 5 years, while Deep and BGC float lifetimes are increasing (now at 3 years), as these float models get debugged and improved. Overall net deployments/year have stalled at around 650/year, but the float mix is changing to include less core and more BGC floats, the latter which have lower float lifetimes. Fortunately, new funding for BGC-Argo is providing additional floats that support the Core-Argo mission, as well as entraining a new set of data users. There remains a danger that global core coverage may start to decline if more additional funding is not identified.

The resources to implement OneArgo are a substantial increase (3 times core) over what most national programs have in hand or expect in the near term. Despite this, resources are moving into the new missions, which may have consequences for core coverage.

To help understand and communicate to our supporting agencies, governments and our users, the consequences for the size and structure of the global array of different funding choices, a set of scenarios were modeled. If funding remains static through 2030, the global core coverage will decline

to 75%, BGC will decline to 20% and Deep remain below 20%. If we attempt to maintain capacity in national programs and a market for the new mission platforms and sensors by redistributing present resources across the new missions, BGC and Deep can grow to 40% of design coverage, but global core coverage collapses to below 50%. These scenarios illustrate that in the next 5 years without major funding increases, the global Argo array will evolve into a very suboptimal state.

AST recognized the tremendous progress that ADMT is making across all missions including driving down latency, and increasing the amount of Deep and BGC data available to users in real-time. In addition, engagement with data aggregators that service the climate community has resulted in changed practices to more quickly replace real-time data with delay-mode versions.

Current issues include:

- How to serve our data better - simpler products, cloud environments, WMO WIS2.
- Continuing to explore how to load-share DAC functions given the increased complexity generated by new missions/platforms/sensors.
- Engaging across networks - discussions with FVON (just started), new OCG Data Team
- AST would like to ask ADMT to undertake an audit of the status of DM for core and any backlogs, to be considered at the next AST.
- AST recognizes there has been some progress on DTraj, but this is patchy. Is there anything ADMT would like AST to do to progress this ?

1.1.4 Status of Action Items from ADMT-24

Megan Scanderbeg reported on the status of the actions from ADMT-24. There were 64 actions in total and 14 were done, 18 are in progress, 21 are still to be done and 11 had no status. She noted that this was a pessimistic view since there was a lack of feedback on some issues and the 11 ones with no status were BGC actions which had not been implemented fully in the GitHub repository.

The rest of the presentation focused on actions excluding DAC and BGC ones. This left 36 actions, of which 13 were done, 12 were in progress, 10 were still to be done and 1 had no status. For the GDACs, the two actions related to the updating of the index files were still in progress and will be resolved after the meeting. The action with no status was concerning the transition of the File Checker to Coriolis which will remain.

There were several actions related to DMQC work and two were still ‘to do’ including one relating to updating the table for deep floats for which there is no clear Cpcor correction information in the SCIENTIFIC_CALIBRATION field. Cecile reported that some entries have been updated, but not all, so this will remain in progress until ADMT-26. The other action that had not been started was a reminder to ask DMQC operators to look at the list of floats on the min/max detection list and to greylist as needed. This action is hard to evaluate, but floats with bad dmode data remain on the list. DMQC operators are asked to review these urgently and to flag data bad as needed. The other two actions in progress were related to ASD floats and Delphine updated the ADMT on Thursday with the information that many CTDs have been identified since ADMT-24, but a large majority of those were PMEL floats entered into the spreadsheet that fall within the already detected serial number ranges. 10 new floats were added with serial numbers greater than 11252. This action will continue. The other action was related to the initial asymptotic salinity detected by Birgit in the Weddell Gyre. Upon further updates during the meeting, it

appears that Tributyltin Oxide (TBTO) may be biasing the initial ten cycles for many floats. The action can be continued and reported on again at ADMT-26.

There were three actions that needed to be implemented by OceanOPS related to monitoring of BGC sensor behavior, the creation of a list of neglected profiles and monthly digest emails to Delayed Mode Contact Person (DMCPs). Later in the meeting, the tools were demonstrated to monitor BGC sensors and to create a list of neglected profiles. Feedback was requested on both and they should be moved to completed.

There were several actions on interactions with manufacturers, all of which were completed by the end of the meeting.

The ADMT co-chairs had not completed all their actions due to slow progress on the update of the ADMT website. When the website is updated by early 2025, the actions will be implemented.

Finally, there were two actions in progress related to users and the min/max test. After Christine's presentation later in the week, it was agreed that Argo should act as soon as possible on the min/max test results rather than asking operational centers to use a new list to exclude data.

1.2 DACs session

1.2.1 AOML (Claudia Schmid)

Overview and Status:

As of October 2024, the AOML U.S. Argo DAC (U.S. DAC) contains data from 8,968 floats (2,192 currently active), encompassing over 1.6 million profiles (1999-2024), and accounting for 52% of all global Argo data. Between September 2023 and October 2024, the U.S. DAC sent 83,702 Argo float profiles to the GDAC, requiring a resubmission of the meta, technical and trajectory files. Overall, there was a 4 % increase in metadata and technical files, a 15 % increase in trajectory files (R- and D-mode), and a 17 % increase in BGC profiles. The U.S. DAC ensures timely data dissemination, submitting 96% of all profiles to the GTS and the GDACs within 12 hours and 98% within 24 hours. The median elapsed time between observation and data availability is approximately 3 hours. Additionally, it maintains a cloud-based mirror system and continually adapts its infrastructure to accommodate new float types, data formats, quality control methodologies, and evolving Argo management requirements.

Processing Capabilities:

The U.S. DAC is capable of processing ten Iridium and five Argos float types. Core and Deep capabilities (R- and A-mode) include pressure; temperature (including near-surface temperature); salinity (including surface temperature and salinity); and conductivity from Teledyne Webb APEX (core, oxygen, BGC); Teledyne Webb APEX (deep); Teledyne PALACE; Seabird NAVIS (core, BGC); NKE Instrumentation PROVOR; MRV Systems ALTO; MRV Systems SOLO (core, oxygen, BGC); MRV Systems SOLO2; MRV Systems SOLOD (deep).

BGC: The AOML Iridium decoder can handle a variety of BGC data variables. These include oxygen; chlorophyll; optical backscatter; CDOM; pH; nitrate; downwelling irradiance; upwelling radiance; and PAR. This decoder supports data from several float types, including Teledyne Webb APEX, Seabird NAVIS, and MRV Systems BGC-SOLO floats; and accepting these data file formats: ASCII/HEX *.msg; ASCII *.phy; Hex *.hex; Hex *.cp; SBD; ASCII *.isus; ASCII *.dura; and ASCII *.srf. Although AOML is actively developing their BGC capabilities, the majority of data from US BGC Argo floats is still being processed and managed by the Monterey Bay Aquarium Institute (MBARI) and transferred to the GDAC through the AOML DAC. This includes data from 396 active five-sensor floats from within the Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) and Global-Ocean Biogeochemistry (GO-BGC) arrays (https://soccom.princeton.edu/; https://www.go-bgc.org/). MBARI continues to play a crucial role in the development and maintenance of BGC-Argo data adjustment protocols as well as routine monitoring and auditing of high-quality BGC-data holdings (both nation-wide and internationally).

AOML U.S. DAC Collaborations:

1) US Argo consortium members:

The U.S. DAC is collaborating closely with the US Argo consortium members with respect to core Argo (AOML, PMEL, SIO, UW, WHOI), deep Argo (PMEL, SIO, WHOI) and BGC (AOML, MBARI, PMEL, SIO, UW, WHOI).

2) **External** (Argo equivalent floats):

JPL: AOML continues to collaborate with JPL on the Iridium SBD APEX decoder, which processes the output from the Teledyne decoder. Most Iridium SOLO data is received in pre-decoded .phy file format.
UMaine: AOML has collaborated with U. Maine in the past and is discussing further collaborations.

U.S. DAC Achievements:

AOML has expanded the capabilities of the APEX/NAVIS Iridium decoder to accept various data file formats, including *.msg; *.cp; *.isus; *.dura; *.srf; and *.sts.

The decoder for SOLO, ALTO, and ALAMO floats has been enhanced to process hex files in a format developed by SIO in addition to SBD data coming in directly via email. Its capabilities have been expanded to process the data from the BGC SOLO floats. This updated decoder uses modules from the APEX/NAVIS system for the conversion of BGC data. Ongoing efforts include consistency checking of results for SOLO and ALTO data by comparing the derived data with SIO and WHOI results. There is also a U.S.-based task team working to develop a unified JSON format for all relevant float types, and a single decoder for the SOLO family floats.
BGC Argo processing achievements led by MBARI over the past calendar year include real-time and delayed-mode processing and management for 113 newly deployed BGC-Argo floats. These deployments have incorporated the following:

- New six-sensor platforms: next-generation Navis Nautilus with .cp continuous profiling format, and six-sensor MRV-SOLO
- New sensors (on both APEX, Navis and SOLO platforms): FLBBFL, OCR504 (multiple channel configurations), SBE83 optode, GDF pH sensor

Current Work:

Grey list flags: The AOML implementation of grey list flags for trajectory data is nearing completion. This feature will help flag data points that may require further scrutiny.

Trajectory files: Final testing of the error ellipse data for Argos float trajectory files is underway, with deployment scheduled once the testing is completed successfully. AOML is also working with MBARI to develop and implement an appropriate workflow for inserting relevant real-time and delayed-mode BGC-parameter data into the v3.2 trajectory file format. This work is ongoing.
Reprocessing legacy floats: This task entails improvements to the algorithms for certain Argos floats, specifically those related to estimating the start of transmission times. Although this reprocessing is of lower priority, it is necessary and will require further testing before it can be finalized.
QC: The AOML US. Argo DAC is currently updating the chlorophyll-A and BBP (backscatter) processing methods to align with the latest quality control (QC) manuals. Similarly, the oxygen data processing and QC protocols are being revised to meet the most recent standards, though the details of this update are still to be determined.
Challenges:
One of the primary obstacles is the tight turnaround time required to incorporate new float types and data formats into the system. Additionally, the reprocessing of legacy data after significant updates to the ADMT (Automated Data Management Tool) is a time-consuming process that adds complexity to the workflow.

1.2.2 BODC (Clare Bellingham)

BODC has completed software development to process Provor CTS5 floats and deep SOLO. A lot of time this year has been spent on the update of BODC internal systems related to Matlab, Oracle and Rocky8 and this resulted in some downtime of our delivery to the GTS and GDAC. There has been investigation and planning work for our RBR RT salinity adjustments and their implementation into the BODC system. We have applied RT adjustments to DOXY, CHLA and Nitrate and addressed our objective analysis and min/max flagging.
We have been responsible for maintenance of the NVS and support to AVTT group. There has been training for a new BODC DAC operator. Work has been done to develop BODC Argo strategy planning (such as working on new proposals and a new finance reprofiling).

We plan to send adjusted BGC params onto GTS in early 2025. Testing the DAC container is underway and we plan to provide feedback. We aim to contribute to scaling up the Argo system by investigating the design of a new, more automatic, and modular software for the Argo real-time system and providing prototype software containers that any DAC could download and deploy which is part of EuroArgo One to begin 2025. Work on the Argo metadata developments by supporting the sustainable development and maintenance of the Argo metadata lists on the NVS, continue collaboration with Argo vendors to improve the Argo metadata workflows – part of EuroArgo One to begin 2025. We hope to address our RBR RT adjusted corrections and other ADMT actions such as TOD will be assessed.

Sensors that our science team are writing into funding proposals this year include the Flowrider Rockland Scientific, Provor with RBR Tridente, Provor with RBR oxygen, Deep SOLO with RBR CTD, Deep SOLO with RBR Tridente, Deep SOLO with RBR oxygen, Deep Arvor with RBR Tridente, Deep Arvor with RBR oxygen and ALAMO core floats.

The UK DAC still suffers from insufficient funding to cover basic Argo activities. Due to this we have single points of failure but we are implementing measures regarding training to help address this. The challenge of software updates and implementations external to BODC Argo but within wider NOC remains an issue, as does software maintenance of our current codebase and applying updates to legacy code which runs parallel, but mostly separate to, other RT platforms at BODC. Running two processing chains has been both beneficial and brought challenges where updates are often at different stages. We want to report an issue with sea surface pressure measurements from APF11 argos floats which is delaying our DM analysis and will result in a larger error being applied if not resolved, this issue has been reported for discussion in github here https://github.com/OneArgo/ADMT/discussions/85

1.2.3 Coriolis (Thierry Carval)

Coriolis DAC challenges (slides)

SWOT analysis

In order to address the challenges posed by the OneArgo program, we performed a SWOT analysis of the Coriolis Data Assembly Center.Strengths, Weaknesses, Opportunities and Threats.

Our Strengths

Active since 1999, a long experience, with precious experts - JPR, CS, HB, VR, …
Deal with 3725 floats (6 families, 185 versions), 60 sensors, 168 parameters
DAC infrastructure hosted by Ifremer, within its large infrastructure for ocean data
Argo-France 2020-2030 funding for « run » operations
Argo-dashboard, Argo-data selection, Argo floats recovery

Our Weaknesses

“Build” activities rely on projects fundings
Significant delays in actions implementation due to manpower shortage and/or funding
Obsolete editorial web site https://www.coriolis.eu.org

Opportunities

Cloud infrastructure and shared development
GitHub DevOps platform
Switch from research to operational fundings (aspirational)

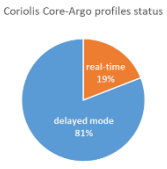
Threats

Some experts will retire within the next 5 years
BGC-Argo QC requires huge scientific efforts with heavy data reprocessing

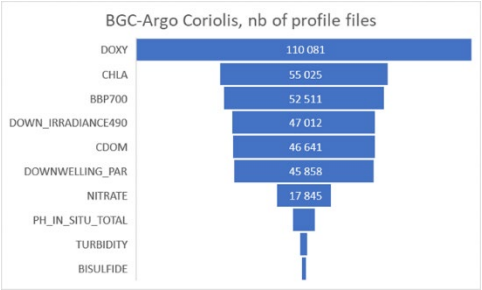
Coriolis DAC status

The status of Coriolis DAC in October 2024: we manage 3855 floats, 680 active floats and 3175 inactive

Core-Argo : 81% of the vertical profiles are delayed mode, 19% are real-time (to be reprocessed in delayed mode).



BGC-Argo : historically, Coriolis profiling floats have primarily measured oxygen profiles. However, there has been a significant shift towards multi-sensor floats, with a particular focus on parameters leading to a more comprehensive understanding of ocean ecosystems.



Deep-Argo : Coriolis DAC distributes 8 000 deep profiles having a pressure deeper than 3000 decibars from 135 floats.

Delayed mode trajectories: we are working on the production of delayed mode trajectories.
Here are the steps to reach that objective

- The integration of the delayed mode QC from the ANDRO Atlas Ollitraut et al., 2024, doi: https://doi.org/10.17882/47077
- Automatic adjustment of the pressure/temperature/salinity measurements of the trajectories, reported from the delayed mode profiles files on the GDAC
- A visual inspection/corrections before Traj-DM distribution on GDAC

Coriolis DAC 2025 Challenges

- Manage new floats versions
- Manage quality control evolutions
- Manage BGC parameters evolutions
- Manage delayed mode data
- Contribute to https://github.com/OneArgo/ArgoVocabs
- Contribute to https://github.com/OneArgo/ADMT
- Enhance the floats recovery website
- Produce delayed-mode trajectories
- Link with WMO WIS 2.0

1.2.4 CSIO (Zenghong Liu)

Zenghong reported the status of CSIO DAC.
Unlike other DACs primarily hosted by operational agencies, the CSIO DAC is hosted by a research institution, necessitating reliance on research project funding for Argo data management. Currently, four staff members are employed to process Argo data, conduct DMQC, and develop Argo data products. CSIO has successfully processed data from about 560 floats in total including Core, BGC, and Deep floats, as well as nearly 20 firmware versions. However, a significant challenge arises from the limited human resources available for software development, updates to the RTQC methods for BGC parameters, and ongoing DMQC efforts.

1.2.5 CSIRO (Dirk Slawinski)

CSIRO has deployed 49 floats, comprising 7 build types and including Core, BGC, Deep and Antarctic Shelf. We have made efforts to correct unintentional ToD sampling in our floats, but this is an on-going effort. We have plans to deploy 67 floats in 2025.

A major achievement this year has been the migration of our RT system to run solely through pyRT, an engineered solution, built with Python and PostgreSQL. The old Matlab system was retired in May 2024. The new system was developed over the last 5 years and ran in parallel with the old system during the migration process. Live floats were migrated in batches by float type. Features of the system include: database storage of data; real-time alerts; web interface to examine meta-data; web interface to update QC and re-process. We have not yet implemented the Min-Max test.

Delayed Mode processing of our floats remains above 95% of eligible profiles for core data. The delayed-mode system passes salinity adjustment through to the RT system so that A-mode PSAL can be produced in RT.

For the BGC floats in our fleet, we have implemented QC = 3 for raw NITRATE, PH, DOXY and CHLA for all live floats and most dead floats. Adjustment coefficients are updated every ~6 months for DOXY, NITRATE, PH (using SAGE). We calculate NITRATE from UV spectra with the new improved temperature calibration coefficients and have implemented BBP RTQC for live floats. Decoding of oxygen in v3.2 traj files is almost complete. Delivery of DOXY to the GTS has not been implemented, as we are hoping to use a community-developed script for this.

One challenge we face is that our delayed-mode code is dependent on Matlab 2014a which is starting to develop conflicts with modern Linux OS. An uplift of the code to Matlab>2018b is underway, but has required significant re-writing of graphics and GUI components. We expect this to be complete in early 2025.

We have started preparing for delayed mode processing of trajectory files. The effort so far has shown that the R-mode trajectory files produced by the PyRT system are of high quality and pass most of the standard tests for CYCLE_NUMBER and JULD. We have identified that a broad knowledge of float operations and the RT data systems is required to do this task well and efficiently. A plan is in place to progress this task and we anticipate producing our first D-mode trajectory files in the next year.

CSIRO Argo team members continue to lead and participate in the Technical CoP, Delayed-Mode discussion meetings, the Polar Argo working group and the Pacific Ocean and Indian Ocean Deployment coordination groups. We continue to provide financial contributions to the Kaharoa and OceanOPS.

1.2.6 INCOIS (Pavan Kumar JONNAKUTI)

The contributions and advancements made by Indian National Centre for Ocean Information Services (INCOIS) in deploying and managing Argo floats in the Indian Ocean region, as part of the Indian Ocean ARC activities.

Deployment and Coordination

India has deployed 24 new Argo floats in strategic locations across the Bay of Bengal, Arabian Sea, and the Equatorial Indian Ocean. This effort brings India's total contribution to 542 floats. Future efforts include the acquisition of Bio-Argo floats equipped with advanced sensors (e.g., Nitrate, pH) to enhance oceanographic data collection.

1.2.7 JMA (Masatoshi Miyamoto)

MIYAMOTO Masatoshi reported on the status of the JMA DAC. Over the past year, the Japan DAC has completed the CPcor adjustment for Deep Argo floats, the processing of the PROVOR float newly deployed by JMA, and replacement of the Argo-processing server. JAMSTEC implements real-time salinity adjustment based on the Argo QC Manual ver. 3.8 every cycle and JMA uses it in real-time.

The Japan DAC is now updating Test 8 of the real-time QCs, which is to be completed by AST-26, and is going to implement real-time QCs of Chl.a, bbp700, and pH based on the published manuals. The Japan DAC is also going to decode BGC float data including the PAR sensor (OCR504), which is new to us. Two APEX floats with the OCR504 are planned to be deployed by JAMSTEC in the tropical Pacific in January 2025. Three PROVOR-Jumbo floats with UVP, also a new sensor to the Japan DAC, are planned to be deployed in 2025.

Frequent position rotations within JMA and ongoing human resource shortages make it challenging to complete ADMT action items in a timely manner. Additionally, the Japan DAC members lack expertise in biogeochemical (BGC) parameters and their sensors, which makes it more difficult to establish our data processing chains.

Progress on DMQC was reported. In 2024, we started submitting BD files, which include the corrected value for DOXY, Nitrate and pH. We correct Nitrate and pH using SAGE. I found garbled characters when SAGE was installed on a Windows PC which was purchased in Japan to read ODV files. We fixed the problem by ourselves.

Ifremer pointed out in the last year that the GDAC cannot create Synthetic files for Japanese BGC floats because PRES of the Core file does not match that of the B files. We found the reason for this issue. In Japan, JMA decodes the files sent from floats to create R and BR files in order to submit them to GTS and GDAC. JAMSTEC also decodes the files from floats to correct Core and BGC parameters. Sometimes, the data files of floats are not received in time for real-time processing or the float data are updated later due to problems such as poor telecommunication. In that case, JAMSTEC decodes the updated data files so that BR-files produced by JMA do not match the results of JAMSTEC decoding. We have solved this issue.

We have not created any Dtraj files. We are now preparing the software to correct the float internal clock, the position information, and Core parameter values. When we finish creating it, we will start to make Dtraj files of the Iridium floats in Japan.

1.2.8 KMA (Baekjo Kim)

KMA Applied the greylist test to trajectory files and further adjustments are still needed. Also updated to the new global range test.
Three Argo floats were deployed in YS and ECS. In December 2024, a total of two Argo floats will be deployed in the Northwestern Pacific.
KMA's future plan is to develop cost-effective coastal Argo floats within the next few years to enhance coastal monitoring capabilities.

1.2.9 KIOST (Kyunghee Oh)

- Currently 15 Core-Argo floats are operating in the East Sea and Northwestern Pacific.
- Deployed ARVOR (102/844) floats with the SBE41cp sensor
- Regularly applying real time salinity adjustments
- Not sending the data directly onto the GTS
- Not creating dmode trajectory files yet
- Approximately 500 T & S profiles were generated by 10 floats since mid-2023
- Request to change the DAC name from KORDI to KIOST
- Data center code 'KO' will be maintained, and only the DAC and organization name will be changed to KIOST, to be implemented from 2025.
- The changed DAC name will also be applied to newly published manuals, documentation and related websites

1.2.10 MEDS (Anh Tran)

Between September 2023 and September 2024, Argo Canada deployed 53 NKE-manufactured floats, marking the first use of Arvor-D, Provor-III with a Nitrate sensor, and Provor_V_Jumbo. Argo Canada now has 192 active floats, with data managed by the Marine Environmental Data Section (MEDS) DAC. MEDS, staffed by three employees, completed data processing for these new floats, including decoders, adjusting CHLA in real-time, metadata generation, and NetCDF profiles. Work also began on trajectory data (NetCDF 3.2). MEDS also restarted delayed mode quality control of core Argo data in August 2024 that was due to a shortage of staff. For delayed mode quality control of BGC variables, Argo Canada started and sent delayed mode quality control files for DOXY. Overall, 88% of Argo data were on the GTS within 12 hours of collection.
MEDS will focus on completing pending tasks and developing a new data processing chain for Apex profile floats with specific sensors between ADMT-25 and ADMT-26.

Challenges include limited human resources and a complex data system developed since 1999, which has required continual updates due to new float types and requirements from ADMT.

1.2.11 DAC discussion (Claire Gourcuff)

Claire reported on the DAC status and actions, summarizing information provided in the national reports. A new template for national reports was set up this year, with additional information requested from DACs and DMQC operators. The reports show that individual DACs are currently processing data from up to 8 different float types. For most float types DACs are handling several versions, up to 9 versions for some types, and for some parameters, there are up to 4-5 different sensors to handle. DAC actions are progressing, both for core/Deep and BGC, as shown in the stoplight charts. Some of the actions are put on the agenda and should be closed at the end of the week. A new action can be created for the new RT QC Test 8, as code is now available and improved test documentation is available in the Argo QC Manual. DMQC of trajectory files is not well implemented yet, and cooperation on this action is suggested by several DACs. Overall, DMQC status is progressing for all parameters. Claire listed the main issues raised in the national reports and ended the presentation by highlighting again the lack of

resources of the Argo data teams and by thanking everyone for providing links to various tools that could benefit the whole ADMT (these tools will soon be listed on the AST/AMDT websites). The presentation was followed by a short discussion on the sampling of MRV floats and a mention by BODC that the python version of the OWC software will be upgraded in 2025 (BODC work under the EAONE project).

1.3 GDACs session: status and modernization

1.3.1 Operational Status of Argo GDACs (Thierry Carval, Mike Frost)

Operational status of Argo GDACs, Coriolis

SWOT analysis

In order to address the challenges posed by the OneArgo program, we performed a SWOT analysis of the Coriolis Global Data Assembly Center (Strengths, Weaknesses, Opportunities and Threats).

Strengths

Active since 1999, a long experience
Argo-France 2020-2030 funding
GDAC hosted on Ifremer's large infrastructure for ocean data, along others (dbcp, gosud, oceangliders, copernicus marine in situ)
Well represented in EOSC project: the European Open Science Cloud Envri-Fair, Envr-hub-next, Fair-Ease, BlueCloud, AMRIT

Weaknesses

"Build" activities rely on projects fundings
Significant delays in actions implementation due to manpower shortage and/or funding
Obsolete editorial – information web site http://www.argodatamgt.org

Opportunities

GitHub DevOps platform
Cloud infrastructure and shared development
Switch from research to operational fundings (aspirational)

Threats

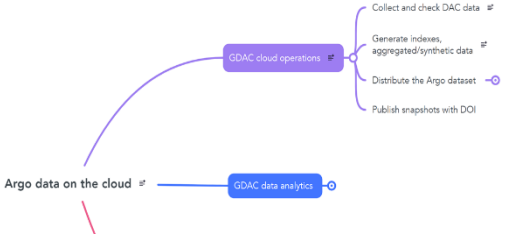
Cope with OneArgo expansion ?

Coriolis GDAC status

In October 2024, the GDAC distributed data and metadata of 19 138 Argo floats (3 708 active, 15 430 inactive).

Coriolis GDAC 2025 Challenges

- Prototype a Cloud GDAC service with AMRIT and EOSC Fair-Ease fundings
- File format checker: evolutions of the rules files, evolution of the code

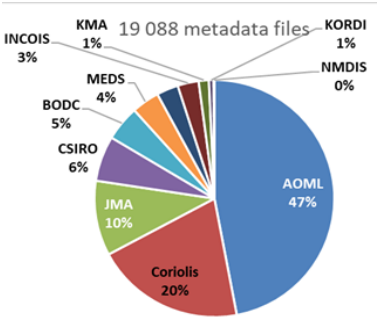


- Unify and enhance indexes
- Seek resources to implement big data streaming for the large (meta)data indexes displayed in web interfaces
- Maintain and update web interfaces
- Prototype STAC catalogue for cross-domain activities (ocean, atmosphere, model, satellite)

GDAC status, October 2024

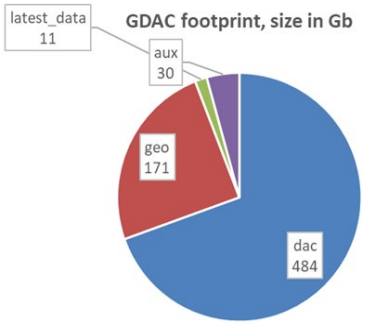
- 11 national DACs submit regularly data to GDACs
- This year, floats increased by 4%, profile files increased by 6%, trajectory files have notably grown by 10%
- Argo GDAC dataset reached 3 million profiles this summer

DAC	metadata files	increase	profile files	increase2	delayed mode profile files	increase3	trajectory files	increase4
AOML	8 973	4%	1 595 932	6%	1 398 450	8%	12 346	15%
BODC	912	5%	135 607	6%	98 459	6%	547	3%
Coriolis	3 852	4%	524 420	8%	424 426	11%	3 766	4%
CSIO	558	4%	77 110	5%	61 154	6%	555	4%
CSIRO	1 179	4%	227 183	5%	214 284	6%	1 141	7%
INCOIS	541	7%	83 958	3%	39 996	0%	416	1%
JMA	1 951	2%	261 603	3%	214 200	3%	1 676	3%
KMA	264	0%	38 676	2%	34 936	3%	255	0%
KORDI	120	3%	15 984	2%	14 504	0%	107	0%
MEDS	719	7%	79 931	10%	51 012	0%	673	5%
NMDIS	19	0%	2 460	0%	2 388	0%	19	0%
Total	19 088	4%	3 042 864	6%	2 553 809	7%	21 501	10%



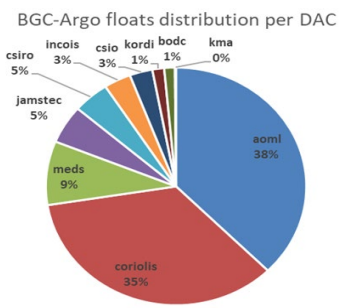
The number of files on dac directory was 3 773 576 (+7%)

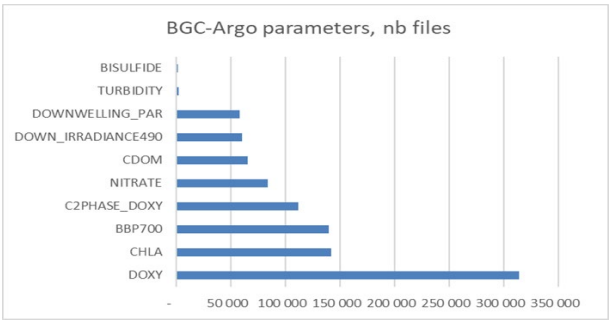
- The size of GDAC/dac directory was 423 Go (+11%)
- The size of the GDAC directory was 931 Go (+26%)



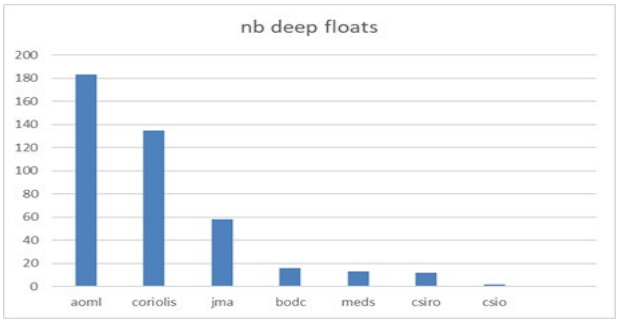
BGC-Argo GDAC status, October 2024

There were 327 017 BGC-Argo profiles from 2 325 floats. This is a fair increase compared to 2023: +12% more floats and +38% more profile files.





Deep-Argo GDAC status
There are 419 deep-Argo floats (+20%) from 7 DACs(+1).
They performed 40 739 deep profiles (+26%).



Greylist status, October 2024
GDAC hosts a grey list of the floats which are flagged before any automatic or visual quality control.
The grey list has 1579 core-Argo entries compared to 1561 entries one year ago

Operations of the ftp, https and erddap servers

- DACs files are collected in parallel every 30 minutes
- Index files of are hourly updated metadata, profiles, trajectories, technical and auxiliary data
- GDAC download services: ftp , https , erddap , s3
- 6 million sessions for Argo data downloads (+200%)
- 1 billion files downloaded (+53%)
- 55% of ftp downloads, 45% of https downloads (80% and 20% last year)
- 14 terabytes daily downloads, median value (+27%)

1.3.2 File Checker updates (Thierry Carval)

Argo NetCDF file format checker status
The Argo NetCDF file format checker is managed on GitHub
https://github.com/OneArgo/ArgoFormatChecker
Each change is related to a release (8 releases during the last 12 months)
https://github.com/OneArgo/ArgoFormatChecker/releases

- The most recent format checker rules files change is v2.8.13 (2024-09-19)
- The most recent format checker code change is v2.8.01 (2023-04-12)

We want to transition from Mark Ignaszewski's java code to a more manageable python code.

- We are doing it gradually: keep Mark's java code plus a python post-processing to implement the new features
- The next new feature : check the technical data times-series https://github.com/OneArgo/ADMT/issues/33

We want to implement GitHub CI-CD for continuous testing and deployment (Continuous Integration - Continuous Deployment). Each new test will be documented and include validation files. Before a

release, all tests must pass with expected results using these validation files. These evolutions are funded by the EU AMRIT project.

1.3.3 Index File homogenization (Delphine Dobler)

During the previous ADMT, additional needs were expressed with respect to Argo indexes, namely greatest pressure reached and ice detection information. There is also a need for better homogenization as several indexes co-exist, with different parsing schemas.
This is detailed in two GitHub actions: https://github.com/OneArgo/ADMT/issues/3 and https://github.com/OneArgo/ADMT/issues/16.

Initial discussions led to the proposal of a super-index, containing all the fields, all the file types and from which dedicated sub-indexes would be derived, which was presented during this ADMT. The associated specification document is drafted here https://docs.google.com/document/d/1pil8WHWSVje086c7hyUNk4q3RJwCqeUJ/edit?pli=1
and open in suggestion mode for comments.

Several questions and comments were raised during this presentation:

- Ice detection:

There is definitely a need for a profile-by-profile indication. For the moment, as foreseen by the Polar Argo Mission team, the synthetic and homogenized information of ice detection would be in the trajectory file. This would mean that the profile-by-profile ice-detection indication in the index would be associated to single profile entries but with trajectory file information. This is referred to as cross-indexation, and has never been done before. There is a need to check whether cross-indexing is sensible with the Coriolis team or whether we must record this information in profile files if we want to index it.

- Rationale behind the need for keeping/having both BGC and synthetic sub-indexes: Besides delay in building synthetic files, there is also a need for both indexes as a real-time BGC file + a delayed mode core file will yield a delayed mode synthetic profile. We need to keep BGC sub-index to quick search real-time BGC files
- PSAL adjusted fields: These fields were initially added in 2017 to quickly monitor the ASD issue. This raises several questions:
    - Such a field for the BGC parameter could be interesting but with the consequence of potential growth in file size. Do we want that ?
    - Shall we keep derived parameters in indexes ? (For specific purpose, such as ASD monitoring, it remains important but it may not need to be exposed externally)
    - Does a vertical average mean something for deep floats where a Cpcor correction is applied ?
- Index names: A suggestion was to shorten the name and not repeat OneArgoIndex, especially if in a separate directory.
- About type new field: Suggestion to use MultiCycle (MC*) instead of MultiProfile (MP*) to avoid confusion with near-surface/secondary profiles. Here, we are talking of {wmo}_prof.nc that aggregates all the float's primary profiles.
- About deep:
    - If using R08 (instrument type), make sure to understand which are the deep floats, because some deep float types do not have ‘deep’ in their description

    - Suggestion to use R22 (platform_family) instead. To be checked if this info is in the single profile files or if it would need cross-referencing
- Parking depth information: suggestion to add parking depth information: this would mean cross-indexation, to investigate
- Size limit: To allow for on-the-fly consultation from cloud/S3/etc., the compressed size should be kept in the order of 50 MB. To assess (an increase of 25% uncompressed does not mean an increase of 25% if compressed, in particular with repeated characters)

As this subject raised many questions, a dedicated follow-up meeting will be organised during the year with willing people to continue discussions, share technical aspects and eventually find a consensus.

1.3.4 Feedback on Coriolis cloud prototype (Guillaume Maze)

Guillaume reported on work done with argopy to test access and search the index files on the ftp, http and AWS-s3 GDAC servers. For the ftp and https hosts, a gz compressed index file is downloaded and then searched in memory. For the AWS-s3 host, he implemented a boto3 method based on SQL. This means a search request is executed on the AWS server side and only the results are downloaded. After performing several tests to compare searches on https vs s3, he concluded that the AWS-s3 ability to execute SQL-like queries on the server side is not useful with our csv index files. The current Argo index files are small enough (50MB) to be downloaded for analysis on the fly (takes 3 seconds to load the 3+ million profile index). This should be considered when creating a single homogeneous index file for the GDAC which will certainly be much larger than 50MB. The recommendation was not to test any other file formats for the profile index.

He next went on to explain that S3 provides object storage through a web service interface. Objects are organized into buckets. Storing data as netCDF files on S3 is not taking full advantage of the service because when a netCDF files is stored as an ‘object’, there is no way to access parts of it such as the temperature data from the float, a single profile per float, or one pressure level for example. Two formats are oriented for object storage access: zarr and parquet. He offered an example of netCDF to zarr conversion and noted it would take a few hours to convert the entire GDAC to zarr. Zarr allows for access to a slice of content from a file via S3 and returns a similar object to netCDF in python. Binary data is transferred when values are requested. Otherwise, only text metadata is sent. WHOI has been creating parquet versions of the GDAC which also take a few hours to create. Parquet allows for access to a slice of content as well, but is set up in a row/column 2D format. Same transfer of binary/text data as zarr. Overall, both formats allow for better selection of data on S3 than netCDF. Zarr is similar to netCDF, but not yet implemented in Matlab. Parquet is very fast, but deals only with 2D arrays. He finished by noting that zarr and parquet versions of the GDAC are/will soon be available and work will continue within argopy to keep testing them.

1.3.5 Update on Argo activities at NCEI (Tim Boyer)

The main current Argo data management function of NOAAs National Centers for Environmental Information (NCEI) is the archival of monthly snapshots of the Argo Global Data Assembly Center (GDAC) in the Global Argo Data Repository (GADR; https://doi.org/10.25921/q97e-d719). There have been 234 monthly snapshots since May, 2003. The latest one archived on October 15, 2024. This is later than the usual archival due to temporary loss of systems due to flooding in Asheville, North

Carolina. A more efficient means of archiving by cycle has been proposed for three years at NCEI but has only begun in earnest now thanks to a migration of NCEI systems to the cloud. The cycle-by-cycle archiving system will make it easier to access specific subsets of Argo data from specific dates as well as ensure any multiple in-month updates are archived. This will allow for full reproducibility of any results with Argo data. Cycle by cycle archival is only feasible with the increased compute capabilities available in the cloud. The cycle-by-cycle archival will be developed in conjunction with a prototype cloud GDAC. GDAC data are already in the cloud through the French GDAC (https://aws.amazon.com/marketplace/pp/prodview-gfyjvcgtdzrlc#overview). The prototype cloud GDAC will implement functionality such as receipt of data from Data Assembly Centers (DAC), file checking, generation of synthesized ('S') files and other products, and cloud ready formats of the Argo data in a cloud environment. Work has begun, with the first step of mirroring the existing GDAC in the prototype GDAC. The next step is to work with the U. S. DAC to establish data receipt and communication from DACs. Finally, NCEI has been involved in developing a cloud optimized format for ocean profile data as represented in the World Ocean Database. Coordination with Argo on an optimal format for Argo and other ocean profile data for ease of use for modeling and other communities is a goal of this work.

1.3.6 Report from Argo cloud WG + discussion (Claire Gourcuff)

A Working Group was created after ADMT-24 to explore new ways to serve Argo data to users, taking advantage of new technologies in the data science domain. Claire reported on the discussions and activities of the group during the past year. The WG discussed the goals of serving Argo data in the cloud, the targeted users, the scope of ADMT with regards to serving data as “products” and possible evolution of the official Argo format in the longer term. The main potential cloud optimized formats identified were parquet/geoparquet, zarr and an indexed database. Some criteria were defined to help in the choices between the various formats, such as metrics for performance, most commonly used format in our community and availability of implementation in common programming languages. The level of metadata to be included in the data was also discussed, with no conclusion as this criteria depends on the users/usage of the data. Various demo datasets set up by several teams were highlighted (links to the demos provided in the slides), from literal conversion of the existing NetCDF files to “light” products containing only the best quality data with limited metadata. Claire ended the presentation with some questions to the ADMT regarding the role of the team, as for now the only official Argo dataset is the similar set of NetCDF files provided in the GDACs.

The discussion was postponed to the last day of the week, to allow time for thinking, introduced by Susan with a few slides on the subject. There was a general agreement that the ADMT should provide an easy cloud-optimized product to users, with only good data plus errors and a limited amount of metadata. Mention of tools to make the subsetting on the fly, such as argopy, was made and the question of the maintenance of such a product was raised. It was also mentioned that the format should be compatible with other observing datasets, starting with GO-SHIP, and Breck agreed to raise the issue to the next OCG meeting. Thierry, Tim, and Annie are already working on such products and will continue and converge to a common version, with the help of Tim especially for the intercompatibility aspect. Several use cases should be provided and raw-tested by us. This/these products should target mainly scientists, and thus we could aim at about weekly updates.

2 BGC session – DAY 1

2.1 BGC introduction

2.1.1 Introduction by BGC-Argo co-chairs (Ken Johnson)

The ADMT is to be congratulated for their work that has greatly improved the quality and consistency of the BGC-Argo data in the Argo data system. The quality controlled data now spans the world ocean and the dataset enables global analyses of biogeochemical processes. The availability of this high quality data has been recognized by the science community, which is now producing a variety of publications that describe basin to global scale processes. A particular metric of success, which recognizes the quality of the dataset, has been the incorporation of BGC-Argo oxygen data into the World Ocean Atlas 2023.

The number of multi-sensor (4+) floats is increasing rapidly and the floats with 5 or more sensors is nearing 40% of the 1000 float target. The North Atlantic is approaching 80% of the target float population, while the Equatorial Pacific, South Pacific, South Atlantic, and Indian Oceans have less than 30% of the desired number of BGC-Argo floats.

Coincident with an increasing number of platforms are increasing variations in approved sensor types that will appear on new floats. These include a number of Trios OPUS nitrate sensors and RBR bio-optical sensors. The new Technology Task Team will play a key role in validating the performance of new sensors.

2.1.2 Technology Task Team Introduction (Yui Takeshita & Edouard Leymarie)

The BGC-Argo Technology Task Team (TTT) was formed last year to address various issues. The abbreviated terms of reference for the TTT is:

- Track and assess performance of currently approved BGC sensors
- Create framework for assessing performance and interoperability of new BGC sensors
- Investigate capability of new BGC sensors for existing and new parameters
- Collect and disseminate information and knowledge about BGC-Sensors to the community
- Provide technical support to ADMT for sensor characterization and data processing

The full terms of reference and objectives of the TTT can be found on the BGC-Argo website.

The activities conducted over the past year were introduced, and updates from these activities were presented throughout the ADMT meeting. Over the next year, the TTT plans to:

- Continue working group activities
- Establish framework for intercomparison for bio-optical and nitrate sensors
- Refine sensor performance tracking at Ocean Ops
- Formalize framework for accepting new sensors

2.1.3 Developing a framework for accepting new sensors and new mission parameters (Henry Bittig / Yui Takeshita / Annie Wong)

A document that lays out the framework for adding new sensors and new mission parameters in OneArgo is being prepared. The framework followed the original terminologies and pathway used in the UNESCO guidelines in 2018 for new mission parameters in Argo, but expanded to include new

sensors. Three phases (experimental, pilot, global implementation) and the transition between them were defined. A final version of the document will be presented at the AST meeting in April 2025. When finalised, this document should provide transparency to users and manufacturers on the procedure required, as well as practical guidance on what needs to be done to add new sensors and new mission parameters in OneArgo.

2.1.4 From the experimental to the pilot study from the data management perspective (Catherine Schmechtig / Tanya Maurer)

While refining the terms “experimental”, “pilot study” and “global” for new sensors and new mission parameters, we take the opportunity to present what should be considered in terms of Data management to go from “experimental” to “pilot study”:

- The parameter vocabulary for the BR- or R-files should be fully developed (NVS R03 table)
- The metadata file should be fully developed (NVS R18, R25, R26, R27 tables)
- Standardize sensor outputs across platforms

As a pragmatic summary, we can consider that, at least one DAC has to show that it can:

- Process the raw data to the target parameter
- Write the documentation according to the processing
- Upload the proposed netCDF data files to the aux directory
- Present the results to be reviewed at the annual ADMT/AST meetings.

2.2 BGC sensors

2.2.1 Chl WG updates/Manufacturer engagement (Nathan Briggs - for Julia Uitz)

Context and objectives

The Chl Working group objective is to provide guidance on how to evaluate and calibrate potential new chlorophyll sensors for inclusion in Argo. Currently, there are two new sensors being evaluated:

1. New “Tridente” sensor from RBR to measure Chl fluorescence with 470 nm excitation wavelength. This is not a new parameter. It is the same fundamental chlorophyll fluorescence parameter that is currently used in ECO and MCOMS sensors from Seabird Scientific on Argo floats.
2. New “dual” chlorophyll fluorescence sensor configuration with both 470 nm and 435 nm excitation wavelengths. This new configuration is now available both from Seabird ECO sensors and RBR Tridente sensors.

Chl WG Activities:

Request more detailed optical configuration and calibration procedures from manufacturers in order to understand theoretical interoperability

WG met with RBR in June 2024 and received the full requested details on lab calibration protocol, spectral characteristics, optical geometry of the sensor, and sensor mode of operation. Meeting was very transparent and productive and was recorded for the community.

Coordinate lab and in-situ evaluation of new Chl sensor and configuration

- Nathan Briggs started compilation and analysis of in-situ Tridente data collected alongside both ECO sensor data and discrete Chlorophyll measurements. Results so far were reported in the "Tridente Update" talk below.
- Baptiste Ozanam conducted initial analysis of both laboratory and in-situ data from new "dual channel" Chl fluorometers to test the potential of the new 435 nm excitation wavelength (either alone or in combination with 470 nm excitation) to improve accuracy of Chl concentration estimates and/or provide new information about phytoplankton community. Results so far were reported in the FLBBFL talk below.

Recommendations and next steps

- WG recommended that RBR include lower concentrations in Chl calibration procedure (range equivalent to in-vivo concentrations between 0-5 mg/m3)
- In order to facilitate recommendations on how/whether to bin RBR tridente data for Argo purposes, RBR was asked to share data on power consumption and instrument noise for different potential frequency and averaging modes.
- WG noted that extracted chlorophyll is not an ideal standard for calibrating 470 nm excitation fluorescence, because signal is very low and dependent on small variations in waveband.
- Further work is needed to continue to compile more Tridente datasets from more users to evaluate consistency of calibration and consistency with ECO sensors across a broad range of conditions
- Further work is needed to evaluate the potential of dual-wavelength fluorometers.

2.2.2 BBP WG updates/Manufacturer engagement (Giorgio Dall 'Olmo)

The Technological Task Team (TTT) BBP subgroup aims to reliably estimate BBP uncertainties and to smoothly introduce in the BGC-Argo dataset BBP data coming from the new RBR Tridente sensor. To do so, it is necessary to gather detailed information on the calibration protocols used by manufacturers. Specifically, to understand BBP calibrations, information on experimental and modeling techniques as well as inputs are needed.

The BBP subgroup first reported on the existing BBP sensors in the BGC-Argo dataset. An audit revealed that the majority of the BBP dataset (1084 sensors) has been collected by ECO_FLBB (45%) and ECO_BB3 (35%) with the remaining part by MCOMS (17%) sensors and "unknown" sensors.

To investigate uncertainties in the existing BBP dataset, the audit then quantified the BBP values at 900-1000 dbar as a stable ocean region where all BBP values should, on average, converge. Preliminary results demonstrated that while the modal values of BBP measured by ECO_BB3 and MCOMS compared favorably, the modal BBP value derived by the ECO_FLBB was about 20% higher than the two other sensor types. Further work is needed to explain this discrepancy.

A report of the recent activities on manufacturer calibration protocols was then presented. A meeting with the manufacturers was planned from mid June 2024 and a detailed list of questions deemed important to fully understand calibration protocols was shared with the manufacturers on June 14th and

July 2nd. Both RBR and SBS agreed to meet on August 1st. At this meeting, RBR presented a detailed report on their calibration protocols and agreed to share more detailed information (e.g., on the inputs used for the Mie modeling code). SBS did not have a presentation on their calibration protocols, discussed their methods verbally, hinted at their willingness to share information, and promised to send a more detailed document. As of Nov 15th 2024, such a document has not been received, nor is it clear what parts of their calibration protocol are considered by SBS proprietary. Nevertheless, SBS has promised to share a document by the end of the year.

A positive outcome of this interaction was that both manufacturers expressed willingness to align their calibration protocols (e.g., using the same Mie code).

2.2.3 Radiometer WG updates/Manufacturer engagement (Edouard Leymarie)

Despite the fact that radiometry is the least measured BGC variable, we already have a wide variety of radiometers on floats. Three types of radiometers are already available on floats: the classical OCR504, the MPE-PAR (Biospherical's high-dynamic PAR sensor) and the Ramses hyperspectral sensor from TriOS. Two new sensors are currently being integrated and could be deployed in 2025: the Quadrente from RBR (Canada) and the SLIM-I4 from SIAT (China). This diversity of sensors is a major motivation for the radiometry working group, which aims, among other things, to carry out intercomparisons between sensors.

The work carried out by the various members of the working group is briefly introduced. The main results are presented in separate presentations.

Concerning discussions with manufacturers. SBS, TriOS and RBR have been contacted and are interested in the initiative. They have already shared documents on the calibration of their instruments. Joint meetings with manufacturers and the working group remain to be organized. It is worth noting that there is an equivalent initiative in the ocean color community. For example, the European project FRM4SOC is structured to provide support for evaluating and improving the state of the art in ocean color validation by using in-situ radiometric measurements. The participants in this project have already contacted the manufacturers SBS and TriOS and written a list of specifications to ensure the interoperability of these sensors. There is certainly a strong synergy to be found with this type of initiative, even if it will require the addition of specifications that are specific to Argo profilers.

2.2.4 Tridente update - bbp and Chla (Nathan Briggs et al.)

In-situ Tridente datasets were collected and analyzed to evaluate performance and inter comparability with ECO sensors. Main findings were:

1. **Tridente and ECO triplet backscattering measurements were highly co-linear** across a broad range of particle types, indicating that the core optical measurements are highly compatible and that, with proper calibration procedures and manufacturing tolerances, Tridente bbp data could, in principle, be integrated into Argo and generate a highly interoperable global scattering dataset.
2. **Chlorophyll fluorescence measurements were also highly co-linear** between ECO and Tridente sensors, leading to a similar conclusion, although further comparisons in different phytoplankton communities would be helpful.

3. Factory calibration consistency - Three Tridente sensors were compared on a single CTD cast. Slope of regression of factory calibrated bbp and chl-a from two new sensors integrated with the RBR Concerto logger were consistent within expectations for existing ECO sensors (1.5% for Chl and 7.7% for bbp). However, **calibration slope differences** between these two sensors and an older Tridente connected to an LOV custom logger were **unacceptably high** (70% difference for bbp and 22% different for Chl). More work needs to be done to diagnose this difference and verify calibration for more sensors.
4. **Tridente sensor noise levels are acceptable**. Chl fluorescence sensor noise estimated from in-situ deep data across four Tridentes were consistently slightly lower (better) than manufacturer specifications of 0.01 mg/m3 standard deviation and only slightly higher than the single ECO sensor tested. Optical scattering sensor noise estimated from in situ deep data across three Tridentes was ~$6x10^{-6}$ m^{-1} sr^{-1}. This is ~2x higher than the ECO sensor that was tested. These results are very good, given the much lower power and integration time of a single Tridente measurement and can be improved by binning.
5. The Tridente dissolved organic matter fluorescence channel was also checked for consistency between two units. Units were highly sensitive and co-linear, with very close calibration slope (difference of 1%), but a somewhat high, constant offset of 0.115 ppb between the two sensors.
6. Tridente is suitable to estimate particle size distribution from backscattering spike height, similar to ECO sensor, but potentially more sensitive to smaller particles.

2.2.5 A look at RBRtridente sample statistics (Mat Dever)

Because of the high sampling frequency available on the RBRtridente (32 Hz), it was requested to develop in the firmware the capability of producing channel statistics (e.g., mean, median, standard deviation, …). This presentation outlined how this was implemented in the RBRtridente. The user has the option to record the mean, median, and standard deviation for each of the three channels available on the RBRtridente. The newly developed “aggregate mode” lets the user define the period at which the statistics are computed, and the number of samples to consider. Other statistics can be requested directly from RBR.

2.2.6 Lab results from comparison of Radiometers (Xiaogang Xing)

To evaluate the performance of three 4-channel irradiance radiometers suitable for the observations on Argo floats (Sea-Bird/Satlantic OCR-504, RBR quadrante, and SIAT SLIM-I4), we conducted a series of laboratory experiments to assess radiometric accuracy and stability, dark-signal stability and residual, and the pressure effect. Overall, all three sensors have similar performance levels, the OCR-504 has high radiometric accuracy and stability, but relatively low dark-signal stability; the quadrante has high dark-signal stability and little pressure dependence, but large dark-signal residual and low radiometric accuracy and stability; the SLIM-I4 has very high dark-signal stability and very low dark-signal residuals, as well as high radiometric accuracy and stability, but most remarkable pressure dependence. Additionally, the aging drift on the dark signal of the OCR-504 is observed, and it is found that the drift affects only the intercept term of dark signals, leaving the slope term unaffected. Based on the experiment results, we highly recommend all the radiometers have internal temperature sensors for a more accurate temperature correction and aging-drift identification, and we recommend three technical criteria for irradiance radiometers on Argo floats as: radiometric accuracy within ±3%, radiometric stability in 1% for irradiance and 0.1% for PAR measurement, dark-signal stability (resolution) superior to 0.005 μW/cm²/nm for irradiance and 0.03 μmol/m²/s for PAR.

2.2.7 pH sensor update - SBS performance, LioniX pH (Yui Takeshita)

An update on the survival statistics of pH sensors in BGC Argo was first presented. In 2022, we noticed a high rate of failure of SBS pH sensors, and ~65% of the sensors failed within the first year of deployment. MBARI worked closely with SBS to remedy the problem, which was identified as a failure in the reference electrode packaging. Two mechanical changes were implemented at SBS, and after extensive laboratory testing, the GO-BGC and SOCCOM projects have resumed deployment of SBS pH sensors. Over the past year (October 2023-October 2024), the SBS pH sensors have had excellent performance, with only 4.8% failing within the first year of deployment (n = 62). Given these results, we are confident that the issues with the SBS pH sensors have been resolved.

Honeywell made a surprise announcement that they had discontinued production of their ISFET, the key sensing component of the pH sensor in 2022. Given that this is a sole source component, it had major implications for BGC Argo. Honeywell has since reversed their decision and resumed production of their ISFETs. However, to minimize this sole-source risk, we have started exploring two options for pH sensor alternatives.

The first is an optical pH sensor, the Pico-pH, which is commercially available through Pyroscience. The results from the characterization and assessment of this sensor was published earlier this year (Wirth et al. 2024). The Pico-pH performance was assessed in the laboratory, on coastal moorings, and on underwater gliders. The main conclusion is that at this state, the Pico-pH is not suitable for long-term, autonomous profiling applications due to its slow response time and sensor drift.

The second is an alternative ISFET, manufactured by LioniX. MBARI and SBS are collaborating in this development, but pursuing parallel designs to maximize development efficiency. Initial designs for this pH sensor at MBARI had a large pressure coefficient, due to the strain on the chip caused by the increased size of the ISFET. A prototype pressure-compensated version of this sensor has been developed, and is currently being tested in the lab. Preliminary results are promising.

2.2.8 CDOM update - SBS (Eric Rehm, Jochen Klinke)

SBS presented an update on the steps to resolve bias in data from SBS CDOM fluorometers. This bias was traced back to the three distinct root causes mentioned in original CDOM advisory from 10/5/23:

1. **Incorrect primary CDOM standard**
   SBS has addressed the issue for all ECO and MCOMS calibrated and shipped since January 1, 2023.
   Outstanding Actions:
   a. Monitor deployed ECO/MCOMS calibrated since January 1, 2023
   b. Apply scaling factor to ECO and MCOMS datasets for sensors calibrated prior to January 1, 2023
      CDOM_adjusted = 5.62 * CDOM
      Sensors affected:
      i. • ECO FLBBCDRT2K (ECO_FLBBCD) with S/N less than 8020
      ii. • ECO FLBBCDAP2 (ECO_FLBBCD_AP2) with S/N less than 6888
      iii. • MCOMSC (MCOMS_FLBBCD) with S/N less than 0406
   c. Apply QC flag 3 to data for ECO and MCOMS data calibrated prior to January 1, 2023

2. **In situ bias**
   MCOMS correction is in beta test, ECO correction is under investigation
   Outstanding Actions:
   a. Verify hypothesis with deployed MCOMS calibrated since January 1, 2023
   b. Determine correction factors for ECOs calibrated prior to January 1, 2023
   c. Apply QC flag 2 to data for ECO and MCOMS data calibrated prior to January 1, 2023
3. **Out-of-tolerance UV LED**
   SBS has addressed issues for all ECO / REMA manufactured (calibrated) by implementing inspection of all UV LEDs since August 2022.
   Outstanding Actions:
   a. Return any undeployed sensors calibrated prior to August 2023 to SBS for evaluation or test with spectrometer kit from SBS
   b. Profiles of all deployed sensors built 2021-2023 are being examined. Results expected by Jan 2025
   c. Apply QC flag 4 to data for ECO / REMA identified with out-of-tolerance UV LEDs

2.2.9 FLBBFL - scientific relevance / channel comparison (Baptiste Ozanam)

Preliminary results from lab experiments suggest that F470:Chla and F435:Chla relations are both linear and that they have a similar variability related to species. Preliminary analysis of in-field and BGC-Argo floats datasets show that the fluorescence signal is overall noisier at 435 nm than at 470 nm. Moreover, the 435 nm channel seems to be more likely to be subject to CDOM influence - especially at depth.

These first results suggest that, for now, the 435 nm channel is not a good candidate to replace the 470 nm channel. More work is needed to determine if the 435 nm channel could be useful for CDOM correction and/or provide information on phytoplankton community composition.

To this end, experimental protocol in the lab will be improved and new species tested to try to evaluate the sensitivities of each channel to other taxonomic groups. Parallel to this, growing materials will be available considering the pursuit of CTD-rosette and HPLC measurements during future cruises and the deployment of new floats equipped with FLBBFL ECO sensors.

2.2.10 Hyperspectral Radiometer update - improvement on depth/time stamp (Edouard Leymarie)

The Ramses hyperspectral sensor can be used to measure light spectra in the water column, reinforcing synergies with spatial observations, particularly with the arrival of hyperspectral sensors such as the PACE mission. In particular, with floats equipped with two RAMSES sensors measuring Ed and Lu, we can have access to a measurement of reflectance (Rrs).

The ERC-REFINE project fleet comprises 13 floats, distributed over a wide variety of bio-optical regions, providing a possible demonstration of the value of Argo profilers for validating satellite data such as that from the PACE sensor. First, very preliminary results are shown.

For surface extrapolation of radiometric profiles to validate satellite data, the IOCCG recommends a depth accuracy of 1 cm and a sampling frequency of 50/m for irradiance and 10/m for radiance. These

specifications are not achievable on an Argo profiler, and simulation and float results show that a depth accuracy of 20 cm would be sufficient especially for wavelengths under 600 nm.

Two pressure sensors are available to estimate the depth of Ramses measurements. The CTD sensor and the Ramses pressure sensor. The Ramses pressure sensor measurement is intrinsically synchronized with the light measurement, whereas the CTD used needs a precise time stamping. Deployments at sea show that the pressure returned by the Ramses sensor is not of sufficient quality. We suggest flagging up this data to 4 in the future. We have worked to improve the estimation of the time offset between the CTD measurement and the light measurement by integrating a time counter into Ramses. A deployment carried out this summer showed that, on over 10k Ramses measurements, this time offset may vary from 1 to 6s, with an average of 2s. We'd like to develop a method for using this time to give the most accurate light measurement depth estimation possible. A discussion with ADMT will be necessary to see how to distribute this estimate of measurement depth.

2.2.11 UVP, hyperspectral data management (Catherine Schmechtig)

36 floats at the Coriolis DAC and 3 Australian floats have been deployed with the Underwater Vision Profiler (UVP). Regarding the Coriolis DAC, the documentation (https://dx.doi.org/10.13155/99280) was released in February 2024 and all the information was reprocessed and stored in the Coriolis aux directory in March 2024 to homogenize the outputs of the different firmwares of the sensor.
20 floats at the Coriolis DAC are equipped with the RAMSES hyperspectral sensor, some data have been published (Kd, Diffuse attenuation coefficient) within the SeaBASS database (https://seabass.gsfc.nasa.gov/experiment/PVST_VDIUP) in the framework of the validation of the PACE satellite mission. In order to provide fully calibrated data within the Coriolis aux directory, there is still some ongoing work (mainly on documentation) at the Coriolis DAC to homogenize the RAMSES sensor outputs between PROVOR and APEX platforms.

2.3 Science presentations from OGS team

2.3.1 BGC Argo in the operational biogeochemical model system for the Mediterranean Sea (Carolina Amadio)

The use of the BGC Argo dataset within the MedBFM (Mediterranean Biogeochemical Flux Model), developed at OGS for the Copernicus Marine Service, has led to significant advancements in simulating the Mediterranean Sea's biogeochemical conditions for the past (25-year reanalysis), present, and future (with 7- and 10-day analysis and forecast, respectively). Through the data assimilation of chlorophyll and nitrate profiles (since 2018) and oxygen profiles (since 2021) into the analysis and forecast product, the MedBFM model's performance has improved, especially in reproducing the vertical structure of the ocean interior, such as the deep chlorophyll maximum. Building on this progress, and considering the high availability of oxygen data (700 profiles in the Mediterranean Sea in 2024) and the lower availability of nitrate data (40 profiles in 2024), a Profiles Prediction Convolutional Neural Network (PPCON) was trained to reconstruct biogeochemical profiles. PPCON predicts vertical profiles of nitrate (NO_3), chlorophyll (Chl-a), and particulate backscatter at 700 nm (BBP700) using parameters such as latitude-longitude, depth, temperature, salinity, and oxygen. By integrating PPCON-predicted nitrate profiles with the in-situ BGC Argo dataset, the available nitrate observations for representing

Mediterranean biogeochemical dynamics achieve an order-of-magnitude increase. Moreover, BGC Argo and PPCON datasets are effectively used at OGS for qualitative comparison with model results, enhancing the ability to investigate key vertical biogeochemical dynamics. Given the importance of BGC Argo in achieving operational goals, a dedicated quality control (QC) procedure for BGC Argo and PPCON data has been developed for near real time (NRT) applications. Future developments will focus on expanding the PPCON model to a global dataset under the GLOBIO Copernicus Service Evolution project (2024–2026), integrating chlorophyll data assimilation by 2026, and developing new methods to convert BBP700 data to particulate organic carbon (POC) under the European NECCTON HORIZON project. These advancements underscore the essential role of BGC Argo in enhancing biogeochemical simulations for both research and operational applications in the Mediterranean Sea.

2.3.2 Assessing the quality of EU operational-oceanography products using BGC-Argo data: a synthesis (Anna Terruzzi)

The European Copernicus Marine Service is part of Copernicus, the Earth observation component of the European Union's Space programme (or "Europe's eyes on the Earth"). Copernicus Marine offers a catalogue of freely available ocean products, which range over different spatial (from the global ocean to the regional European Seas) and temporal (multi-decadal reanalysis and near real time, up to 10 days, forecasts) scales. The products address the physical, biogeochemical and sea-ice domains and are obtained by observation and model systems. Together with their timeliness and operational delivery, Copernicus Marine targets the release of validated and reliable products. This objective is pursued throughout activities proposed and shared in the product quality working group, which includes one member from each Copernicus Marine production center of the Copernicus Marine Service. Until recent years, the operational validation (in near real time, NRT) of biogeochemical products was mainly based on satellite ocean colour estimates (mainly chlorophyll concentration). The relatively recent availability of BGC-Argo profiles gave the opportunity to enlarge the NRT validation framework for the Copernicus Marine products to additional variables and to the ocean interior. The validation with BGC-Argo is performed differently in each of the marine forecasting systems (MFCs; modeling systems) and of the thematic assembly centers (TACs, observation systems). Some examples were provided in the presentation to highlight the really valuable role of BGC-Argo in the validation activities: scatter plots showing matching with BGC-Argo variables; process-oriented validation (deep chlorophyll maximum and nitracline); the use of co-located physical measurements (mixed layer depth). Future plannings of MFCs and TACs foresees that BGC-Argo observations will be used not only to increase validation capabilities but also to be integrated throughout data assimilation and neural network applications or model calibration. The use of BGC-Argo observations into Copernicus Marine will enhance the operational capabilities to produce reliable products but on the other hand will possibly feed scientific results increasing the knowledge of ocean processes.

3 BGC Session - DAY 2

3.1 BGC Data Management status

3.1.1 Actions/stoplight chart review (Tanya Maurer / Catherine Schmechtig)

It is broadly recognized that BGC Argo data management is still developing and exists in different stages across DACs. One goal of the ADMT is to continue to clarify the status of global Argo data management, and also to identify near-term and long-term community objectives from year to year. Therefore, an effective way to track and carry out BGC data management actions, as identified by ADMT, is crucial. The BGC ADMT co-chairs have proposed to lean on the broader ADMT GitHub actions dashboard (with 'BGC' tags) moving forward for tracking actions and assigning leads for each action (https://github.com/orgs/OneArgo/projects/1/views/4). An internal 'stoplight chart' will still be maintained as a quick-view for certain longer-term goals, which may better serve for tracking the more rudimentary data-stream implementations across DACs (ie RT versus DM protocol implementations).

3.1.2 Flagging status (Josh Plant / Tanya Maurer)

One goal of the global ADMT is to strive to follow "FAIR" data principles (Findable, Accessible, Interoperable, and Reusable). Success of the program largely depends on the data being readily usable, which means it should, for example, be easy to access, as accurate as possible, and properly flagged. To further assist users, ADMT tries to communicate to the user-base on how to best navigate the data system, and often urges users to only use ADJUSTED data fields, and quality flags of '1'. Therefore, as data managers we should continue to prioritize flagging refinement of legacy floats in support of this framework.

Each year we report on the status of adjusted data and flagging consistency across DACs. Due to the larger and more timely adjustment requirements for BGC data, all raw BGC data should be flagged '3' ('questionable') until an initial adjustment has been performed. Over the past several years significant progress has been made on increasing the level of high-quality adjusted data available to users, globally. Over 90% of available DOXY, CHLA, and NITRATE data now have ADJUSTED fields populated, and percentages continue to increase for the other parameters. However, there remains some clean-up to be done on removing mislabeled QC flags for raw data fields, and propagating adjusted parameter data to the GDAC. Some summary points from this year's flagging and adjustment audit include:

- Significant improvement since last year was made by BODC and Corlios for removing qc = 1 from raw pH data files. There still remains data without adjusted pH fields, however, across DACs
- There are inconsistencies in how raw irradiance data are flagged, primarily between AOML and Coriolis. The documentation should be reviewed and decided if raw irradiance data should be a '2'
- There still remains some historical qc = 1 for DOXY. Modifying these to '3' should be a priority.
- Flagging inconsistencies for CDOM also exist, although no qc = 1, so the user remains protected. In the coming year(s) it will be decided by the ADMT how to manage the CDOM dataset, given the known issues with manufacturer calibration.

3.1.3 Documentation (Catherine Schmechtig)

We report here that the BGC Argo data management team is a bit behind regarding two BGC-Argo QC documents (NO3 and Radiometry).
All the documents can be found on line here: https://biogeochemical-argo.org/data-management.php and are also shared on a google drive (access required) to be able to edit in a cooperative manner the documentation.
The first BGC DMQC workshop took place in Villefranche in January 2023. Already planned, a new BGC DMQC workshop will be organised within the framework of the European project Euro-Argo One at the beginning of 2027 (it is mandatory that the meeting will take place in Europe).
We also want to discuss/present the opportunity to organize a BGC DMQC workshop in the US in 2025 based on feedback from an online meeting of the BGC Argo data management team. The discussion is still open and we will set up an online survey.
We would also want to gather volunteers to organize BGC DMQC workshops online (like what is done for the core data).

3.1.4 Recommendations on reporting pressures from BGC floats (Henry Bittig / Annie Wong)

A discussion was held on how different float firmwares were enabled to manage BGC sampling and communicate the BGC samples with pressure. The next generation of float firmware will have the option of polling all the BGC sensors simultaneously or in sequence. This means that the BGC samples can be aligned in pressure onboard the float, or the float can send back all the pressure data. It was acknowledged that the final decision on float firmware development would be based on multiple factors, including the cost and availability of electronics for the controllers, and telemetry cost. If all things being equal, it is desirable for floats to return all pressure data, since they will have impact in some scientific applications, e.g. radiometry studies.

3.2 Real-Time procedures

3.2.1 Improved RT test for pH, nitrate (Logan Grady)

As more BGC Argo floats are deployed with onboard nitrate and pH, the effort required to provide consistent delayed-mode quality control (DMQC) every 6-12 months is rapidly increasing. Nitrate and pH sensors are still in adolescent stages of development and some sensors can drift between DMQC, requiring adjustment updates to be made earlier than normal. Current real-time quality control of nitrate and pH relies on global range checks and spike tests performed on the profile in order to flag erroneous data, however, these tests do not flag or indicate questionable data that can still be corrected. A real-time gross sensor drift test is already applied to Core Argo parameters for catching questionable data and provides a possible solution for improving real-time nitrate and pH data quality. A similar test is currently in development at MBARI, and has already caught several nitrate and pH sensors within the U.S. BGC fleet that benefitted from earlier QC or were beginning to degrade before breaching the range check. Additionally, the level of false-positives has remained low, with two cases of false positive drift linked to highly dynamic oceanographic regions rather than degrading sensor diagnostics. To assist with identifying such cases where drift is natural, a supplementary “reference anomaly test” was used. Using the difference between float data and the ESPER model for nitrate and pH (Carter et al., 2021), this test

checks if the observed drift is resolved by the ESPER model, or if the drift is independent of oceanographic conditions. After running these tests on the MBARI fleet for several weeks, catch results indicate that the sensor drift test can be a practical real-time test applied at other DACs. The reference anomaly test is more specialized, but proved to be an incredibly useful tool for auditing nitrate and pH drift over time in dynamic regions of the ocean.

3.2.2 NO2 calculation (Ken Johnson)

Detection of nitrite using the UV spectrum reported by ISUS and SUNA nitrate sensors now appears to be feasible. There is significant interest in nitrite cycling in oxygen deficient zones, so this capability will generate significant interest. The procedure to detect nitrite is described in a manuscript that is in preparation (M. Bif and K. Johnson, BGC-Argo floats reveal nitrite and thiosulfate dynamics in the oceans with high spatiotemporal resolution, in prep.). The process is complex enough that the calculated nitrite concentrations are likely to be provided as a product, rather than a core variable. An advanced statistical/machine learning method termed LASSO regression is needed to process the data. The LASSO method requires a training dataset in the form of coincident BGC float profiles and hydrocast measurements. Optimizing the fit of the float data with the training values requires the presence of an additional UV absorbing chemical. The best fit is provided by including thiosulfate in the fit model, but no validation data is available for the predicted concentrations.
The ADMT can contribute to this effort by ensuring that UV spectra and UV calibration files are available. The community can contribute by providing validation data in the form of bottle measurements of nitrite coincident with float deployments, particularly in oxygen deficient zones.

3.2.3 PAR estimation from radiometric data (Robert Frouin / Jaime Pitarch)

Jaime Pitarch

A simple neural network (NN) derives PAR from multispectral Ed at few bands. The NN only ingests an Ed spectrum and hence is depth-agnostic. It has been validated with independent data in a wide range of global oceanic waters and depths (>300 m). Its computing time is negligible. It is exportable to other languages and software platforms. Estimates of systematic and random uncertainties are provided per every PAR value, following operational requirements.

Robert Frouin

A General Additive Model was developed to accurately reconstruct underwater PAR profiles (0–100 m) from multi-spectral irradiance (Ed) measurements at 380, 412, 490, and 555 nm, replacing the broad PAR band on Biogeochemical (BGC) Argo floats. The model's coefficients vary with depth, require no tuning, and uncertainties are associated with each reconstructed PAR estimate; the code is available on GitHub. Using coupled ARTDECO-Hydrolight simulations and validation against in-situ hyperspectral Ed profiles, the model demonstrates robust performance, achieving average biases below 1% and RMS errors of 4.5 % across depths and diverse atmospheric and oceanic conditions (>57,000 data points). Incorporating additional parameters like chlorophyll concentration and particulate backscattering, also measured on BGC Argo floats, marginally improve accuracy. The approach enhances BGC Argo capabilities for monitoring underwater light and could be extended to estimate UV-A irradiance and support broader biogeochemical applications.

3.2.4 RTQC for radiometry (Giovanni La forgia)

We developed a comprehensive quality control (QC) protocol for processing real-time multi-spectral radiometric data from BGC Argo platforms, aimed at detecting potential sensor failures and malfunctions. The protocol assigns quality flags to each data point by analyzing the shape of radiometric profiles in relation to solar elevation at the time of acquisition. It automatically identifies regions in both daytime and nighttime profiles that may be influenced by temperature effects, which could impact data accuracy. The proposed methodology is robust to sensor drift and variable sea conditions and has been tested across different platform types. Furthermore, it is adaptable to any radiometric band, offering significant potential for future research and broadening the application of real-time radiometric data.

3.2.5 CHLA RT-A correction (Raphaëlle Sauzède)

The presentation discussed methodologies and status for refining RT adjustments of Chlorophyll-a concentrations (Chl-a).

DM adjustment status : The DM adjusted Chl-a is up-to-now the most accurate Chl-a dataset from Argo that we have (evaluated from a Machine-Learning-based workflow). An updated dataset, semi-automatically adjusted for DM correction, is now available on SEANOE, which provides adjusted values using the DM adjustment procedure proposed by C. Schmechtig in 2022, ensuring consistency.

Generation of a global climatology of physiological ratio between fluorescence and Chl-a : SOCA integrates ocean color data with Argo to estimate bio-optical properties to depth using neural networks, creating gridded fluorescence climatologies and radiometric parameters climatologies (among them ED490 from which we derive KD490). Using Morel et al. (2007) to derive Chl-a from light, it becomes possible to derive a climatology of the physiological ratio between fluorescence and Chl-a. This allows generation of a lookup table (LUT) with some ratios tailored by region (e.g., using Roesler's ratio for the Baltic Sea and a DM-aligned ratio for the Black Sea) to support the RT corrections globally.

Operational Implementation : The LUT, with a 1°x1° resolution, will be provided in NetCDF format, ensuring corrections are applied post-dark and NPQ correction. Once approved by a white paper, these will be shared with DACs.

Evaluation of Ratios : The presentation compared the Chl-a derived from new RT ratios and previous RT (i.e., Roesler's ratio of 2) against DM at surface and 100m depths to assess performance in different ocean regions.

Nomenclature Considerations : we propose to change the terminology of slope factor used previously with physiological ratio between fluorescence and Chl-a, and proposed acronyms if the community wants to use one to standardize reference to this ratio across studies.

3.3 Oxygen Data Quality

3.3.1 SBS83 performance update (Yui Takeshita)

SBS83 is an oxygen optode that has a fast response time because it is in the outflow of the pumped CTD flowstream, but also can be air-calibrated. The SBS83 uses all of the same sensing elements and electronics as the proven SBS63, thus, this is a mechanical repackaging thus a low-risk development. Details of the performance of SBS83 based on there tripleO_2 floats (Navis floats that are equipped with SBS83, SBS63, and Aanderaa 4830) were presented last ADMT, and were summarized here: 1) SBS83 have better air calibration precision than the Aanderaa; 2) SBS83 air-calibrations are consistent to Aanderaa 4330 to 0.5%, and 3) SBS83 have comparable response time as SBS63. So far, we have deployed 30 SBS38's on floats worldwide, and all sensors are working well. The GO-BGC program is planning to equip ~50% of their floats over the next 2 years with the SBS83s, amounting to ~150 floats.

3.3.2 Rinko ARO-FT performance update (Kanako Sato)

ARO-FT and AROD-FT are the optical oxygen sensors developed by JFE Advantech in collaboration with JAMSTEC in 2011. They are named RINKO sensors for profiling floats and their features are high accuracy and fast response time.

JAMSTEC deployed 13 floats with ARO-FT in the western subtropical North Pacific in 2021 and 2022. Using the data of the floats, the storage drift and temporal drift after float deployment of ARO-FT were examined. Though the storage drift of ARO-FT was relatively large, the oxygen profiles measured by ARO-FT at the first cycle were corrected well using the linear relationship between them and ship-based bottle sampling data at float deployment. The reason for the relatively large storage drift is probably the long storage period after the sensor calibration, because the storage drift of ARO-FT depends on the storage period and because the floats used in this study were deployed at 450~900 days after sensor calibration due to changing deployment plan of the floats by COVID-19 pandemic.

Because the oxygen profile correction using the linear relationship between the raw oxygen of ARO-FT and bottle sampling data does not have bias in the whole profile, the correction of response time is not required for the oxygen data of ARO-FT.

Because we found that partial pressure of oxygen (PPOX) measured in air by the ARO-FT often showed an anomalous value in the local day time, we examined the temporal drift of the ARO-FT after float deployment using only PPOX measured in the local nighttime. The amount of temporal drift of ARO-FT after float deployment estimated by equation 21 of Bittig et al. (2018) is -0.31±0.17% yr^-1, which is similar to that estimated by equation of Johnson et al. (2015). At five dbar, the correlation between oxygen saturation of floats calculated using oxygen which are corrected for storage drift and temporal drift after deployment by the equation 21 of Bittig et al. (2018) and that of WOA2023 is close to that between oxygen saturation of floats calculated using oxygen which are corrected for storage drift and temporal drift after deployment by the equation of Johnson et al. (2018) and that of WOA2023. But, root mean squares between oxygen saturation of floats calculated using oxygen which are corrected for storage drift and temporal drift after deployment by the equation 21 of Bittig et al. (2018) and that of WOA2023 is smaller than that between oxygen saturation of floats calculated using oxygen which are corrected for storage drift and temporal drift after deployment by the equation of Johnson et al. (2018)

and that of WOA2023. The method of Bittig et al. (2018) is better for the correction of ARO-FT than that of Johnson et al. (2015).

Therefore, we proposed that the storage drift of ARO-FT should be corrected before temporal drift after float deployment using oxygen measured in air and that the gain coefficient for the correction of temporal drift after float deployment are better calculated using the equation 21 of Bittig et al. (2018). In order to correct oxygen of ARO-FT well, the oxygen in-air should be measured at the local nighttime and the bottle sampling observation should be implemented at float deployment to correct the storage drift of ARO-FT.

We announced some updated information on ARO-FT and AROD-FT by the JFE Advantech. The film stopper has been improved. It is expected that the improvement allows the sensor to measure oxygen in air better. They decided to perform pressurization and decompression on the sensing foil several times before shipping the sensors to alleviate the pressure dependency. This is expected to reduce the temporal drift after float deployment. They started giving the coefficient of pressure correction for each sensor. It has been recommended to be a constant (=0.032) in the “Processing Argo oxygen data at DAC level”.

JAMSTEC has plans to deploy floats equipped with ARO-FT and deep floats equipped with AROD-FT. We continue to monitor and examine the storage drift and temporal drift of ARO-FT and AROD-FT.

3.3.3 Rinko / Aanderaa comparison (Virginie Thierry, Catherine Kermabon and Lidia Carracedo)

The presentation concerns the comparison of two oxygen sensors, the Aanderaa 4330 and the RINKO/AROD-FT, mounted on a Deep Arvor float as part of the Ifremer PIANO project. Two Deep Arvor floats were deployed in the North Atlantic Ocean in August 2024 during the CROSSROAD cruise, each equipped with both sensors. JFE-Advantech provided the RINKO/AROD-FT sensors. The decoding procedure for the ARO-FT sensor was adapted to the AROD-FT sensor, the deep version of the ARO-FT. The Argo-O2 cookbook will be updated based on this. Raw data from the floats were compared to ship-based CTD oxygen casts calibrated against Winkler titration data and revealed the need to correct the two datasets. A correction was applied to the raw data using LOCODOX. The method is based on the comparison between in-air sensor measurements and NCEP reanalysis fields. Initial gain corrections were applied for both sensors, but these were deemed unsatisfactory. Further work is needed to improve the correction, including pressure compensation, sensor drift evaluation, and sensors' time response in oxygen gradients assessment. We thank JAMSTEC and JFE-Advantech for their contributions.

3.3.4 MBARI processing implementations - DOXY response time, BBP RTQC (Tanya Maurer)

The MBARI data team has been working on a number of processing upgrades, both real-time and delayed-mode, in order to improve the quality of the global dataset. Two recent implementations that are near completion are the optode response time correction for DOXY_ADJUSTED data on APEX and Navis floats, and the newly approved RTQC tests for BBP. This presentation reviewed the status of these implementations at MBARI, as well as recent insights gained through the process.

The global Argo oxygen array is biased low due to slow response of the oxygen optode. The magnitude of this bias is small (< ~2 umol/kg low on average at the sfc, fleetwide), and is largest in steep gradients (so varies regionally as well as throughout the profile). A correction method exists (Bittig et al, 2014;2017) which can be applied if sample times are known. This enhancement to delayed-mode processing has been discussed numerous times at past ADMTs. The tradeoffs and shortcomings have been addressed, and the method was accepted by the community, with the agreement that if a bias can be removed or improved upon, it should be implemented. It is important to note that not all floats in the global array will receive this correction, either due to errors in the time-vector (required), or inability to implement due to other priorities (the case at many of the DACs). As MBARI continues to roll out this correction at their data center, it was identified as a priority that this must be effectively communicated to the user base (both within the SCI-CAL-COMMENT of the files, as well as through routine communications).

The second implementation that has been moving forward at MBARI is the implementation of the newly documented BBP RTQC protocols, based on Dall'Olmo et al, 2023. MBARI has tested this implementation and plans to complete the rollout by the end of the year. We have been following protocols outlined in the publication, with some slight modification to the "Missing Data Test". Due to a number of false positives due to the sample resolution on APEX platforms (and old, shallow floats), we have modified the bin thresholds a bit to better suit our suite of APEX floats, and caution other DACs to take care when implementing this test.

3.4 Delayed Mode Procedures

3.4.1 pH pump offset & SAGEv2 (Josh Plant)

The SAGEv2 update intends to ease the burden on DM operators who are performing quality control adjustments for nitrate and pH. A second goal is to enable the correction of the "pH pump offset" which is observed mostly on APEX floats though there is starting to be an uptick of occurrences in Navis floats. The offset presents itself as a drop in pH when the float ascends from spot sampling to constant profiling mode usually at 985 dbar. This issue has been discussed at several previous ADMTs and the correction strategy was approved for implementation. The correction scheme in SAGEv2 is identical to that used in SAGE and described in detail by Maurer et al. (2021), doi: 10.3389/fmars.2021.683207. Briefly, the correction is a collection of linear anomaly segments determined at depth (~1500 dbar) using a reference climatology (ESPER, CANYONB, WOA23). The number of segments are determined using change point detection constrained with the Beysian Information Criteria to minimize overfitting of the anomaly time series. The main enhancements include: direct loading of synthetic profile files (Sprof), removal of external toolboxes in the code (m_map, nctoolbox, Gui Layout Toolbox), pH pump offset correction, built in Matlab's App Designer environment and enhanced sensor specific metadata information in the text-based correction file. It was suggested to include code to update existing B-files with adjusted nitrate and pH using the derived corrections.

3.4.2 Oxygen and BBP audits (Josh Plant / Raphaëlle Sauzède)

DOXY audit: The amount of quality oxygen data on the GDAC now is truly a success story due to the dedication of the BGC Argo data management community. In 2019, the majority of the oxygen data was not of "scientific quality". Only 38% of the data were adjusted and lots of unflagged bad data existed in

the system. As of 2024, just five years later, the story has completely changed. 93% of the data are corrected and most bad data are flagged as such. Oxygen data are transmitted to the GTS, BGC Argo oxygen data dominate the available open ocean oxygen data, and papers are being published about potential biases less than 3 umole/kg! The data are being used in World Ocean Atlas 2023 which reduced the Median Absolute Deviation of the audit by 20%
The DOXY AUDIT for ADMT-25 identified 2322 BGC Argo floats at https://www.ocean-ops.org as of October 08, 2024,. Merged synthetic profile (Sprof) files were found for 2,165 of these floats at the GDAC, leaving 157 floats where Sprof files were not generated and thus not inspected in this audit. Floats lacking Sprof files may be incorrectly identified as BGC floats at OceanOps or have NetCDF format errors preventing Sprof file creation. Sprof creation errors for each DAC can be identified in the log files (https://data-argo.ifremer.fr/etc/argo-synthetic-profile-log/). This year World Ocean Atlas 2023 (WOA223) was used as the reference dataset instead of WOA18. In addition to increased bottle data, WOA23 has incorporated over 240,000 D-mode DOXY profiles and included a solubility correction to account for ocean warming. The DOXY data array has increased by 255 floats since last year's audit. These 2,165 floats generated over 72.7 million DOXY measurements. 8.8% of these data have been flagged as bad by DM operators & DOXY_ADJUSTED data exist for 93% of the good DOXY data. This is a 1% decrease in the percent of adjusted data since last year's audit. Of the 249,650 profiles inspected in the audit, 1,925 or 0.7% of the profiles are flagged as anomalous and would benefit from further inspection by DM operators. This is the same percent as last year. Many of the profiles on the audit have been identified previously. A secondary audit was performed using Ocean Data View to look at outliers in oxygen % saturation throughout the water column as well as to inspect the correction factor used to generate DOXY_ADJUSTED. Both inspections identified further outliers as well as anomalous correction factors which may indicate an error in the calculation of either raw or adjusted data.

BBP audit: This presentation reported the latest status of the BBP700 dataset (that will be pushed online in November 2024), now containing 138,966 profiles, with a notable rise in real-time adjusted data using the RTQC procedure from Dall'Olmo et al. (2023). The audit highlighted differences in BBP700 readings across sensors at depth, which appear consistent globally and not due to regional differences from the distribution of the sensors, suggesting further investigation by the BBP WG. Audits rely on SOCA-based climatology to identify anomalies, with 0.7% of profiles flagged for review—a decrease due to the new RTQC application. Future directions emphasize the use of exclusion lists to refine SOCA's accuracy and exploring improved drift detection techniques to better capture bio-optical signals, including zooplankton signatures.

3.5 BGC-Argo products

3.5.1 Update from the SCOR WG (Raphaëlle Sauzède / Johnathan Sharp)

The presentation covered the SCOR WG 168's mission to coordinate the development of Gridded Four-Dimensional Data Products from Biogeochemical-Argo Observations (4D-BGC). The Goals of this WG include connecting data producers with users, creating a catalog of 4D-BGC products, and developing standards and methodologies for data validation and distribution. Key deliverables include an online product repository, a synthesis paper, and capacity-building resources, all aiming to enhance ocean biogeochemistry research and support climate change studies.

4 OneArgo session – Part 2: Real Time Data Management

4.1 GTS

4.1.1 Timeliness & availability of real time data delivery for all parameters on GTS (Anh Tran)

MEDS routinely decoded GTS data received from Environment and Climate Change Canada and Japan Meteorology Agency(JMA). Between September 2023 and September 2024, MEDS decoded an average of 13,664 Argo BUFR messages on the GTS each month, with 87% meeting the Argo target for timely transmission (within 12 hours for Iridium and 24 hours for Argos satellite data). 95% of these messages came from Iridium-enabled floats.
Regarding biogeochemical data, DACs with DOXY-adjusted data transmitted fewer profiles on the GTS than those available in NetCDF files, and no DOXY data is available for Japan, Australia, the UK, and India DACs. MEDS plans to stop sending non-adjusted DOXY data with a flag of 3 by the end of 2024.

Currently, only Coriolis and MEDS send Chlorophyll-A data on the GTS, and only Coriolis sends Nitrate and backscattering data. No pH data is available on the GTS.

4.2 WIS2.0

4.2.1 Background, introduction and next steps for Argo during transition to WIS2.0 (Megan Scanderbeg)

Megan Scanderbeg reported on some of the technical details of WIS2 and how Argo will need to host a WIS2 node to make data available. This involves creating a metadata record describing the entire Argo dataset and the BUFR files themselves. WMO has defined ‘core’ and ‘recommended’ data which correspond to core and BGC Argo data. There is a ‘WIS2 in a box’ tool available for implementing a node.

M. Scanderbeg then presented several questions regarding the implementation of WIS2 for Argo that she hopes will get resolved in the next year through meetings with the engineer of WIS2 and the Coriolis team beginning to investigate how to implement a node as part of their next funding cycle. She will report back information she learns to the ADMT exec and at AST-26.

4.3 Monitoring by Ocean OPS

4.3.1 Monitoring activities at OceanOPS + any additional ADMT requests + duplicate WMO numbers (Victor Turpin, Orens de Fommervault)

Victor Turpin started the presentation by acknowledging that OceanOPS was down for five months from mid-February to mid-June and while not all services have been restored yet, most have. He noted that this migration to IFREMER puts OceanOPS in a more robust position in terms of its infrastructure than the previous year. He thanked IFREMER for their collaboration, support and hosting of OceanOPS.

Regarding the issue of WMO ID duplication, he advised that to avoid this, PIs should get rid of old stock WMO IDs and use OceanOPS services when you need new WMO IDs. He advised people to not request a batch of WMO IDs until you really need it and when you have defined deployment plans. If you don't have a well defined deployment location, he suggested entering a date in the far future and lat/lon set to zero. He noted that deployment plans often have WMO IDs associated with them and asked that you update or delete plans if need be. In the following discussion, several people asked that deployment plans be separated from WMO IDs. This could encourage PIs to enter deployment plans more efficiently and would alleviate the problem of needing to release WMO IDs that have been attached to a float that may no longer be deployed as initially thought. OceanOPS agreed to continue discussing this issue with a small group interested in this to try and find a solution for all.

Sensors performances : Monitoring sensor performance at OceanOPS is an ADMT Action Item. OceanOPS is using various methods, including the MBARI tool for GO-BGC and SOCCOM floats and the Stoer et al. (2023) paper, to develop the required tool. The system is based on the BGC Argo profile-level flag from the synthetic_profile_detailed_index GDAC file, with sensor failure identified when the flag is "F" (0% high-quality data). The survival rate is calculated as the ratio of floats with functioning sensors to the total operating floats. Details are available here: https://github.com/OceanOPS/helpdesk/wiki/Argo-Chart#sensor-activity.
For access to the plots in the OceanOPS interface, use the Charts > Instrumentation > Sensor Activity option. The plot is dynamic and associated with float selection (Search menu).
The tool requires further validation. In addition, specific cases like NO3 and pH still need to be addressed.

4.3.2 Orphan floats & neglected floats: which are they and who will DMQC them? (Victor Turpin, Orens de Fommervault)

Victor Turpin presented how to identify the status of delayed mode processing and suggested that floats with profiles not dmoded after four years are likely to remain un-dmoded. He demonstrated how you can now search for 'standby observations' to identify these floats and suggested you enter '4' for the number of years. This will generate a list of floats without dmode observations for four years for the variables of interest. He compiled the statistics for this and found a total of 2601 floats with at least one overlooked profile. 7% had more than 100 overlooked profiles and corresponded with 5% of the fleet. Floats with 50 - 99 overlooked profiles contributed another 2% of the fleet. Therefore, the ADMT asked DM operators to please consider adopting a float with 50+ overlooked profiles to try and get the backlog down.

4.4 DAC Modernization

4.4.1 Feedback on testing of Coriolis container

This was not presented formally since no DAC has successfully implemented the Coriolis container yet. MEDS and BODC have begun investigating how to install it and will give feedback when they have had a chance to test it out.

4.4.2 Status of machine readable metadata delivery from manufacturers (Brian King)

Brian King reported on the status of the sensor and platform metadata that can be delivered by manufacturers to DACs and float owners in a machine readable JSON format. He thanked both RBR and SBS for their development work on format that includes the same vocabulary as what is in the Argo metafiles along with additional spaces for information that vendors find useful to pass along but which may not yet have a space in Argo files. The development is described in this GitHub: https://github.com/euroargodev/sensor_metadata_json

RBR was able to implement the scheme quickly for their CTDs which is great. It has been harder for SBS to implement because their metadata are embedded in many different databases and it has been hard for them to machine-read and reformat their complete metadata into the Argo JSON format. Eric Rehm has provided some examples, but has not had the bandwidth to do it in production mode. SBS recognizes the need for dedicated effort on this and plans to finish it by the end of Q1 2025.

As this gets rolled out, we expect some bugs and initial tweaks. After it is more stable, other manufacturers will be approached with Aanderaa being first as they already expressed willingness at AST-25. In terms of platform metadata, this was introduced at the Float Technical Workshop in Seattle in September 2024 and all manufacturers indicated a willingness to get on board.

After the sensor and platform metadata starts being delivered into an Argo JSON format, the question is what to tackle next and a decoder format was suggested. The aim would be that decoders could map what a float sends back more directly onto the Argo variable naming conventions, especially for the MISSION CONFIG, meta, tech, and traj data.

4.4.3 Steps US is taking to modernize real time data processing chain (John Gilson)

The U.S. Argo Consortium has submitted to NOAA its proposed 5-year work plan for the next renewal of the U.S. Argo grant. In the buildup to this submission, NOAA requested for the consortium to address ways to modernize and future proof its real time data flow. A few ‘modernization’ examples were suggested including decoders of modular design and coding in more recent and open source programming languages. Additional goals included reducing the data pathway differences between float providing groups and mitigating the impact of future retirements. A working group of real time and delayed mode personnel from the six consortium members was formed.
The main topics which were felt to be relevant to the wider ADMT community follow.
1) Development of a shared, machine readable intermediate data format
In the U.S., Argo data is distributed from the float providing groups to the AOML DAC via different format-rigid text files. They are not formatted to be ‘machine readable’. The working group recommended the development of a shared, machine readable intermediate file format/template. All float data parsers

would adopt this intermediate format for their immediate output which would then be passed to AOML. Longer term, this format would also be the basis for the float-providing groups internal data monitoring. Several float models/manufacturers are used within the U.S., with their own distinctive data. The intermediate file would at first provide only storage for the transmitted data of the floats. Later additional processing and modification of the float data is also hoped to be accommodated within the same format. A sample JSON file containing the data of a BGC SOLO cycle was created by Ben Greenwood and was reviewed favorably. This is not to say the decision of format is finalized. In the development the working group will consider similar files/templates that our international partners may already be using.

2) Development of a shared SOLO family float decoder

The SOLO family of floats are deployed by three of the four US float providing groups. For various reasons, there are three independently developed SOLO decoders currently in use within the U.S. Parts of these decoders have developed piecemeal over the last 15 years as the Argo data system has substantially become more complicated. They are programmed in different computer languages.

It was decided to expend significant effort in developing a new shared SOLO family decoder. It will include all SOLO family float models that are currently in significant use. Future maintenance of the code base with Argo personnel is critical. Although it is possible outside personnel will be the primary programmers of the decoder, Argo personnel from SIO, WHOI, and AOML will be heavily involved to establish this expertise within the program.

Once completed the U.S. will begin implementing the code within the processing procedures of both the float-providing groups as well as the DAC. The modular code will be available to the international community.

3) The AOML DAC will explore ways to modernize their codebase with the explicit goal of increasing modularity and adopting shared intermediate file formats

The codebase at AOML, like those at the float providing groups, can be improved with increased modularity and use of shared intermediate output files. The working group suggested two ideas towards this goal, however the hope would be that additional improvements will be identified.

a) A modular code to assign the real-time quality-control flags directly to the Argo netCDF files

b) Design a code set to compute the ocean state BGC variables from the data transmitted by the float and the sensor manufacturers pre-calibration coefficient data

4) The most difficult, and in some cases subjective, part of the Argo data system is the mapping of float data to Argo data. A longer-term goal of the working group which is necessary to accompany the three recommendations above is to redesign the mapping of the data between float and netCDF in a way that is more modular, open, and modifiable. In the short time the working group had no concrete ideas on how to accomplish this were reached, and as such was not presented to the ADMT.

The timelines of development and implementation will depend on the level of funding available in the next 5-year grant.

4.4.4 Summary of DAC modernization meetings & discussion to identify possible actions (Megan Scanderbeg)

Megan Scanderbeg summarized the feedback from the series of DAC meetings held in the springtime with the ADMT co-chairs. Two topics were discussed and the pros and cons of each were presented. The first was using containers to implement either the entire processing chain or in modular parts. In general, there were concerns regarding the technical implementation of containers and how they would be maintained. There was general consensus that using containers would be a good way to effectively share code. Some of the concerns could likely be addressed via training and education on containers.

The second topic was the possibility of developing a common output format for float decoders. Several DACs had concerns about asking manufacturers to create the decoder, but there was agreement that it would be a useful first step to begin sharing code further down the processing chain.

M. Scanderbeg then posed some possible actions and topics for discussion including DAC trainings on Containers and GitHub, the formation of a working group to develop a common, flexible format that float data could be decoded into, the sharing of decoders via GitHub, and regular virtual meetings for DACs to discuss issues like experiences with modernization, trainings, etc. She also noted that asking DACs to work together on code development would be a change in the ADMT culture. In the discussion, GitHub training was well received and the idea of a Working Group to develop the common, flexible format was endorsed. No leader was identified for leading regular DAC discussions, but the ADMT co-chairs could lead it if needed.

4.5 Real Time QC

4.5.1 Status and timeline for removal of v3.1 Btraj files and replacement with v3.2 traj files for BGC floats (Annie Wong)

As of October 2024, 3 DACs (CSIO, MEDS, KMA) still needed more time to transition their old BGC float trajectory files from the old V3.1 Btraj format to the new V3.2 combined trajectory format. One DAC (BODC) has made the transition, but has yet to remove the old Btraj files from the GDACs.

The status of removal of the old Btrajetory files from the GDACs will be revisited in 2025.

4.5.2 Greylist proposal (Annie Wong)

Here are the conclusions from the discussions concerning the “greylist”.

1. Argo RTQC Test 15: "Grey List Test", will be renamed as "Supplemental Sensor Exclusion List Test". This is in response to a request from the AST to remove any mention of color in the name. The short name is the "exclusion list", as suggested by Dirk. Please note that this is just a name change; the workings of RTQC Test 15 stay the same.

Actions:

- Annie will change the name of RTQC Test 15 in the next update of the QC manual.
- The name entry in R11 for Test 15 should also be changed.

2. The aggregated grey list file, "ar_greylist.txt", which is made by the GDACs and is available to the general public, will be removed from the GDACs from public access. This is a legacy from the TESAC era and should be cleaned up. The proposed removal date is sometime in June 2025 to facilitate the transition of several super users.

Actions:

- Thierry & Mike (GDAC managers) and Annie to fix a removal date in June 2025, and communicate this to all Argo data users with ADMT co-chairs.
- Thierry & Mike (GDAC managers) to proceed with the removal of "ar_greylist.txt" from the GDACs on the agreed date in June 2025.

3. After the removal date in June 2025, to facilitate internal users within the ADMT and OceanOPS who use "ar_greylist.txt", Coriolis will make an aggregated "exclusion list", with warning in the

header that this is not a comprehensive list of failed sensors, and should only be used by experts with full knowledge of its limitations. @tcarval and @coatanoan will decide where in Coriolis to put this aggregated "exclusion list".

Actions:

- After the "ar_greylist.txt" removal date in June 2025, DACs will continue to send their internal "exclusion list" to Coriolis. Coriolis will make an aggregated "exclusion list". Thierry and Christine will put this in an area in Coriolis (to be determined), with warnings.

4.5.3 Real time results from min/max test (Christine Coatanoan)

A review of the two actions since the last ADMT has been presented.

First action: Make available the list of questionable floats from the min/max test that have not been greylisted. Advertise this as a supplemental list to be used together with all the QC test results in the Argo data files. #10. From a discussion with Annie Wong, we agreed that it was not a good idea to have this kind of index file. The idea is that the modelers/users no longer use the current greylist because the QCs are already present in the BUFR file formats. So why add a new one? The goal is to encourage the detection and removal from the data flow of profiles that show anomalies, as soon as possible, so we need to work further upstream at DAC level, paying particular attention to the relationships between DACs, PIs and DM operators.

Second action: Encourage operational centers to include some elements of Gourrion et al. (2020) in their own in-house screening of input data. Advertise public code and Christine's supplemental list. #11. A survey has been sent (end of September) to all the DACs to gather information on how they work with MinMax anomalies feedback. From this survey, it seems that only three DACs have downloaded the codes and only one used it.

Results of the survey (10 questions) have been presented. These show that DACs have no problem to get and read the messages but corrections, when applied, are done manually. Some read the monthly report and others only the csv files that are on the Coriolis ftp site. Some put floats on the greylist while others wait for feedback from PIs. Examples of anomalies (RT,DM, NetCDF) have been presented and still show large anomalies going through the dataflow. Feedback coming from the minmax CORA was also presented.

A better connection is needed between each team of the chain process (DAC, PIs, DMQC operators). A discussion to try to detect anomalies more quickly before submitting profiles to GTS suggests setting the MinMax code as an automatic test at the DAC's level.

5 Deep & RBR data management

5.1 Deep data management

5.1.1 Deep Argo data: Cpcor correction & DMQC status (Cécile Cabanes)

The status of the Cpcor correction as well as the salinity flags assigned in real time or delayed time have been presented.

~ 88 % of the deep salinity profiles have been corrected with a new Cpcor value either in A mode or D mode. A few deep floats (14) in D mode do not have information on the Cpcor correction in the SCIENTIFIC_CALIB section and/or Cpcor is not corrected. DM operators should check the following table :
https://docs.google.com/spreadsheets/d/1sGYM-hTV7OemiLjmg2MXqfhUZqco4JpK6QOiz7nV1HQ/edit?usp=sharing

Optimum Cpcor values (SBE41CP and SBE61) now converge towards -11.7e-8.
Raw salinity data below 2000db are often QC = 1 (profiles in "D mode"). This is not consistent with the QC manual. DMQC operators/ DACs should check. Consistently with the QC manual, PRES and TEMP (both raw and adjusted data in real time) are QC = 2 below 2000db. This prevents modelers from using pressure and temperature data below 2000db.

DAMT made a presentation to request changes to the QC flags of Deep Argo data and Cpcor. This request will be finalized on Github.

A supplemental database from good deep Argo profiles was proposed by Annie and John at the last DMQC meeting (30/08/2024). This supplemental database is an xlsx file for experienced DMQC folks to record Deep profiles that they think will help others to DMQC the 2K floats, and can be found here: https://docs.google.com/spreadsheets/d/1Pj3MBSBmHMH-QDMrOb5Ri9Ud6Xxx5RXe5DV7v1-r6C0/edit?usp=sharing

5.1.2 SBE Cpcor update (SBE)

A summary of the CPCor update at AST-25 by Nathalie Zilberman was provided, since no new developments could be reported. The main conclusions were:

- Validation of laboratory measurements of CPcor using shipboard salinity samples show lab measurements are an improvement over current nominal CPcor of -9.57e-8 $dbar^{-1}$
- laboratory CPcor measurements of SBE61s are lower in magnitude than either direct field measurements or statistical estimation, indicating need for further development of laboratory method
- CPcor values estimated from the individual laboratory characterizations are about 10% lower than the optimal CPcor corrections derived from the recent Tangaroa field data. About 46% of SBE61s and SBE41s would be within ±0.002 PSS-78 by adopting this field-derived CPcor value

Based on previous analysis by Cecile Cabanes, Argo QC manual currently calls for the following CPcor corrections:

CPcor = –12.5e–8 $dbar^{-1}$ for SBE-61 data
CPcor = –13.5e–8 $dbar^{-1}$ for Deep SBE-41CP data

SBS recommends using the new field-derived value of CPcor_new = –11.70e–8 dbar-1 for both SBE61 and Deep SBE41 CTDs.

5.1.3 Deep RBR update (Mat Dever)

An update was provided on the data quality of the RBRargo|deep6k using data collected from a research cruise in 2024 to 6000 dbar. The five RBRargo|deep6k deployed on the ship's rosette showed good agreement with the ship's CTD for conductivity over the 6000 dbar range (within ± 0.005 mS/cm),

confirming that the individual pressure correction to conductivity done during calibration is valid in the field. The presentation also showed evidence of the performance of the dynamic corrections determined in the lab and validated using IFREMER's in-situ dataset on deep floats. The correction is similar to the one already implemented for the RBRargo|2k CTD, with different coefficients. Finally, the stability of the RBRargo|deep6k is evaluated using IFREMER'S dataset of bi- and tri-headed floats, showing good stability over more than 700 days.

5.2 RBR Data management

5.2.1 RBR CTD update (Mat Dever, Annie Wong)

An update on the status of the RBRargo|2k fleet was provided during a presentation split into three parts. Part 1 presented an overview of the fleet (deployments, failures, etc) and showed good stability of the fleet as a whole using an aggregated OWC analysis. Part 2 presented the results from the floats equipped with onboard dynamic corrections, confirming that (1) the onboard algorithm matches the DMQC algorithm, and (2) the quality of the data is significantly improved when this correction is applied, as demonstrated by a decrease in negative N2 in the data. Finally, Part 3 discussed the recent error found in the salinity computation onboard the RBRargo|2k, presenting the amplitude of the detected error (0.0014 ± 0.0005) as well as the code to correct for this error in the data.

6 Core Delayed mode quality control

6.1 SBE CTDs

6.1.1 Salty drifter spreadsheet update (Delphine Dobler, Birgit Klein)

Compared to last year, there are 132 more ASD floats, this increase is mainly due to a batch of legacy PMEL ASD floats that were missing in the spreadsheet and recently added.
Since the last ADMT, the warranty range has 40 more floats (incl. 27 from PMEL) and CTD SN > 11252 (high boundary for the warranty range) has 10 more floats.

Both automatic comparison with climatology, and ASD spreadsheet analysis provide similar conclusions as last year: 3 peaks (6000-6999, 8000-8999 and 10482-11252) reach 40% error rate (error rate is computed as the percentage of floats having reached an unadjustable state when grouped by batch of 300 SNs compared to CTD effectively mounted on Argo floats within the batch). A smaller 10% peak also shows in the SN range 12600-12900.

The number of salinity profiles with QC = 3 or 4 in all layers decreases gradually from 2022. It accounts for 16.7% of the total number of profiles in 2022, 15.3% in 2023, and 14.4% in 2024.
Another analysis shows that about 18% of the operational floats as of June 2024 are acquiring salinity profiles with QC = 3 or 4 in all layers. About 53% of these floats have been in operation for more than

2000 days. Therefore, the number of salinity profiles with QC = 3 or 4 in all layers is expected to decrease in the future.

An update of the warranty process with SBS was also presented, Europe has sent an additional 8 floats that were agreed to by SBS, OGS has spent its certificate, SIO plans to use theirs in a next order, JAMSTEC has also received theirs but is facing procedural problems.

6.1.2 ASD Warranty update (Jochen Klinke)

The majority of the ASD relief certificates were issued in Nov/Dec 2023 after ADMT-24.
A final review of the fleet within the SBE 41 recall range was completed by Euro Argo in June 2024. It resulted in identifying fewer than 10 additional ASD failures, with fewer than 40 floats still below the ASD relief threshold of 220 cycles. SBS is in the process of issuing relief certificates for these newly identified ASD failures.
Thanks to the support of Birgit Klein (BSH) and other participants of the ADMT-25, it was possible to resolve issues with the outstanding ASD submissions from India. We anticipate ASD relief being completed in early 2025.

6.1.3 SBE CTD storage update (Jochen Klinke)

A summary of best practices for Argo SBE 41CP was presented. A comprehensive guide for system integrators and expert users, AN97-Best Practices for Shipping and Deploying Profile Floats with SBE41/41CP, is available at www.seabird.com/application-notes and covers:
Storage & Shipping Practices to prevent drift and contamination of sensors from their calibrations

- Avoid exposure of sensors to temperatures above 45^{o}C
- Prevent contamination of conductivity cell with surface oil slicks during ballasting
- Safe storage & packing to protect the glass cell from breaking
- Ideally store the CTD head (float) in a horizontal position to minimize effects of high temperature exposure

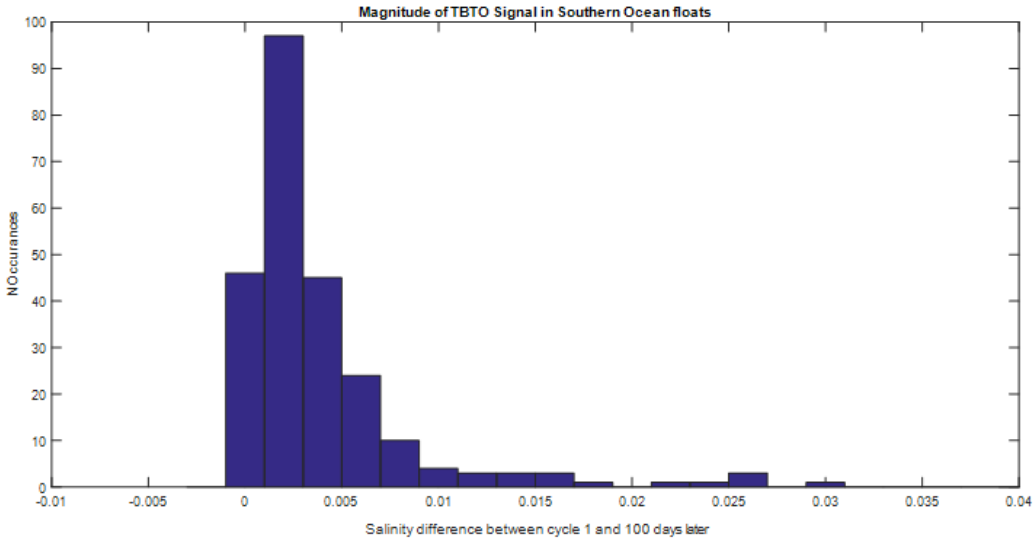
6.1.4 SBE CTD sampling rate update (Jochen Klinke)

A controlled flow rate in the SBE41CP ensures that temperature and conductivity are measured in the same parcel of water, matching the response time of the sensors and minimizing dynamic errors. The pump operates at two different speeds: a slow rate of approximately 10 ml/sec and a fast rate of approximately 30 ml/sec. When the float is in CP mode, the pump runs at the slow rate for the entire ascent, except for a 2.5-second fast interval that flushes out the old water and cleans the cell. The current draw during CP mode is 20 mA, and the energy consumed over 6 hours of profiling is 5000 Joules.
In Spot Sampling mode, a 3-second pump time ensures that the thermistor equilibrates and measures the in-situ temperature accurately. The parameter “tswait” can extend this pump time if needed. tswait refers to the time the pump turns on until the first measurement is taken. For longer tswait durations, there is higher energy consumption per tsall command.

6.2 Other DMQC items

6.2.1 Initial asymptotic adjustment of salinity (Birgit Klein, Cécile Cabanes)

The initial survey conducted on floats in the Weddell Gyre presented at the previous ADMT meeting was extended to the entire Southern Ocean south of 62°S. The analysis looked for initial asymptotic adjustments of salinity on deeper (>1000 m) isotherms. The initial too low readings of salinity and following asymptotic adjustment can be linked to the flushing of TBTO into the conductivity cell and have been observed in other ocean areas as well, but depending on background noise, normally only larger magnitude signals are noticed. Low noise levels in the Southern Ocean south of 62°S allow detection of very small signals. From the 843 floats in the sample 499 fitted the criteria to calculate the magnitude of the TBTO leakage. The census showed that about 50% of the floats were affected and showed mean fresh salinity bias in this sample in the order of 0.002 fading away over a period of approximately 100 days.



There were differences in the occurrence across national programs and those are probably linked to pre-deployment cleaning of floats and precautions during shipment. Similar low magnitude TBTO signals were also seen in the deep float measurements. But numbers of floats are still small and will need larger sample sizes. It was suggested to investigate if the TBTO was still needed to protect the floats from biofouling, now that the surface times are so small using iridium communications. SBS was offering guidance on energy consumption during pumping to help flush the TBTO out of the cell as fast as possible.

6.2.2 DM trajectory files: status and possible workshops (Annie Wong, Cécile Cabanes)

As of October 2024, there were 3543 Dtraj files at the GDACs (3542 under AOML, 1 under Coriolis). Under the AOML DAC, 2 groups were producing Dtraj files: SIO (by John Gilson) and UW (by Matt Alkire). Other delayed-mode groups will start to produce Dtraj files soon. For now, people prefer to work through the Dtraj process in their own time, and discuss the preliminary steps with colleagues in informal ways.

6.3 DMQC reference databases

6.3.1 CCHDO updates (Savannah Lewis)

Since ADMT-23 (last CCHDO attended), 641 GO-SHIP CTD profiles have been added to our collection. Steve Diggs, the previous Argo representative, is now working at UCoP, so CCHDO sent a new representative, Savannah Lewis. The main updates to report are: 1.) The majority of our holdings (88% of CTD files and 99% of bottle files) are now available in CF netCDF 2.) Our holdings are now archived monthly with a doi at the UCSD library (https://library.ucsd.edu/dc/object/bb3391883k November's Collection) 3.) We are beginning to add float links to cruise pages. If there are any cruises of interest that are not in our collection currently, feel free to reach out and we will try to hunt it down and provide it in our standardized format! Email: cchdo@ucsd.edu Website: https://cchdo.ucsd.edu/

6.3.2 CTD reference database updates (Christine Coatanoan)

Since the last ADMT, a new version 2024_V01 has been provided in February 2024. This version takes into account corrections following the feedback received from users, CTD from the latest EasyOcean product, CTD from CCHDO (mainly for Argo DMQC), CTD provided by scientists and CTD from WOD (Ocean Climate Library). Request from the Argo Polar Mission team to not consider a threshold for the selection of the CTD has been accepted and will be applied in the next version. A study to change the threshold of CTD selection towards shallower profiles for the Yellow Sea has to be discussed with DMQC KMA operators, changing the threshold from 900 dbar to 700 dbar or 500 dbar seems to not be enough. A new version is in progress taking into account feedback from DM operators of the North Atlantic Ocean (done), and with adding data from CCHDO, WOD updates and CTD from scientists.

7 Argo Regional Centres

7.1.1 Atlantic (Cécile Cabanes)

This year, consistency checks of the delayed mode salinity correction have been performed for the AARC region.

In the Argo data snapshot of June 2024, 3814 floats have been processed in DM in the Atlantic ARC region. For each float, we run the OWC method using a standard set of configuration parameters. We further checked the DM salinity correction of a float only if the results obtained differ significantly from the result obtained by the PI of the float. We were then able to isolate a small number of floats for which salinity profiles were further checked: sections along the float trajectory, comparison of some profiles with the closest reference data or with the closest real time Argo data available, if needed. Finally, when we thought it was necessary, we suggested to the PI or DM operator of the float to modify the salinity corrections. The AARC web page gives the list of floats for which the PI or the DM operator are warned: https://www.umr-lops.fr/en/SNO-Argo/Activities/A-ARC/Consistency-checks-of-DM-salinity-corrections.

A presentation of the various products available for the AARC was given. This year, the ANDRO velocity atlas (https://www.seanoe.org/data/00360/47077/) has been updated.

7.1.2 Pacific Ocean (Kanako Sato)

Pacific Argo Regional Center (hereafter, PARC) is operated by JAMSTEC since 2019 when IPRC stepped back from the operation due to funding and human resource issues. However, IPRC (APDRC) actively provides various products. Users can easily and freely download products from http://apdrc.soest.hawaii.edu/.

JAMSTEC has renewed the PARC website in October 2024 (https://www.jamstec.go.jp/PARC/). On the PARC website, the statistics, time series of the number of Core and BGC profiles in the Pacific etc., are shown. The web site provides the meta-information, time section figures, and time series of error magnitude on floats with data which deviate significantly from the MOAA GPV.

JAMSTEC has also released the information of Pacific Deployment Coordination Group and its activities on the PARC website: https://www.jamstec.go.jp/PARC/float_deployment. This page provides Pis and users related to the Pacific region a way to communicate with each other. You can see lots of information, including reports of the group meetings and Members.

We also plan to develop a few new functions; to share information of technical problems and quality control of data including Core, BGC, and Deep Argo floats among PIs, and DMQC operators and users in the next year.

7.1.3 Indian Ocean (Pavan Kumar JONNAKUTI)

Enhanced Data Products and Research

INCOIS continued to generate value-added gridded data products using advanced analysis techniques. These products, including metrics like mixed-layer depth (MLD), dynamic heights, and geostrophic currents, are shared publicly through the Live Access Server (LAS). The data has supported numerous research publications, theses, and dissertations. INCOIS also established the Indian Ocean Biogeochemistry Group to centralize biogeochemical data and submitted a white paper to the Ministry of Earth Sciences for further implementation. Moreover, INCOIS is exploring artificial intelligence (AI) and machine learning (ML) applications using Argo data to estimate dissolved oxygen and chlorophyll-a levels, aiming to enhance predictive and analytical capabilities.

Data Quality and Recovery

Quality control is a priority, with delayed-mode quality control (DMQC) processes ensuring the accuracy of sensor data from over 11,000 floats. Collaborations with institutions like CSIRO and use of background CTD data have supported these efforts. Archived cruise data from Indian research vessels further enriches the dataset.

Capacity Building and User Engagement

INCOIS emphasizes capacity building through workshops and training programs to increase the utilization of Argo data. Students and researchers are encouraged to use the data for academic purposes, with support provided for hands-on training and access to INCOIS's extensive databases.

7.1.4 Med ARC (Antonella Gallo)

MedArgo is the Argo Regional Centre for the Mediterranean and the Black Sea and OGS coordinates its activities. More than 100,000 profiles were acquired in the Mediterranean and Black Seas from 2000 to August 2024, about 6000 profiles were collected in 2024 up to August. 17 new floats were deployed: 8 core Argo, 8 core Argo with DO, and 1 Deep. Regarding the performance of the fleet, the mean half-life is about 180 cycles for floats with Iridium telemetry. The maximal vertical distance (upward profiles) observed is about 600 km, whilst the mean distance traveled is about 125 km. The population that changes related to the number of yearly deployments and dead floats, is around 80 floats in the last years due also to the decrease in the death rate. OGS performed the DMQC activity for the Argo physical data. The DMQC analysis is applied to 84% of the eligible floats deployed between 2003 and 2023 in the Mediterranean and Black Seas. 80% of the D-files were sent to GDAC. 4% out of this percentage were quality controlled but the D-files were not sent to GDAC yet. This percentage includes analysis that has to be repeated due to limitations related to the reference dataset or problematic floats that need additional analysis. The high-quality ship-based CTD reference data from the near-surface to depths more than 2000 m, for QC purposes of Core and Deep Argo float data in the Mediterranean and Black Seas, was reviewed and improved. In addition, a second CTD reference dataset obtained with the code developed by BSH was tested taking into account profiles deeper than 500 dbar. The BSH code is faster than the OGS one and removes spikes and duplicates more accurately. The two datasets were compared using the OWC procedure. The results are very similar but a reduced mapping error was observed using the dataset obtained with BSH procedure. The CTD reference dataset using all profiles from 80 m to 4000m is used for qualitative analysis of profiles shallower than 500 m (for example if a float during its lifetime crosses a shallow water sub-basin), in complement to OWC. The CTD reference dataset using BSH procedure with profiles deeper than 500 m is used only for OWC.

7.1.5 Southern Ocean (Kamila Walicka)

SOARC group remains inactive due to lack of resources. Some of the group activities have been picked up by the Polar Argo Mission team. SOARC group members continue carry on the ARC activities independently focusing on developing tools and interaction with scientific users.

8 OneArgo session – part 3

8.1 Updates on vocabulary

8.1.1 Updates on NVS server, ways to access and workflow updates (Danielle Wright, Claire Gourcuff)

The process to request changes in Argo vocabulary managed using the NVS was presented as a reminder. The GitHub repository to manage Argo vocabularies has been moved from the NVS GitHub "organisation" to the OneArgo github "organisation": https://github.com/OneArgo/ArgoVocabs. A new section "Argo vocabulary" has been created on the www.argodatamgt.org website with all the information provided.

Update on actions from ADMT-24:

Item #35 - Ask NVS/AVTT to show how best to access NVS Argo reference tables via API.
Done, Violetta created some demo code in a Jupyter notebook which is available in the ArgoVocabs repo. We would like to know if this is sufficient or if any other machine-to-machine capability is required: https://github.com/OneArgo/ArgoVocabs/blob/master/m2m_NVS_sparql.ipynb

Item #36 - Apply 'SYN' mappings to identical sensors that have changed manufacturer.
In progress - awaiting final list of identical sensors which have changed manufacturer so that mappings can be loaded.

8.2 AVTT issues to be discussed

8.2.1 PROGRAM & PROJECT_NAME issues (Danielle Wright)

OceanOPS collections
- PROGRAM (https://github.com/OneArgo/ArgoVocabs/issues/80)
Will be limited to Argo programs only, rather than all programs overseen by OceanOPS.

Latest suggested definition:
PROGRAM_NAME | char PROGRAM_NAME(N_PROF, STRING64);
PROGRAM_NAME:long_name = "Name of the program";
PROGRAM_NAME:_FillValue = " "; | The overarching program(s) of which the dataset is a part.
A program defines a group of floats managed by the same lead agency. It materializes the implementing, operating, and responsible team of the float.
A program can consist of a set of related and possibly interdependent projects (PROJECT_NAME) that meet an overarching objective.
PROGRAM_NAME is managed by OceanOPS, the list of acceptable PROGRAM_NAME types is in the reference table: "https://www.ocean-ops.org/api/help/?param=program"

Collection metadata still to be agreed:

Collection ID e.g. ‘RXX’, Description, editors, collection name e.g. ‘Argo program names’, ‘OceanOPS program names’, ‘Argo-OceanOPS program names’

PROGRAM links to the long-term overarching agency responsible for the operation of the float. Consensus was that further clarification may be required for the definition in relation to PROJECT.

- PROJECT (https://github.com/OneArgo/ArgoVocabs/issues/5)
Latest suggested definition:
PROJECT_NAME | char PROJECT_NAME(N_PROF, STRING64);
PROJECT_NAME:long_name = "Name of the project";
PROJECT_NAME:_FillValue = " "; |
Name of the projects the float is part of. PROJECT_NAME is a tag used to group floats together easily. Multiple PROJECT_NAME can be separated by commas.
Example : “EA RISE", "HE GEORGE"; |

OceanOPS maintains a list of projects but these may not be the complete list that everyone has used to populate PROJECT_NAME which is currently unconstrained. Consensus was that this should become a controlled vocabulary and we should review all the existing OceanOPS projects. Need to decide who would have governance of the collection.

- DEPLOYMENT PLATFORM (https://github.com/OneArgo/ArgoVocabs/issues/2)
Will become a new controlled vocabulary, OceanOPS have provided their list which includes C17 ICES codes where they exist. It will be limited to Argo Platforms only similar to PROJECT/PROGRAM.

Not all platforms can/will be approved for new ICES codes, and only certain people can request new codes for approval. It can also take several months for new ICES codes to be approved. AVTT would map to new C17 ICES codes on a case by case basis as and when they are approved.

Collection metadata still to be agreed:
Collection ID e.g. ‘RXX’, Description, editors, collection name e.g. ‘Argo platform names’, ‘OceanOPS platform names’, ‘Argo-OceanOPS platform names’.

8.2.2 R27 update & proposal (Megan Scanderbeg)

Megan Scanderbeg updated the ADMT on the status of the R27 reference table which corresponds to SENSOR_MODEL. With Eric Rehm’s and Jochen Klinke’s help, the SBE CTDs have been cleaned up and mapped to SENSOR_FIRMWARE_VERSION needed to fully identify the sensors. This information is contained in a Google spreadsheet: https://docs.google.com/spreadsheets/d/1GcpM4PoCnsZf_2jw6EpinoxB4eittFufAJrxNyEutKQ/edit?usp=sharing

Before this can be implemented, two steps need to be done including:

- Updating the User’s Manual with the new definition of SENSOR_MODEL and the new variable SENSOR_FIRMWARE_VERSION.
- Updating the NVS version of R27 to be consistent with the Google spreadsheet above.
- Updating the File Checker to allow the two new additions to R27 discovered in the clean up.

After that, DACs are asked to begin conforming to the updated NVS R27 table. As time permits, DACs are asked to go back and update SENSOR_MODEL to the new constrained NVS R27 vocabulary with the addition of SENSOR_FIRMWARE_VERSION using the Google spreadsheet for reference.

SBE is asked to deliver SENSOR_MODEL and SENSOR_FIRMWARE_VERSION according to the updated definitions.

The GDAC File Checker will not migrate to the updated NVS R27 until DACs are ready. This will be revisited at ADMT-26.

8.2.3 Other AVTT tickets to be discussed (Thierry Carval)

Issues with “priority” label on https://github.com/OneArgo/ArgoVocabs/issues

- There was an agreement that DACs should revisit historical datasets to add an underscore (“_2”) when more than one sensor is measuring the same parameter. The number of occurrences of the issue in the past is relatively low.
- A new collection will be created for float ending causes.

8.3 Documenting special float behavior

8.3.1 Time of Day sampling (John Gilson)

It was agreed at ADMT-24 to adopt the recommendations of the Ad-Hoc Committee on Sampling Issues.
a) All floats should be set to a near-10 day interval which will result in surfacing at an ever changing time of day (local time)
b) BGC floats with radiometers should be set to include an extra local time noon profile.
At ADMT-24 an audit was performed, looking at the prevalence of floats cycling at an integer number of days. That audit was rerun at the ADMT-25. The results are highlighted in the talk.
a) Floats cycling at an integer number of days (e.g. 10 days) was reduced in 2024 by 46% over 2023.

b) The improvement was seen at most DACs

There will be some floats where an integer days cycle time will be retained. These floats should be identified within the meta netCDF. If the float model has firmware capable of targeting a set time-of-day surfacing, the proper CONFIG name should be used.

- CONFIG_SurfaceTime_HH
- CONFIG_DownTimeExpiryTimeOfDay_minutes
- CONFIG_ClockAscentStart_HH

For the audit, if a float identified itself as a time-of-day float by using any of these three CONFIG in the meta netCDF, it was removed from the audit that was sent to the dm mail list.
It is suggested that beyond using the above CONFIG that the string ‘TOD_SAMPLING_ALERT’ be placed in the CONFIG_MISSION_COMMENT. If a float model does not have time-of-day firmware, yet cycles at an exact 10-day cycle, the only way to identify itself is by adding this string.

Several issues were identified with the audit that will be corrected in future years. It was also suggested that formal documentation should be developed (action item).
Next year the audit will be rerun with the additional constraint of using the proper CONFIG (of the 3) for the float model as well as checking a reasonable value for the time-of-day CONFIG.

8.3.2 Ice Avoidance Working Group Update (John Gilson, Esmee van Wijk & Nicolas Kolodziejczyk)

Over the last year, the Ice Working Group refined its proposal, first presented at ADMT-24 to better present critical ice-algorithm information to users within the netCDF data files. Given the acceptance of the ADMT to the Ice Working Groups proposal, an 'Ice manual' has been written and will be published in January 2025 which will reflect comments since it was distributed in October 2024. A quick synopsis of the ADMT-25 talk is given here.

a. Critical mission CONFIG related to the ice-algorithm of various float variables have been defined and if not already existing will be requested to be added to the NVS.
b. Critical ice-algorithm TECH names have been defined and will be requested for inclusion at the NVS if necessary.
c. A new category of CONFIG is introduced that will describe the float hardware that are specifically designed to make the float more hardened to ice impacts (and in some cases to enable estimation of sea-ice draft in post-processing). These CONFIG will link to look-up tables that define the 'Ice Guard Type' and the 'Ice-Guard Manufacturer'. These look-up tables will be maintained by the Ice Working group.
d. A new trajectory netCDF variable named ICE_ALGORITHM_STATUS(N_CYCLE) will be introduced that presents the user a simple integer that will be referenced to a look-up table in the 'Ice Manual'. The values within the look-up table are based upon a mapping of the float firmware configuration and/or engineering tech data that the float transmits. The aim of this variable is to match what the float transmits to a list of common situations thus enabling comparison across different float models. Depending on the resources at the DAC, a BASIC and EXTENDED option are offered. Both options are based upon telemetered data, with the BASIC option reporting only whether the ice-algorithm algorithm of the float was triggered in that cycle while the EXTENDED also reports why the algorithm was triggered. Different float models use different ice algorithms and telemeter different values meaning that the values in the new variable will vary by float model/version. In the manual each float model will have a separate table that links the floats' telemetered data to the resultant ICE_ALGORITHM_STATUS value.

The manual and tables within will be monitored by the Ice Working Group for completeness (e.g. new float models, firmware versions). Longer term, the Ice Working Group will instigate discussions with float manufacturers to increase the commonality of telemetered ice-algorithm information across float models. Once DACs are consistently filling the ice-related information in the Argo netcdf we can generate an index file of non-surfaced profiles for Polar Argo users.

8.4 Communication with external and internal users

8.4.1 How to interact with the updated OneArgo GitHub organization (Claire Gourcuff)

Claire presented a tutorial on how to interact with the OneArgo GitHub space. The question whether all discussions and issues on the OneArgo github should be moved from public to private was discussed, to avoid having sensitive discussions reaching out to malevolent audiences or being misinterpreted. No consensus was reached, as there are pros and cons for both solutions.

8.4.2 Regular updates on status of Argo data (Megan Scanderbeg)

Megan Scanderbeg updated the ADMT on the two versions of OneArgo DataBytes that were sent out this year with help of the Communications Task Team. The first one was a slideshow designed to address subtle data topics and can be used by others as needed. The second one moved to a new, more classic newsletter format. All are available here (https://argo.ucsd.edu/oneargo-data-bytes/) and the plan is to send out 3 - 4 per year. Contact Megan with article suggestions!

8.4.3 Website updates (Claire Gourcuff, Megan Scanderbeg, Catherine Schmechtig)

The ADMT website (www.argodatamgt.org) is going to be redesigned before the end of the year 2024 by Thierry and Claire. It will be simplified and updated, with the aim for it to be useful to the ADMT. Access to the Excel spreadsheets used by AVTT editors will be managed so that it is still accessible to the editors, while not confusing for others.

Several recent updates were made on the AST website, and there is a plan to add two web pages in order to (i) provide more resources to get users started and (ii) provide regular updates to experienced users. RT and DM tools will be removed from the AST website once available on the ADMT website.

Material from the first BGC-DMQC 2023 workshop was added onto the BGC-Argo website, as well as material regarding the webODV for OneArgo tool (webinar video, links, etc.).

8.5 Upcoming Meetings

8.5.1 AST-26: 14-18 April 2025 (Megan Scanderbeg / Nathalie Zilberman)

The AST26 meeting will be held on the week 14-18 April 2025, hosted by Scripps Institution of Oceanography, in San Diego, USA.

8.5.2 ADMT-26

The location has not been finalized for the ADMT-26 meeting next year. It was recognized that it is important to rotate the geographic location of the meeting so that we can try and balance out the length of travel for in-person participants and time zones for virtual participants. The meeting was in Europe this year, so it should be held elsewhere next year. If you would like to offer to host, please let the ADMT co-chairs know right away, ideally by December.

Edit after the meeting: WHOI/USA offered to host the ADMT26. The meeting will be held on the week 20-24 October 2025.

9 Annexes

Annex 1 - Acronyms
Annex 2 - ADMT-25 daily schedule
Annex 3 - Participants list
Annex 4 - Actions list BGC
Annex 5 - ADMT actions
Annex 6 - National Reports

Annex 1 – List of acronyms

ARC	Argo Regional Centre
ASD	Abrupt Salty Drift - name for set of CTDs within specific serial number ranges that showed early rapid salty drifting
AVTT	Argo Vocabulary Task Team
BGC	BioGeoChemical
DAC	Data Assembly Centre
DMCP	Delayed mode contact person - terminology used at OceanOPS to identify the person to contact regarding any delayed mode quality control issues for that float
DMQC	Delayed mode quality control
NVS	NERC Vocabulary Server - hosts the online collection of Argo vocabularies
GDAC	Global Data Assembly Centre
GTS	Global Telecommunications System - distribution service for real time data that is used by meteorology centers around the world
RTQC	Real time quality control
TBTO	Tributyltin Oxide

ADMT-25 SCHEDULE

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Make a copy of this spreadsheet and then set your local start time in box B9 and all other times will automatically adjust

	Link to google drive for ADMT-25 with presentations and reports			
Start time	**duration**	**Presentation**	**Speaker (blue: virtual)**	**slack monitor:**
				Brian
Time is UTC+2		**Introductory session**		
9:00 AM	00:05	Local arrangements	Giulio Notarstefano	
9:05 AM	00:15	Local welcome speaker	OGS' President Prof. Nicola Casagli	
9:20 AM	00:10	Welcome & Objectives of the meeting	ADMT co-chairs	
9:30 AM	00:20	Feedback from AST-24	S. Wijffels, B. King	
9:50 AM	00:30	Status of Action Items from ADMT-24	Megan Scanderbeg	
10:20 AM	00:20	BREAK		
		DAC Challenges		
10:40 AM	00:15	AOML	Claudia Schmid	
10:55 AM	00:15	BODC	Clare Bellingham	
11:10 AM	00:15	Coriolis	Thierry Carval	
11:25 AM	00:15	CSIO	Zenghong Liu	
11:40 AM	00:15	CSIRO	Dirk SLAWINSKI	
11:55 AM	00:15	INCOIS	Pavan Kumar JONNAKUTI	
12:10 PM	00:15	JMA	Masatoshi Miyamoto	
12:25 PM	00:15	KMA	Baekjo Kim	
12:40 PM	00:15	KORDI/KIOST	Kyunghee Oh	
12:55 PM	00:15	MEDS	Anh Tran	
1:10 PM	01:00	LUNCH BREAK		
				Slack monitor:
		DAC Discussion		Susan
2:10 PM	00:30	Summary from ADMT co-chairs, DAC actions status + disucssion	Claire Gourcuff	
		GDACs		
		GDAC status		
2:40 PM	00:20	Operational status of Argo GDACs	Thierry Carval, Mike Frost	
3:00 PM	00:10	File Checker updates	Thierry Carval	
3:10 PM	00:15	Index file homogenization	Delphine Dobler	
3:25 PM	00:20	BREAK		
		GDAC Modernization		
3:45 PM	00:15	Feedback on Coriolis cloud prototype	Guillaume Maze	
4:00 PM	00:15	Update on Argo activties at NCEI	Tim Boyer	
4:15 PM	00:45	Report from Argo cloud format working group + discussion	Claire Gourcuff	
5:00 PM		**END OF DAY**		

ADMT-25 SCHEDULE

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Make a copy of this spreadsheet and then set your local start time in box B9 and all other times will automatically adjust

	Link to google drive for ADMT-25 with presentations and reports			
Start time	**duration**	**Presentation**	**Speaker (blue: virtual)**	**Slack monitor**
		BGC Sessions		Megan
Time is UTC+2				
9:00 AM	00:15	BGC introduction	Ken Johnson / Herve Claustre	
9:15 AM	00:10	TTT Introduction	Takeshita & Leymarie	
9:25 AM	00:20	Developing a framework for accepting new sensors	Bittig/Takeshita/Wong	
9:45 AM	00:15	From the experimental to the pilot study from the data management perspective	Schmechtig/Maurer	
10:00 AM	00:15	Chl WG updates/Manufacturer engagement	Nathan Briggs (for Julia Uitz)	
10:15 AM	00:15	BBP WG updates/Manufacturer engagement	Giorgio Dall 'Olmo	
10:30 AM	00:15	Radiometer WG updates/Manufacturer engagement	Edouard Leymarie	
10:45 AM	00:15	Discussion		
11:00 AM	00:30	BREAK		
11:30 AM	00:15	LISST tau (c sensor)	Griet Neukermans	
11:45 AM	00:20	Tridente update (bbp and Chla)	Nathan Briggs (et al)	
12:05 PM	00:20	A look at Tridente sample statistics	RBR	
12:25 PM	00:15	Lab results from comparison of Radiometers	Xiaogang Xing	
12:40 PM	00:20	Discussion		
1:00 PM	01:30	LUNCH BREAK		
				Slack monitor
2:30 PM	00:20	pH sensor update (SBS performance, LioniX pH)	Takeshita	Claire
2:50 PM	00:20	CDOM update	SBS	
3:10 PM	00:20	FLBBFL - scientific relevance / channel comparison	Baptiste Ozanam (LOV)	
3:30 PM	00:20	Hyperspectral Radiometer update (improvement on depth/time stamp)	Edouard Leymarie	
3:50 PM	00:10	UVP, hyperspectral data management	Catherine Schmechtig	
4:00 PM	00:15	BREAK		
4:15 PM	00:20	BGC Argo in the operational biogeochemical model system for the Mediterranean Sea	Carolina Amadio	
4:35 PM	00:20	Assessing the quality of EU operational-oceanography products using BGC-Argo data: a synthesis	Anna Terruzzi	
4:55 PM	00:35	Discussion/wrap up		
5:30 PM		**END OF MEETING**		

ADMT-25 SCHEDULE

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Make a copy of this spreadsheet and then set your local start time in box B9 and all other times will automatically adjust

	Link to google drive for ADMT-25 with presentations and reports			
Start time	**duration**	**Presentation**	**Speaker (blue: virtual)**	**Slack monitor**
Time is UTC+2				Annie
		BGC Session		
9:00 AM	00:15	Actions/stoplight chart review	Maurer/Schmechtig	
9:15 AM	00:15	Flagging status	Plant/Maurer	
9:30 AM	00:10	Documentation	Schmechtig	
9:40 AM	00:20	Recommendations on reporting pressures from BGC floats	Bittig/Wong	
		Real-Time procedures		
10:00 AM	00:20	Improved RT test for pH, nitrate	Logan Grady	
10:20 AM	00:20	NO2 calculation	Johnson	
10:40 AM	00:20	Discussion		
11:00 AM	00:20	BREAK		
		Real-Time procedures (cont'd)		
11:20 AM	00:30	PAR estimation from radiometric data	Frouin/Pitarch	
11:50 AM	00:20	RTQC for radiometry	Giovanni La forgia	
12:10 PM	00:20	CHLA RT-A correction	Sauzede	
12:30 PM	00:30	Discussion		
1:00 PM	01:30	LUNCH BREAK		
		Oxygen Data Quality		**Slack monito**
2:30 PM	00:15	SBE83 performance update	Takeshita	Thierry
2:45 PM	00:15	Rinko ARO-FT performance update	Sato	
3:00 PM	00:15	Rinko / Aanderaa comparison	L. Carracedo	
3:15 PM	00:15	MBARI processing implementations (DOXY response time, BBP RTQC)	Maurer	
		Delayed Mode Procedures		
3:30 PM	00:10	pH pump offset & SAGEv2	Plant	
3:40 PM	00:30	Oxygen and BBP audits	Plant/Sauzede	
4:10 PM	00:20	DM radiometry and audits	E. Cariou-Allard	
4:30 PM	00:15	BREAK		
4:45 PM	00:30	BGC-Argo products -- an update from the SCOR WG	Sauzede / Sharp	
5:15 PM	00:15	Discussion / wrap up		
5:30 PM		**End of day**		

ADMT-25 SCHEDULE

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Make a copy of this spreadsheet and then set your local start time in box B9 and all other times will automatically adjust

Link to google drive for ADMT-25 with presentations and reports

Start time	duration	Presentation	Speaker	Slack moderator
				Tanya
Time is UTC+2				
		Real Time Data Management		
		GTS		
09:00	00:15	Timeliness & availability of real time data delivery for all parameters on GTS	Anh Tran	
		WIS2.0		
09:15	00:15	Background, introduction and next steps for Argo during transition to WIS2.0	Megan Scanderbeg	
		Monitoring by OceanOPS		
09:30	00:20	Monitoring activities at OceanOPS + any additional ADMT requests + duplicate WMO numbers	Victor Turipin, O. de Fommervault	
09:50	00:15	Orphan floats & neglected floats: which are they and who will DMQC them?	O. de Fommervault	
		DAC Modernization		
10:05	00:00	~~Feedback on testing of Coriolis container~~		
10:05	00:15	Status of machine readable metadata delivery from manufacturers	Brian King	
10:20	00:20	BREAK		
10:40	00:10	Steps US is taking to modernize real time data processing chain	John Gilson	
10:50	00:30	Summary of DAC modernization meetings & discussion to identify possible actions	ADMT co-chair	
		Real Time QC		
11:20	00:10	Status and timeline for removal of Btraj files and replacement with v3.2 traj files	Annie Wong	
11:30	00:10	Greylist proposal	Annie Wong	
11:40	00:15	Real time results from min/max test	Christine Coatanoan	
		Revisit actions around min/max from ADMT-24?		
		Deep data management		
11:55	00:10	SBE cpcor update	SBE	
12:05	00:15	Deep Argo data: cpcor correction & DMQC status	Cecile Cabanes	
12:20	00:10	Deep RBR update	Mat Dever	
		RBR Data management		
12:30	00:20	RBR CTD update	Mat Dever, Annie Wong	
12:50	01:15	LUNCH BREAK		
				Slack monitor
		Delayed mode quality control		Breck
		SBE CTDs		
14:05	00:15	Salty drifter spreadsheet update	D. Dobler, B. Klein	
14:20	00:10	ASD Warranty update	Jochen Klinke	
14:30	00:05	CTD storage update	SBE	
14:35	00:10	CTD sampling rate update	SBE	
14:45	00:10	SBE discussion		
		Other DMQC items		
14:55	00:15	Initial asymptotic adjustment of salinity	Birgit Klein, Cécile Cabanes	
15:10	00:10	DM trajectory files: status and possible workshops	Annie, Cecile	
15:20	00:20	BREAK		

ADMT-25 SCHEDULE

octobre 25

Make a copy of this spreadsheet and then set your local start time in box B9 and all other times will automatically adjust

	Link to google drive for ADMT-25 with presentations and reports				
Start time	**duration**	**Presentation**	**Speaker (blue: virtual)**		
Time is UTC+2		**Argo Vocabulary & GitHub**			
9:00 AM	00:10	Updates on NVS server, ways to access and workflow updates	Danielle Wright, Claire Gourcuff		
		AVTT issues to be discussed			
9:10 AM	00:15	PROGRAM & PROJECT_NAME issues	Danielle Wright		
9:25 AM	00:15	R27 update & proposal	Megan Scanderbeg		
9:40 AM	00:20	Other AVTT tickets to be discussed	Thierry Carval		
10:00 AM	00:20	BREAK			
		Documenting special float behavior			
10:20 AM	00:15	Time of Day sampling	John Gilson		
10:35 AM	00:30	Ice Avoidance Working Group Update	John, Esmee & Nicolas		
		Communication with external and internal users			
11:05 AM	00:20	How to interact with the updated OneArgo GitHub organization	Claire, Megan, Danielle, Thierry		
11:25 AM	00:10	Regular updates on status of Argo data	Megan, Claire		
11:35 AM	00:20	Website updates	Thierry Carval, Claire, Megan, Catherine		
		Other ADMT business			
11:55 AM	00:30	Return to Argo format in the cloud discussion			
12:25 PM	00:10	Other business			
12:35 PM	00:30	**Review BGC Action Items**	Catherine, Tanya		
1:05 PM	01:15	LUNCH BREAK			
2:20 PM	01:00	**Review Action Items**	Megan, Claire		
		Upcoming Meetings			
3:20 PM	00:05	AST-26: 14-18 April 2025	Megan/Nathalie		
3:25 PM		**END OF MEETING**			

PARTICIPANTS LIST

First name	Last name	Institution	Country
Matthew	ALKIRE	University of Washington	United States of America
Carolina	AMADIO	OGS	Italy
Katy	BALDWIN	National Oceanography Center	UK
Kevin	BALEM	Ifremer	France
Andrew	BARNA	Scripps Institution of Oceanography	United States of America
Andrew	BARNA	Scripps Institution of Oceanography	United States of America
Sarah	BARTOLONI	Monterey Bay Aquarium Research Institute	United States of America
Clare	BELLINGHAM	BODC/NOC	UK
Vincent	BERNARD	Ifremer	France
Henry	BITTIG	IOW Leibniz Institute for Baltic Sea Research WarnemÃ¼nde	Germany
Christine	BOONE	CLS	France
Tim	BOYER	NOAA National Centers for Environmental Information	United States of America
Jodi	BREWSTER	University of Miami/NOAA-AOML	United States of America
Nathan	BRIGGS	National Oceanography Centre, UK	UK
cecile	CABANCES	CNRS	France
Romain	CANCOUET	Euro-Argo ERIC	France
Eloise	CARIOU-ALLARD	IMEV	France
Lidia	CARRACEDO	Ifremer	France
Fiona	CARSE	Met Office	UK
Thierry	CARVAL	Ifremer	France
Marialena	CHRISTOPOULOU	Sea-Bird Scientific	United States of America
Herve	CLAUSTE	LOV-CNRS-SU	France
Christine	COATANOAN	IFREMER	France
Gianpiero	COSSARINI	National Institute of Oceanography and Applied Geophysics	Italy
Giorgio	DALL'OLMO	OGS	Italy
Mathieu	DEVER	RBR	United States of America
Delphine	DOBBLER	Euro-Argo ERIC	France
MINGMEI	DONG	NATIONAL MARINE DATA & INFORMATION SERVICE,Ministry of National Resources of the People's Republic of China	China
Cedrick	ESTELHOMME	UM/AOML	United States of America
Biancamaria	FARINA	OGS	Italy
Andrea	FASSBENDER	NOAA PMEL	United States of America
Laura	FEUDALE	OGS	Italy
Hartmut	FRENZEL	NOAA-PMEL	United States of America
Giovanni	GALLI	OGS	Italy
Antonella	GALLO	National Institute of Oceanography and Applied Geophysics - OGS	Italy
Emma	GARDNER	NOC - BODC	UK
John	GILSON	Scripps Institution of Oceanography : UCSD	United States of America
Alberto	GONZÃLEZ-SANTANA	Instituto Espanol de Oceanografia	Spain
Christopher	GORDON	Fisheries and Oceans Canada	Canada
Claire	GOURCUFF	Euro-Argo ERIC	France
Logan	GRADY	Monterey Bay Aquarium Research Institute	United States of America
Blair	GREENAN	Fisheries and Oceans Canada	Canada
Benjamin	GREENWOOD	Woods Hole Oceanographic Institution	United States of America
Nicola	GUISEWHITE	MBARI	United States of America
Candice	HALL	AOML	United States of America
Takuya	HASEGAWA	JMA	Japan
Shigeki	HOSODA	JAMSTEC	Japan
Roberta	HOTINSKI	Princeton University	United States of America
Genevieve	HOWELL	Sea-Bird Scientific	United States of America
Federico	IENNA	OGS - National Institute of Oceanography and Applied Geophysics	Italy
Hyeongjun	JO	Korea Meteorological Administration(KMA) / National Institute of Meteorological Sciences(NIMS)	Korea
Kenneth	JOHNSON	MBARI	United States of America
S.P.	JOHNSON	UM / CIMAS / NOAA / AOML	United States of America
PAVAN KUMAR	JONNAKUTI	Indian National Centre For Ocean Information Services (INCOIS)	India
Catherine	KERMABON	Ifremer	France
Baekjo	KIM	Korea Meteorological Administration(KMA) / National Institute of Meteorological Sciences(NIMS)	Korea
Brian	KING	National Oceanography Centre, Southampton	UK
Birgit	KLEIN	Bundesamt fuer Seeschifffahrt und Hydrographie	Germany
Jochen	KLINKE	Sea-Bird Scientific	United States of America
Nicolas	KOLODZIEJCZYK	UBO - Argo France	France
Giovanni	LA FORGIA	ISMAR CNR Rome	Italy
Joon-Soo	LEE	National Institute of Fisheries Science / Korea Oceanographic Data Center (NIFS/KODC)	Republic of Korea
Savannah	LEWIS	Scripps Institution of Oceanography	United States of America
Edouard	LEYMARIE	LOV - CNRS	France
Zhaoqin	LIU	CSIO, MNR	China
Zenghong	LIU	Second Institute of Oceanography, Ministry of Natural Resources	China
Jenny	LOVELL	CSIRO	Australia
Rustam	MANUROV	OGS	Italy
Riccardo	MARTELLUCCI	OGS	Italy
Meike	MARTINS	BSH	Germany
Tanya	MAURER	Monterey Bay Aquarium Research Institute (MBARI)	United States of America
Elena	MAURI	OGS	Italy
Guillaume	MAZE	IFREMER/LOPS	France
Milena	MENNA	OGS	Italy
Malgorzata	MERCHEL	Institute of Oceanology PAN	Poland
Masatoshi	MIYAMOTO	JMA	Japan
Kjell Arne	MORK	Institute of Marine Research	Norway
Tammy	MORRIS	SAEON	South Africa

Jaya	NAIR	AOML - MIAMI, USA	United States of America
Brandon	NAVARRO	AOML	United States of America
David	NICHOLSON	WHOI	United States of America
Giulio	NOTARSTEFANO	National Institute of Oceanography and Applied Geophysics - OGS	Italy
Kyung-Hee	OH	Korea Institute of Ocean Science & Technology	Republic of Korea
Peter	OKE	CSIRO	Australia
Emanuele	ORGANELLI	CNR ISMAR	Italy
Emily	OSBORNE	NOAA/AOML	United States of America
Breck	OWENS	Woods Hole Oceanographic Institution	United States of America
Baptiste	OZANAM	Laboratoire d'Oceanographie de Villefranche (LOV)	France
Violetta	PABA	OGS	Italy
Massimo	PACCIARONI	OGS	Italy
Hyukmin	PARK	Korea Institute of Ocean Science&Technology(KIOST)	Republic of Korea
Orens	PASQUERON DE FOMMERVAULT	IOC/UNESCO - OCEANOPS	France
Annunziata	PIRRO	OGS	Italy
Jaime	PITARCH	CNR-ISMAR	Italy
Josh	PLANT	MBARI	United States of America
Antoine	POTEAU	Sorbonne Universite	France
Pierre-Marie	POULAIN	OGS	Italy
Virginie	RACAPE	POKaPOK	France
Jean-Philippe	RANNOU	Capgemini	France
Stephen	RISER	University of Washington	United States of America
Pelle	ROBBINS	WHOI	United States of America
Pelle	ROBBINS	Woods Hole Oceanographic institution	United States of America
Edward	RYAN	AOML / Uni of Miami	United States of America
Tatiana	RYKOVA	CSIRO	Australia
Jerome	SAGOT	nke instrumentation	France
Carole	SAOUT-GRIT	GLAZEO	France
Kanako	SATO	JAMSTEC	Japan
Raphaelle	SAUZEDE	CNRS	France
Megan	SCANDERBEG	Scripps Institution of Oceanography	United States of America
Christina	SCHALLENBERG	CSIRO	Australia
Catherine	SCHMECHTIG	CNRS	France
Claudia	SCHMID	NOAA/AOML	United States of America
Taketo	SHIMADA	Japan Meteorological Agency	Japan
Dirk	SLAWINSKI	CSIRO	Australia
Melissa	SMUCK	UCAR/NOAA	United States of America
Madison	SODEN	NOAA - AOML	United States of America
Yumi	SONG	Kyungpook National University	Korea
shinichi	TAKAI	JFE Advantech.Co.,Ltd.	Japan
Yui	TAKESHITA	MBARI	Japan
Jon	TAYLOR	RBR	United States of America
Anna	TERUZZI	OGS - Istituto Nazionale di Oceanografia e di Geofisica Sperimentale	Italy
Virginie	THIERRY	Ifremer	France
Anh	TRAN	Department of Fisheries and Oceans Canada	Canada
Victor	TURPIN	OceanOPS	France
Jon	TURTON	Met Office	UK
TVS	UDAYA BHASKAR	INCOIS, MoES	India
Esmee	VAN WIJK	CSIRO	Australia
Pedro	VELEZ-BELCHI	Instituto Espanol de Oceanografia	Spain
Kamila	WALICKA	NOC	UK
Qi	WANG	Fisheries and Oceans Canada	Canada
Deborah	WEST-MACK	Woods Hole Oceanographic Institution	United States of America
Susan	WIJFFELS	Woods Hole Oceanographic Institution	United States of America
Annie	WONG	Scripps Institution of Oceanography	United States of America
Keegan	WRIGHT	Ocean Networks Canada	Canada
Danielle	WRIGHT	British Oceanographic Data Centre, National Oceanography Centre, Southampton, UK	UK
Xiaofen	WU	SIO,MNR(China)	China
Xiaogang	XING	Second Insitute of Oceanography, NMR	China
Mayu	YAMAMOTO	Japan Meteorological Agency	Japan
Ya	YANG	FIO/MNR	China
Nathalie	ZILBERMAN	Scripps Institution of Oceanography	United States of America

Actions :

Number	Topics	Actions	Suggested assigned person
ADMT25-1	RT	Investigate the difference of 20% at depth between MCOMS and FLBB sensor	BBP WG TTT and data management persons: Raphaelle, Antoine Giorgio
ADMT25-2	RT	Check that for floats transmitting the complete spectrum of UV Absorption, that the calibration is present in the meta file (Nitrite products)	Tanya
ADMT25-3	RT	Update the DOXY processing documentation to take into account the pressure coefficient of ARO FT and AROD FT	Kanako, Catherine
ADMT25-4	RT	Update the radiometry QC document rapidly to avoid discrepancy in the flagging status	Catherine
ADMT25-5	RT	Compare the different tools for PAR processing and report on the topic and provide feedback to Jaime and Robert	Yui, Edouard
ADMT25-6	RT	Adapt the units of the PAR models outputs to the PAR Argo units and consider providing guidances to estimate uncertainties for the PAR estimated relative to a potential channel failure	Jaime, Robert, Tanya
ADMT25-7	RT	Address the issue of storing the PAR estimation (products vs Bfiles)	Catherine
ADMT25-8	RT	Organize implementation rollout with DACs for RT CHLA-adjustment with new phys-ratio	Raphaelle, Catherine
ADMT25-9	RT	Investigate CDOM update implementation (timing, how/when/if to roll out, and how to track within data system)	Catherine, Tanya
ADMT25-10	DM	Begin work on pH and/or NITRATE community audit/alert list	Logan
ADMT25-11	DM	Investigate the DOXY bias in anoxic area (including working with manufacturers on improving calibration procedures at low oxygen)	Ken
ADMT25-12	DM	Update the DOXY documentation to report the correction of DOXY in anoxic area for legacy floats DModed	Henry, Catherine, Tanya
ADMT25-13	DM	Update the DOXY documentation to report DM of the ARO FT	Kanako, Virginie, Henry
ADMT25-14	DM	Move the audit repository from the MBARI ftp to the bgc argo website	Raphaelle, Josh

ADMT25-15	DM	Organize remote BGC Argo DMQC sessions agenda and topics	Chris, Kamila, Catherine, Tanya
ADMT25-16	DM	Organize remote DMQC sessions with addressing in priority the audits	Catherine, Josh, Raphaelle
ADMT25-17	DM	Organise a BGC-Argo DMQC workshop in person in 2025	Tanya, Catherine
ADMT25-18	DM	Update DOXY QC documentation with recommended keyword usage for representing DM methods applied within SCI_CAL_COMMENT	Tanya
ADMT25-19	DM	Refine DOXY_ADJUSTED_ERROR recommendation to better account for all uncertainties!	Henry, EuroArgo
ADMT25-20	DM	Place sage-v2 code on github for community beta-testing	Josh
ADMT25-21	Communication	Provide feedbacks on the document presented by Henry relative to experimental, pilot, global path	Henry
ADMT25-22	Communication	Write an FAQ to warn user about the bias in the DOXY data in anoxic region	Ken Johnson
ADMT25-23	Communication	Write an FAQ to warn user that CHLA is derived from the FLUORESCENCE which makes them really tight parameters	Catherine, Christina, Nathan
ADMT25-24	Communication	Organize a tutorial with OceanOps to better teach the BGC community on new interactive plotting functionalities	Kamila
ADMT25-25	Communication	Initialize more routine communications between bgc modellers & ADMT to better understand how/when model-obs misfits occur	Raphaelle
ADMT25-26	Communication	Include in the FAQ a discussion of DOXY bias due to response time	Tanya, Henry
ADMT25-27	GTS	Investigate why there is such a discrepancy between the number of NC files and BGC data going to the GTS	Thierry Carval, Anh Tran, Catherine Schmechtig
ADMT25-28	GTS	Place instances of GTS bgc index file into GDAC ‘etc’ (and update monthly?)	Thierry Carval, Anh Tran
ADMT25-29	TTT	Organise a third channel group to investigate what should be the preferred channel for ECO/Tridente third channel	Nathan, Mat, …
ADMT25-30	TTT	Provide recommendations for the type of statistics to be applied to high-frequency measurements with the Tridente RBR sensor	Giorgio, Nathan
ADMT25-31	TTT	Provide recommendations on how to set up common acquisition parameters for the various sensors on the different floats	Edouard

DRAFT non-BGC actions as discussed and agreed during the actions review on Friday 25 October 2024. The actions will then be moved to the OneArgo github ADMT repository: https://github.com/OneArgo/ADMT/issues

Action	Who
DACS	
Action on pressure issues related to APF11 ArgFos floats - see ticket already set up by Clare	BODC/Clare Bellingham
Ask DACs to speak with their National Weather Services about the transition to WIS2 and specifically whether it would be acceptable for a GDAC (outside their nation) to send data onto WIS2	All DACs
Consider holding regular virtual meetings on topics such as GitHub training, sharing of CSIRO's experience, etc. Other topics could be suggested as they arise	
Revisit when to remove Btraj files ADMT-26	DACs
Check the link for downloading the min/max code (last update). A version of the min/max code that is more appropriate for automatic use would be welcomed by DACs.	
Annie and Mat work to insert instructions into QC manual regarding square root error fix for RBR CTDs.	Annie, Matt
Ask that DACs/DM operators implementing square root error fix for RBR CTDs when instructions are inserted in QC manual.	
DACs to begin implementing the new procedure to identify multiple parameters with '_2' on current and future floats	DACs
DACs to go back and reprocess files to be compliant with the new procedure to identify multiple parameters with '_2' on current and future floats	DACs
For new floats, DACs should use the cleaned NVS version of R27 to fill SENSOR_MODEL in coordination with the uncontrolled SENSOR_FIRMWARE_VERSION	DACs
As time permits, DACs are asked to go back and update SENSOR_MODEL to new constrained R27 vocabulary with addition of SENSOR_FIRMWARE_VERSION using mapping from Google sheet on ADMT website for reference: https://docs.google.com/spreadsheets/d/1GcpM4PoCnsZf_2jw6EpinoxB4eittFufAJrxNyEutKQ/edit?usp=sharing	DACs
GDACs	
Agreement to move forward with KIOST name change. Thierry and KORDI to discuss and decide on the timeline. Index files will not need to change (ie KO will remain).	KIOST, Thierry
Have virtual mtg regarding index list homogenization and sub-index lists	Delphine, Megan, Victor, Susan
Roll out index list updates as part of other GDAC updates.	Thierry, Mike
Thierry and Delphine to try and see if ice avoidance information can be harvested from the trajectory files to put into the profile index	Thierry, Delphine
GDACs to work with Anh Tran to serve her index list of data from the GTS in the /etc folder on the GDACs	Anh, GDACs, Victor
Coriolis to implement a WIS2 node in next 1-2 years. report update at ADMT-26	Thierry
Ensure the FileChecker will take this new convention "0_2" into account	Thierry
Annie to change the name of RTQC Test 15 in the next update of the QC manual	Annie
Change the name entry in R11 for Test 15	NVS action
Annie and GDACs managers to fix a removal date of ar_greylist.txt in June 2025, and communicate this to all Argo data users with ADMT co-chairs	Thierry, Mike, Annie
GDAC managers to proceed with the removal of "ar_greylist.txt" from the GDACs on the agreed date in June 2025	Thierry & Mike
After the "ar_greylist.txt" removal date in June 2025, DACs will continue to send their internal "exclusion list" to Coriolis. Coriolis will make an aggregated "exclusion list". Thierry and Christine will put this in an area in Coriolis (to be determined), with warnings	Thierry & Christine
DMQC	
Audit of core DMQC status (including Dtraj) - present this as next AST meeting to faciliate possible need for additional funding	ADMT co-chairs to report at AST-26
Make a list of DMQC 'neglected profiles' from OceanOPS	OceanOPS
ask for DM operators who are willing to take on float(s) for which >50 profiles & over four years old that have not been dmoded.	DM operators, DMQC discussion forum
Need to revisit some DMQC corrections from the list of floats in Cécile's slides. Cécile will contact DM operators individually (small number), but list should maybe be posted somewhere with other audits	Cecile
Pavan and Christine to exchange about getting the CTD data in Indian Ocean in the CTD reference database.	Pavan, Christine
Deep	
Ask Deep DMQC operators to share good quality deep profiles that could be used as reference data for core DMQC in the spreadsheet set up for this purpose. https://docs.google.com/spreadsheets/d/1Pj3MBSBmHMH-QDMrOb5Ri9Ud6Xxx5RXe5DV7v1-r6C0/edit?usp=sharing	DAMT co-chairs
Ask DAMT to finalise the request to change the QC flags and CpCor of Deep Argo data on Github.	DAMT co-chairs
Monitoring	
Development of an internal notification by Ifremer/OceanOPS/EuroArgo as part of AMRIT for dissemenation of problems within the Argo datastream (not planned for this year)	Iremer, OceanOPS, EuroArgo
Continue conversation regarding WMO allocation and submission of deployment plans. Formulate procedures to prevent duplication of WMOs, but also to get deployment plans as early as possible. Circulate procedures to National Programs when decided.	Victor, Orens, Deb, John?
Communication	
Ask Annie to speak with operational users about transition to WIS2	Annie
Ask Christine to present the results from min/max test at AST to highlight the issue. Remind PIs that the recommendation was to implement the results automatically.	Christine + Megan to add the item to AST agenda
Add SBE note on CTD storage Best Practices to be posted on AST website	SBS, Megan
Ask Japan if they have recent experience with deploying floats without TBTO and to report on it at AST-26	
ADMT co-chairs	
Take message to AST that data system remains underfunded, including GDACs who are now being tasked with additional tasks	

Megan to meet with Tom Kralidis about WIS2 and relay information to ADMT exec and Coriolis Team, AST	
Communicate with DACs/PIs who have not stopped TOD sampling to understand their reasons and report to AST-26	
Explore how best to set privacy settings on OneArgo GitHub organization to keep internal disucssions private.	ADMT co-chairs, Dirk
At ADMT-26, check with DACs to see if they are ready for GDAC File Checker to move to cleaned R27 version	
NVS	
Complete R28 on NVS table	Dani
Create PROGRAM collection in NVS and start implementing it at both NVS and OceanOPS	OceanOPS, Dani
Create PROJECT collection in NVS and start implementing it at both NVS and OceanOPS	OceanOPS, Dani
Publish Argo User's Manual with updated definition of the meta variable SENSOR_MODEL & Char SENSOR_FIRMWARE_VERSION(N_SENSOR,STRING32)	Thierry
Update R27 according to the new constrained vocabulary that will allow identification of similar sensor models easily for monitoring	R27 editors
When ready, SBE can include both SENSOR_MODEL and SENSOR_FIRMWARE_VERSION in the JSON schema to deliver sensor/float metadata	SBE
GDAC File Checker: continue using the google sheet (downloaded & served from ADMT website) of SENSOR_MODEL entries based on the old R27 so DACs can continue to submit Argo meta files	Thierry
Update NVS tables as needed for ice WG	
Modernization	
Form WG to establish a common, flexible, modern format that all floats could be decoded into. This would not be a translation of data - simply a straight decoding of what the float sends. A float type expert for each float type is needed.	Ben Greenwood, John Gilson, Clare Bellingham, NKE person, Annie, ?
Offer virtual GitHub training for DACs (+ others)	Guillaume Maze
Continue development of Argo product(s) to be served from the cloud & consider how often they would be updated, how they could be interoperable with other networks, timeliness	Thierry, Annie, Breck, Tim
Ask Breck to raise the idea at OCG of a common format for an Argo product that could be adopted by other networks. GO-SHIP may be a good candidate to start with	Breck
Ask Cloud WG to evaluate product(s) developed by Thierry, Annie, Breck, Tim for their technical performance	Cloud WG
Ask data users to evaluate product(s) developed by Thierry, Annie, Breck, Tim for their scientific usefulness	Susan, Guillaume, CSIRO
Ask WG to study and recommend best cloud-optimized format for direct translation of GDAC netCFs files in the cloud	Cloud WG
RBR	
If deploying floats with RBR Scor, please put the data in the aux so that an assessment can be done.	
Ask AST for instructions on when Scor can start being sent as the primary salinity channel.	
Technical Community of Practice	
Continue exploring whether it is possible for floats to be issued a 'flushing mission' command to clear out TBTO and the impact this may have on the float's lifetime / energy consumption.	TCoP
Consider developing an easy protocal to flush out TBTO in pre-deployment procedures	TCoP
Document SBE CTD sampling rate protocol and options (TSWAIT issues) - maybe on Technical Community of Practice webpage?	TCoP
Documentation	
Add instructions for storing TOD information into the profile cookbook to help DACs understand how to implement this properly	John
ADMT co-chairs to clarify the actions related to ice information recordings with John	Claire, Megan, John
Once the recommendations have been clarified,Thierry to update User Manual per ice WG recommendations	Thierry
Update the user manual to document the way to name parameters for multiple sensors ("_2")	Thierry

Argo National Data Management Report for ADMT-25

Peter Oke[1], Lyudmila Koziy[1], Lisa Krummel[2], Jenny Lovell[1], Annie Foppert[3], Pat McMahon[1], Gabriela Pilo[1], Steve Rintoul[1], Tatiana Rykova[1], Christina Schallenberg[1], Roger Scott[1], Dirk Slawinski[1], Peter Strutton[3], Esmee Van Wijk[1]

[1]CSIRO Environment; [2]Bureau of Meteorology; [3]University of Tasmania

1. Real Time Status

We run our real-time data processing system 8 times per day – four times at CSIRO and four times at the BoM – with scheduling 3 hours out of sync. Our real-time system processes data from all float types: Core, BGC, and Deep. We produce data in NetCDF and BUFR. NetCDF data is immediately transferred to the GDACs, and BUFR data are immediately transferred to the GTS.

How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX	9	98
ARVOR	6	44
PROVOR		
Navis	1	158
BGC Navis		
SOLO/S2A		
Deep SOLO	2	11
Deep Arvor		
BGC APEX	3	4
BGC PROVOR	5	13
ALTO	3	10
Other (customize additional rows as needed)		

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	SBE41CP, SBE61, RBR3
oxygen	Aanderaa4330
NO3	ISUS, SUNA
pH	DURA, SEAFET
Chla	FLBB2, FLBB_AP2, FLBBCD
bbp	FLBB2, FLBB_AP2, FLBBCD
irradiance	OCR504_ICSW
New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
We have purchased a float with a UVP and a RAMSES hyper spectral sensor. We plan to deploy this float in March 2025 on the Denman Voyage.	

- What is the status of BGC processing and RTQC test implementation?

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**
oxygen	current	Current (adjusted error in progress)	
NO3	current	current	
pH	current	current	
Chla	current	current	
bbp	current	current	

irradiance	current	current	

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time?

RBRargo3 2K model	**Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?**	**Notes or additional information**
pre-April 2021	Yes	
post-April 2021	Yes	

- Are you regularly applying real time adjustments for the following items:
    - Salinity adjustments
    - Cpcor for deep floats
    - BGC parameters (if so, which ones)

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	Yes	Yes	
Cpcor adjustment for Deep floats	Yes	Yes	Individual Cpcor values (calculated using shipboard CTD data) used for Rfiles when available (and for Dmode files). Otherwise, the most up-to-date default value in manual is used.
oxygen	Yes	Yes	Using SAGE and WOA2018
NO3	Yes	Yes	Using SAGE

pH	Yes	Yes	Using SAGE
Chla	Yes	N/A	Following latest RT recommendations
bbp	Yes	N/A	Following latest RTQC recommendations
irradiance	No	No	

- What data are you sending onto the GTS?
    - Currently core only

- What data is going to the aux directory?
    - UVP and FL2BB

- Are you automatically greylisting questionable floats detected by min/max test?
    - No

- What is the status of the transition to v3.2 trajectory files?
    - This has been done, but currently only enabled for BGC floats

- When do you think you will be ready to stop acceptance of v3.1 Btraj files?
    - We are producing v3.2 traj files for BGC floats but not all the parameter data is complete. We have the ability to produce v3.2 for core floats but are not routinely doing this yet, it can be done quickly (e.g. days rather than months) if v3.1 is made obsolete.

- Do you have any code to share with other DACs? If so, where is that available?

    - We have completed the development and testing of a Python version of our Real-time data processing system (*PyRT*). We transitioned all of our floats across to the *PyRT* system and (anxiously) turned off our Matlab RT system. The transition was smooth and the *PyRT* system works beautifully (phew), producing real-time alerts, automatically generating easy-to-read webpages, and provides a valuable reference for our DMQC team to assess float status, performance, and other relevant factors.

    - The *PyRT* system was developed at CSIRO and implemented on CSIRO servers. Once completed, we ported this system to the Bureau of Meteorology, on different servers, in a different environment. The transfer was relatively smooth. If other DACs were interested, we could discuss sharing the *PyRT* System.

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any d-mode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?
    - Some of our DM effort has been allocated into this task and we have progressed with tools for visual assessment of some trajectory variables. However, we have not produced any submittable d-mode trajectory files as of this time. The effort so far has shown that the r-mode trajectory files produced by our *PyRT* system are of high quality and pass most of the standard tests for CYCLE_NUMBER and JULD. We have identified that a broad knowledge of float operations and the RT data systems is required to do this task well and efficiently. A plan is in place to progress this task and we anticipate producing d-mode trajectory files in the next year.
    - We have engaged with WHOI and Scripps for assistance and code sharing. As our RT system is Python based and our collaborators are Matlab based this task will focus on methodology and process sharing. Matlab and Python code sharing will be an adaptive process as we integrate the methods into our respective systems. Our codebase will be managed in a Git repository and could be shared at a later date.

- How are you implementing BGC d-mode - by parameter or one expert does all parameters?
    - We have one expert doing QC for all the BGC parameters, as such BGC DMQC is not as far along. The exception being DOXY, which has been DMQC'ed on >90% of our dead floats. We have prioritized getting the RTQC and RT adjustments correct for BGC parameters, including the use of SAGE to estimate the adjustments. The final step to follow will to DMQC the data. The code is ready to do DMQC of nitrate, pH and oxygen. We expect to start rolling this out for dead floats in the next 6 months, and then step it up from there.

- What challenges have you encountered and how have you dealt with them?
    - The CSIRO DM processing system is an integrated set of Matlab scripts, running on a Linux virtual machine. It relies heavily on graphics and GUI-based interfaces. The GUI elements of the code are incompatible with more recent versions of Matlab. Current Linux operating systems have been progressively removing support for the old Matlab version required to run our codebase. A significant effort this year has gone into uplifting the code to run using contemporary Matlab versions (2020 and beyond). This has involved re-writing much of the interface and plotting to adhere to modern Matlab standards and to

improve the speed of graphics rendering. The modified code is in the testing phase and will be brought into production mode over the next 2-3 months.

- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?
    - Our DM code is used by China-Argo and has been used by India-Argo (INCOIS). We have supported China-Argo to perform DMQC on floats with RBR CTDs. Once we have fully tested the new version of our codebase, we will make this available to China-Argo if they wish to upgrade.

- Do you have any concerns you'd like to bring to the ADMT?
    - We have switched off the sampling on ascent for our deep floats, because we learnt that the current firmware does not possible allow decoupling of sampling on descent and ascent sampling, (i.e., we can't just sample the top 500 m on ascent). This is a significant power drain, reducing the operational life of deep floats. We understand that IDG has some test floats in the water where ascent sampling can be programmed independently. When that firmware becomes available on the MRV floats we intend to implement it to sample the upper layer on ascent. We acknowledge (and regret) that this means that our Deep floats are not contributing to the OneArgo mission as intended.
    - Not a concern, but we can report that the CSIRO-led Argo DMQC Discussion series has continued, with a virtual meeting every two months. These meetings continue to be well-attended. A record of meetings and discussion topics is at: https://www.marine.csiro.au/argo/dmqc/html/ArgoDM-Disc.html.

3. Value Added items

- List of current national Argo web pages, especially data specific ones
    - IMOS-OceanCurrent plots Argo data in RT around Australia for comparison with other ocean data (satellite and in-situ). The images are used for decisions in marine operations (science, fisheries, aquaculture, recreational activities), training (universities, data management courses, national navy), and media/outreach. Example of Argo plot: https://oceancurrent.aodn.org.au/profiles/cycle.php?wmoid=5905513&cycle=85&depth=0

- Known National Argo data usage
    - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Bureau of Meteorology (OceanMAPS, Australia's operational short-range ocean forecast system, www.bom.gov.au/oceanography/forecasts/)	Lisa Krummel (lisa.krummel@bom.gov.au) Gary Brassington (gary.brassington@bom.gov.au)	Core Argo data (including T/S from Core, BGC, and Deep)
Bureau of Meteorology (POAMA, Australia's operational seasonal prediction system, www.bom.gov.au/climate/ocean/outlooks/)	Lisa Krummel (lisa.krummel@bom.gov.au) Debbie Hudson (debbie.hudson@bom.gov.au)	Core Argo data (including T/S from Core, BGC, and Deep)
Royal Australian Navy, CSIRO (ROAM, Australia's Relocatable Ocean Atmosphere Mode – a ocean-atmosphere-wave forecast system run by the Australian Navy)	Emlyn Jones (emlyn.jones@csiro.au)	Core Argo data (including T/S from Core, BGC, and Deep)

- Products generated from Argo data that can be shared

  Global Ocean Reanalysis
  CSIRO has perfoprmed a new global ocean reanalysis, called BRAN2023 (version 2023 of the Bluelink ReANalysis). The latest product is complete and is undergoing final quality checks before public release. Once released, BRAN2023 data will be freely available (alongside all previous versions of BRAN) at: https://dapds00.nci.org.au/thredds/catalog/gb6/BRAN/catalog.html.

  BRAN2023 includes several incremental improvements to the data assimilation system, and also includes biogeochemistry (BGC). This is the first version of BRAN that includes BGC. As a first step, the BGC fields are _not_ constrained by observations. We constrain the physical fields (temperature, salinity, velocity, and sea-level) and allow the BGC fields to evolve freely. We plan to use BGC Argo data, along with satellite data, to evaluate the BGC fields in BRAN2023. Initial qualitative assessments show that the BGC fields realistically respond to the reanalysed circulation (Figure 1).

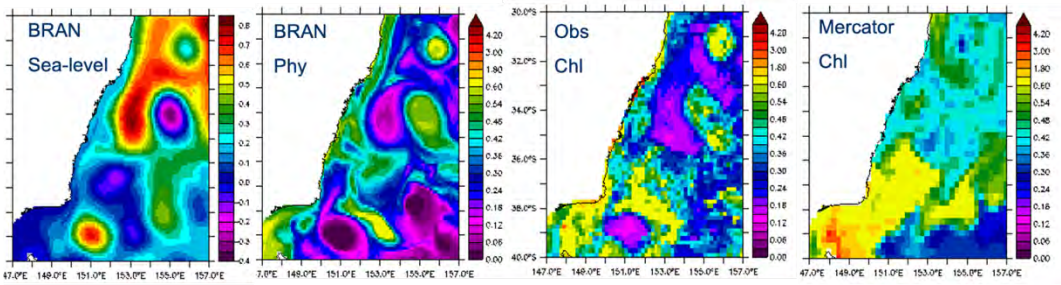


Figure 1: A qualitative comparison of phytoplankton from BRAN2023, observed Chlorophyll-a from satellites, and reanalysed Chlorophyll-a from Mercator Ocean's reanalysis product (see labels). Sea-level from BRAN is included below to provide the oceanographic context.

  Argo trajectories under ice
  CSIRO produced estimates of Argo trajectories for floats that sampled under ice in the southern hemisphere. Data are available at: https://zenodo.org/records/6571146.CSIRO plan to provide an updated dataset in early 2025. The paper describing the method used is at:
  Oke, P.R., Rykova, T., Pilo, G.S. and Lovell, J.L., 2022. Estimating Argo float trajectories under ice. *Earth and Space Science*, *9*(7), p.e2022EA002312.

- For the information of the ADMT, we wish to report that a Special Issue of Frontiers in Marine Science on "Demonstrating Observation Impacts for the Ocean and Coupled Prediction", has been published (most articles being considered have either been accepted, or will soon be finalised). This special issue is an initiative under SynObs (led by Yosuke Fujii and Elizabeth Remy). Articles of relevance to the Argo community include:

- Balan-Sarojini, B., Balmaseda, M.A., Vitart, F., Roberts, C.D., Zuo, H., Tietsche, S. and Mayer, M., 2024. Impact of ocean in-situ observations on ECMWF sub-seasonal forecasts. *Frontiers in Marine Science*, *11*, p.1396491.
    - This article demonstrates that with-holding Argo data from coupled sub-seasonal predictions has an impact on the lower and upper atmospheric circulation. This is one of the first demonstrations of the impact of Argo on this type of system. The authors acknowledge that the skill of the coupled predictions is significantly degraded by problems with “initialisation”. This problem is common – and arises when the ocean and atmospheric states are not in balance. After the coupled system is initialise, both the ocean and atmospheric states adjust, and as a result, some information from observations (including Argo) is lost. But the impacts demonstrate provide clear evidence of the potential of Argo data for improving sub-seasonal coupled predictions.
- Balmaseda, M.A., Balan Sarojini, B., Mayer, M., Tietsche, S., Zuo, H., Vitart, F. and Stockdale, T.N., 2024. Impact of the ocean in-situ observations on the ECMWF seasonal forecasting system. *Frontiers in Marine Science*, *11*, p.1456013.
    - This article demonstrates that in situ ocean observations, including Argo, have a “profound and significant impact” on oceanic and atmospheric variables. The authors attribute changes of atmospheric variables to impacts on (i) air-sea interactions, (ii) dynamical imbalance, (iii) impacts of large-scale SST gradients, and (iv) impacts of warm pools (on deep atmospheric convection). The study found that Argo data in the Atlantic Ocean and extratropics had the most impact, and that many impacts on atmospheric variables were “non-local”.

- Publicly available software tools to access

  NA

4. GDAC Functions

NA

5. Regional Centre Functions

NA

6. Other Issues

For the information of the ADMT, we wish to report some metrics from our program.

Here we record the locations of floats deployed under the Australian Argo program over the last year (Figure 2), along with locations of planned deployments over the next year (Figure 3). We also record some details of the performance of our new real-time data system (Figure 4-6) to demonstrate the reliable performance we have achieved with this system.

Re: Deployments over the past year (Figure 2)

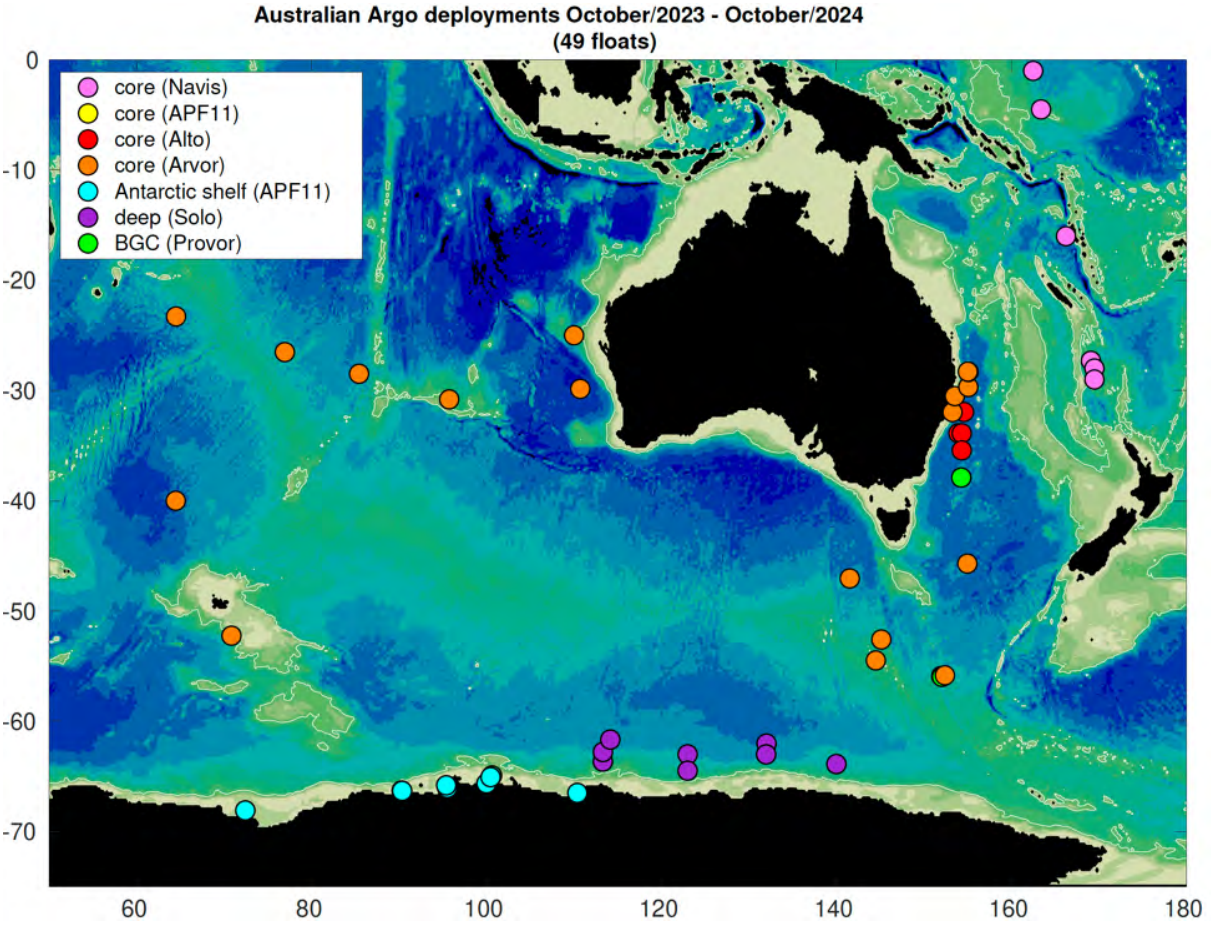


Figure 2: A map of the locations of Argo float deployments between October 2023 and October 2024, indicating float types

Re: Planned deployments over the next year (Figure 3)

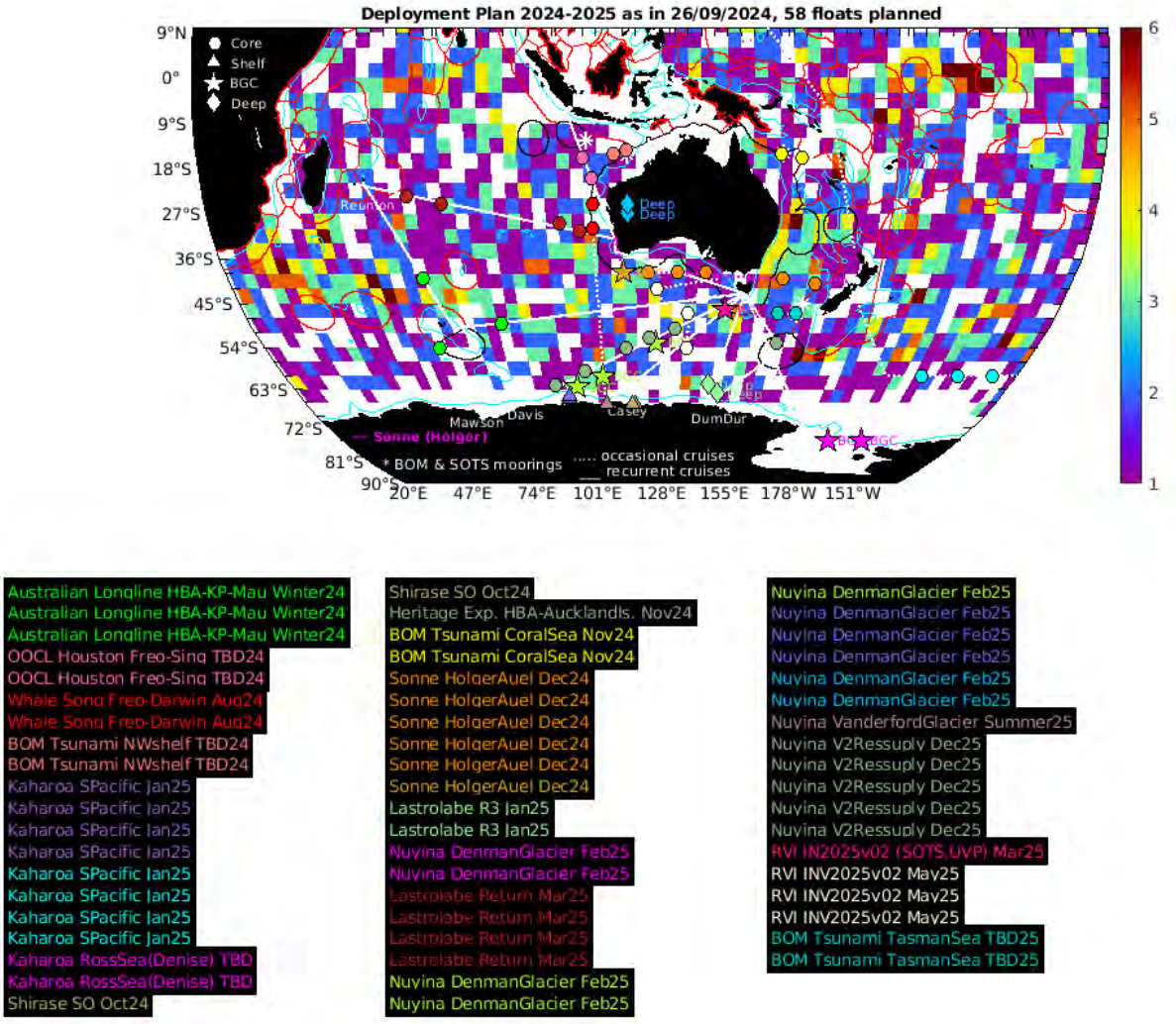


Figure 3: Deployment plans for 2024-2025. We plan to deploy 58 floats, including 8 BGC floats (stars, 6 from Australia and 2 from New Zealand), 4 deep floats (diamonds, 2 are still to be allocated), and 44 core floats (circles and triangles). Background colours denote the number of floats within each 3x3deg box in July-August 2024; the cyan lines denotes the 2000 m isobath; the red lines denote international EEZs; black lines indicate Australia's EEZ. Solid and dashed white lines indicate common ship routes.

Re: Real-time data processing and dissemination (Figures 4-6)

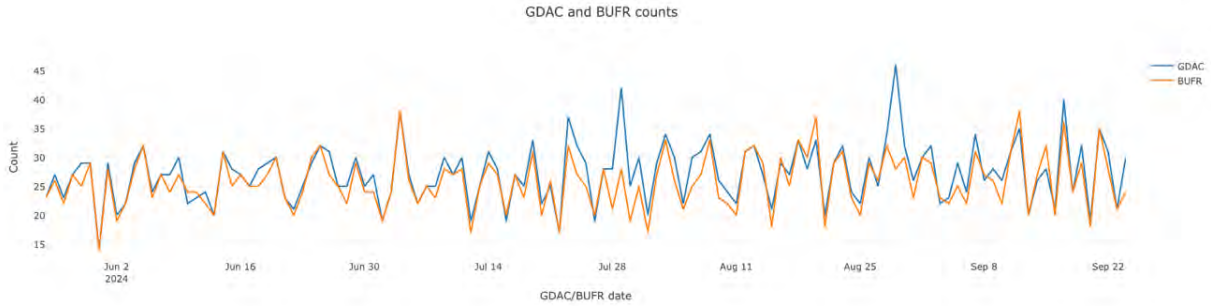


Figure 4: Time-series of the GDAC and BUFR file counts since the end of May 2024 (when we switched to the *PyRT* system for real-time data processing), showing the number of GDAC (blue) and BUFR (orange) files created daily.

Figure 5: Time-series of the percentage of data processed and disseminated within 6 hours (blue) and 12 hours (orange). The 95% level is denoted by the dashed line. The top panel shows the percentages delivered relative to the time the "first file" is sent; and the bottom panel shows percentages delivered relative to the "last file" sent. The difference between the results in the top and bottom panel indicate that delays are due to problems with data transmission, and not due to delays related to the data processing system.

Figure 6: As for Figure 5, except for BUFR files.

Argo Canada Data Management Report for ADMT-25

1. Real Time Status

Between September 2023 and September 2024, Canada deployed a total of 53 floats manufactured by NKE. The Department of Fisheries and Oceans Canada (DFO), Ocean Networks Canada, Dalhousie University, and other government departments contributed to the acquisition of new Argo floats. As of the end of September 2024, Argo Canada has 192 active floats. The data processing system runs every 3 hours. The profile, technical trajectory, and meta files of core Argo floats are transmitted to the GDAC in NetCDF format. For BGC and Deep Argo floats, all NetCDF files are available at the GDAC, except for the trajectory NetCDF files. All temperature, salinity, and chlorophyll-A data are issued to the GTS in BUFR format.

The table below listed the different kinds of float that MEDS is currently processing.

- *How many floats are you currently processing & what type are they?*

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX		
ARVOR	2	147
PROVOR	2	23
Navis		
BGC Navis		
SOLO/S2A		
Deep SOLO		
Deep Arvor	1	12
ARVOR(with RBR sensor)	1	9
NOVA	1	1

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**

Temperature/Salinity	SBE41CP and RBR
oxygen	Aanderaa Oxygen Optodes 4330
NO3	SUNA_V2
pH	SBE PH
Chla	ECO Chlorophyll Fluorometer(FLBBRT2K)
bbp	ECO Chlorophyll Fluorometer(FLBBRT2K)
irradiance	Ocean Radiator Color Radiometer 504

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
SUNA	Yes

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**
oxygen	Ver 2.3.1 Jun 13, 2018	Ver 2.1 Feb 24, 2021	
NO3	Ver 1.2.2 Mar 4, 2024	N/I	Current QC manual being tested, implemented by end of year (EOY)
pH	Ver 1.0 Apr 9, 2018	Ver 1.0, Dec 2023	

Chla	Ver 1.0, Sep 30, 2015	Ver. 2.1, July 2021	Update to dark count calculation by EOY. Code for slope LUT written/tested and ready to be implemented.
bbp	Ver 1.4 Mar 7, 2018	Ver 1.0, Sept 2023	BBP_ADJUSTED not populated at this time.
irradiance	Ver 1.1 Oct 9, 2017	Ver 1.0, July 2019	

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See [DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)]

  Argo Canada deployed a total of 13 floats equipped with RBR sensors. Seven floats were calibrated before April 2021, and their salinity data are flagged as '3'. Six floats were calibrated after April 2021, and their salinity data are flagged as '1' and sent to the GTS. The codes to process pre-April 2021 data have been developed, and currently being tested and to be implemented in the current system by end of year.

RBRargo3 2K model	**Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?**	**Notes or additional information**
pre-April 2021	None	The code is already developed, currently being test before implementing it in the current process.
post-April 2021	None	

- Are you regularly applying real time adjustments for the following items:
  - **Salinity adjustments**: Salinity of core Argo are adjusted in real-time where it's applicable. For deep Argo floats, the salinity data are also adjusted in real-time
  - **Cpcor for deep floats**: Deep Argo floats data are quality control as described in the Argo Quality Control Manual for CTD and Trajectory data version 3.6.1. Pressure, temperature and salinity from Deep Argo float are adjusted in real-time using new Cpcor_new= –13.5e–8 $dbar^{-1}$

- **BGC parameters (if so, which ones):** Only Chlorophyll-A are adjusted in real-time. Backscatter adjusted data will be populated with a 1:1 copy of the raw data with the next update of our RTQC code.

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	Yes	No	Due to backlog of floats to DMQC, we mostly only perform DMQC on inactive floats. Hence, this situation hasn't arose yet.
Cpcor adjustment for Deep floats	Yes	N/A	All the profiles of deep Argo floats are adjusted in real-time and we don't have any DMQC Argo floats yet.
oxygen	No		MEDS hasn't worked on the DMQC of active oxygen floats.
NO3	No	N/A	Our float is still less than one year old.
pH	No	N/A	Our float is still less than one year old.
Chla	Yes	N/A	Our float is still less than one year old.
bbp	No		Our float is still less than one year old.
irradiance	No		Our float is still less than one year old.

- What data are you sending onto the GTS?
    - We currently only send temperature, salinity and chlorophyll-A on the GTS in BUFR format since other BGC variables are not real-time adjusted.
- What data is going to the aux directory? UVP, FL2BB, etc
    - We don't have any data in the aux directory

- Are you automatically greylisting questionable floats detected by min/max test?
    - Yes, we're regularly greylisting questionable floats when the situation arises.
- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files?
    - We haven't had a chance to complete the transition to trajectory files V3.2 due to other priorities. We might be able to complete the transition of trajectory to V3.2 by ADMT 26.

- Do you have any code to share with other DACs? If so, where is that available?

    - We completed the development of BUFR encoder for BGC variables. The code is available on https://github.com/trana99/ArgoBufrEncoder
    - Additionally, python software for performing RTQC on CHLA and BBP was developed this year (medsrtqc). While the package is currently specific to the MEDS DAC, the code was written in a modular way, and there is strong interest in contributing to a "system-agnostic" python package for RTQC. This code is also publicly available on the ArgoCanada github page, https://github.com/argocanada .

2. Delayed Mode QC status

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?

    - Unfortunately, we have not performed DMQC for the trajectory files and currently lack an operator delegated for delayed mode quality control for these files. Due to staff shortage, we are behind on DMQC overall and our current priority is to clean the backlog for CORE Argo DMQC.
- How are you implementing BGC dmode - by parameter or one expert does all parameters?

    - For the moment, DOXY is the only BGC variable being DMQCed. As our floats with additional sensors (FLBB, pH) have begun to age, there will be a priority to DMQC those variables in the coming year. This will likely be handled by the same operator performing DOXY DMQC.

    - At the time of writing this report, 2034 of 9575 (21.2%) eligible DOXY profiles are in D-mode. An additional 1374 (14.4%) are in A-mode.

- What challenges have you encountered and how have you dealt with them?

    - One of the significant challenges we have faced at MEDS DMQC is managing the backlog of CORE Argo DMQC tasks from the past few years, primarily due to a shortage of staff. To tackle this issue, we hired a new DMQC operator in August 2024. This new staff member is

dedicated to addressing the backlog, maintaining our DMQC code and tools, standardizing our procedures, and enhancing documentation.

- We are actively educating the newly-hired operator and updating the existing MATLAB package. Additionally, we are clarifying and summarizing our current backlog. For example, we have compiled a list of active MEDS floats, detailing total cycle numbers for each float compared to DMQC cycle numbers (Figure 1), based on the records from ar_index_global_prof.txt on the Ifremer FTP. We prioritize our DMQC operations based on the results from Min/Max checks, allowing us to address the most critical issues first. Through these efforts, we are working diligently to overcome our challenges and improve our DMQC processes.

- For DOXY floats, there are 3 floats that remain in the DOXY audit produced by MBARI. These float have been a challenge to process, but we are currently seeking support from MBARI on how to proceed with these floats and they should be resolved shortly.

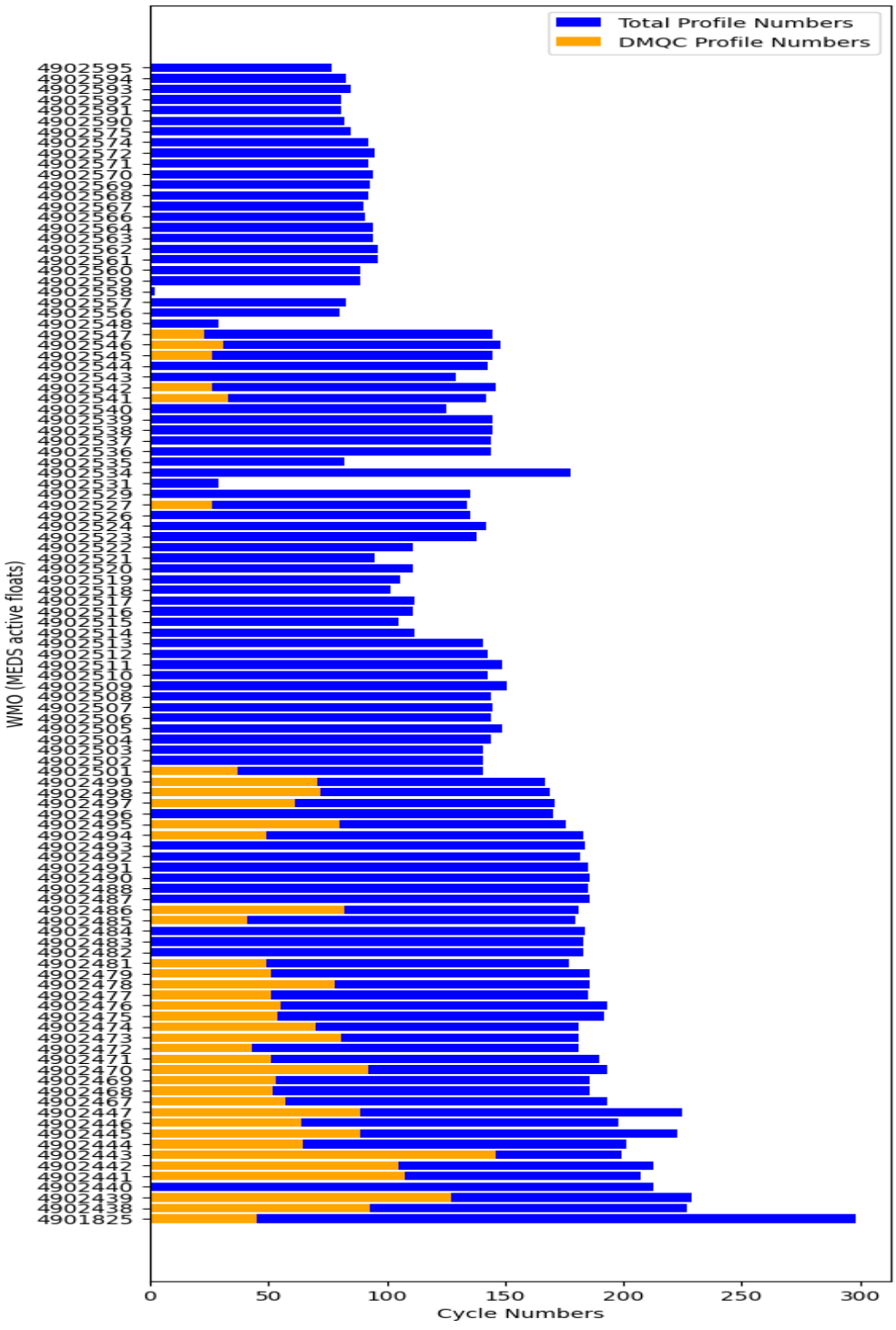


Figure 1. Total cycle numbers (blue) versus DMQC cycle numbers (orange) for active MEDS floats (deployed over a year), based on records from ar_index_global_prof.txt, Ifremer FTP

- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?

    - As for the tools for core variables DMQC, we have developed a MATLAB package named Argo_DMQC. This package facilitates the downloading of Argo data from the Ifremer FTP, conduct pressure adjustments using surface pressure measurements, and perform visual quality control assessments. It also supports OWC analysis, updates QC flags accordingly, and generates D-mode NetCDF files that are ready for upload to the MEDS FTP.

      The majority of the scripts within this package were developed between 2017 and 2019. In February 2023, we reorganized the code and published the first stable release in the private DFO-MEDS repository on GitHub. In April 2023, we integrated new features for thermal mass correction, though a stable release for this update is still pending.

      Currently, the package is primarily intended for internal use at MEDS. Since hiring a new DMQC operator in August 2024, we have been actively updating the MATLAB package to align with evolving NetCDF file formats, including variable name updates and profile number modifications, while also addressing existing bugs. Our ultimate goal is to prepare the package for public use in the future.

    - For BGC DMQC, the python package bgcArgoDMQC provides code to load in BGC-Argo oxygen data, calculate gain via comparison to WOA climatology data in the water column or NCEP data using in-air measurements, update QC flags and DOXY_ADJUSTED values, and export them to a D-mode netCDF file. The software is under active development, but a stable release is available that has been shown to closely agree with the analogous matlab software, SAGE-O2, for WOA gains. This release can be installed via Anaconda or pip, and to code can be found on the ArgoCanada github page, https://github.com/argocanada.

      DMQC procedures for additional variables are being considered for development in the near future.

- Do you have any concerns you'd like to bring to the ADMT?

    - We appreciate the sharing of the OWC analysis Python package available on the Euro-Argo GitHub. And we realize that the package is currently compatible with Python versions 3.6 to 3.8, as indicated in the setup.py file here. However, since Python 3.8 is reaching its end of life at the end of October 2024, we anticipate that there will be no further bug fixes or security patches for this version. Given these circumstances, it would be beneficial to understand the compatibility of the OWC Python package with higher versions of Python and any potential development plans.

3. Value Added items

- List of current national Argo web pages, especially data specific ones

    - Argo data have been used to generate monthly maps and anomaly maps of temperature and salinity along line P in the Gulf of Alaska. Line-P has been sampled for 50 years and has a reliable monthly climatology. For more information on the Line-P products and other uses of Argo to monitor the N.E. Pacific go to: http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/argo/canadian-products/index-eng.html.

- Known National Argo data usage
    - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Environmental and Climate Change Canada		Core, BGC data via the GTS data stream.

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

4. GDAC Functions

Canada has no Argo GDAC function. However, Canada forwards TESAC data to the GDACs in Ifremer (France) and USGODAE (USA) three times a week. Canada also monitors the timeliness of Argo data on the GTS in BUFR format.

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

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

5. Regional Centre Functions

Canada has no regional center function.

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

6. Other Issues

There was no other issue to report during the compilation of this report.

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.

Chinese Argo National Data Management Report

21-25 October, 2024 (ADMT-25)

Zenghong Liu[1], Xiaogang Xing[1], Xiaofen Wu[1] , Mingmei Dong[2], Fengying Ji[2],

1) Second Institute of Oceanography, Ministry of Natural Resources, Hangzhou, China

2) National Marine Data & Information Service, Ministry of Natural Resources, Tianjin, China

1. Real Time Status

- **Data acquired from floats**

From last October, China acquired 3,484 core profiles (additionally 931 DOXY, 591 CHLA, 1025 BBP, 157 CDOM, 789 DOWN _IRRADIANCE, 334 NITRATE and 297 pH) from 79 operational floats including 51 PROVOR, 6 HM2000, 2 ARVOR_D, 2 NAVIS_BGCi, 1 HM4000 and 15 XUANWU floats (Fig.1). All these data were received and processed at CSIO DAC.

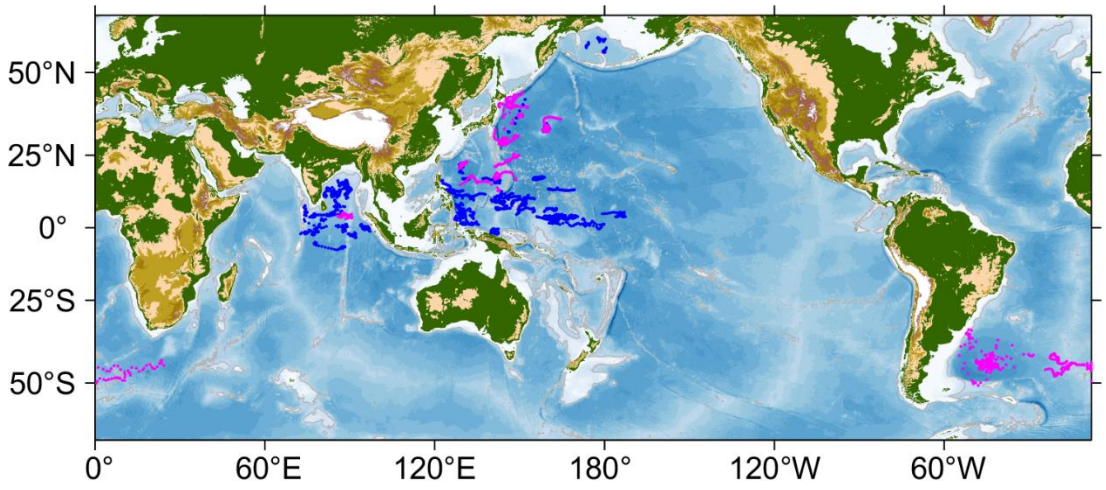


Fig.1 The geographic distributions of Core (blue) and BGC (pink) profiles since last October

- **Data issued to GTS**

All core profiles and DOXY profiles processed by CSIO are distributed on the GTS by China Meteorological Administration (CMA). The profiles are sent as BUFR bulletin. Most data are inserted on the GTS within 6 hours.

- **Data issued to GDACs after real-time QC**

Meta-data, technical, trajectory and profile files are delivered to Coriolis GDAC on an operational basis. CSIO also routinely checks feedbacks from Coriolis data center and reflags the doubtful data.

- **Delayed mode data sent to GDACs**

The total number of the D-files submitted to GDACs is about 6952, some of them belong to secondary quality control. In general, about 80% of the core profiles have been DMQC'd.

Since last ADMT meeting, NMDIS has corrected and uploaded some previously missed data to GDAC.

2. Delayed Mode QC status

Currently, Mrs. Xiaofen WU continue to be responsible for DMQC of Argo data at CSIO. With the help from the CSIRO DMQC team, CSIO updated the DMQC system this year to process RBR CTD data.

For deep Argo floats, we used full-depth shipboard CTD cast at float deployment to obtain CPcor_new and then corrected salinity profiles in DMQC.

NMDIS adopted the OWC3.0 method and developed an enhanced version of the background dataset specifically for the Pacific region based on the publicly available 2023 background dataset from ADMT. The corrected results were confirmed and evaluated using spatiotemporal proximity data, demonstrating the ability to correct Argo buoy temperature and salinity profiles.

3. Value Added items

3.1 List of current national Argo web pages, especially data specific ones

China Argo Real-time Data Center (CSIO) http://www.argo.org.cn

Deep-Argo web application: http://deep.argo.org.cn

China Argo Data Center (NMDIS): https://www.argo-cndc.org

3.2 Statistics of National Argo data usage

Operational uses: Argo data have been used in most ocean data assimilation systems operated by department or institutions such as NMEFC, NMDIS, IAP, Laoshan Lab, etc.

Scientific applications: Argo data are mainly used in scientific studies from seasonal to decadal ocean variations in global and regional scales, air-sea interactions, ocean's role in global climate change.

National PIs: About 22 PIs from 11 agencies have deployed profiling floats and agreed to join China Argo.

3.3 Products generated from Argo data that can be shared

BOA_Argo: It is a biannually updated gridded Argo product developed by CSIO (ftp://data.argo.org.cn/pub/ARGO/BOA_Argo/). The product is based on the post-QC'd Argo dataset maintained by CSIO.

GDCSM_Argo: It is a gridded Argo product jointly developed by SHOU (Shanhai Ocean University) and CSIO based on the Gradiente-dependent Correlation Scale Method (ftp://data.argo.org.cn/pub/ARGO/GDCSM/).

IAP data set: The IAP data set is a global ocean gridded data set developed by Lijing Cheng from IAP (Institute of Atmospheric and Physics, Chinese Academy of Sciences). Besides Argo core profiles, other available profiles from various instruments (e.g. XBT, MBT and shipboard CTD, etc.) are also used. (http://www.ocean.iap.ac.cn/). The gridded data set includes temperature, salinity, stratification, heat content, steric sea level and oxygen.

CSIO Argo trajectory data set: This Argo trajectory data set provides the QC'd satellite fixes and underwater velocities for all floats and annual mean mid-depth velocity field at 1000 m. The extrapolated fixes for the floats using Argos satellite system are calculated with Park's method.

NMDIS T&S integrated dataset: NMDIS standardizes, quality controls, and removes duplicates of internationally shared temperature and salinity data such as Argo, GTSPP, WOD and produces a global temperature and salinity integrated data set. The dataset is newly published via China Ocean Cloud, https://OceanCloud.nmdis.org.cn.

4. GDAC Functions

None.

5. Regional Centre Functions

None.

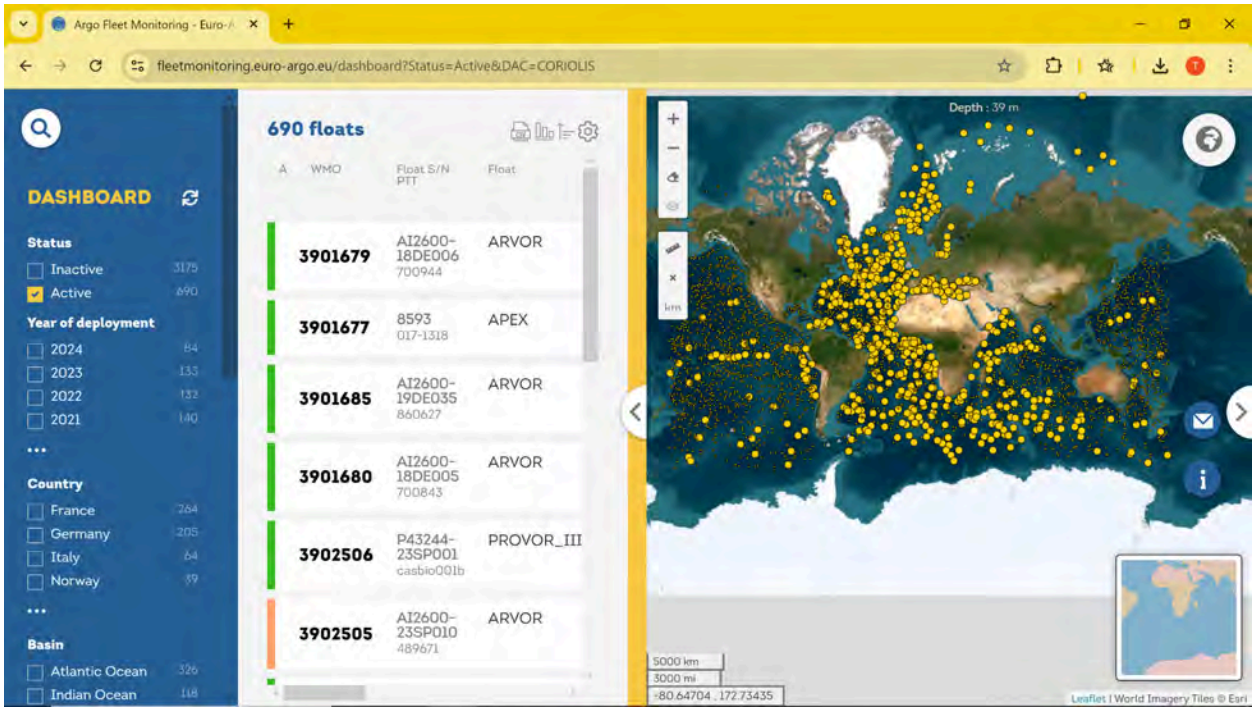
6. Other Issues

Total 495 shipboard CTD casts have been submitted to Coriolis for Argo DMQC (482 from NMDIS,13 from CSIO).

Argo National Data Management Report for ADMT-25

Coriolis DAC - GDAC - NAARC

October 10th 2024, version 1.0.0
https://doi.org/10.13155/102566



Coriolis DAC floats (690 active, 3175 inactive for a total of 3865 floats), see https://fleetmonitoring.euro-argo.eu

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other section prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Active floats

Float family	**Number of versions**	**Number of floats*** (*approximate)
Arvor	9	518
Provor	4	70
Arvor deep	2	41
Provor Jumbo	5	30
Apex	8	27
Arvor coastal	2	4
Nova	1	1
Total	31	691

All floats

Float family	**Number of versions**	**Number of floats*** (*approximate)
Arvor	20	1405
Apex	81	947
Provor	55	903
Nemo	8	174
Deep Arvor	10	139
Nova	3	85

Arvor_C (coastal)	4	45
Provor jumbo	5	34
BGC Navis	1	3
Total	187	3735

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature: 15 sensors, 3865 floats	FSI FSI RBR RBR_ARGO3 SBE SBE41 SBE SBE41_V3 SBE SBE41CP SBE SBE41CP_V1.2 SBE SBE41CP_V1.3 SBE SBE41CP_V1.4 SBE SBE41CP_V2 SBE SBE41CP_V3.0c SBE SBE41CP_V7.2.3 SBE SBE41CP_V7.2.5 SBE SBE41N SBE SBE41N_V5.3.0 SBE SBE41N_V5.3.4
Salinity: 14 sensors, 3453 floats	FSI FSI RBR RBR_ARGO3 SBE SBE41 SBE SBE41_V3 SBE SBE41CP SBE SBE41CP_V1.2 SBE SBE41CP_V1.3 SBE SBE41CP_V1.4 SBE SBE41CP_V2 SBE SBE41CP_V7.2.3 SBE SBE41CP_V7.2.5 SBE SBE41N SBE SBE41N_V5.3.0 SBE SBE41N_V5.3.4
Oxygen: 5 sensors, 784 floats	AANDERAA AANDERAA_OPTODE_3830 AANDERAA AANDERAA_OPTODE_3835 AANDERAA AANDERAA_OPTODE_4330 SBE SBE43F_IDO

	SBE SBE63_OPTODE
NO3: 1 sensors, 121 floats	SATLANTIC SUNA_V2
pH: 1 sensor, 93 floats	SBE SEAFET
Chla: 7 sensors, 355 floats	WETLABS ECO_FLBB WETLABS ECO_FLBB_2K WETLABS ECO_FLBB_AP2 WETLABS ECO_FLBB2 WETLABS ECO_FLBBCD SBE ECO_FLBBFL WETLABS ECO_FLNTU
BBP: 6 sensors, 339 floats	WETLABS ECO_FLBB WETLABS ECO_FLBB_2K WETLABS ECO_FLBB_AP2 WETLABS ECO_FLBB2 WETLABS ECO_FLBBCD SBE ECO_FLBBFL
Irradiance: 2 sensors, 289 floats	SATLANTIC_OCR504_ICSW TRIOS RAMSES_ACC
Turbidity: 1 sensor, 14 floats	WETLABS ECO_FLNTU

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
UVP (particles size distribution and taxonomic classification)	Yes (36 floats)
RAMSES (Hyperspectral radiometer) ACC(irradiance) ARC(radiance)	In progress (21 floats)
TRIOS OPUS (NO3 sensor)	In progress (2 floats)
NKE PAL Acoustic sensor (parameters : rain, wave, anthropic noise)	No (no float deployed yet)
4H-JENA HYDROC_CO2	In progress (3 floats, data in “aux” directory)

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**
oxygen	2.3.3	2.1	-
NO3	1.2.2	1.0	-
pH	1.2	1.0	-
Chla	1.0	3.0	We are planning to update the QC document to report the use of a look-up table for the multiplicative factor to be used for the RT adjustment
bbp	1.4	1.0	-
irradiance	1.1	1.0	We are planning to update the QC document to report the DM procedure (github repository, SCIENTIFIC_CALIB_xx examples)

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)

RBRargo3 2K model	Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?	Notes or additional information
pre-April 2021	yes	Since Coriolis decoder version 048a (april 6th 2022)
post-April 2021	yes	Since Coriolis decoder version 048a (april 6th 2022)

- Are you regularly applying real time adjustments for the following items:
    - Salinity adjustments
    - Cpcor for deep floats
    - BGC parameters (if so, which ones)

	Yes/No for current R files	Are you going back to make adjustments on all available R files when new adjustment comes in?	Notes or additional information
Salinity adjustment	yes	yes	-
Cpcor adjustment for deep floats	yes	yes	-
oxygen	yes	yes	-
no3	yes	yes	We still need to write specifications to apply in the new incoming R files an adjustment based on a previous DM adjustment
pH	no	no	-
chla	yes	yes	-

bbp	NA	NA	We push BBP=>BBP_ADJUSTED after RTQC, following the recommendations
irradiance	NA	NA	No procedure defined yet

- What data are you sending onto the GTS?

Temperature, salinity, oxygen, chlorophyll-A, nitrate, pH, BBP700 are distributed on GTS as BUFR messages.

The Argo BUFR template is “3-15-003”. The Coriolis DAC identifier is “IOPX01_LFVX”.

- What data is going to the aux directory?
    - UVP for particles size distribution and taxonomic classification
    - FL2BB for CHLA435
    - RAMSES radiometric hyperspectral data
    - OPUS (TRIOS) data for nitrate estimation
    - MPE (Biospherical instruments inc) for PAR estimation
    - Acoustic geolocation estimated by RAFOS data

All the files are distributed in NetCDF format and there is an index gathering the information that helps in finding the data efficiently.
https://data-argo.ifremer.fr/etc/argo-index/argo_aux-profile_index.txt

- *Are you automatically greylisting questionable floats detected by min/max test?*

No, a visual inspection by a specialist is performed before greylisting parameters on a float. This is performed daily (only working days).

- *What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files?*

The transition to v3.2 trajectory files was completed in 2022.
We still have a backlog of 25% of trajectory files in version v2.3, we gradually convert them into v3.2 format. The conversion is complex because of missing metadata.

- *Do you have any code to share with other DACs? If so, where is that available?*

Coriolis Argo floats data processing chain
The Coriolis Argo floats data processing chain https://doi.org/10.17882/45589 is freely available, under a CC-BY license. It has been updated once a month (new features, patches) since 2010.

The data processing chain is also available from GitHub as a docker container, to be activated where needed. It does not require Matlab.
https://github.com/euroargodev/Coriolis-data-processing-chain-for-Argo-floats-container

LOCODOX, software for adjusting Argo oxygen profiles
A MATLAB based interactive software that corrects dissolved oxygen concentration data acquired by Argo profiling floats. The correction schemes are based on Takeshita et al (2013) and Bittig and Kortzinger (2018). Three types of correction are proposed : a pressure dependent correction, a time drift correction and a slope/ offset correction (also called Gain correction).
https://github.com/euroargodev/LOCODOX

Argo DMQC float salinity calibration software
This software is a python implementation of the "OWC" salinity calibration method used in Argo floats Delayed Mode Quality Control.
https://github.com/euroargodev/argodmqc_owc

Scoop-Argo: visual quality control of Argo NetCDF profiles
Visual inspection and expert quality control of Argo profiles
https://doi.org/10.17882/48531

Virtual fleet: make and analyse simulations of virtual Argo float trajectories
Using a 3D velocity fields, program your own Argo floats behaviour, set up a deployment plan and simulate trajectories (and sampling) of your virtual fleet of Argo floats.
VirtualFleet uses Parcels as a Lagrangian framework to simulate Argo floats and to compute trajectories.
https://github.com/euroargodev/VirtualFleet

DMQC_status_and_statistics Figures for DMQC statistics for a given list of floats
This script computes DMQC statistics for a given list of floats
https://github.com/euroargodev/DMQC_status_and_statistics

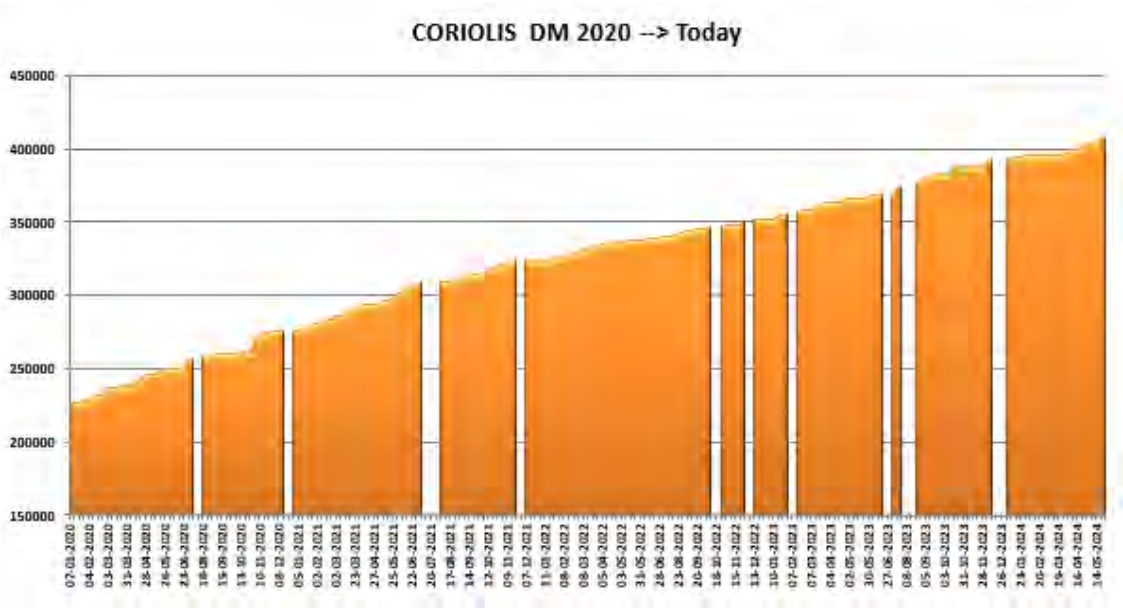
Coriolis under-ice positioning algorithm
Coriolis implementation of the “Terrain-following interpolation for under-ice floats” method presented by Kaihe Yamazaki at ADMT-22.
https://github.com/euroargodev/Coriolis-under-ice-positioning

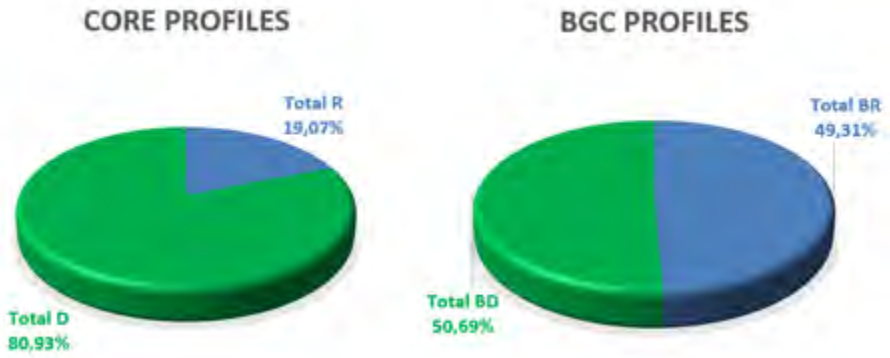
Argo life expectancy analysis
Plots the status of a list of floats regarding a configuration parameter and splitting the results depending on the country, deployment date and float model
https://github.com/euroargodev/Argo_life_expectancy_analyses

2. Delayed Mode QC status

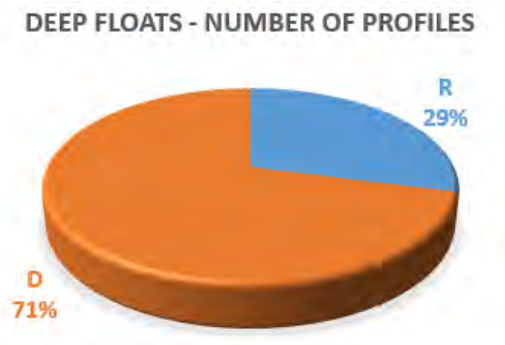
This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

DM on Core profiles: Over the past 5 years, a major effort has been made to steadily improve the quality control status of the delayed mode. During the last year (October 2023 to October 2024), 40205 new delayed mode profiles were produced and validated by PIs. A total of 423711 delayed mode profiles have been produced and validated since 2005.





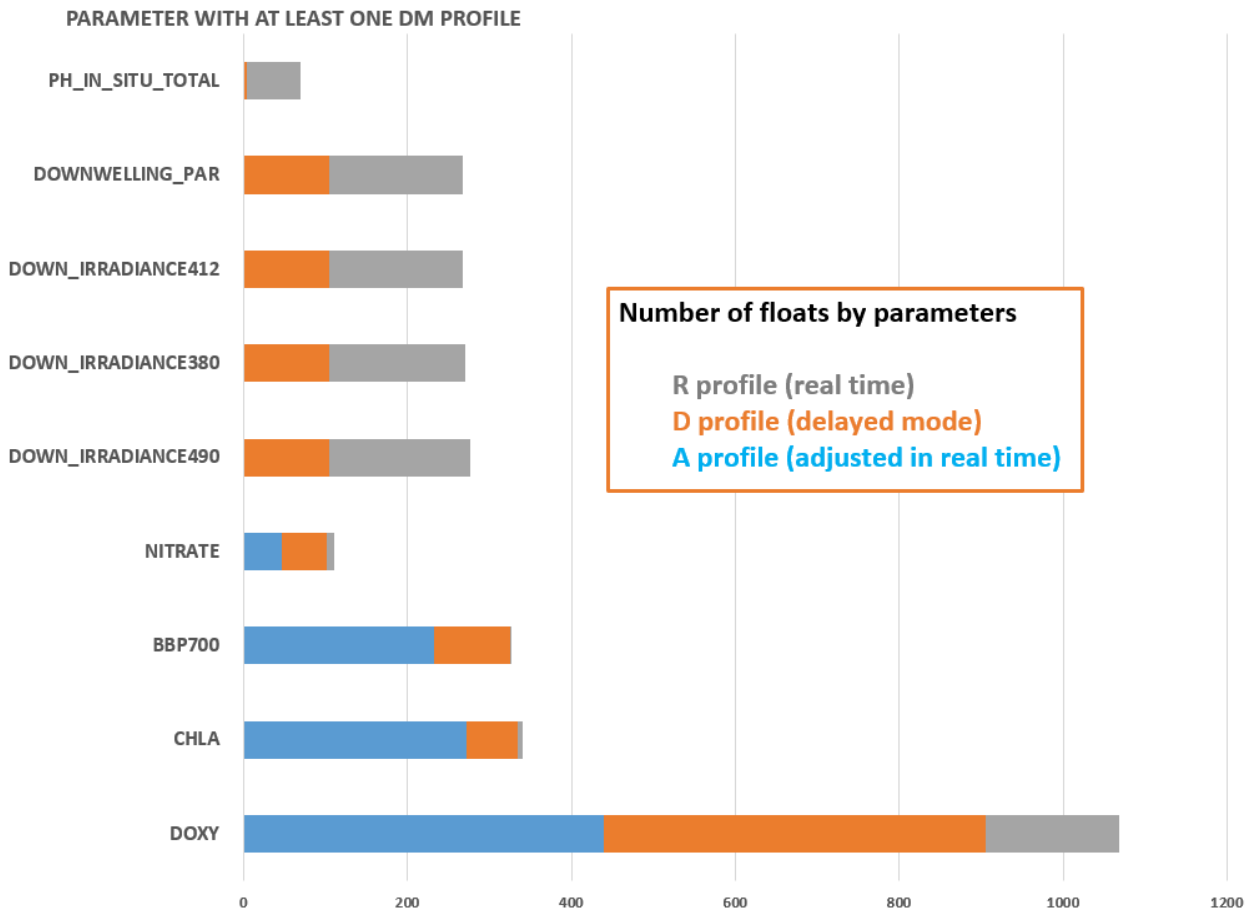
Looking more in detail to focus on Depp Argo data, a great effort has also been made to increase the count of delayed mode profiles : 71% of Deep Argo profiles have been processed in delayed mode (compared to the last year where 58% were processed).



DM on BGC profiles: The status of the quality control done on the Coriolis BGC floats is presented in the following plot for some BGC parameters. Some parameters are regularly updated in DM mode (DOXY,CHLA, BBP, IRRADIANCE).

Presently, only the CHLA in the Mediterranean Sea data has been Dmoded. Once the new adjustment in real time for CHLA will be in place in all the DACs, we will be able to push data at the global scale (https://doi.org/10.17882/102324).

For all BGC parameters, marginal seas like Black Sea and Baltic Sea are very specific (OMZ, depth) and by way of consequence, we need to develop very specific procedures to be able to perform DM. (These issues should be addressed in the EuroArgo One project).



Status of the quality control done on BGC floats.
Float for which at least one profile has been performed in delayed mode for the parameter.

A lot of work is always done from BSH (Birgit Klein) taking into account also floats from other German institutes and OGS (Antonella Gallo/Massimo Pacciaroni/Giulio Notarstefano) for the MedSea as well as Alberto Gonzalez Santana for IEO.

<u>DM mode trajectory files:</u>

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?

We do not yet distribute delayed mode trajectory (TRAJ-DM), we may start in 2024 as we have already completed these three preparatory steps:

- Definition of a DM process
- Implementation of dedicated tools

- Generation of few TRAJ-DM files (core floats) based on ANDRO project files (for cycle timings, grounding and RPP) and on DM profile files (for sensor measurements adjustment).

- How are you implementing BGC dmode - by parameter or one expert does all parameters?

Very few experts perform all parameters (1-2), with the support of specific parameter experts, but training is on-going work. Focusing on DOXY, the expertise relies on a more robust team.

- *What challenges have you encountered and how have you dealt with them?*

Because of numerous failing sensors, performing DM on pH is still very challenging.

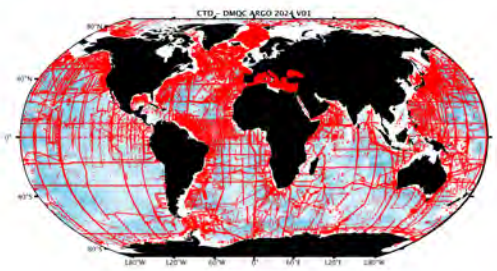
- *Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?*

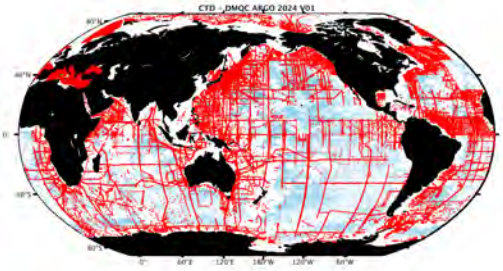
Regarding "official" BGC-DM tools, they are available at https://biogeochemical-argo.org/data-tools.php (Scoop-Argo, Locodox, BGC DM files writer) and on the euroargodev repository (https://github.com/euroargodev/radiometry_QC)

CTD Reference database for DMQC

A version 2024_V01 was provided in February 2024. In this version, these elements were taken into account ➕

- corrections following the feedback received by the users
- CTD from the last EasyOcean product
- CTD from CCHDO (mainly for the Argo DMQC), some are in the arctic area
- CTD provided by scientists
- CTD from WOD (Ocean Climate Library)



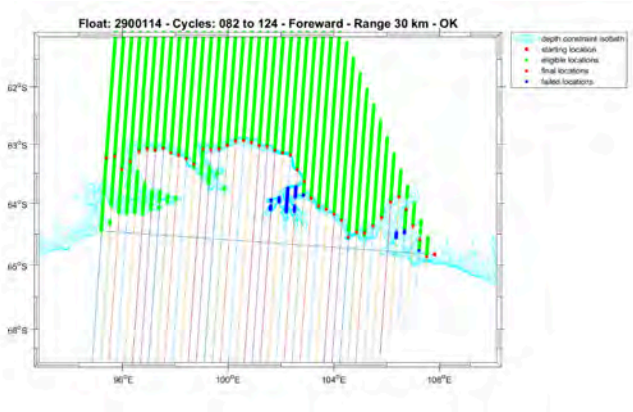


A new version is in preparation, taking into account feedback from A-ARC for corrections to certain boxes, as well as CTDs from CCHDO (public and confidential). A request was also made

by the polar team mission to consider all CTDs in the polar regions, with no restrictions on the depth threshold to be taken into account.

BGC-Argo QC cloud workbench
Within the EU project FAIR-EASE, we develop a web service, aiming at facilitating the use of quality control tools for the qualification (flagging measurements), the calibration and validation (comparison with different reference dataset). by ignoring the various programming languages, the differences in vocabularies and data location.
More on https://fairease.eu

Coriolis under-ice positioning algorithm
Coriolis implementation of the “Terrain-following interpolation for under-ice floats” method presented by Kaihe Yamazaki at ADMT-22. Shared with BSH (Birgit Klein).
https://github.com/euroargodev/Coriolis-under-ice-positioning



- *Do you have any concerns you’d like to bring to the ADMT?*

The majority of BGC-Argo activity is funded by project. A sustainable operational funding is much needed to implement OneArgo program.

3. Value Added items

- List of current national Argo web pages, especially data specific ones

A non exhaustive list of national Argo programs related to Coriolis DAC
- Euro-Argo ERIC https://www.euro-argo.eu

- Argo France
- Argo Germany
- Argo Ireland
- Argo Italy
- Argo Norway
- Argo Poland
- Argo España
- Greek Argo

Major web interfaces on Argo data

- The Argo fleet monitoring: https://fleetmonitoring.euro-argo.eu
- The Argo data selection: https://dataselection.euro-argo.eu
- The Argo floats recovery: https://floatrecovery.euro-argo.eu

Argo FAIR data services

Developed within the ENVRI-FAIR project and enhanced within FAIR-EASE and ENVRI-Hub-Next projects

- Argo GDAC https://doi.org/10.17882/42182
- OpenSearch API https://opensearch.ifremer.fr
  Adopted by Copernicus Eumetsat for Argo-satellite matchup, Blue-Cloud
  Example of request
- Metadata API https://fleetmonitoring.euro-argo.eu/swagger-ui.html#
  On top of Elasticsearch, adopted by Argo floats dashboard
- Data API https://dataselection.euro-argo.eu/swagger-ui.html#
  On top of Cassandra, adopted by Argo data subsetting or data visualization
- ERDDAP API https://www.ifremer.fr/erddap/index.html
  Example of request
- OGC SensorThings API https://sextant.ifremer.fr/examind/WS/sts/coriolis/v1.1
  Example of client https://isi-sbx.ifremer.fr/sextant/SensorThings/ifremer-webui
- Argo vocabulary server
  http://www.argodatamgt.org/Documentation/Argo-vocabulary-server
  Example of request
- Argo ontology
  http://www.argodatamgt.org/Documentation/Argo-vocabulary-server/Argo-linked-data-and-SPARQL-endpoint
  Explore the ontology
- Argo SPARQL endpoint https://sparql.ifremer.fr/argo/query
  Example of request
- Argo S3 server https://registry.opendata.aws/argo-gdac-marinedata/

- Known National Argo data usage
    - Please list known operational centers using Argo data in your country in this table:

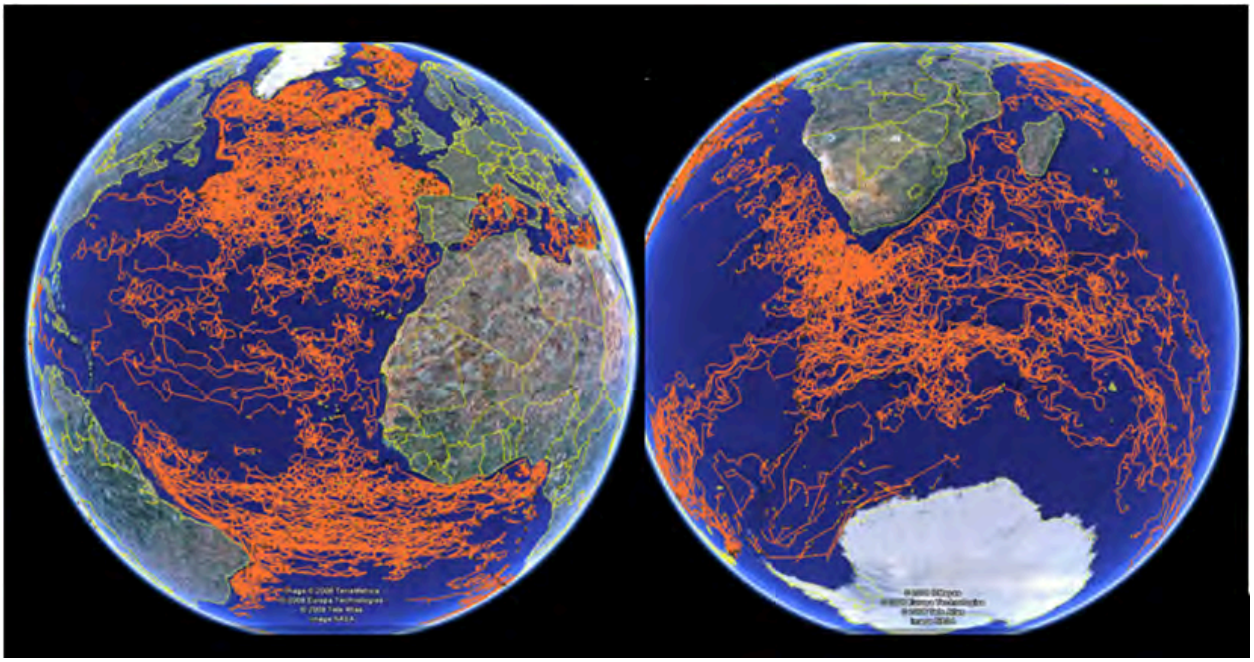
Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Copernicus Marine	https://help.marine.copernicus.eu	Core-Argo, BGC-Argo, Deep-Argo profiles
SeaDataNet	https://www.seadatanet.org/sendform/contact	Core-Argo, BGC-Argo, Deep-Argo profiles
EMODnet chemistry	-	BGC-Argo profiles
SHOM Hycom operational model	-	Core-Argo profiles

- Products generated from Argo data that can be shared

Sub-surface currents ANDRO Atlas

Based on Argo trajectory data, Ifremer and CNRS team are regularly improving the “Andro” atlas of deep ocean currents. The ANDRO project provides a world sub-surface displacement data set based on Argo floats data. The description of each processing step applied on float data can be found in:

· Ollitrault Michel, Rannou Philippe, Brion Emilie, Cabanes Cecile, Piron Anne, Reverdin Gilles, Kolodziejczyk Nicolas (2022). **ANDRO: An Argo-based deep displacement dataset**. SEANOE. https://doi.org/10.17882/47077



Argo trajectories from Coriolis DAC are carefully scrutinized to produce the “Andro” atlas of deep ocean currents.

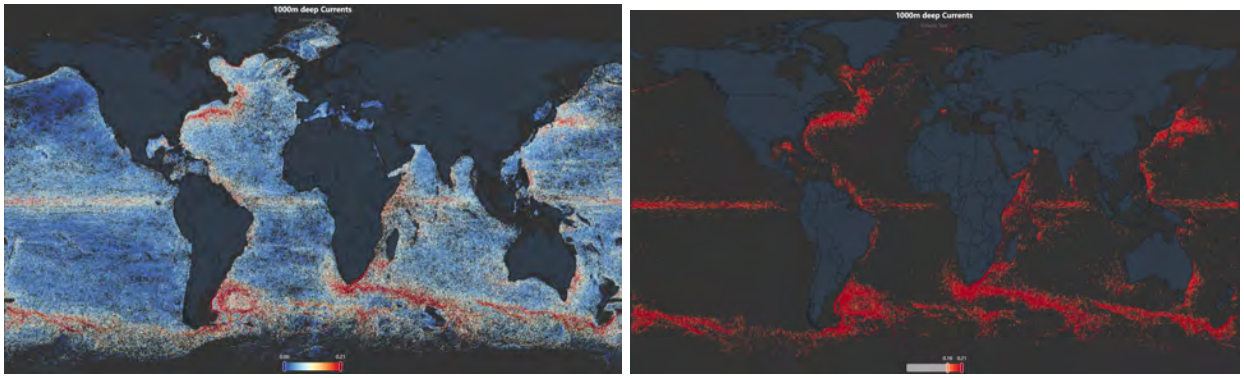
Sub-surface currents real time data

The Argo current product produced by Copernicus marine in situ is derived from the original trajectory data from Argo GDAC (Global Data Assembly Center). The Argo currents are calculated from Argo trajectories format version 3.1 or higher; the previous formats are ignored (2.*, 3.0).

It is daily updated and available from https://doi.org/10.48670/moi-00041

In November 2023 release, two significant improvements are implemented:

- A series of 20 quality control tests is applied on each Argo trajectory file documented in *Herbert Gaelle (2020). Qualification temps réel des données trajectoire des flotteurs Argo. https://doi.org/10.13155/95169*
- The currents are calculated with the Ollitrault-Rannou method documented in *Ollitrault Michel, Rannou Jean-Philippe (2013). ANDRO Dataset contents and format. https://archimer.ifremer.fr/doc/00360/47126*



Map of Argo deep ocean currents, each dot represents the deep ocean current from one cycle (typically 10 days) from one float
From dark blue dot: 0 meter/second, to red dot: 2 meter/second

Copernicus Marine real-time currents derived from Argo floats trajectories
https://doi.org/10.48670/moi-00041
The Argo current product produced by Copernicus marine in situ is derived from the original trajectory data from Argo GDAC (Global Data Assembly Center). The Argo currents are calculated from Argo trajectories format version 3.1 or higher; the previous formats are ignored (2.*, 3.0).

- The currents are calculated with the Ollitrault-Rannou method documented in Ollitrault Michel, Rannou Jean-Philippe (2013). ANDRO Dataset contents and format. https://archimer.ifremer.fr/doc/00360/47126
- Quality control: a series of 20 quality control tests is applied on each Argo trajectory file documented in Herbert Gaelle (2020). Qualification temps réel des données trajectoire des flotteurs Argo. https://doi.org/10.13155/95169

- *Publicly available software tools to access*

Coriolis Argo floats data processing chain https://doi.org/10.17882/45589

Coriolis Argo floats data processing chain embed in a docker container
https://github.com/euroargodev/Coriolis-data-processing-chain-for-Argo-floats-container

Argo NetCDF file format checker https://github.com/OneArgo/ArgoFormatChecker

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

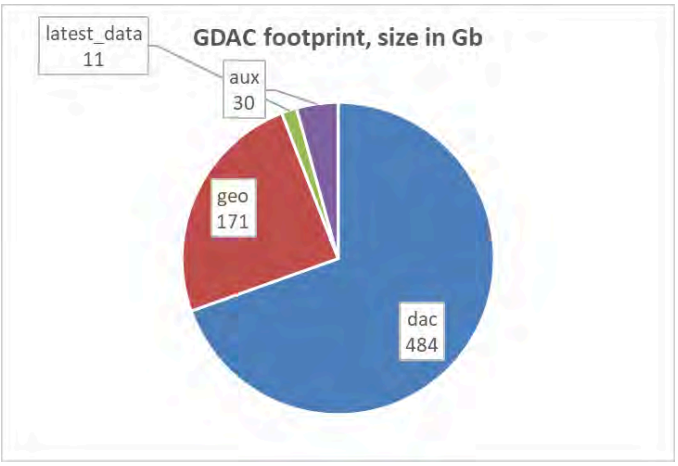
Currently, 11 national DACs regularly submit data to the Coriolis GDAC. As of October 2024, the following files were available from the GDAC FTP site. Compared to 2023, the number of floats (metadata) has increased by 4%, the number of profile files has risen by 6%, and **trajectory files have notably grown by 10%.**

DAC	metadata files	increase	profile files	increase2	delayed mode profile files	increase3	trajectory files	increase4
AOML	8 973	4%	1 595 932	6%	1 398 450	8%	12 346	15%
BODC	912	5%	135 607	6%	98 459	6%	547	3%
Coriolis	3 852	4%	524 420	8%	424 426	11%	3 766	4%
CSIO	558	4%	77 110	5%	61 154	6%	555	4%
CSIRO	1 179	4%	227 183	5%	214 284	6%	1 141	7%
INCOIS	541	7%	83 958	3%	39 996	0%	416	1%
JMA	1 951	2%	261 603	3%	214 200	3%	1 676	3%
KMA	264	0%	38 676	2%	34 936	3%	255	0%
KORDI	120	3%	15 984	2%	14 504	0%	107	0%
MEDS	719	7%	79 931	10%	51 012	0%	673	5%
NMDIS	19	0%	2 460	0%	2 388	0%	19	0%
Total	**19 088**	**4%**	**3 042 864**	**6%**	**2 553 809**	**7%**	**21 501**	**10%**

GDAC files size

- The total number of NetCDF files on the GDAC/dac directory was 3 773 576 (+7% in one year)
- The size of GDAC/dac directory was 423 Go (+11%)
- The size of the GDAC directory was 931 Go (+26%)

branch	GDAC size in Gb	yearly increase	N-1
dac	484	14%	423
geo	171	8%	159
latest_data	11	-54%	24
aux	30	150%	12
gdac total	926	-1%	931



Operations of the ftp, https and erddap servers

For each individual DAC, every 30 minutes, meta-data, profile, trajectory and technical data files are automatically collected from the national DACs. The 11 DACs are processed in parallel (one process launched every 3 minutes).

Index files of metadata, profiles, trajectories, technical and auxiliary data are hourly updated.

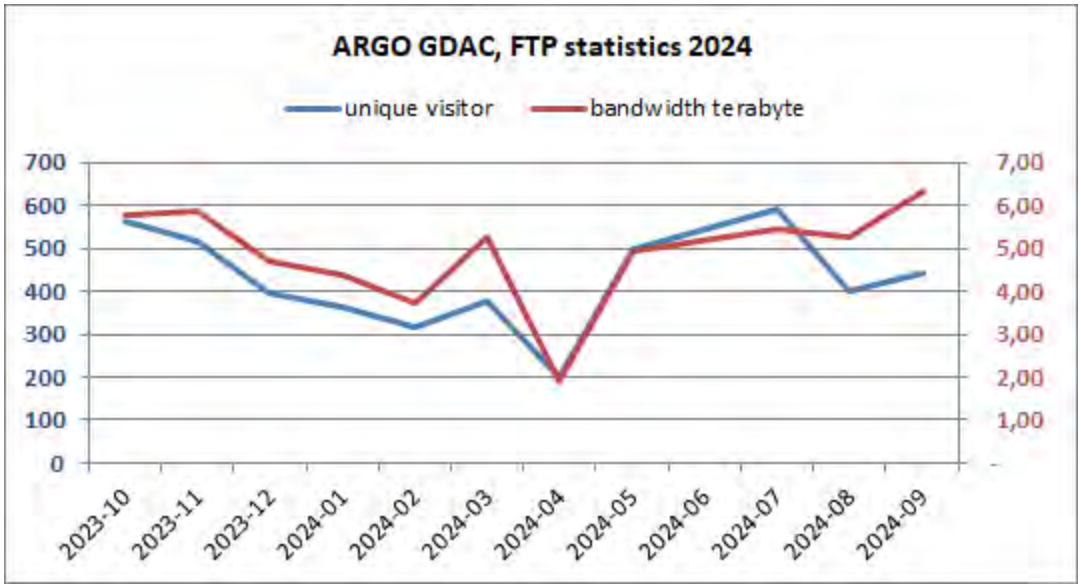
GDAC files size

- The total number of NetCDF files on the GDAC/dac directory was 3 773 576 (+7% in one year)
- The size of GDAC/dac directory was 484 Gb (+14%)
- The size of the GDAC directory was 931 Gb (-1%)

GDAC download services

- ftp ftp://ftp.ifremer.fr/ifremer/argo
- https https://data-argo.ifremer.fr
- erddap https://erddap.ifremer.fr

On the FTP server there is a daily average of 5500 sessions and downloading 5 terabytes of data files. The https and erddap statistics have not yet been calculated.



5. Regional Centre Functions

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

France operates the A-ARC (Atlantic Argo Regional Centre).
The main recurrent activities are:
- Check the consistency of the delayed mode salinity correction
- Verification of the CTD reference database in the A-ARC region
- Production and delivery of products (ISAS and ANDRO)

This year the delayed mode salinity correction of 3814 floats has been checked.We have identified 24 floats for which we think the DM correction should be revised. This list of 24 floats is available here:
https://docs.google.com/spreadsheets/d/1IUYTXPMRZx_kRc0fOuIKQwCoBxQvwiMO_wpiiocks zI/edit?usp=sharing.

The quality of the CTD reference database in the A-ARC region has been checked, focusing on the deepest layers. A simple Matlab tool was developed to visualize and select suspicious profiles in 10° x 1° boxes. So far 761 suspicious profiles have been detected and sent to Christine Coatanoan. These profiles will be removed from the new release of the reference CTD database.

A-ARC products:

- ISAS, monthly gridded field of T/S (last versions : ISAS17, ISAS20) is provided on https://doi.org/10.17882/52367 . New release is envisioned for 2025.
- The new ISASO2 fields (decadal and pentadal mean field) from available DMQC DO Argo data have been released in 2024 (https://doi.org/10.17882/52367) along with an accepted publication in ESSD describing the dataset on : https://doi.org/10.5194/essd-2024-106 .
- An update of the ANDRO velocities atlas has been released and is available here: https://doi.org/10.17882/4707. This update includes the velocities computed from the trajectories of 920 additional floats (AOML+CSIRO).

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.

Argo National Data Management Report for ADMT-25

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other section prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX	current version	47 active floats
ARVOR	current version	184 active floats
PROVOR	2 Provor-III, 7 Provor IV, 1 Provor V	10 active floats
Navis		none
BGC Navis		none
SOLO/S2A		none
Deep SOLO		none
Deep Arvor		none
Other (customize additional rows as needed)		

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	227 SBE41 and 14 RBR
oxygen	19 floats with Aanderaa Optode
NO3	-----
pH	9 floats with Seafet sensor
Chla	6 floats with ECO_FLBBCD sensor
bbp	6 floats with ECO_FLBBCD sensor
irradiance	6 floats with Satlantic OCR504 sensor

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
pCO2	in progress

The real time processing for all German Floats is performed by Coriolis. The relevant documents (manuals, calibration sheets) are exchanged prior to deployment by file exchange. Decoders for the specific floats are developed at the data center. At present there are 241 operational German floats processed by Coriolis some of which may presently be under ice in ice covered regions.

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter ‘N/A’ (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter ‘N/I’ (Not Implemented).

parameter	Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)	QC manual version you are using (ie, current or version 2.0 Oct 2018)	Notes on when changes will be made to update to latest version
oxygen	current	current	
NO3	current	current	
pH	current	current	
Chla	current	current	
bbp	current	current	
irradiance	current	current	

All German BGC floats are also processed by Coriolis in the real time chain and the most recent versions of the processing cookbook are applied.

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See [DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)]

RBRargo3 2K model	Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?	Notes or additional information
pre-April 2021	yes	for 5 floats compressibility had to be determined by deployment CTDs
post-April 2021	yes	9 floats have been calibrated in the tank

- Are you regularly applying real time adjustments for the following items:
  - Salinity adjustments -> done by Coriolis if applicable
  - Cpcor for deep floats -> no German floats yet
  - BGC parameters (if so, which ones) -> done by Coriolis if applicable

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	yes	yes	
Cpcor adjustment for Deep floats	n.a.	n.a	
oxygen	yes	no	Realtime adjustments proposed by Coriolis are applied to some of our Argo-O2 floats
NO3	no	no	
pH	no	no	
Chla	no	no	
bbp	no	no	
irradiance	no	no	

- What data are you sending onto the GTS? All German data are ingested directly on GTS by Coriolis unless they are greylisted.
- What data is going to the aux directory? UVP, FL2BB, OPUS and pCo2
- Are you automatically greylisting questionable floats detected by min/max test? Yes, normally Coriolis directly does this for the German floats.
- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files? Information should be provided by Coriolis.
- Do you have any code to share with other DACs? If so, where is that available? Information should be provided by Coriolis

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any d-mode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?

  > No trajectory files have been d-moded due to lack of time. Task still does not have high priority and since most of our active floats are Arvor, we would like to profit from code development at Coriolis.

  > Quota of finished core dmqc is remaining at high levels. A total of 117096 profiles have been collected by German floats, 102964 D-files have been created for the core variables and 9389 eligible profiles have not yet received a dmqc yet, resulting in a percentage of 92 % for dmqc work on German floats. Only the AWI data stand out with much lower quota of only 41%. This is due to the below detailed problems with the old Nemo floats and ongoing discussions about the correction of the initial asymptotic adjustments of the salinity of the AWI floats, which is more abundant in the Weddell gyre than in other areas of the world ocean. We hope to resolve the issues until the end of the year.

German Floats/ Program Name	Number of profiles	Number of D-files	D-files pending
Argo BSH	90169	82267	3539
Argo AWI	10108	4034	5694
Argo GEOMAR	13474	13407	67
Argo U. HH	3347	3258	89
Argo Denmark with U.HH	371	360	11

  > BSH has also adopted some floats from Finland (10 non Baltic floats), the Netherlands (113 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 [80- 90%). 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)	1604	1309	289	Handed over to operators in Poland in 2019
Argo Finland (10 floats out of 49)	798	795	3	Mostly Baltic and Barent Sea floats handed over to operator from Finnland
Argo Netherlands (113 out of 125 floats)	13826	12078	447	Mainly RBR floats still pending
Argo Norway (30 floats out of 92)	5131	4902	118	Handed over to operator from Norway in 2019
MOCCA (45 floats out of 119)	12253	8785	3093	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

- How are you implementing BGC dmode - by parameter or one expert does all parameters?
  > On 3 parameters (pH – Geomar/Kiel, NO3 – IOW/Warnemünde and IRR – ICBM/Wilhelmshaven) we rely on experts from cooperating institutes, other 3 parameters (Chla, CDOM, DO) the expertise of the current cookbooks will be applied by one expert.

- What challenges have you encountered and how have you dealt with them?
  > A large portion of older AWI floats (NEMO floats) is still untouched. Preparing D-files for these needed another revision of the tech-files, which has recently been finished after intense discussion with AWI and Coriolis. Hopefully, the preparation of D-files can now start soon.
  > The implementation of the RBR processing is underway, discussion with RBR are planned at ADMT to discuss the calculation of elptime from the time information available for Arvor floats.
  > For the DMQC of floats in the Baltic another workshop was held at Sopot (Poland) from 13.09-26.09.2024 and procedures for validation were jointly developed and need to be finished.
  > The DMQC for all BGC parameters is delayed due to missing personal. However, expertise is slowly being developed with support from several cooperating German institutes. More progress is expected in 2025.

- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?

- Do you have any concerns you'd like to bring to the ADMT?

  > Density maps for BGC parameters would be very useful in order to deploy floats with BGC sensors (eg. Oxygen) in areas of data need.

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.

- Known National Argo data usage
  - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Fleet support German Navy		The German Navy uses Argo data on a regular basis for the operational support of their fleet
Earth System model (ESM) of MPI University of HH, ESM-W used at Germany's National Meteorological Service (DWD)		Argo data (now including BGC data) are 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.

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

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

Not applicabable

5. Regional Centre Functions

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

Not appliable

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.

The prolonged down-time of OceanOPS was a major setback at the beginning of the year. In future it would be preferable if there could be advanced warning about shut-downs. Also more detailed information on the dmqc of the bgc variables would be helpful. So far the graphs on the overall percentages give on information on the number of profiles involved .

Argo National Data Management Report (2024) – India

1. Status

- **Data acquired from floats**
  INCOIS has deployed 24 new floats—6 in the Bay of Bengal, 1 in the Arabian Sea, and 16 along the Equatorial Indian Ocean in a north-south (meridional) pattern. With these deployments, India's total contribution since 2002 has reached 542 floats, of which 75 remain active. The data from all active floats are processed and sent to GDAC.

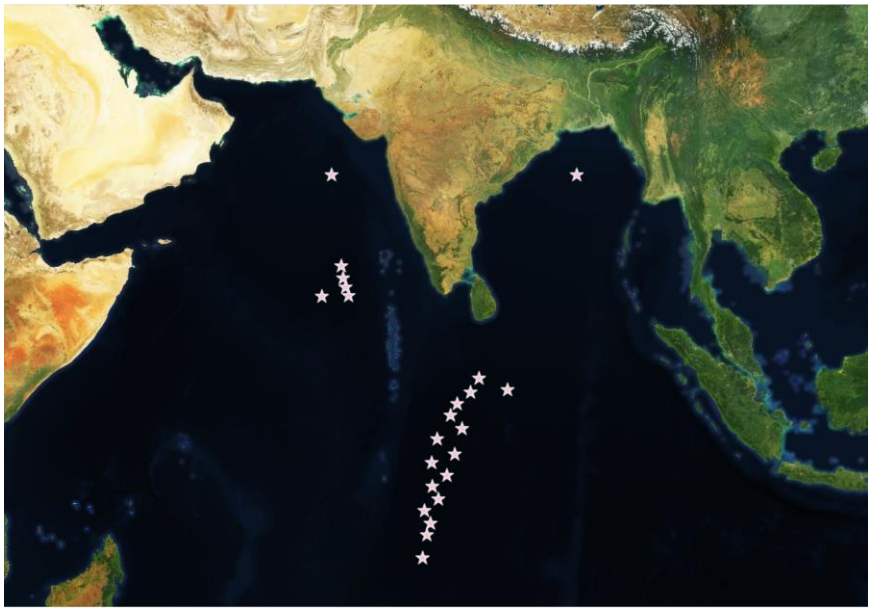


Fig: Map showing the deployment locations of Argo floats by INCOIS in 2024 across the Indian Ocean.

- **Data issued to GTS**
  All the 75 active floats data is being distributed via RTH New Delhi. Data in BUFR format is distributed to IMD, New Delhi and the same are distributed to GTS by assigning a time stamp.

- **Data issued to GDACs after real-time QC**
  All the active floats (75) data are subject to Real Time Quality Control (RTQC) and are being successfully uploaded to both GDACs.

- **Data issued for delayed QC**
  In total ~51% of the eligible profiles for DMQC are generated and uploaded to GDAC. Floats identified and notified through the ocean-ops are passed through DMQC and submitted to GDAC. Some more floats are grey listed, and the list is updated on GDAC.

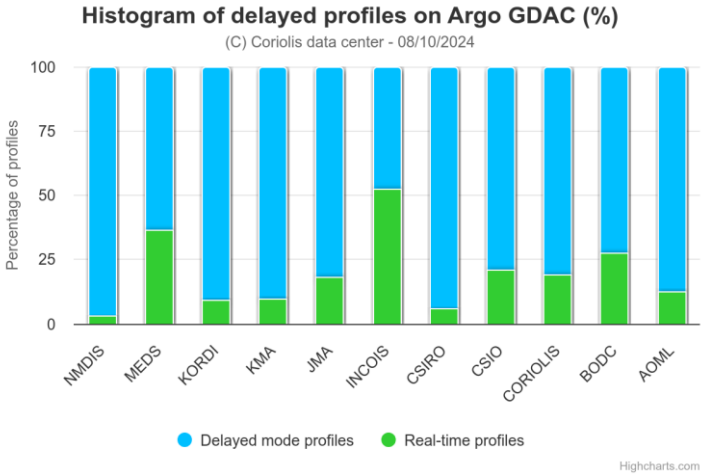


Fig: Histogram of DMQC profiles of all DACs

- **Web pages**
  - INCOIS continued maintaining Web-GIS based site for Indian Argo Program. It contains entire Indian Ocean floats data along with profile position. Further details can be obtained by following the link http://www.incois.gov.in/Incois/argo/argo_home.jsp. Apart from the floats deployed by India, data from floats deployed by other nations in the Indian Ocean are received from the Argo Mirror and made available in the INCOIS website. User can download the data based on his requirement.

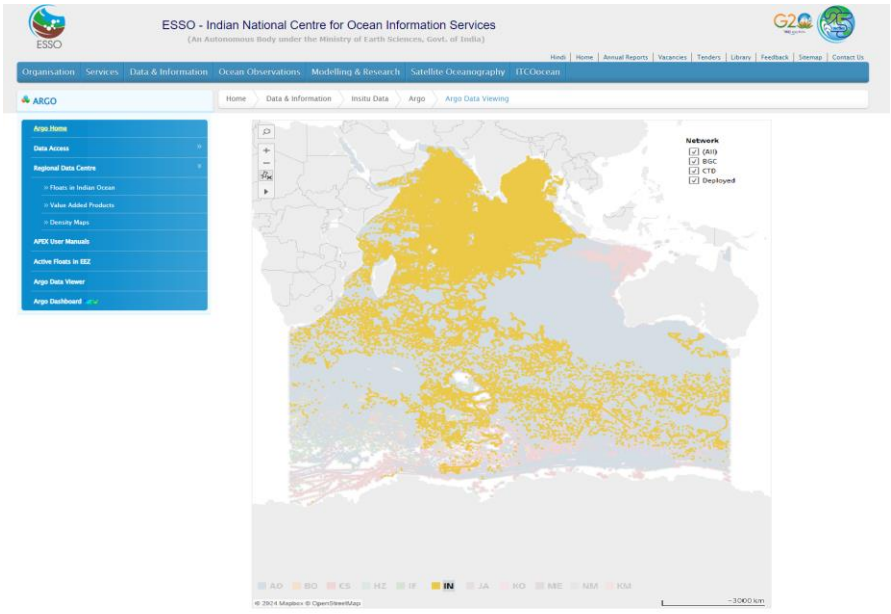


Fig: Snapshot of all the profiles being served by INCOIS website.

  - The Indian ARGO Dashboard is an interactive platform developed by INCOIS to monitor and display real-time data from Argo floats deployed across the Indian Ocean. It provides detailed statistics on the number of floats deployed, their current

status, and their geographic locations. The dashboard also displays key oceanographic data such as temperature, salinity, and pressure profiles, while offering insights into active and inactive floats, deployment history, and India's overall contribution to the global Argo program. The dashboard is scalable to the global ocean, enabling users to monitor Argo floats and analyze data across all oceans, contributing to worldwide ocean observation efforts. For full details visit https://incois.gov.in/argo/argo_dashboard.jsp

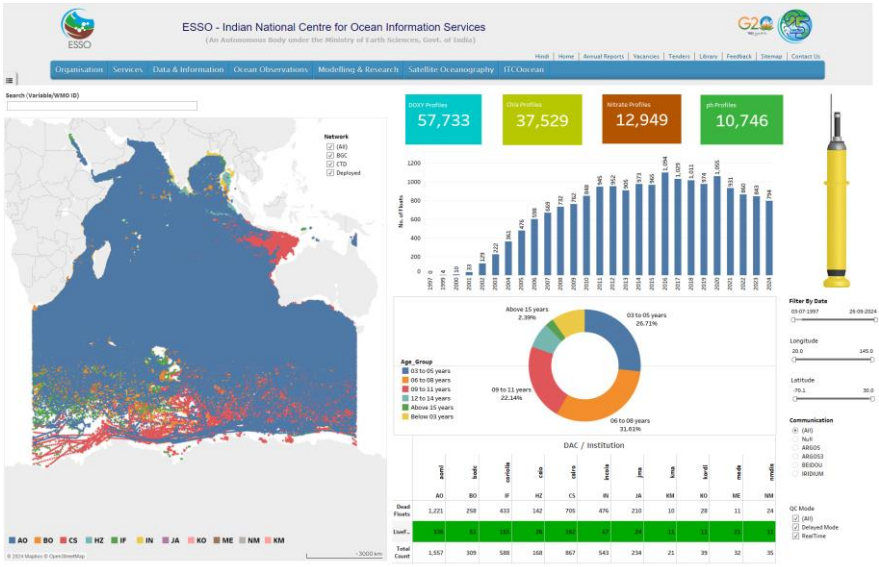


Fig: Indian ARGO Dashboard showcasing statistics of all the profiles available/archived at INCOIS.

- **Trajectory**
  INCOIS continued generating Ver 3.1 trajectory files and uploaded them to GDAC. The implementation of the ARGO trajectory using a new container-based approach is currently underway.
- **Statistics of Argo data usage**
  INCOIS continued Argo data outreach program specifically targeting students, researchers and research scholars. Argo data is popularized and being widely use by various Organisations/ Universities/ Departments. Scientists, Students and Researchers from INCOIS, NIO, SAC, C-MMACS, NRSA, IITM, NCMRWF, IISc etc are using Argo data in various analysis. Many publications based on Argo data were also published in reputed journals. See the references below. Bio-Argo data is continued to be supplied to researchers interested in using it. Data from BGC-Argo is continued to be used for validation of Biogeochemical model outputs like ROMS with Fennel module.

- **Products generated from Argo data**
  1. INCOIS continued to generate value added products using all Argo data (both national and international). Continued to use variational analysis method (DIVA) while generating value added products. Many products are generated using Argo temperature and salinity data. The Argo T/S data are first objectively analysed, and this gridded output is used in deriving value added products.

2. DVD on “Argo data and products for the Indian Ocean” is discontinued which is being made available via INCOIS and UCSD web sites. However, the older version of the same is still available for download.

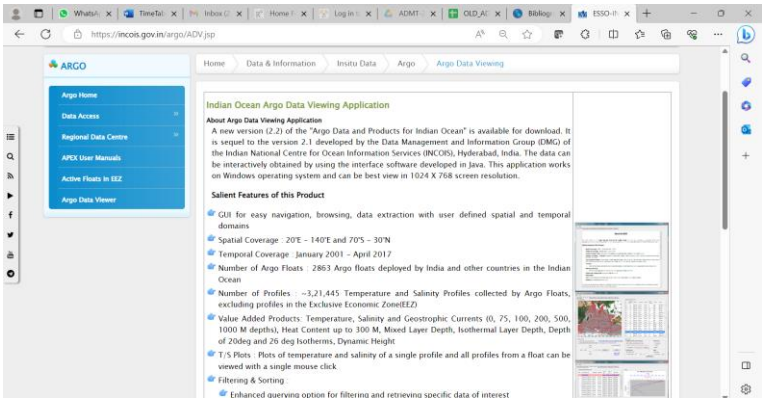


Fig: Web page of the Argo data viewer.

3. Argo valued products are continued to be made available through INCOIS LAS. For further details visit http://las.incois.gov.in.

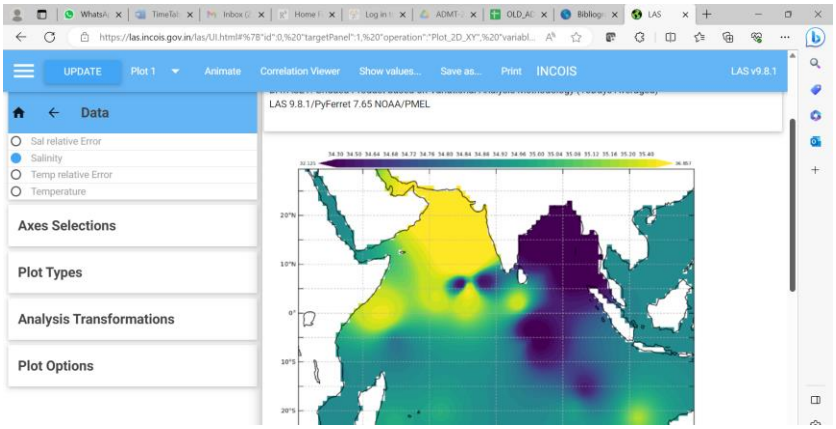


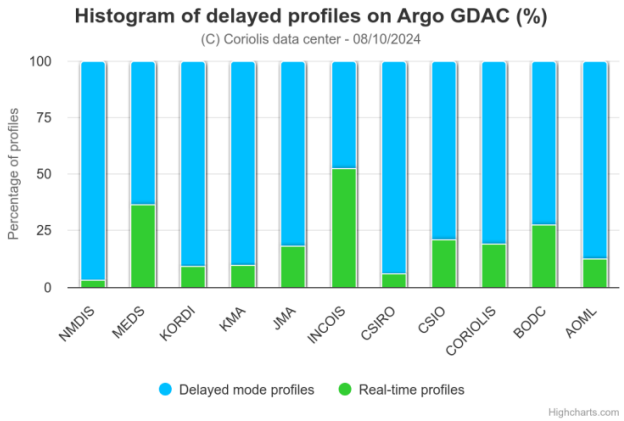
Fig: Screeshot of the LAS page for Argo value added products.

4. Continued to provide the Argo and value-added products derived from Argo data through ERDDAP.
5. Argo data and products are made available through Digital Ocean. For more details users are requested to visit: http://do.incois.gov.in

2. Delayed Mode QC

- INCOIS started generating and uploading D files to GDAC from July 2006, and as of today, profiles belonging to all eligible floats have been subjected to DMQC.
- Modified DMQC S/W obtained from Cecil, IFREMER is also being used. Using this s/w all the eligible floats are reprocessed to tackle pressure sensor offset problems, salinity hooks, thermal lag corrections, salinity drifts.
- Floats, specifically falling in serial numbers above 10,000 are specifically subjected to DMQC in collaboration with CSIRO. Those identified as having ASD were grey listed and Dmoded files were uploaded to GDAC.
- Data obtained from sister concerns and archived is continued to be used in the delayed mode processing.

- About 51% of the eligible profiles are subjected to DMQC and the delayed mode profiles are uploaded on to GDAC.



3. GDAC Functions

INCOIS is not operating as a GDAC.

4. Regional Centre Functions

- INCOIS continued acquisition of Argo data from GDAC corresponding to floats other than deployed by India and made them available on INCOIS web site.
- Delayed Mode Quality Control (Refer 2.0 above).
- Data from the Indian Ocean regions are gridded into 1x1 box for monthly and 10 days and monthly intervals using Variational Analysis (DIVA) and Objective Analysis. These gridded data sets are made available through INCOIS Live Access Server (ILAS).
- ERDDAP site was set up for the data and data products derived from Argo floats.
- INCOIS continued acquisition of data Sets (CTD, XBT, Subsurface Moorings) from principle investigators. The CTD data are being utilized for quality control of Argo profiles.
- Value added products:
  Products are currently being made available to various user from INCOIS web site. They are:
  (i) Spatial plots using the objectively analysed from all the Argo floats data deployed in the Indian Ocean.
  (ii) Spatial plots using the DIVA method from all the Argo floats data deployed in the Indian Ocean

  These valued added products can be obtained from the following link http://www.incois.gov.in/Incois/argo/products/argo_frames.html and also through Live Access Server (LAS).
- Regional Co-ordination for Argo floats deployment plan for Indian Ocean. Coordinating the deployment of floats based on the density maps. These maps are generated before cruise beginning and possible regions with low density are targeted for deployment provided, they are within the regions of planned cruises.

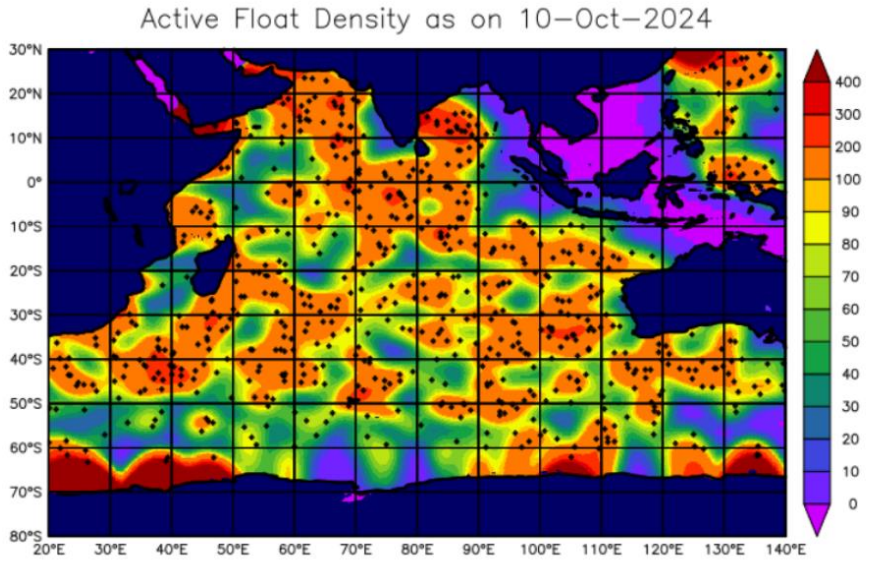


Fig : Argo density map of all available floats as on 10th Oct 2024.

Publications:

INCOIS continued to actively utilize Argo data in various studies pertaining to Indian Ocean. Also INCOIS is encouraging utilization of Argo data by various universities by bringing awareness about the data. Some of the publications resulted from Argo data which includes scientists from INCOIS are given below:

1. Akhter, S., F. Qiao, K. M. A. Chowdhury, X. Yin, and M. K. Ahmed (2024), Simulation of the upper oceanic response to the super cyclonic storm Amphan in the Northern Bay of Bengal, *Journal of Sea Research*, *198*, 102484, doi: https://doi.org/10.1016/j.seares.2024.102484
2. Aravind, H. M., H. S. Huntley, A. D. Kirwan, and M. R. Allshouse (2024), Drifter Deployment Strategies to Determine Lagrangian Surface Convergence in Submesoscale Flows, *J. Atmos. Ocean. Technol.*, *41*(1), 95-112, doi: https://doi.org/10.1175/JTECH-D-22-0129.1
3. Athira, K. S., R. Attada, and V. B. Rao (2024), Synoptic dynamics of cold waves over north India: Underlying mechanisms of distinct cold wave conditions, *Weather and Climate Extremes*, *43*, 100641, doi: https://doi.org/10.1016/j.wace.2024.100641
4. Bhanu Deepika, P., S. Mohan, and G. Srinivas (2024), Intercomparison of tropical Indian Ocean circulation in ocean reanalysis and evaluation in CMIP6 climate models, *Dynamics of Atmospheres and Oceans*, *106*, 101456, doi: https://doi.org/10.1016/j.dynatmoce.2024.101456
5. Chandra, A., N. Keenlyside, L. Svendsen, and A. Singh (2024), Processes Driving Subseasonal Variations of Upper Ocean Heat Content in the Equatorial Indian Ocean, *Journal of Geophysical Research: Oceans*, *129*(2), e2023JC020074, doi: https://doi.org/10.1029/2023JC020074
6. Ghosh, J., K. Chakraborty, V. Valsala, T. Bhattacharya, and P. Kanti Ghoshal (2024), A review of the Indian Ocean carbon dynamics, acidity, and productivity in a changing environment, *Prog. Oceanogr.*, *221*, 103210, doi: https://doi.org/10.1016/j.pocean.2024.103210

7. Girishkumar, M. S., K. Ashin, and E. P. Rama Rao (2024), Diapycnal mixing induced by salt finger and internal tides on the northwest coast of India, *Cont. Shelf Res.*, *273*, 105172, doi: https://doi.org/10.1016/j.csr.2024.105172
8. Gulakaram, V. S., N. K. Vissa, and P. K. Bhaskaran (2024), Processes responsible for mixed layer variations near mesoscale eddies in the Bay of Bengal, *Ocean Dyn.*, doi: https://doi.org/10.1007/s10236-024-01612-z
9. Jarugula, S., D. Sengupta, E. Shroyer, and F. Papa (2024), Mixing of Rain and River Water in the Bay of Bengal From Basin-Scale Freshwater Balance, *Geophys. Res. Lett.*, *51*(3), e2023GL106451, doi: https://doi.org/10.1029/2023GL106451
10. Kumar, R., P. S. Pippal, A. Chauhan, R. P. Singh, R. Kumar, A. Singh, and J. Singh (2024), Dynamics of land, ocean, and atmospheric parameters associated with Tauktae cyclone, *Environmental Science and Pollution Research*, *31*(8), 12561-12576, doi: https://doi.org/10.1007/s11356-023-31659-2
11. Kumar, V., D. Sumangala, and H. Warrior (2024), Salinity data curation using CMIP6 projections and artificial neural network for the Bay of Bengal, *ISH Journal of Hydraulic Engineering*, *30*(2), 218-227, doi: https://doi.org/10.1080/09715010.2023.2291796
12. Rahman, R., and H. Rahaman (2024), Impact of bathymetry on Indian Ocean circulation in a nested regional ocean model, *Scientific Reports*, *14*(1), 8008, doi: https://doi.org/10.1038/s41598-024-58464-2
13. Raja, K. J., M. C. Buijsman, A. Bozec, R. W. Helber, J. F. Shriver, A. Wallcraft, E. P. Chassignet, and B. K. Arbic (2024), Spurious internal wave generation during data assimilation in eddy resolving ocean model simulations, *Ocean Model.*, *188*, 102340, doi: https://doi.org/10.1016/j.ocemod.2024.102340

Argo National Data Management Report for ADMT-25. ITALY (MedArgo ARC)

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other section prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

This task is carried out by (is the responsibility of) the Coriolis DAC

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

Italy is in charge of the DMQC of the physical variables (temperature and salinity) acquired by Argo floats (Core, Deep, BGC) deployed in the Mediterranean and Black Sea by any country. See section 5 for details.

- *What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?*

  No resources available for this activity.

- *How are you implementing BGC dmode - by parameter or one expert does all parameters?*

  LOV in France is in charge of DMQC for BGC parameters acquired by the Italian fleet. OGS is working to implement DMQC of Oxygen and BBP

- *What challenges have you encountered and how have you dealt with them?*

- *Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?*

- *Do you have any concerns you'd like to bring to the ADMT?*

3. Value Added items

- *List of current national Argo web pages, especially data specific ones*

The MedArgo web page is available at http://argo.ogs.it/medargo/. Tables and graphics are updated in near real time. The float positions are plotted daily (figure 1); the float deployments are added to the web page as soon as the technical information is available (figure 2); the monthly and the whole trajectories are also provided. Links with the Euro-Argo data selection tools and GDAC center (Coriolis) are also available for downloading both the real-time and delayed-mode float profiles.

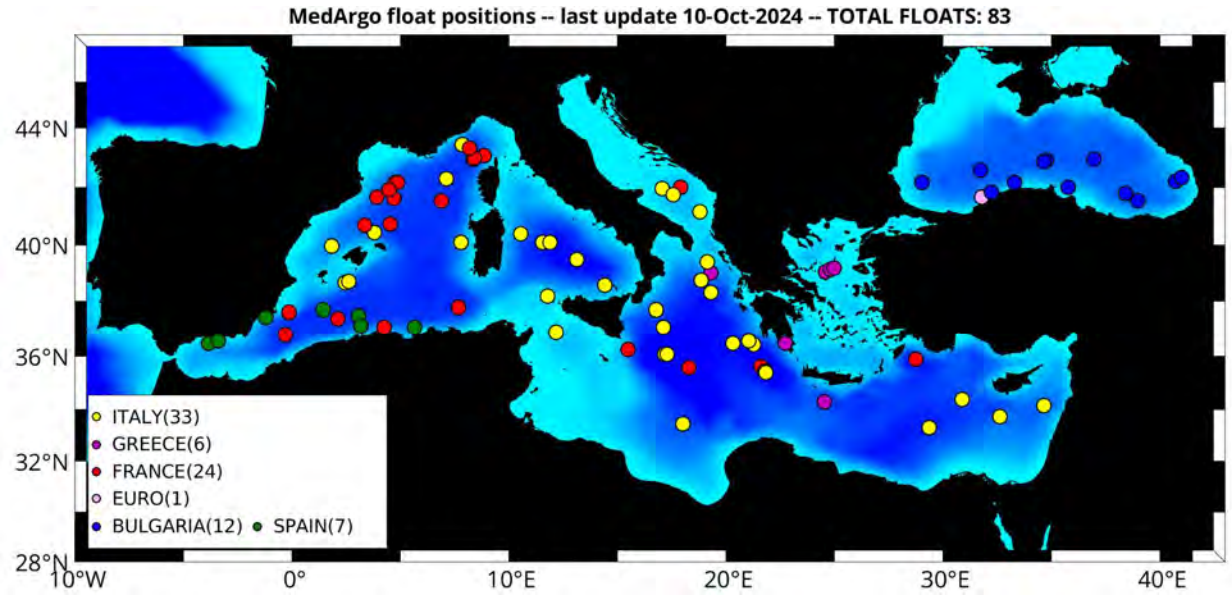


Figure 1. MedArgo float positions as of 10 October 2024 (updated daily).

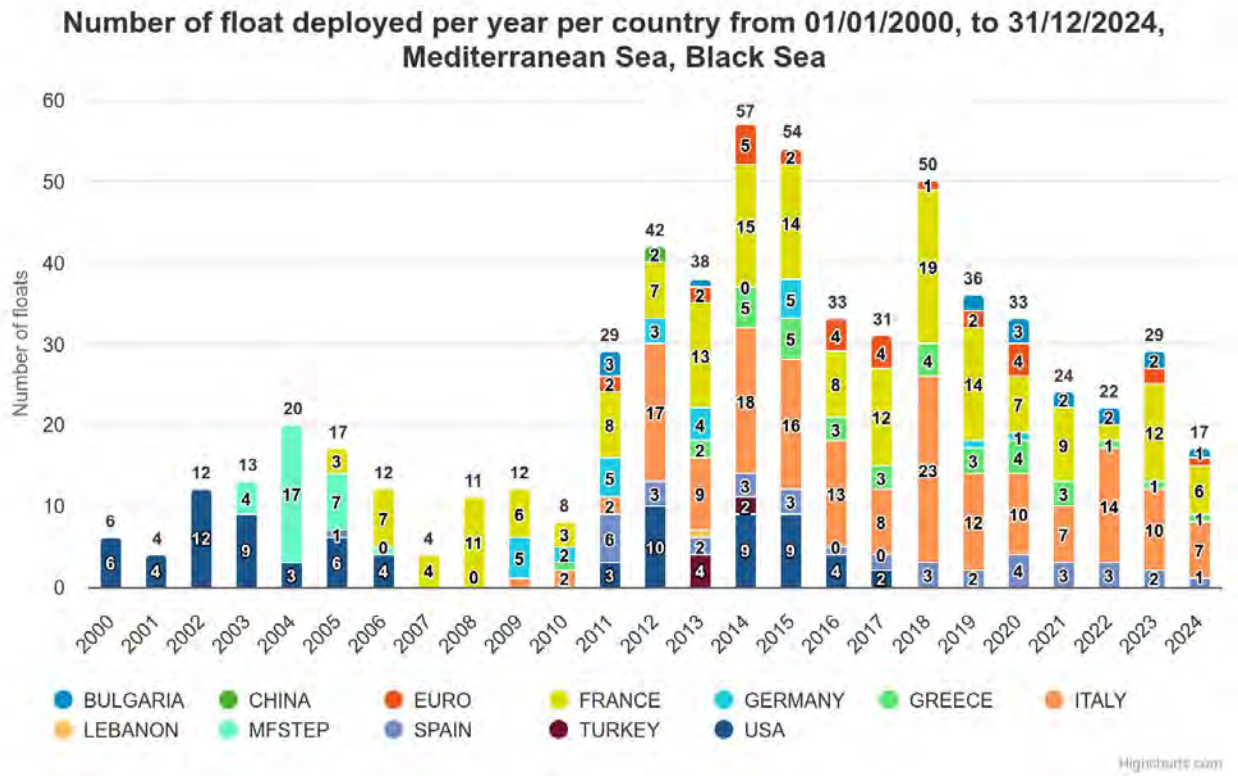


Figure 2. MedArgo number of float deployments until September 2024.

- *Known National Argo data usage*
    - *Please list known operational centers using Argo data in your country in this table:*

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Centro Euro-Mediterraneo sui Cambiamenti Climatici (https://www.cmcc.it/it)	Emanuela Clementi (emanuela.clementi@cmcc.it) Jenny Pistoia (jenny.pistoia@cmcc.it)	Core-Argo
Mediterranean Ecosystem Analysis and Forecast (https://medeaf.ogs.it/)	Gianpiero Cossarini (gcossarini@ogs.it)	BGC-Argo

- *Products generated from Argo data that can be shared*

Physical and Biogeochemical Argo float data are assimilated in numerical forecasting models by CMCC and OGS; 3D daily maps of Mediterranean ocean forecasting systems are produced and available on CMEMS (figure 3).

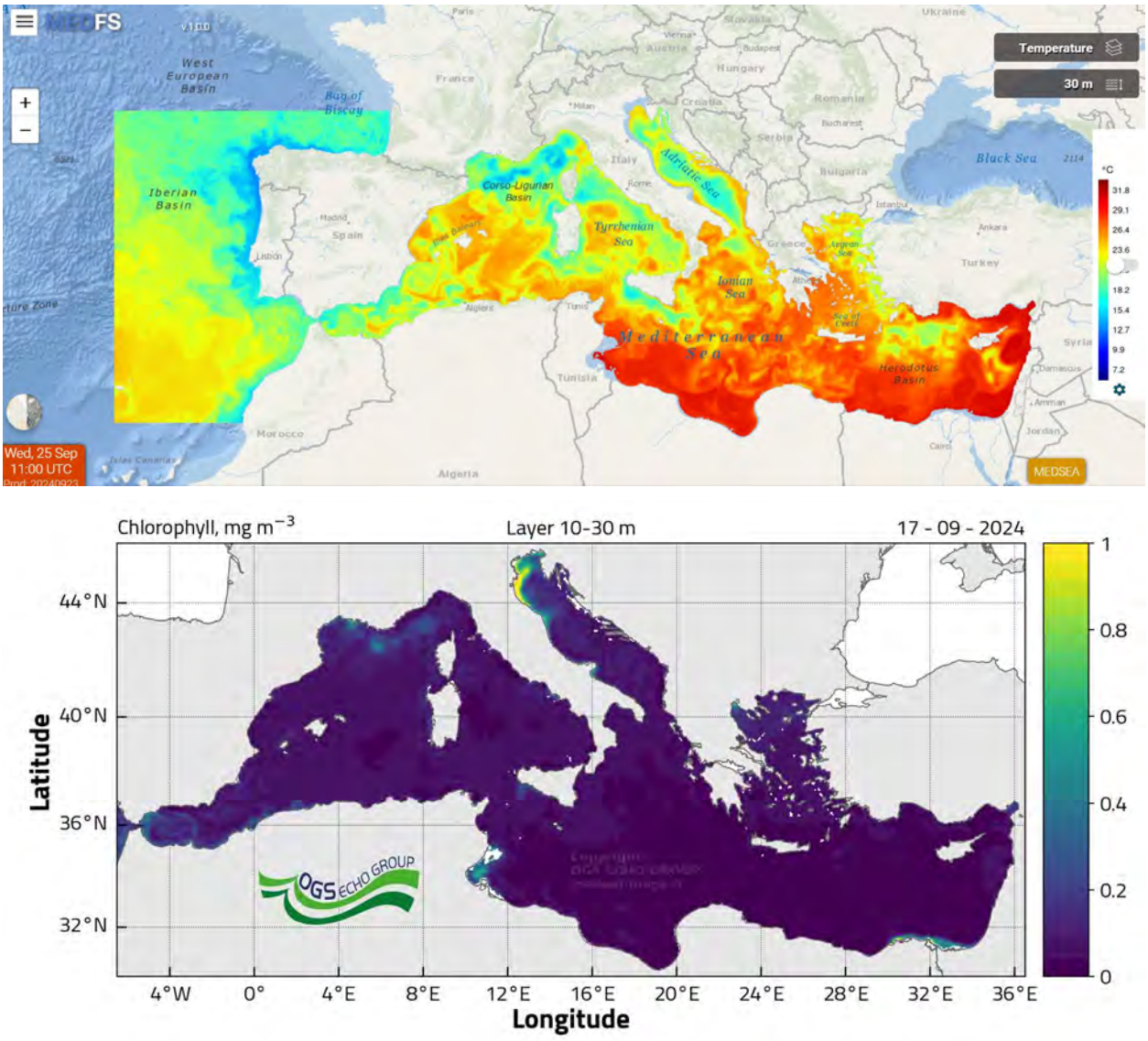


Figure 3. Forecasting models' products available on CMEMS and on the Italian operational centers. Physical (top panel https://medfs.cmcc.it/) and biogeochemical (bottom panel https://medeaf.ogs.it/forecast) products.

- *Publicly available software tools to access*

4. GDAC Functions

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

No GDAC function

5. Regional Centre Functions

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

✔ MedArgo is the Argo Regional Centre for the Mediterranean and the Black Sea. OGS, who coordinates the MedArgo activities, established several collaborations with European and non-European countries in order to set the planning and the deployment coordination of floats. Hence, a good coverage is maintained throughout the years. As part of these cooperations, the float data are transferred in near real time to MedArgo and 17 new floats have been deployed in the Mediterranean and Black Sea during 2024 (as of September), through a coordinated activity of deployment opportunities and thanks to scientific projects. Additional floats will be deployed before the end of 2024.

✔ More than 100,000 Argo profiles were acquired in the Mediterranean and in Black Seas between 2000 and August 2024. The temporal and spatial distribution of these profiles is depicted in figure 5 and 6 respectively, sorted by the different float types used (Core-Argo, Core-Argo with DO, Bio-Argo [carrying some of the BGC sensors], Deep-Argo and BGC-Argo [equipped with sensors to measure the 6 EOVs]); the monthly and yearly distribution is shown in Figure 7. About 80 floats per month have been operated simultaneously in the basins in 2024 and more than 5700 profiles have been acquired (up to August 2024) by different float models (figure 8).

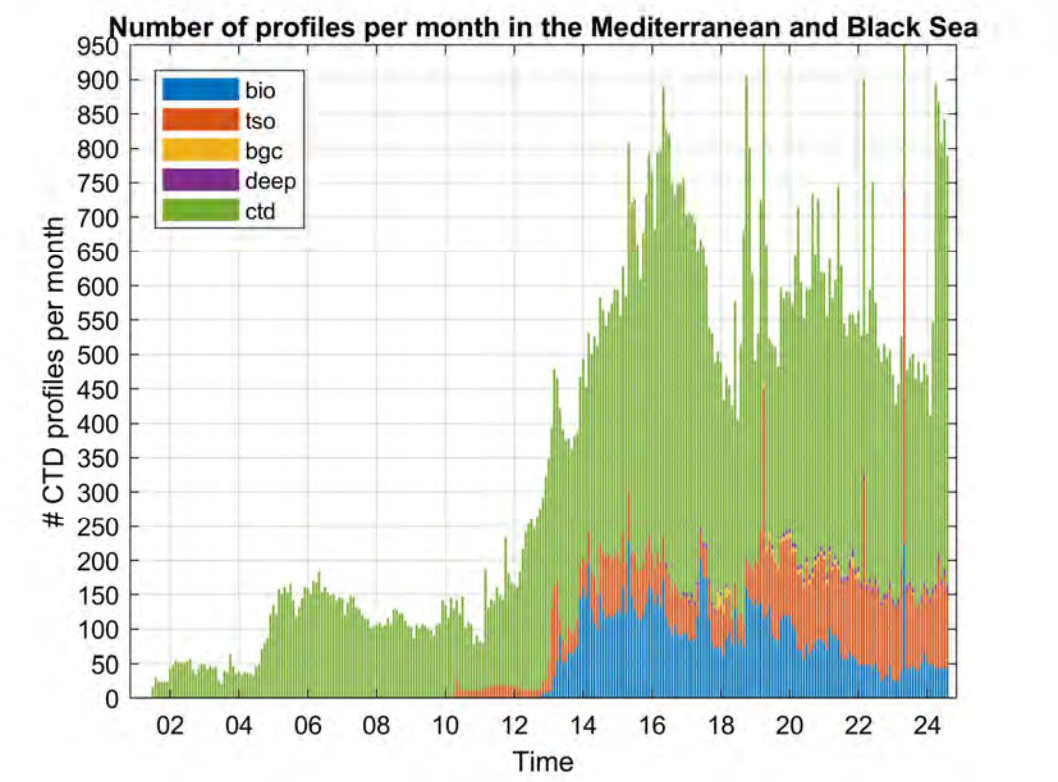


Figure 5. Temporal distribution of float profiles in the Mediterranean and Black Sea between 2000 and August 2024.

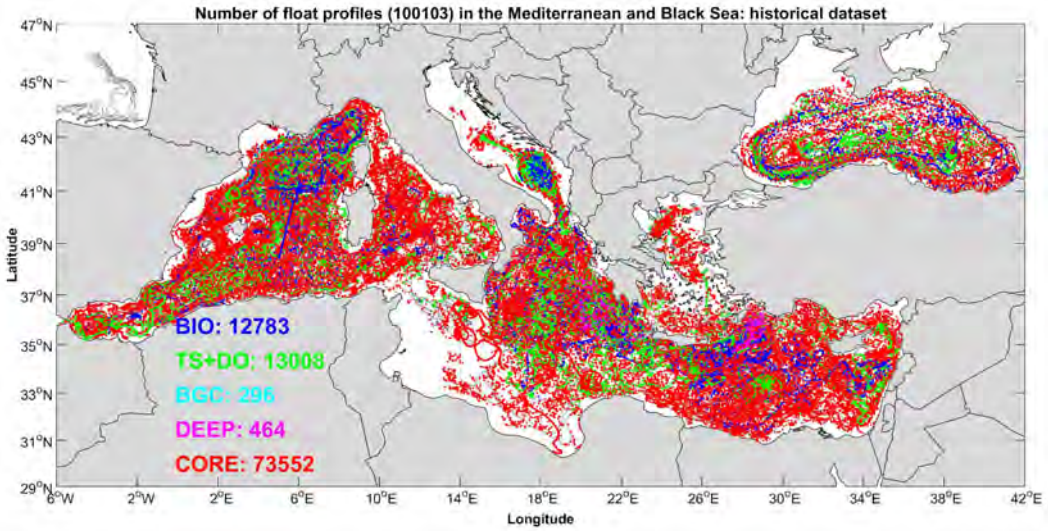


Figure 6. Spatial distribution of float profiles in the Mediterranean and Black Sea between 2000 and August 2024.

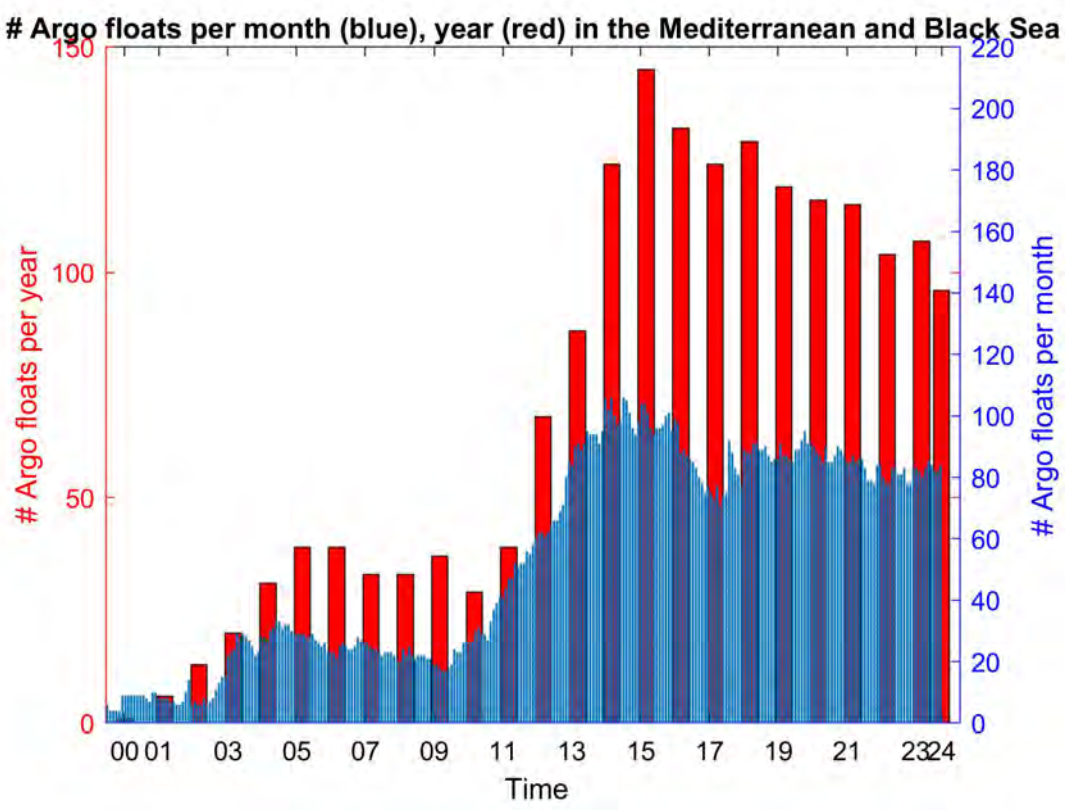


Figure 7. Monthly (blue bars) and yearly (red bars) distribution of Argo floats in the Mediterranean and Black Sea between 2000 and August 2024.

✔ The number of profiles acquired by Argo-extension floats in 2024 (January-August) is 1373 whilst the ones collected by the core-Argo floats are 4375 (figure 8). Italy, EU, Spain, Greece, France, Bulgaria (see their national reports at https://argo.ucsd.edu/organization/argo-meetings/argo-data-management-team-meetings/argo-data-management-team-meeting-25-admt25/admt-25-agenda-national-reports/) contributed to maintain the Argo population in 2024: a total of 17 new floats (as of September) have been deployed both in the Mediterranean and in the Black Seas; 8 out of 15 platforms are Core-Argo, 8 are Core-Argo with DO, 1 is Deep-Argo. The deployment strategy was chosen according to the project's targets and to replace dead floats or under-sampled areas.

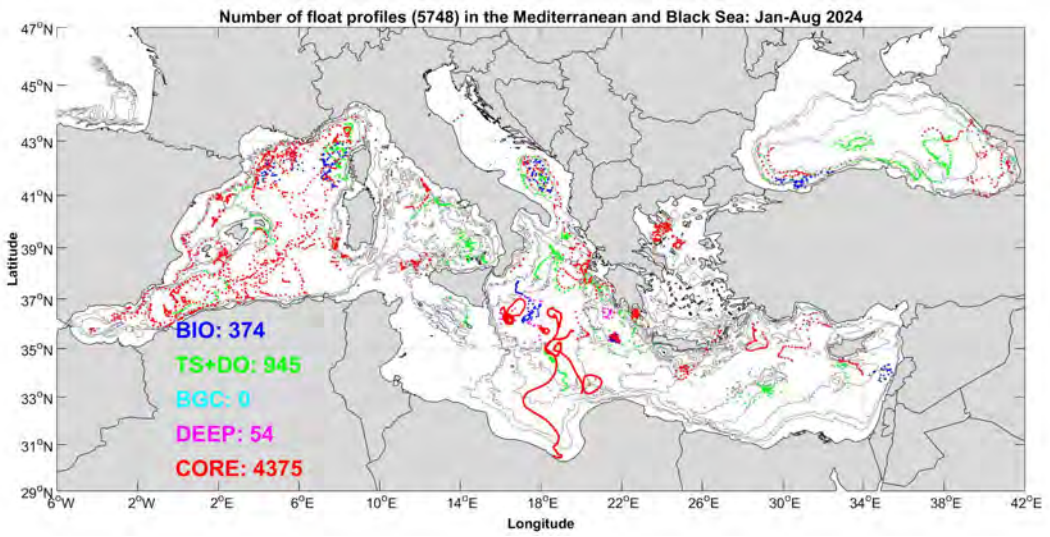


Figure 8. Spatial distribution of profiles collected by Argo floats in 2024 (January-August) in the Mediterranean and Black Sea: locations are color-coded per float type.

✔ Statistics have been computed to assess the fleet performance. The survival rate diagrams produced are separated by transmission mode (figure 9). The maximum operating life is about 600 cycles (900 when 1 out of 511 floats with an unusual high cycling time is considered), whilst the mean half-life is about 150 cycles (figure 9a). In this computation, active floats with life lower than the mean half-life and recovered floats were excluded (about 20). The vertical distance (upward profiles) traveled by floats is computed and used as an indicator of the profiler performance (figure 9b). The maximal distance observed is about 600 km, whilst the mean distance traveled is about 125 km. The balance of the population is in figure 10 and the annual death rate in figure 11.

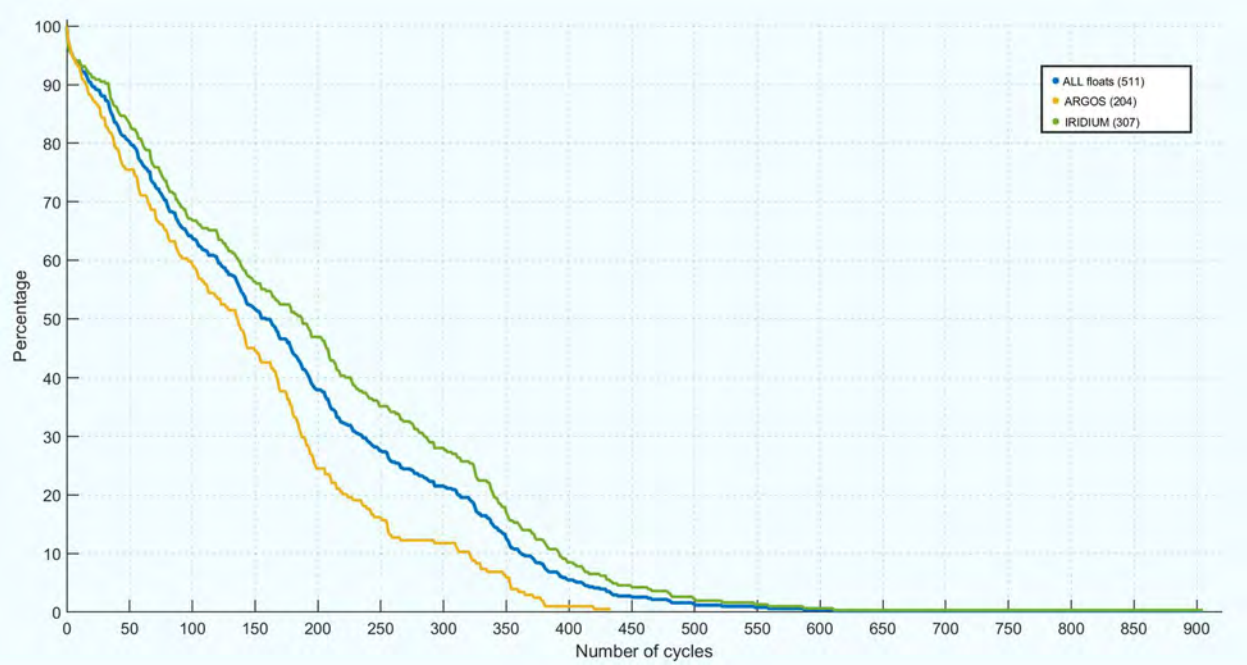


Figure 9a. Survival rate diagrams separated by telemetry system.

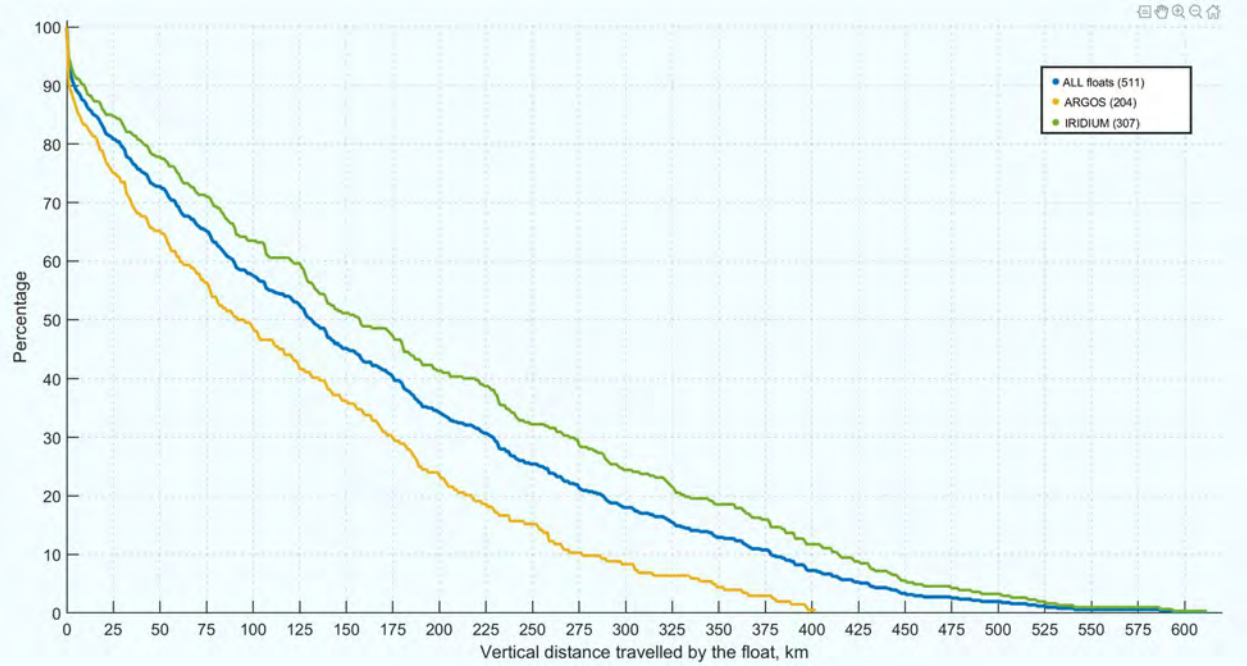


Figure 9b. Diagram of the vertical distance traveled floats, separated by telemetry system.

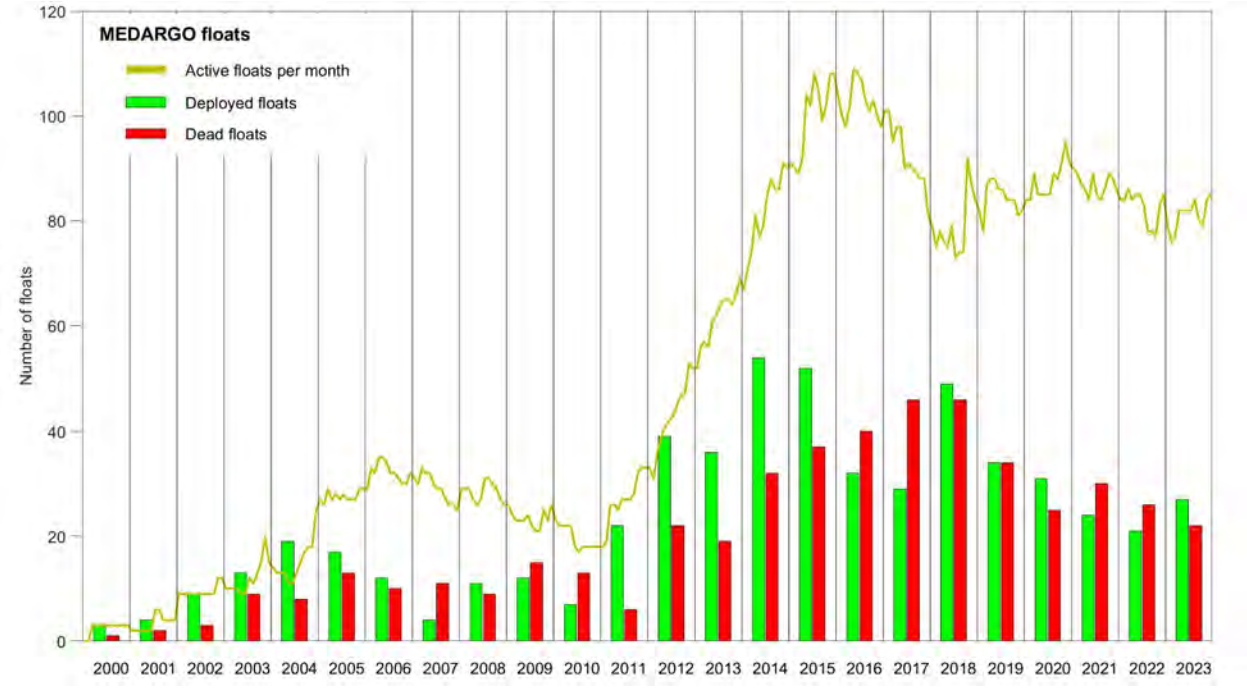


Figure 10. Balance of the population (rate of population change related to the number of yearly deployments and dead floats).

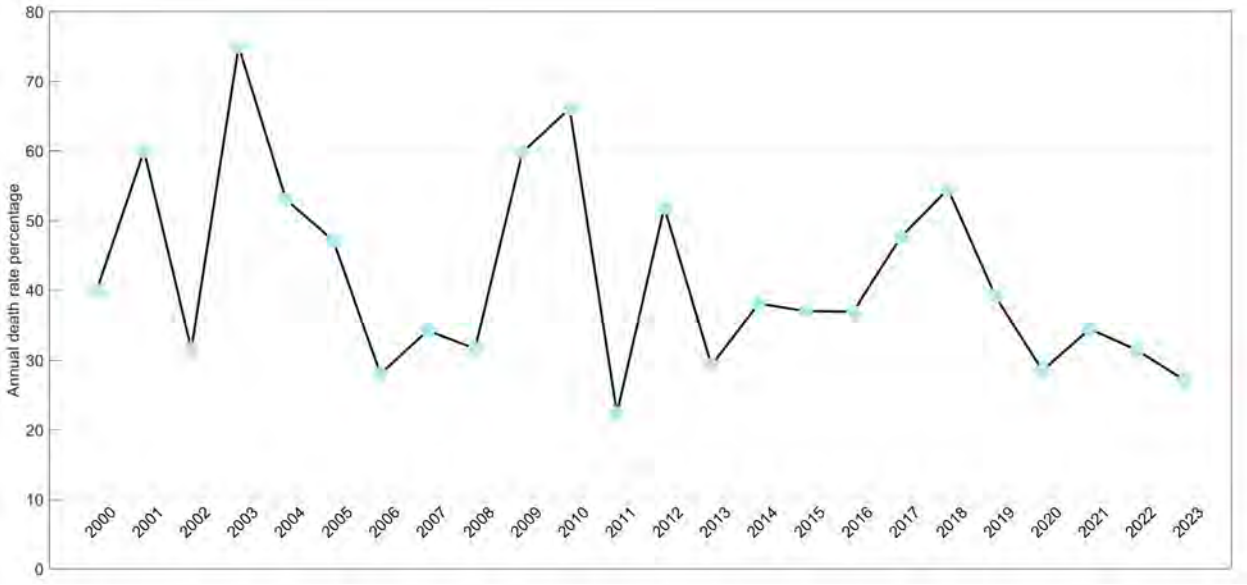


Figure 11. Annual death rate (ration between yearly failure and yearly average population).

✔ The high-quality ship-based CTD reference data from the near-surface to depths more than 2000 m, for QC purposes of Core and Deep-Argo float data in the Mediterranean and Black seas, was improved adding some new CTD data (figures 12 and 13). Data was collected from several research institutes at regional level and the main European Marine Services. Data was converted in mat format to be used in OWC procedure. A quality control was applied such as an additional visual check to avoid spike or duplication. Data was merged and divided in subsets of WMO boxes according to the climatological areas of the Mediterranean Sea. The updated reference dataset consists of about 55955 CTD profiles.

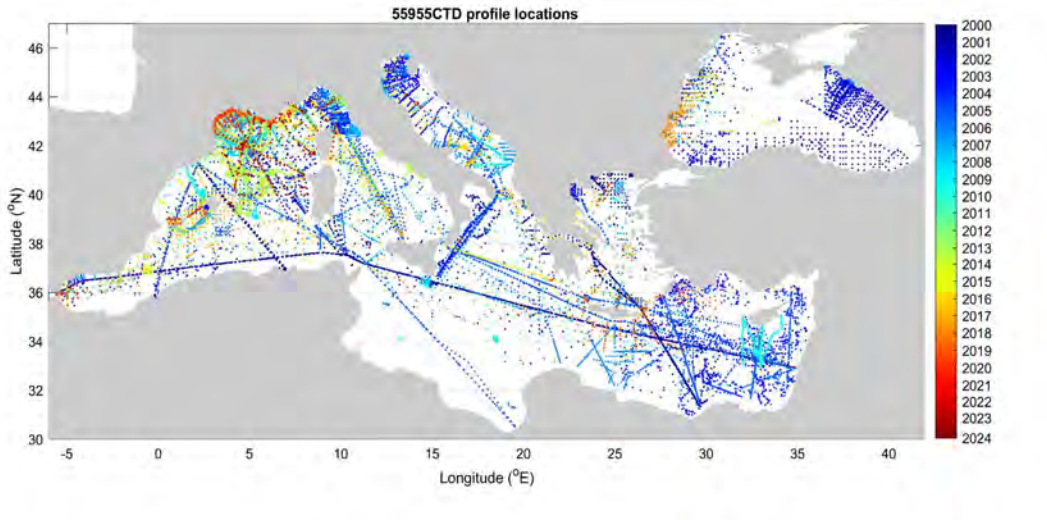


Figure 12. Spatial distribution, color-coded for time, of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas.

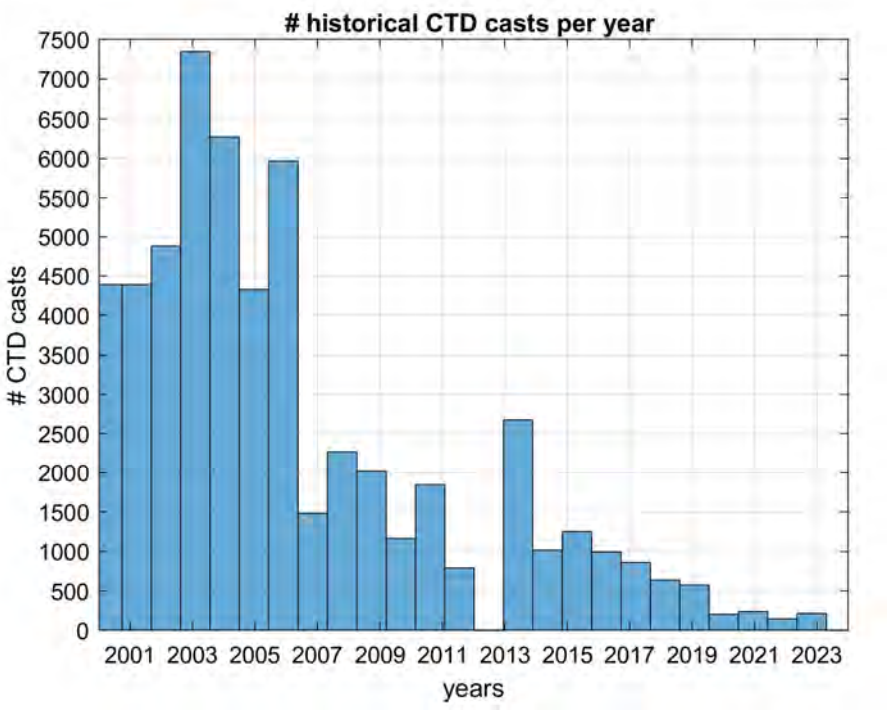


Figure 13. Temporal distribution of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas.

In addition, the method developed by BSH was applied to create a CTD reference sub dataset used only for OWC procedure. Only profiles deeper than 500 m was taken in account. This reference dataset consists of about 6294 CTD profiles. Although the image (figures 14 and 15) shows that the coverage is poor, this dataset is more consistent to be used for OWC and allows for more reliable results (more recent and deeper profiles). In the shallow basin, OWC is not applied.

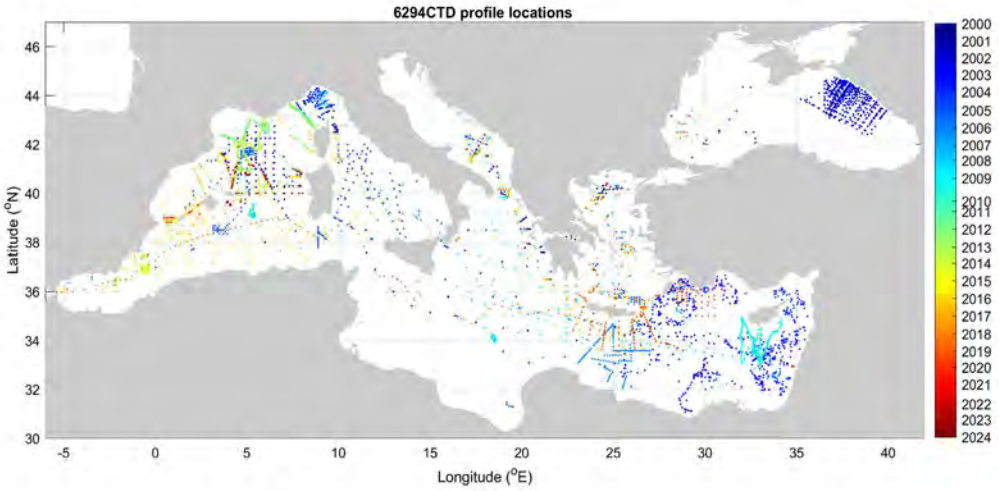


Figure 14. Spatial distribution, color-coded for time, of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas obtained with the BSH procedure.

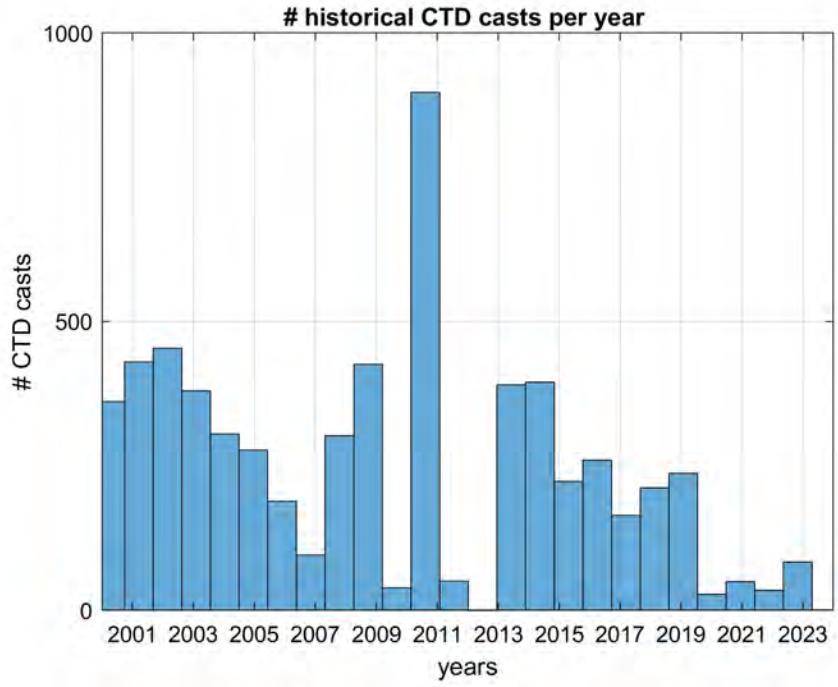


Figure 15. Temporal distribution of the CTD profiles in the final version of the CTD reference dataset of the Mediterranean and Black Seas obtained with the BSH procedure.

✔ Most of the eligible floats were quality controlled in delayed-mode for salinity, temperature and surface pressure and the respective D-files were gradually sent to GDAC. The DMQC method was applied to approximately 84% of eligible floats deployed

between 2003 and 2023 in the Mediterranean and Black Seas (figures 16 and 17). 4% out of this percentage were quality controlled but the D-files were not sent to GDAC yet. This percentage includes analysis that has to be repeated due to problems related to the reference dataset (scarcity or old data), shallow/coastal floats. The DMQC report/info of each float can be downloaded by the MedArgo web page (http://argo.ogs.it/medargo/table_out.php).

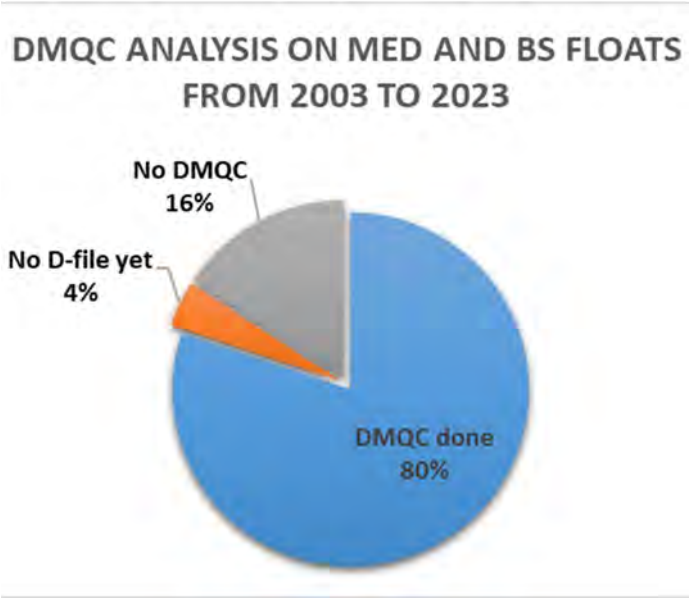


Figure 16. DMQC status.

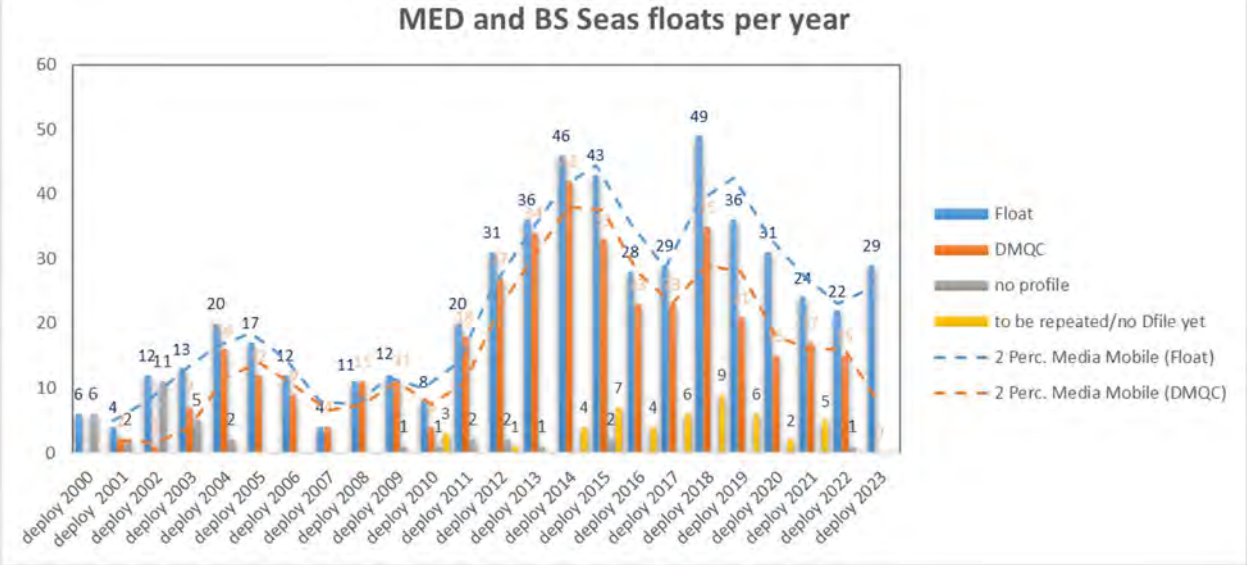


Figure 17. DMQC status per year.

Future plans:

- Maintain > 70 active floats in the Mediterranean Sea, with ~20-25% BGC-Argo)
- Maintain 2 deep floats in the deep Ionian & Rhodes Gyre area. This estimate might increase in the next years (PNRR Italian ITINERIS project https://itineris.cnr.it/ → 4-6 Deep-Argo deployment in the deepest area of the Mediterranean Sea)
- Maintain > 10 active floats in the Black Sea, with ~10-20% BGC-Argo

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.

Argo National Data Management Report for ADMT-25, JAPAN

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Float family	**Number of version (DAC_FORMAT_ID)**	**Number of floats*** (*approximate)
APEX	9	99
ARVOR	1	52
PROVOR	1	2
Navis	1	5
BGC Navis	1	2
Deep APEX	2	6
Deep NINJA	1	1

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Pressure	KISTELER, DRUCK, RBR_PRES, RBR_PRES_A
Temperature/Salinity	SBE41CP_V7.2.5, SBE41N_V5.3.5, SBE61, RBR, RBR_ARGO3
Oxygen	AROD_FT, SBE63_OPTODE
NO3	SUNA_V2
Chla	MCOMS_FLBBCD
bbp	MCOMS_FLBBCD
CDOM	MCOMS_FLBBCD

We processed following BGC sensors, but those floats have already been inactive.

Parameters	**Type(s) of sensor for that parameter**
Oxygen	ARO-FT, AANDERAA_OPTODE_3830, AANDERAA_OPTODE_4330, AANDERAA_OPTODE_4831, SBE43F_IDO, SBE43I
pH	SEAFET
Chla	ECO_FLBB_AP2, ECO_FLBBCD_AP2
bbp	ECO_FLBB_AP2, ECO_FLBBCD_AP2
CDOM	ECO_FLBBCD_AP2

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
OCR504	The floats have not yet been delivered and cannot be checked.

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**
oxygen	Current	Current	
NO3	Current	Current	
pH	N/A	N/A	
Chla	Current	N/I	By ADMT-26
bbp	Current	Version 0.9	By ADMT-26
CDOM	Current	N/A	
irradiance	N/A	N/A	

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = ‘1’ in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)

RBRargo3 2K model	**Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?**	**Notes or additional information**
pre-April 2021	Yes	JAMSTEC implement rea-time salinity adjustment based on QC Manual ver 3.8 every cycle and provide them JMA in real time.
post-April 2021	Yes	

- Are you regularly applying real time adjustments for the following items:
    - Salinity adjustments
    - Cpcor for deep floats
    - BGC parameters (if so, which ones)

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	Yes	No	
Cpcor adjustment for Deep floats	Yes	No	
oxygen	Yes	No	
NO3	Yes	No	
pH	No	No	
Chla	No	No	
bbp	No	No	
irradiance	N/A	N/A	

- What data are you sending onto the GTS?
  Pressure, Temperature, and Salinity.

- What data is going to the aux directory? UVP, FL2BB, etc
  UVP.

- Are you automatically greylisting questionable floats detected by min/max test?
  No, we are processing manually.

- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files?
  Not implemented. We have not made any v3.1 Btraj files.

- Do you have any code to share with other DACs? If so, where is that available?
  No.

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?

  JAMSTEC have not created any dmode trajectory files. Before making dmode trajectory files, it is necessary to correct the float internal clock, the position information and the parameter values (P, T, and S, etc.) measured during the float parking phase at the parking depth and at the sea surface. We are now preparing a tool to correct the time of the float clock. Using our database that stores all data and corrected parameter values of Japanese floats, we can extract the information to dmode trajectory files. As soon as it is completed, we will start to make dmode trajctory files of the Iridium telecommunication floats which are not necessary to correct their position.

- How are you implementing BGC dmode - by parameter or one expert does all parameters?

  JAMSTEC are implementing BGC DMQC of DOXY, Nitrate, pH, Chla, BBP700 and CDOM measured by the Japanese BGC floats. Of these six parameters, one person is responsible for the correction of DOXY, Nitrate and pH, and the other person is working for that of Chla. The person in charge of DMQC of BBP700 and CDOM will be assigned when the dmqc and correction methods of BBP700 and CDOM are finalized.

- What challenges have you encountered and how have you dealt with them?

  The problem on synthetic profiles of the Japanese floats

  The Ifremer GDAC pointed out that there are many profiles of the Japanese floats which PRES of Core file does not match one of B files, therefore, GDAC can not create Synthetic files using them. We found the reason why GDAC pointed out, the problem occurred in two cases: one is that PRES of Core-R file did not match one of BD file, the other that PRES of Core-D file did not match one of BR file. That is, this problem occurred when the data mode was different for Core and BGC.

In Japan, JMA is the Japanese DAC and decodes the data of Japanese floats to create Core-R and BR files of Japanese floats. JAMSTEC is in charge of DMQC of Core and BGC parameters for Japanese floats. JAMSTEC decodes data of all Japanese BGC floats and corrects them using the data decoded by JAMSTEC. Sometimes, the float data files are not received in time for real-time processing or the float data are updated later due to the problems such as poor telecommunication. In that case, JAMSTEC decodes the updated data files so that BR-files produced by JMA do not match the results JAMSTEC decoding. In addition to this, because JMA was not aware of the apf11 firmware error which writes data files overlapping observation layers, another reason why the results of decoding data by JMA and JAMSTEC were different. To avoid occurring the problem, JMA and JAMSTEC decide to submit Core-D and BD files simultaneously after both DMQC for Core and DMQC for one of BGC parameters are completed. Following the decision, JAMSTEC just started submitting BD files of Japanese floats with the corrected values for DOXY, Nitrate and pH to the GDAC.

Fixing the SAGE tool

We correct Nitrate and pH using SAGE, which are released by MBARI. We found that garbled characters appeared in SAGE installed on a Windows PC purchased in Japan when reading ODV files, which contain only alphanumeric characters, and neither ODV files could be read nor results output. We debugged the problem ourselves and solved it. Similar problems may occur in other languages.

Evaluating again the temporal drift of ARO-FTs

We evaluated again the temporal drift of ARO-FTs with ten APEX floats after the float deployment, which were deployed in 2021 and 2022. The ARO-FT is the optical dissolved oxygen sensor developed by JFE Advantech Co., Ltd., in collaboration with JAMSTEC. They have higher accuracy and resolution and faster response time than Optode4330. The temporal drift of ARO-FTs after the float deployment were estimated using oxygen measured in air approximately 20 times each time the floats reachs the sea surface each cycle. The oxygen partial pressure measured by ARO-FT in air often showed the unusual values, such as those close to 0 or above 1,000 mbar, when the float reaches the sea surface in the local daytime. The temporal drift of the float deployment estimated without these unusual values of the oxygen partial pressure is estimated to be $-0.31 \pm 0.17\%$ year^{-1} by applying Bittig et al. (2018). This is slightly larger than that of Optode4330 mounted on the Argo floats. However, we successed that the temporal drift of dissolved oxygen

measured by ARO-FT after the float deployment could be corrected well. We confirmed the seasonal change of ocean saturation concentration calculated using the corrected dissolved oxygen of ARO-FT at 5 dbar and its amplitude was consistent with those shown in the monthly climatology of WOA2023 . We also checked that the corrected dissolved oxygen profile of ARO-FT observed at 210 days after the float deployment was within the initial accuracy of the specification using the dissolved oxygen data of the ship-based bottle sampling data which were sampled with in 5km of the float position on the same day.

- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?

  No.

- Do you have any concerns you'd like to bring to the ADMT?

  No.

3. Value Added items

- List of current national Argo web pages, especially data specific ones

Japan Argo

https://www.jamstec.go.jp/J-ARGO/?lang=en

This site is the portal of Japan Argo program. The outline of Japanese approach on the Argo program, the list of the publication, and the link to the database site and PIs, etc. are being offered.

Real-time Database (JMA)

https://www.data.jma.go.jp/argo/data/index.html

This site shows global float coverage, global profiles based on GTS BUFR messages, and status of the Japanese floats.

- Known National Argo data usage
    - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Japan Meteorological Agency	argoadmin@climar.kishou.go.jp	Core profile data

- Products generated from Argo data that can be shared

Products of JMA

The following parameter outputs of MOVE/MRI.COM-JPN was released in December 2021 and can be found on https://www.data.jma.go.jp/goos/data/database.html.

- Daily, 10day-mean and Monthly mean subsurface temperatures at the depths of 50m, 100m, 200m and 400m analyzed for approximately 0.1 x 0.1 degree grid points.
- Daily and 10day-mean Surface Currents for approximately 0.1 x 0.1 degree grid points.

MOAA GPV (Grid Point Value of the Monthly Objective Analysis using the Argo data)

MOAA GPV is the global GPV data set which is made by monthly OI objective analysis using Argo and TRITON mooring data. The dataset consists of two products using different float data modes, Near Real Time (NRT) mode and Delayed Mode (DM). The former mainly use real time QC Argo profile. The latter uses delayed mode QC Argo profile. The dataset of DM is updated once a year for last 10 years, using all Argo profile data in GDAC at that time.
These data set are released on the following website:
https://www.jamstec.go.jp/argo_research/dataset/moaagpv/moaa_en.html

MOAA GPV version 2 will be released in November 2024. The updates since version 1 are 3-dimetional (horizontal and temporal) OI objective analysis and the increase layers from 25 to 66 layers. The data set has monthly and every 10 days.

G-YoMaHa (Objectively mapped velocity data at 1000 dbar derived from trajectories of Argo floats)

JAMSTEC maps the drift data from Argo floats, YoMaHa'07, at the depth of 1000 dbar on a 1 degree grid, using optimal interpolation analysis. The mapped velocity field satisfies the geostrophic balance and the horizontal boundary condition of no flow through the boundary. The dataset is released on the following website:
https://www.jamstec.go.jp/argo_research/dataset/gyomaha/gyomaha_en.html

MILA GPV (Mixed Layer data set of Argo, Grid Point Value)

JAMSTEC provides a data set of gridded mixed layer depth with its related parameters, named MILA GPV. This consists of 10-day and monthly average data and monthly climatology data in the global ocean using Argo temperature and salinity profiles. According to abrupt salty drift of CTD sensors on Argo floats that occur more frequently than usual because of a manufacturing problem, JAMSTEC had recalculated using the Argo profile data on the latest quality control status at September 17th 2021. Furthermore, JAMSTEC has released the new dataset mainly delayed mode Argo profile data (hereinafter referred to as Delayed Mode (DM)), in addition to the MILA GPV mainly using real time QC Argo profile (this version is hereinafter referred to as Near Real Time (NRT)). DM is updated once a year and JAMSTEC will recalculate the dataset for the entire period, using all Argo profile data in GDAC. Therefore, DM uses more delayed mode Argo profile data than NRT.
These data set are released on the following website:
https://www.jamstec.go.jp/argo_research/dataset/milagpv/mila_en.html

AQC Argo Data version 1.2

JAMSTEC provides the Argo temperature and salinity profiles as an extra corrected dataset, conducting more advanced automatic checks than real-time quality controls every month. This data set delivers in the ascii formation as well as the netcdf format, because it is useful for analyses using various software. This dataset are released on the following website:
https://www.jamstec.go.jp/argo_research/dataset/aqc/aqc_en.html

ESTOC

This product is an integrated dataset of ocean observations including Argo data by using a four dimensional variational (4D-VAR) data assimilation approach. ESTOC is the open data that consists of not only physical but also biogeochemical parameters for 60 years during 1957-2016 (See the website

in JAMSTEC, https://www.godac.jamstec.go.jp/estoc/e/). The dataset will be updated for physical
parameters for 65 yeas during 1957-2022.

JCOPE (Japan Coastal Ocean Predictability Experiment)

JCOPE is a research project for prediction of the oceanic variation using ocean models with assimilation of remote-sensing and in-situ data, which is managed by JAMSTEC. In 2019, JCOPE2M, which is updated version of JCOPE2/FRA-JCOPE2 reanalysis covering the Northwestern Pacific, was released. The Argo data are used by way of GTSPP. The hindcast data 6 months back and the forecast data 2 months ahead are disclosed on the following website: https://www.jamstec.go.jp/jcope/htdocs/e/home.html. More information is shown in https://www.jamstec.go.jp/jcope/htdocs/e/distribution/index.html.
In 2022, JCOPE-FGO, a reanalysis product covering a quasi-global ocean, was released:
https://www.jamstec.go.jp/jcope/htdocs/e/distribution/fgo.html.

- Publicly available software tools to access
  None.

5. Regional Centre Functions

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

Pacific Argo Regional Center (hereafter, PARC) is operated by JAMSTEC since 2019 when IPRC terminated to co-operate due to their funding and human resource issue. However, IPRC (APDRC) actively provides various products. Users can easily and freely download products from http://apdrc.soest.hawaii.edu/.

JAMSTEC has renewed PARC website in October 2024 (https://www.jamstec.go.jp/PARC/). In the PARC web site, the statistics, time series of number of Core and BGC profiles in the Pacific etc., are shown. The web site provides the meta-information, time section figures, and time series of error magnitude on floats with data which deviate significantly from the MOAA GPV.

JAMSTEC has also released the information of Pacific Deployment Coordination Group and its activities on the PARC website:
https://www.jamstec.go.jp/PARC/float_deployment.

This page provides for Pis and users related to the Pacific region to communicate with each other. You can see lots of information, including reports of the group meetings and members.

We also plan to develop a few new functions; to share information of technical problems and quality control of data including Core, BGC, and Deep Argo floats among PIs, and DMQC operators and users in the next year.

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.

JMA and JAMSTEC provide Argo-related figures on each web site using data in the OceanOPS server, e.g., “argo_operational.csv”. The programs create the figures on their servers routinely.

The OceanOPS frequently changes data format and directory structure, like delimiters of their files and csv files. The changes in OceanOPS make us frustrated, because we need to modify their programs and contents, while sometimes it is difficult for us to modify promptly due to busy schedules for other businesses.

We would like to ask the OceanOPS to announce for DACs, PIs , or users in advance when they plan to change the format, contents and directory structure, at least within one month.

Argo National Data Management Report for ADMT-25(KMA/NIMS)

1. Real Time Status

NIMS/KMA is acquires Argos and Iridium messages in real-time via a web service from CLS. All profile data obtained undergo a real-time quality control process within the operational system before being transmitted to GDAC in NetCDF format using BUFR data.

In December 2024, a total of two Argo floats will be deployed in the Northwestern Pacific.

- How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX	-	-
ARVOR	2(ARVOR-L, ARVOR_I)	5
PROVOR	-	-
Navis	-	-
BGC Navis	-	-
SOLO/S2A	-	-
Deep SOLO	-	-
Deep Arvor	-	-
Other (customize additional rows as needed)	-	-

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	SBE41CP
oxygen	-
NO3	-
pH	-
Chla	-
bbp	-
irradiance	-

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

  : No BGC Argo

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)

  : No RBR sensor

- Are you regularly applying real time adjustments for the following items:
    - Salinity adjustments
    - Cpcor for deep floats
    - BGC parameters (if so, which ones)

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	Yes	If possible	
BGC parameter	No BGC Argo		

- What data are you sending onto the GTS? Core Argo data
- What data is going to the aux directory? None
- Are you automatically greylisting questionable floats detected by min/max test?
  : Not yet. The delayed mode operator is working to check for questionable floats not only by the min/max test but also by examining the vertical structure and T-S structure
- What is the status of the transition to v3.2 trajectory files?
  We are still using v3.1 trajectory files and do not have any plan to change that at any time soon. Such a transition needs some extra funding under our Argo data management system. So, it would take at least a couple of years.
- When do you think you will be ready to stop acceptance of v3.1 Btraj files? No BGC Argo
- Do you have any code to share with other DACs? If so, where is that available? No

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?

  We haven't created any dmode trajectory files yet, as we are awaiting a formal QC procedure and/or a kind of software to help it.

- How are you implementing BGC dmode - by parameter or one expert does all parameters?
  There is currently no active BGC float.

- What challenges have you encountered and how have you dealt with them?
  We are actively deploying Argo floats in the continental shelf areas, such as the Yellow Sea and the East China Sea. Some of these floats have exhibited salinity offsets from the moment of deployment, a problem also reported by JAMSTEC. So, we assess the offsets using shipboard CTD data taken right before or after the float deployment. We believe these initial salinity offsets in some of the shallow Argo floats might result from the conditions during shipment or storage. These floats operate at shallow parking depths of less than 100m with short cycle times (approximately 1~2 days) and last only several months due to the shorter cycle times than that of the open ocean floats. Because of their shorter lifespan, most of them keep the initial salinity offsets rather than a gradual drift. In fact, it is hard to identify such a small gradual drift in the context of dramatic salinity variation in the shallow water area.
  Furthermore, the Yellow Sea and East China Sea, with wide continental shelves, have smaller temporal and spatial scales of salinity variability compared to the open ocean. Therefore, it is important to conduct shipboard CTD measurements for identifying the initial offsets when a float is deployed unless a laboratory facility to evaluate the salinity offset is available.
  Although Argo floats are supposed to be used in the open ocean, they are extremely useful in the coastal areas, especially where multiple countries share with. Since actively steered platforms like OceanGliders, cannot trespass to other countries' borders line, their observations cannot be limited to the the EEZ area. Thus, because coastal Argo floats are still valuable for our country, we plan to develop cost-effective coastal Argo floats - expected to be 70% cheaper than the core Argo floats- within a couple of years.

- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available? No
- Do you have any concerns you'd like to bring to the ADMT?

  Yes, one concern is the lack of standardized software across different platforms and operators. Aside from the OW software, there are a couple of software (as far as I know) to help the DM operators generate or update D-files. They seem neither standardized nor frequently updated. While they have been helpful in understanding how to update D-files, such as writing NC files with Matlab or updating QC flags, etc., there are several unclear steps, such as filling up all variables related with 'HISTORY' and 'CALIBRATION' info. It would be very helpful if there is an Excel format to fill up all other information for D-files and software to read the Excel files and to update them in D-files.
  The variability in software tools used for quality control and data processing can lead to

inconsistencies in results. This makes it challenging to ensure uniformity and comparability across datasets. A more unified approach, or at least clearer guidelines, would be beneficial to minimize discrepancies and improve overall data integrity. The most effective solution would be to develop a single software platform in a cloud-based system to assist DM operators. This would eliminate the need to download new data over several days, allowing for more efficient and timely updates.

3. Value Added items

- List of current national Argo web pages, especially data specific ones
- Known National Argo data usage
    - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
KMA/NIMS (http://argo.nims.go.kr)	Baek-Jo Kim(swanykim@korea.kr) Hyerong-Jun Jo(hjjo543@korea.kr)	Core, all profile data(NetCDF, txt)

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

4. GDAC Functions

: N/A

5. Regional Centre Functions

: N/A

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.

We deployed ARVOR_I(iridium Argo) for the first time this year, So the data processing was delayed. It is almost complete for now, so we'll process it in real-time from next month.

Three floats were deployed in the YS and ECS from June to July, 2024, with a parking depth of 60m and two-day profiling scheme for shallow sea observation(Figure 1). All floats deployed using the GISANG 1, the KMA's research vessel, could obtain the profile from the starting day.

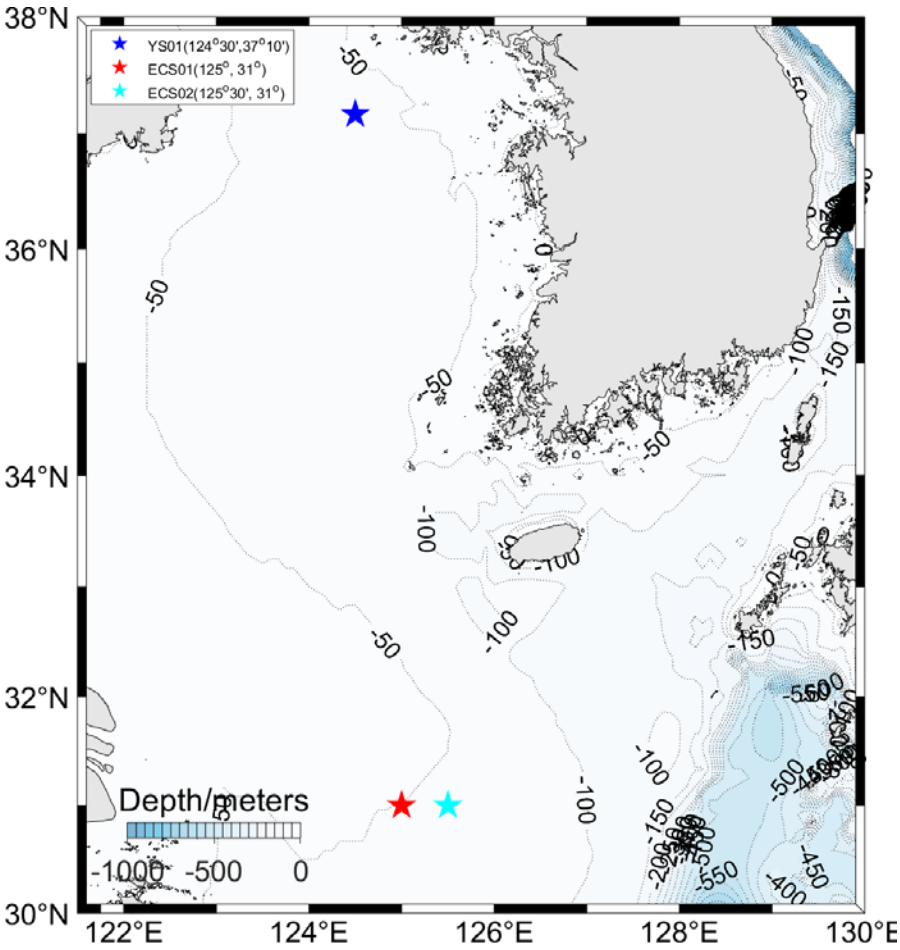


Figure 1. Deployment points of Argo floats in the Yellow Sea and East China Sea in 2024.

Argo National Data Management Report for ADMT-25

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other section prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX		
ARVOR	1	15
PROVOR		
Navis		
BGC Navis		
SOLO/S2A		
Deep SOLO		
Deep Arvor		
Other (customize additional rows as needed)		

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	SBE41cp
Oxygen	
NO3	
pH	
Chla	
bbp	
irradiance	

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

  : No information

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**
oxygen			
NO3			

pH			
Chla			
bbp			
irradiance			

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See [DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = ‘1’ in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)]

  : No information

RBRargo3 2K model	**Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?**	**Notes or additional information**
pre-April 2021		
post-April 2021		

- Are you regularly applying real time adjustments for the following items:
  - Salinity adjustments
  - Cpcor for deep floats
  - BGC parameters (if so, which ones)

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**

Salinity adjustment	Yes	If possible	
Cpcor adjustment for Deep floats			
oxygen			
NO3			
pH			
Chla			
bbp			
irradiance			

- What data are you sending onto the GTS?
- What data is going to the aux directory? UVP, FL2BB, etc
- Are you automatically greylisting questionable floats detected by min/max test?
- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files?
- Do you have any code to share with other DACs? If so, where is that available?

  : No information

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?

  : We are not able to create dmode trajectory file. I heard that technically we are having difficulty creating dmode trajectory file. This is one of the issues that needs to be addressed in the future.

- How are you implementing BGC dmode - by parameter or one expert does all parameters?

- What challenges have you encountered and how have you dealt with them?

- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?
- Do you have any concerns you'd like to bring to the ADMT?

3. Value Added items

- List of current national Argo web pages, especially data specific ones
- Known National Argo data usage
    - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
KIOST	https://oceanclimate.kr/kiost_argo/	we made a website to introduce KIOST Argo DAC. However, we are not yet able to provide Argo data through the website.

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

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 https server
- Operations of a user friendly interface to access data
- Data synchronization

- Statistics of Argo data usage : Ftp and https access, characterization of users (countries, field of interest : operational models, scientific applications) …

: no information

5. Regional Centre Functions

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

: no information

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.

: We are considering changing the name of KORDI DAC to KIOST DAC.

Argo National Data Management Report for ADMT-25 – NORWAY

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX		
ARVOR	1	25
PROVOR	2	12
Navis		
BGC Navis		
SOLO/S2A		
Deep SOLO		
Deep Arvor	1	3
Other (customize additional rows as needed)		

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	SBE41
oxygen	Aanderaa 4330
NO3	SUNA

pH	SBE-SEAFET
Chla	SBE-FLBBCD
bbp	SBE-FLBBCD
irradiance	SBE-OCR504

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
CROVER	Yes?
UVP6	Yes?

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**
oxygen	current	current	
NO3	current	current	
pH	current	current	
Chla	current	current	
bbp	N/I		
irradiance	N/I		

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)

RBRargo3 2K model	Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?	Notes or additional information
pre-April 2021		
post-April 2021		

- Are you regularly applying real time adjustments for the following items:
  - Salinity adjustments
  - Cpcor for deep floats
  - BGC parameters (if so, which ones)

	Yes/No for current R files	Are you going back to make adjustments on all available R files when new adjustment comes in?	Notes or additional information
Salinity adjustment	No	No	
Cpcor adjustment for Deep floats	No	No	
oxygen	No	No	
NO3	No	No	

pH	No	No	
Chla	No	No	
bbp	No	No	
irradiance	No	No	

- What data are you sending onto the GTS?
- What data is going to the aux directory? UVP
- Are you automatically greylisting questionable floats detected by min/max test?
- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files?
- Do you have any code to share with other DACs? If so, where is that available?

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?

  No trajectory files in dmode are created because lack of personnel/time.

- How are you implementing BGC dmode - by parameter or one expert does all parameters?
  Two persons by parameter: one person does oxygen and pH and another person does NO3, CHLA.

- What challenges have you encountered and how have you dealt with them?
  We lack personnel with competence and funding to do BGC DMQC of all parameters. We have submitted a proposal to the Research Council and if it is successful we will hire a new person to do DMQC.

- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?

A MATLAB toolbox (DMQC-fun) is made for DMQC of core floats. DMQC-fun is a comprehensive toolbox for performing DMQC on and salinity calibration of core data from Argo floats. Link: https://github.com/euroargodev/DMQC-fun

- Do you have any concerns you'd like to bring to the ADMT?

  I think that several of the DMQC user manuals are difficult to read/understand for a person that wish to start DMQC.

3. Value Added items

- List of current national Argo web pages, especially data specific ones

  https://norargo.no/ (Argo Norway web page)

  https://norargo-map.hi.no/ (Location of Argo floats in the Nordic Seas, with options to plot and download data)

- Known National Argo data usage
  - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Met.no	Ann Kristin Sperrevik (annks@met.no)	All T/S-profiles
NERSC	Johnny A. Johannessen (jaj@nersc.no)	All T/S-profiles

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

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

5. Regional Centre Functions

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

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.

UK Argo National Data Management Report for ADMT-25

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other sections prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX		53 Argos, 98 Iridium
ARVOR		56
PROVOR		27
Navis		1
BGC Navis		2
SOLO/S2A		0
Deep SOLO		1
Deep Arvor		0
Other (customize additional rows as needed)		

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	SBE41, SBE61, RBR
oxygen	AANDERAA_OPTODE_4330
NO3	SATLANTIC SUNA_V2
pH	SBE SEAFET - – processing for NKE floats need development for Navis floats
Chla	Wetlabs ECO FLBBCD – processing for NKE floats need development for Navis floats
bbp	WETLABS ECO_FLBBCD
irradiance	SATLANTIC_OCR504_ICSW

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
Floatrider Turbulence sensor which will be processed through the Coriolis processing chain	Yes – new parameters will need to be requested

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**

oxygen	Current	Current	For NKE floats only via Coriolis processing chain. Not implemented at BODC processing chain (Apex, NAVIS)
NO3	Current	Current	For NKE floats only via Coriolis processing chain. Not implemented at BODC processing chain (Apex, NAVIS)
pH	Current	Current	For NKE floats only via Coriolis processing chain. Not implemented at BODC processing chain (Apex, NAVIS)
Chla	Current	Current	For NKE floats only via Coriolis processing chain. Not implemented at BODC processing chain (Apex, NAVIS)
bbp	Current	Current	For NKE floats only via Coriolis processing chain. Not implemented at BODC processing chain (Apex, NAVIS)
irradiance	Current	Current	For NKE floats only via Coriolis processing chain. Not implemented at BODC processing chain (Apex, NAVIS)

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See [DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)]

RBRargo3 2K model	**Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?**	**Notes or additional information**
pre-April 2021	no	Lack of funding for software update
post-April 2021	no	Lack of funding for software update

- Are you regularly applying real time adjustments for the following items:
  - Salinity adjustments
  - Cpcor for deep floats
  - BGC parameters (if so, which ones)

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	No	No	Lack of funding for software update
Cpcor adjustment for Deep floats	No	No	Lack of funding for software update

oxygen	Yes	No	via Coriolis processing chain for NKE floats only Lack of funding for software update to non NKE floats
NO3	Yes	No	via Coriolis processing chain for NKE floats only
pH	No	No	
Chla	Yes	No	via Coriolis processing chain for NKE floats only
bbp	Yes	No	via Coriolis processing chain for NKE floats only
irradiance	No	No	

- What data are you sending onto the GTS?
- What data is going to the aux directory? UVP, FL2BB, etc
- Are you automatically greylisting questionable floats detected by min/max test?
- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files?
- Do you have any code to share with other DACs? If so, where is that available?

Data which are sent to GTS are:

Temperature and salinity profiles and their RT QC flags, from all UK Argo floats (including BGC and Deep). These are sent by the Met Office in BUFR format, template 3-15-003. The Met Office are in the process of re-writing the netCDF-to-BUFR code to include the BGC PARAM_ADJUSTED sequences and their QC flags. We expect to complete this work later in 2024.

BODC is manually updating the greylist of questionable floats as soon as they arrive via email. After this, the next incoming profiles are automatically updated at GDAC.

BODC stopped sending v3.1 from early January 2024 although some old versions remain on the GDAC – these should probably be removed. All currently produced trajectory files in BODC are in v3.2.

BODC does not have any additional software to share with other DACs.

DAC Argo Challanges

The key limitation is insufficient funding and people allocation to cover the basic Argo activities. Currently, the BODC Argo data management group has only 1.5 FTE separated into 4 people, where there is a need for a minimum of 3.5 FTE.

To try to improve our poor funding situation BODC has re-evaluated the outdated and underestimated cost of Argo activities which is used for budgeting of UK Argo projects. Additionally, after improving the visibility of BODC Argo across NOC and other UK research institutes, UK Argo DAC has been included in new funding proposals.

Another key challenge is that BODC Argo has been operating with a single point of failure where one person has been mostly responsible for managing the real-time processing of Argo floats, which presents a potential risk. To address this, BODC has started training an additional 2 employees to support daily activities. However, this has been done without increasing the overall FTE allocation to the BODC Argo DAC, which is limiting our ability to fully mitigate the risk.

Over the past year, various parts of the BODC infrastructure have undergone mandatory updates to ensure the security and integrity of the systems and maintenance activities (Oracle database patching, server updates and migrations, Matlab 2022b version upgrades, and Linux outages), which have impacted the Argo software's performance and data delivery. The system updates have affected the timeliness of BODC Argo’s real-time data delivery to the GDAC.

To mitigate the challenge of future software upgrade complications, BODC took the initiative to prepare a software strategy plan to look at improved coordination, better implementation of best practice in software development and testing environments, developing better and more robust contingency and proposing automatisation and monitoring solutions. Some of the ideas being looked at are ways to deliver a better test environment for the current Argo workflow; developing a testing framework to allow each data stream to be tested independently; develop the ability of more automatic software management procedures with the appropriate linting/unit tests; deliver an improved logging system to facilitate the monitoring and de-bugging of the system.

BODC Argo software requires continuous maintenance and improvements to be more adaptable to the new technologies and new different types of floats. Due to limited software development funding for the BODC Argo system over the last few years BODC Argo software is not keeping up with recent tasks requested by the ADMT.

BODC Argo runs a local version of the Coriolis processing chain to process core and bgc NKE floats and installs regular updates from Coriolis. However, the remaining challenge for BODC is

keeping up with required improvements for RT non-NKE BGC Argo floats. BODC is currently testing accessing the Coriolis chain via the docker.

BODC has discovered an issue with the raw sea surface pressure data delivered from 40 APF11 Argos floats. The recorded values once decoded from hex are mostly 0 dbar or –1000 dbar. BODC has contacted Teledyne for advice and further investigation of this issue and has forwarded affected firmware versions and copies of the BODC decoder scripts for affected floats. If other DACs have experienced similar issue, BODC would appreciate some discussion.

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any d-mode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?
- How are you implementing BGC d-mode - by parameter or one expert does all parameters?

- What challenges have you encountered and how have you dealt with them?
- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?
- Do you have any concerns you'd like to bring to the ADMT?

DMQC progress
From January 2024 BODC Argo submitted to GDAC of 42 core Argo floats with around 13 000 profiles in D-mode. The DMQC analysis has focused on processing the suspected salty drifting floats on processing the Argo grey list.

Additionally, in 2024 some of the BODC Argo floats coming from the MOCCA project have been continuously DMQC-ed by external European partners. We have received and submitted to the GDAC 3 analysed core Argo floats (with 660 D-mode profiles) from BSH.

The BODC Argo team has greatly expanded their knowledge of the DMQC analysis of BGC Argo floats. BODC has started implementing the workflow of the DMQC BGC procedures of the Nitrate and pH parameter for the BGC Argo floats.

From January 2024 BODC Argo submitted to GDAC of 15 DOXY Argo floats with around 1442 profiles in d-mode; 10 Nitrate Argo floats with around 1022 profiles in d-mode and 10 pH Argo floats with around 1022 profiles in d-mode.

Overall, BODC DMQC-ed 92.8% DOXY profiles, 84.8% of Nitrate profiles and 76.7% of pH profiles of available UK Argo BGC profiles.

NOC is actively involved in the DMQC core discussion meetings sessions and provides DMQC support to other national programs (Argo Poland, Argo Ireland).

DMQC Challanges

BODC DAC is only producing the trajectory files in RT for NKE BGC floats. This is possible thanks to the adoption of the Coriolis processing chain in BODC. We are not producing the trajectory files for our other floats (e.g. Apex, NAVIS) due to limited software development resources to update the codebase. None of the BODC's trajectory data went through DMQC analysis yet. The current BODC Argo team does not have enough knowledge, software and experience to work with this data.

In BODC, we conduct the DMQC analysis of DOXY, Nitrate and pH. The challenge we are facing is to gain more knowledge and experience in processing other BGC parameters. In the following year, we are also planning to improve our capability by starting to process in D-mode the radiometry data.

BODC can process only the NKE floats via the Coriolis processing chain in D-mode. There are remaining 47 legacy BGC Argo floats which are still not available in R-time in BODC, hence the DMQC for these floats is also blocked. These require additional development work in the BODC Argo processing chain.

The BODC software for D-mode corrections to deep and RBR Argo floats also requires significant development. However, over the past few years, these efforts have been delayed due to other priorities, such as real-time data delivery. Limited resources have made it difficult to allocate time and staff to develop the DMQC component of the software, causing further postponements in addressing these needs.

At BODC, we face funding resource constraints for conducting DMQC analysis, limiting our ability to cover all necessary activities. Currently, the UK Argo program has over 300 floats eligible for DMQC analysis, all awaiting processing. A key challenge is that only one person, Kamila Walicka, is qualified to perform both core and BGC DMQC analysis for Argo floats at BODC. This creates a significant risk due to the potential single point of failure. To mitigate this risk, we have initiated a series of training courses for core Argo analysis within BODC. We also plan to expand our capacity by training an additional operator for BGC DMQC analysis. However, a major hurdle is the limited funding available for DMQC analysis, which restricts our ability to provide hands-on experience and fully develop the skills of new operators.

3. Value Added items

- List of current national Argo web pages, especially data specific ones
    - NOC continues to maintain the UK Argo website (www.ukargo.net)
    - BODC Argo website (https://www.bodc.ac.uk/data/hosted_data_systems/argo_floats/)
    - NVS VocPrez website (http://vocab.nerc.ac.uk/)
    - Facebook page (www.facebook.com/UKArgofloats/)
    - Twitter account (twitter.com/ukargo)

- NOC maintains the SOARC website (www.soarc.aq)

- Known National Argo data usage
  - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)
Met Office	Fiona Carse (fiona.carse@metoffice.gov.uk)	Assimilation of real-time temperature and salinity profiles into the operational ocean forecasting (FOAM) and coupled Numerical Weather Prediction models
Met Office Hadley Centre for Climate Science and Services	Rachel Killick (rachel.killick@metoffice.gov.uk), Fiona Carse (fiona.carse@metoffice.gov.uk)	Ingestion of temperature and salinity profiles into several marine climate data sets (EN4 and HadIOD), (see http://www.metoffice.gov.uk/hadobs/en4/).

- Products generated from Argo data that can be shared
  - At NOC we produce a 4-D global map of Argo T and S data at 2 degree lat and long resolution from 60S to 60N. The data are gridded in 10-day windows using objective mapping on sigma-1 or neutral density levels and then interpolated back to 20 dbar vertical resolution. This is generally updated towards the end of each calendar year. A time series of global heat content is calculated and reduced to annual averages and then incorporated into the synthesis of global heat content calculations led by K von Schuckmann. The full 4-D gridded fields can be made available by contacting Brian King at NOC.
  - In the Hadley Centre for Climate Science and Services, Argo data is used in 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 was 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/.

- ARGO NVS server
    - BODC hosts all 32 Argo vocabulary collections on the NVS. There is ongoing discussion around the addition of new collections owned by OceanOPS for populating PROGRAM_NAME (https://github.com/OneArgo/ArgoVocabs/issues/80) and DEPLOYMENT_PLATFORM (https://github.com/OneArgo/ArgoVocabs/issues/2). Discussion is also ongoing regarding the population of PROJECT_NAME (https://github.com/OneArgo/ArgoVocabs/issues/5). The current recommendation is that EDMERP (https://edmerp.seadatanet.org/) could be used. Open for feedback.
    - ADMT action #35 https://github.com/OneArgo/ADMT/issues/65 SPARQL demo code can be found in the ArgoVocabs Github repository which can be used to help users pull vocabulary information from the NVS; issue is open for specific feedback and requests. We will also be looking to develop the JSON template further from 2025: https://github.com/nvs-vocabs/ArgoVocabs_Meetings/issues/13
    - ADMT action #36 https://github.com/OneArgo/ADMT/issues/66 relates to https://github.com/nvs-vocabs/ArgoVocabs_Meetings/issues/10. This can be addressed by implementation of 'SYN' sameAs mappings between R27 concepts and the manufacturer, allowing identification of identical sensors that have changed manufacturer.

    - In the last year, 13 new concepts and 186 new mappings have been created within 8 existing collections.

- Publicly available software tools to access
    - A Python implementation of the "OWC" salinity calibration method traditionally available for Matlab used in Argo floats Delayed Mode Quality Control https://github.com/euroargodev/argodmqc_owc
    - A software for an infrastructure agnostic set of common BGC parameter derivation equation functions https://github.com/euroargodev/bgc_derivation
    - Real time QC automated tests for Argo data. https://github.com/euroargodev/argortqcpy
    - The quality assessment method in the Southern Ocean (SO) uses the pre-classified core Argo float and climatological data belonging to similar water mass regimes using the Profile Characterization Model (PCM). https://github.com/euroargodev/DMQC-PCM/tree/SO_assesment
    - This repository includes the report template and Matlab codes used to generate plots required in the DMQC report for core Argo parameters. https://github.com/euroargodev/dm-report-template
    - 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

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

N/A

5. Regional Centre Functions

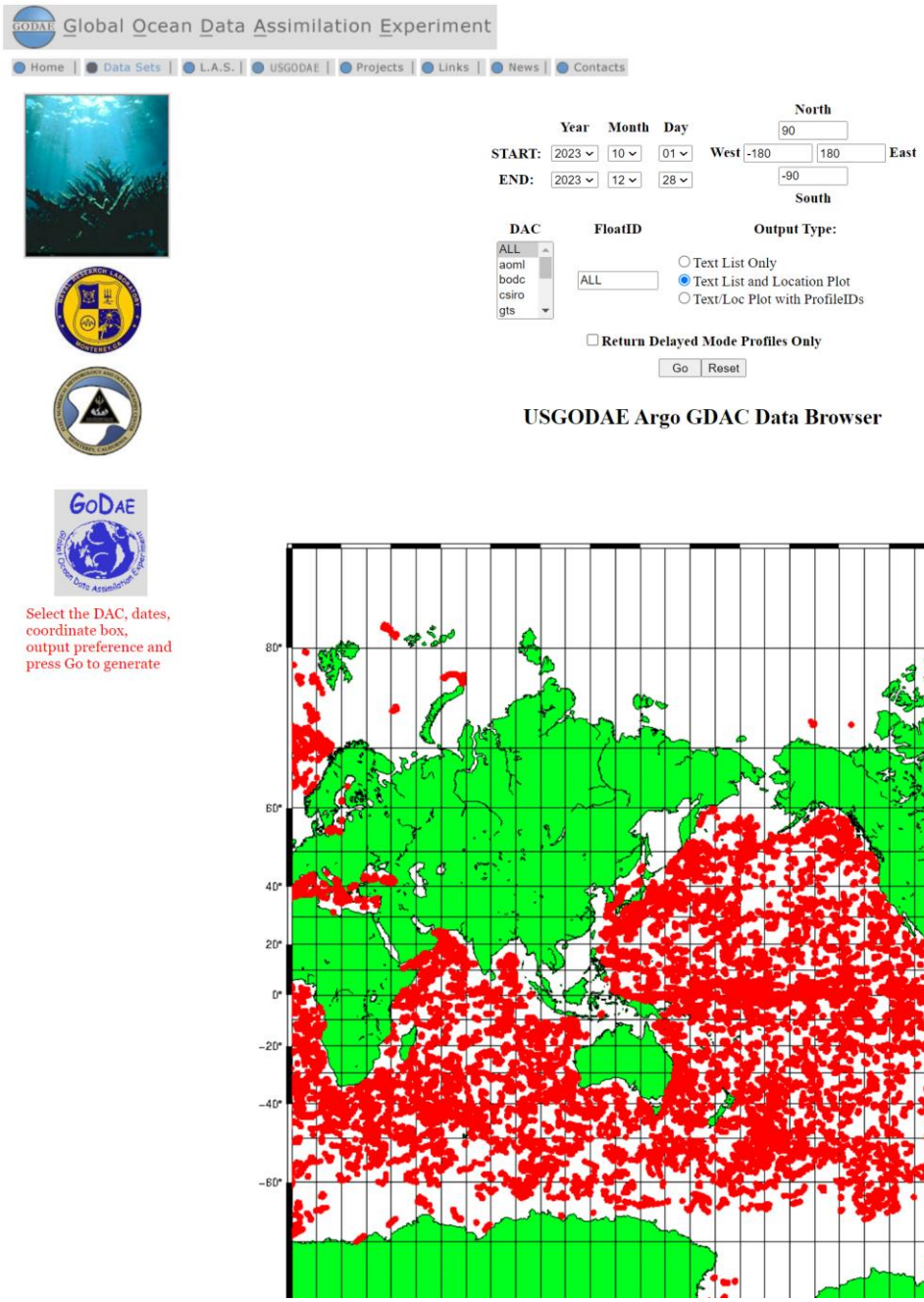
If your Nation operates a regional centre, report the functions performed and any future plans.

BODC is a member of the Southern Ocean Argo Regional Centre (SOARC). However, due to limited funding in BODC the activity of this group has been put on hold. Some of the SOARC group activities has been undertaken by newly formed Argo Polar working group.

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.

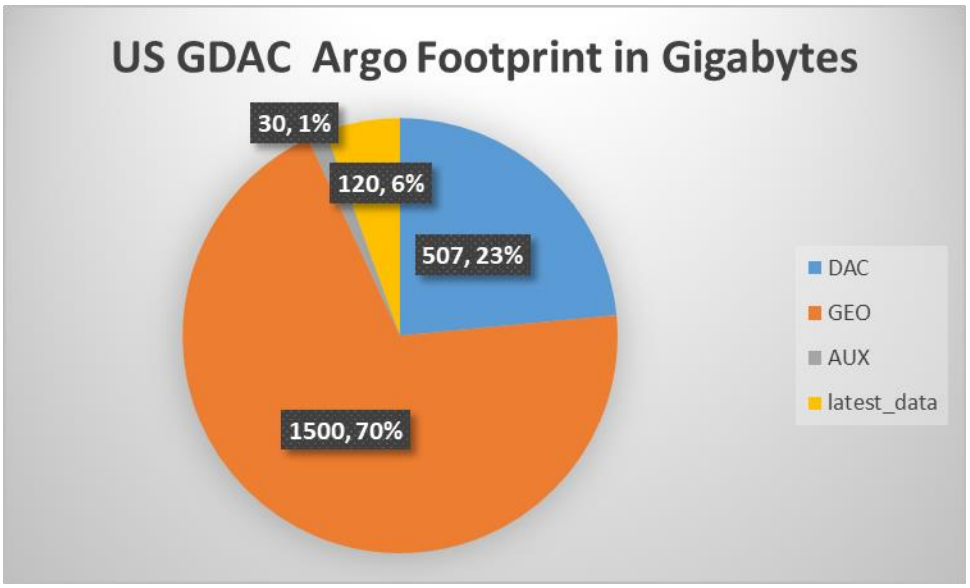
Argo Data Management report 2024
US GDAC (Global Data Assembly Center) October 19th, 2024



National centres reporting to you

Currently, 7 of the National DACs submit regularly to the US GDAC. The other DACs use the Coriolis as a proxy, and the US GDAC downloads the data from this proxy.

As of October 19th, 2024, the footprint on the Argo portion of the US GDAC was 2.1 TB.



DAC	MetaData	Technical	Trajectory	Trajectory D-Mode	Trajectory Bio
AOML	8982	8822	12360	3542	0
BODC	912	912	547	0	14
Coriolis	3852	3806	3766	1	0
CSIO	558	555	555	0	36
CSIRO	1179	1163	1141	0	0
INCOIS	541	524	416	0	0
JMA	1951	1683	1676	0	0
KMA	264	243	255	0	3
KORDI	120	120	107	0	0
MEDS	721	702	673	0	55
NMDIS	19	19	19	0	0
Totals	19099	18549	21515	3543	108

DAC	Profiles	Profiles D-Mode	Profiles Bio
AOML	195651	1402703	114884
BODC	37156	98629	6336
Coriolis	100752	424628	121738
CSIO	16130	61170	12434
CSIRO	13137	214352	24005
INCOIS	44024	39996	13217
JMA	47694	214200	20661
KMA	3744	34936	468
KORDI	1490	14504	3426
MEDS	29113	51012	9783
NMDIS	72	2388	0
Totals	488963	2558518	326952

Operations of the ftp server

The anonymous FTP server running on the US GDAC was disabled in December of 2023 due to IA restrictions. It was replaced with a SFTP (secure FTP). Data providers had to switch to SFTP.

Folks that used anonymous FTP to download data had to switch to using programs like wget that can utilize ‘https’.

This was a very challenging time for the US GDAC / Argo. That being said, the patience/understanding of the entire Argo was tremendous and much appreciated.

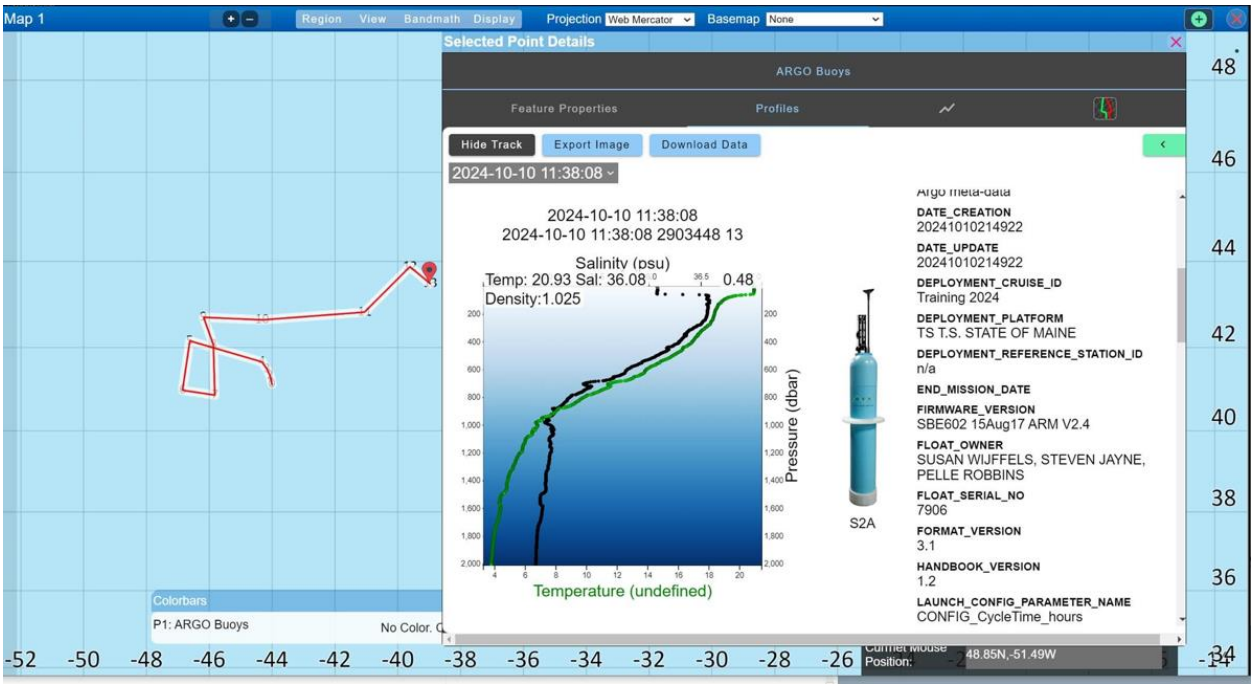
Operations of the www server

The US GDAC hosts an apache webserver that allows the users to download Argo data via standard tools such as wget.

In addition the US GDAC hosts the ‘USGODAE Argo GDAC data browser’ that allows for limited querying capabilities (time, area, dac, etc).

US GDAC HTTP server: https://usgodae.org/pub/outgoing/argo
Argo Data Browser: https://usgodae.org/cgi-bin/argo_select.pl

We are in the process of replacing the current Argo Data Browser with a program called Map room. We have been having issues with the current browser. Well, not necessarily the browser itself, but with the dependencies that it has.



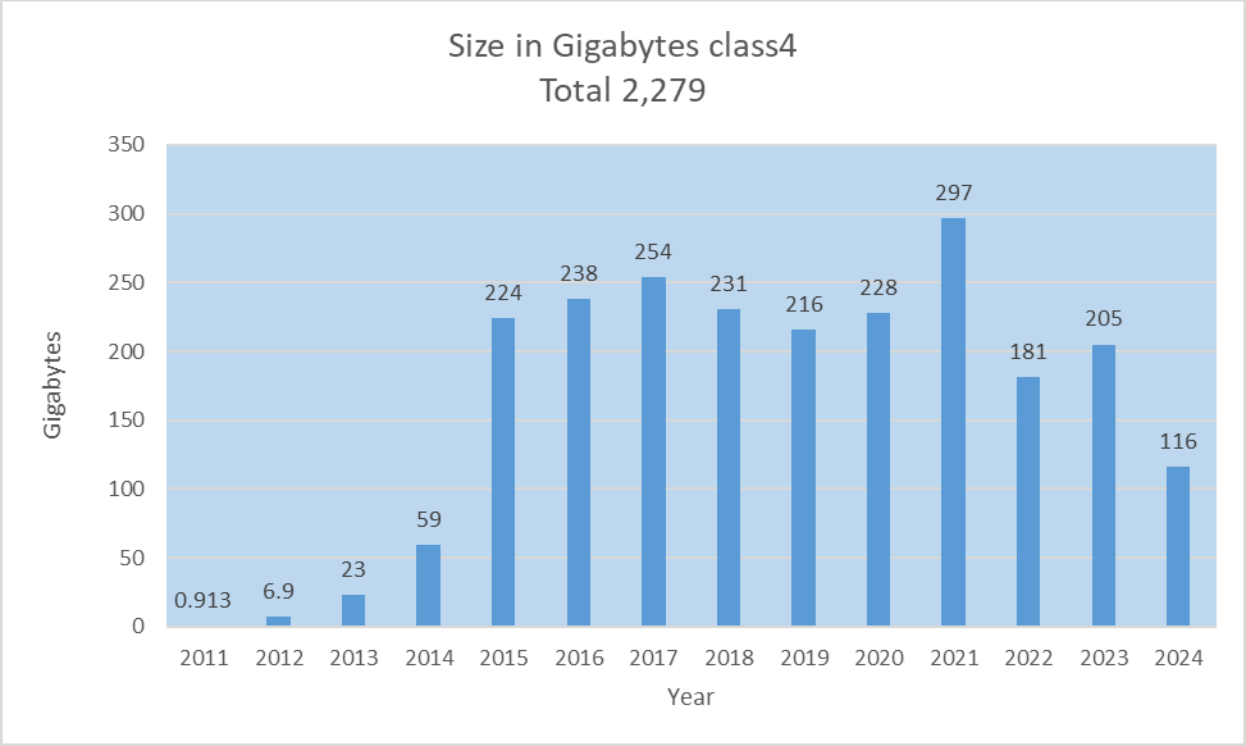
Data synchronization

The US GDAC synchronizes with the French GDAC once per day at 1015 UTC. The process involves downloading all of the index files from the French GDAC and comparing them to the local US GDAC. After comparison, all necessary files are then downloaded and submitted normally into the US GDAC.

The typical synchronization takes approximately 15 minutes to complete each day. However, there are times when it takes much longer and we need to investigate.

Class4

The US GDAC also hosts the class4 model comparison files. The US GDAC receives the files from 5 different sites.



Issues

Once again, I am missing the majority of the webserver log files. I only have the past months' worth (22Sep2024-20Oct2024).

Total successful Argo downloads 2,849,592
Total Argo size of downloads 1,933,645,757,070
Unique IP addresses 768

Total successful GODAE_class4 downloads 923,951
Total GODAE_class4 size of downloads 191,315,477,688
Unique IP addresses 20

Argo National Data Management Report for ADMT-25

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other section prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX	8	416
BGC APEX	8	156
ARVOR	0	0
PROVOR	0	0
Navis	2	477
BGC Navis	3	35
SOLO/S2A	3	982
SOLO S2-BGC	1	9
Deep SOLO	3	110
Deep Arvor	0	0
ALTO	1	9

Other (customize additional rows as needed)		

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	SBE41CP, SBE61, RBR, SBE41N, SBE_STS
oxygen	SBE63, SBE83, Aanderaa 3830, Aanderaa 4330
NO3	ISUS, SUNA
pH	DURA, SEAFET, GDF
Chla	MCOMS_FLBBCD, MCOMSC, ECO_FLBB_AP2, ECO_FLBBCD, ECO_FLBBCD2, ECO_FLBBCD_AP2, ECO_FLBBFL_AP2
bbp	MCOMS_FLBBCD, MCOMSC, ECO_FLBB_AP2, ECO_FLBBCD, ECO_FLBBCD2, ECO_FLBBCD_AP2, ECO_FLBBFL_AP2
cdom	MCOMS_FLBBCD, MCOMSC, ECO_FLBBCD, ECO_FLBBCD2, ECO_FLBBCD_AP2
irradiance	OCR504_ICSW
radiance	OCR504_ICSW
PAR	SATLANTIC_PAR

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
CHLA DUAL channel	No or In progress?
FLBBFL	No

SBE83 optode	No

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

parameter	**Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)**	**QC manual version you are using (ie, current or version 2.0 Oct 2018)**	**Notes on when changes will be made to update to latest version**
oxygen	Version 2.3.1 2018-06-13	Version 2.0 2018-10-23	Processing Version 2.3.3 2022-04-27 QC Version 2.1 2021-02-24
NO3	**Current** **Version 1.2.2** **2024-03-05**	**Current** **Version 1.0** **2021-10-01**	
pH	**Current** **Version 1.2** **2023-12-19**	**Current** **Version 1.0** **2023-12-11**	
Chla	**Current** **Version 1.0** **2015-09-30**	Version 1.1 2018-03-15	QC Version 3.0 2023-09-30 WIP By 2024-11
bbp	**Current** **Version 1.4** **2018-03-07**	BGC QC Version 1.0 2016-03-01	QC Version 1.0 2023-09-01 WIP By 2024-11
CDOM	**Current** **Version 1.0** **2017-10**	**BGC QC** **Version 1.0** **2016-03-01**	
irradiance	**Current** **Version 1.1** **2017-10-09**	**Current** **Version 1.0** **2019-07**	

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)

RBRargo3 2K model	**Are you filling Adjusted data (A mode) following QC Manual 3.8 instructions?**	**Notes or additional information**
pre-April 2021	Yes	Using this list : https://github.com/ArgoDMQC/RBRargo_DMQC/blob/main/Compressibility_correction/RBRargo3_compressibility_table.csv
post-April 2021	Yes	

- Are you regularly applying real time adjustments for the following items:
  - Salinity adjustments
  - Cpcor for deep floats
  - BGC parameters (if so, which ones)

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	yes	yes	
Cpcor adjustment for Deep floats	yes	yes	

oxygen	WIP	yes, when done	
NO3	WIP	yes, when done	
pH	WIP	yes, when done	
Chla	yes	yes, when done	Based on 2018 QC Manual
bbp	yes	yes, when done	
irradiance	no	no	No adjustments described in the QC Manual

- What data are you sending onto the GTS?
  Core & Adjusted Doxy data. Other BGC parameters are WIP; collaboration with Anh Tran.

- What data is going to the aux directory?
  UVP, FL2BB, etc

- Are you automatically greylisting questionable floats detected by min/max test?
  For most floats, we contact the float owner and refer to their judgment. Following their guidance, we then grey list the float. We provide feedback on this as needed.

- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files?
  Ready with v3.2 trajectory files. Reprocessing of older BGC floats to add BGC data to the Rtraj files is ongoing.

- Do you have any code to share with other DACs? If so, where is that available?
  We have code to share. We have to figure out the logistics on sharing (dedicated github account)

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others?
- How are you implementing BGC dmode - by parameter or one expert does all parameters?
  One lead person. Joint effort, not split by parameter.
- What challenges have you encountered and how have you dealt with them?
  Delayed moding old AOML floats that don't have certain sensors. I am working on making a GUI, so I can adjust the data while I can see it.
- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available?
  We use code provided to us by others.
- Do you have any concerns you'd like to bring to the ADMT?

3. Value Added items

- List of current national Argo web pages, especially data specific ones:
  https://www.aoml.noaa.gov/argo/
  https://www.aoml.noaa.gov/biogeochemical-argo-program/
- Known National Argo data usage
  - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)

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

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

N/A

5. Regional Centre Functions

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

N/A

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.

Argo National Data Management Report for ADMT-25

MBARI report, prepared by Tanya Maurer and the MBARI data management team, Oct 1, 2024

Each country is asked to send a National Report using this document as a guide for the material to be reported. As we take steps to modernize the real time processing chain, we have changed the format for the Real Time Status to help better understand the current status at each DAC. We also updated several other section prompts and ask that you use this updated template when writing your report.

Reports are DUE: 10 October 2024

1. Real Time Status

Please report the status of your real time data processing for all Argo Missions, including pilots. If you have not yet implemented the tasks, please give us an estimate of when you expect the task to be completed. Here are some questions to answer:

- How many floats are you currently processing & what type are they?

Float family	**Number of versions**	**Number of floats*** (*approximate)
APEX	2 (Apf9i; Apf11i)	446
ARVOR	0	--
PROVOR	0	--
Navis	0	--
BGC Navis	2 (Navis-EBR; Navis Nautilus)	137
SOLO/S2A	2 (Early IDG-built; MRV)	13
Deep SOLO	0	--
Deep Arvor	0	--

Other (customize additional rows as needed)	0	--

- How many different sensors are you currently processing?

Parameters	**Type(s) of sensor for that parameter**
Temperature/Salinity	SBE41
oxygen	4 (Aanderaa 3830; 4330; SBE63; SBE83)
NO3	2 (SBS SUNA; MBARI ISUS)
pH	3 (SBS DURA; MBARI DURA, MBARI GDF)
Chla	3 (MCOMS_FLBBCD, ECO-FLBBAP2, ECO-FLBBFL)
bbp	3 (MCOMS_FLBBCD, ECO-FLBBAP2, ECO-FLBBFL)
irradiance	1 (OCR504), yet we have multiple channel configurations (although moving forward will be deploying solely the recommended 380, 443, 490, 555 channel config)

New Sensors you have begun processing (either deployed in past 12 months or expected in the next few months)	**Have all the Argo vocabularies been implemented to accommodate the sensor? (Yes, No, In progress)**
FLBBFL	No
SBE83 optode	No
GDF pH sensor	Yes

- What is the status of BGC processing and RTQC test implementation? See here to get the version of manuals you are using to process and qc the BGC variables or : Documentation - Argo Data Management (argodatamgt.org) If your floats **do not** include a listed parameter, please enter 'N/A' (Not Applicable); if your floats **do** include the listed parameter, but you have not yet implemented processing for this parameter, please enter 'N/I' (Not Implemented).

parameter	Processing cookbook version you are using (ie, current or version 2.0 Oct 2018)	QC manual version you are using (ie, current or version 2.0 Oct 2018)	Notes on when changes will be made to update to latest version
oxygen	*Current* V2.3.3 (2023)	*Current* V2.1 (2021)	--
NO3	*Current* V1.2.2 (2024)	*Current* V1.0 (2021)	--
pH	*Current* V1.2 (2023)	*Current* V1.0 (2023)	--
Chla	*Current* V1.0 (2015)	*Current* V3.0 (2023)	D-mode procedures not yet implemented.
bbp	*Current* V1.4 (2018)	--	Implementation of QCv1.0 is in progress
irradiance	*Current* V1.0 (2015)	--	--

- What is the status of RBR data processing (if applicable)? Are you adjusting salinity in real time? See DACs with floats with RBR CTDs to implement real-time salinity adjustment as per QC Manual, and flag PSAL_ADJUSTED_QC = '1' in 'A' mode. Real time adjusted data can be distributed onto GTS · Issue #55 · OneArgo/ADMT (github.com)

RBRargo3 2K model	Are you filling Adjusted data (A mode) following User Manual 3.8 instructions?	Notes or additional information
pre-April 2021	NA	MBARI only processes BGC
post-April 2021	NA	MBARI only processes BGC

- Are you regularly applying real time adjustments for the following items:
    - Salinity adjustments **N/A**
    - Cpcor for deep floats **N/A**
    - BGC parameters (if so, which ones) **Yes**

	Yes/No for current R files	**Are you going back to make adjustments on all available R files when new adjustment comes in?**	**Notes or additional information**
Salinity adjustment	N/A	N/A	
Cpcor adjustment for Deep floats	N/A	N/A	
oxygen	yes	yes	
NO3	yes	yes	
pH	yes	yes	
Chla	yes	yes	
bbp	yes	yes	
irradiance	N/A**	N/A**	

** We are not populating adjusted fields for irradiance data (in real-time, nor delayed mode). However, we do maintain the capability to rapidly reprocess all profiles from a single float, should the need arise to retroactively apply updated cal coeffs or processing procedures. This is true for all sensor parameter data that we manage.

- What data are you sending onto the GTS? AOML manages this data stream for the US.
- What data is going to the aux directory? FLBBFL for two deployed floats (~20 more floats with FLBBFL will be deployed in the coming year), but these data streams are being managed through manual batch updates to the aux dir.
- Are you automatically greylisting questionable floats detected by min/max test? We are automatically flagging any and all measurements caught by the min/max test in real time, and also maintain an internal greylist, but this list is managed manually.
- What is the status of the transition to v3.2 trajectory files? When do you think you will be ready to stop acceptance of v3.1 Btraj files? We are working with AOML and UW to

refine a workflow for v3.2 trajectory files. AOML is managing the real-time Rtraj. UW will be managing D-mode for core & timing data within the v3.2 traj; MBARI will be managing the D-mode for BGC data within the v3.2 traj. This collaboration is in the early stages but we hope to make significant progress on this in the coming year, as we now have dedicated personnel assigned to this task.

- Do you have any code to share with other DACs? If so, where is that available? All of our processing code is currently available via the SOCCOM github: https://github.com/SOCCOM-BGCArgo

2. Delayed Mode QC status

This section of the report is for reporting on the status of DMQC in your country and is the place to share your progress, your challenges, your concerns and any links to shareable tools or code. The following questions to help guide you:

- What is the status of delayed mode trajectory files? Have you created any dmode trajectory files? If not, what are the reasons? If you have, would you be interested in sharing your experiences with others? Not yet but we will be collaborating with UW on Dtraj for SOCCOM/GO-BGC floats and are in the early stages of defining this workflow. We plan to make progress in the coming year, as we now have more resources to devote to this project.
- How are you implementing BGC dmode - by parameter or one expert does all parameters? We have 5 DMQC operators managing ~350 operational floats. We D-mode all relevant BGC data for each float, assigning batches of floats to each operator for each DMQC session (typically ~2 DMQC sessions per year). Additionally, regular review of the data for scientific consistency is performed by the data team and by biogeochemists using Ocean Data View.
- What challenges have you encountered and how have you dealt with them? Floats that operate outside of the conditions in which published qc methods were built upon present a challenge (ie floats that profile in shallow waters, and in regions with limited coverage). We tend to take a conservative approach when presented with such challenges, leaning on inflation of the <param>_ADJUSTED_ERROR terms (and/or flagging), as is deemed appropriate through detailed analysis of nearby floats and any/all available ancillary data, and until methods are further refined/characterized for such cases.
- Do you have any code or tools you'd like to share with other DM operators? If so, where is that available? All code is available on our github: https://github.com/SOCCOM-BGCArgo
- Do you have any concerns you'd like to bring to the ADMT?

3. Value Added items

- List of current national Argo web pages, especially data specific ones

    - https://www.go-bgc.org/
    - https://soccom.princeton.edu/

- Known National Argo data usage
    - Please list known operational centers using Argo data in your country in this table:

Operational center	**Contact (name, email), if known**	**What data do they use?** (for example, core, BGC, all profile data, trajectory data)

- Products generated from Argo data that can be shared
    - Derived carbon parameters available in SOCCOM/GO-BGC routine data archives: https://library.ucsd.edu/dc/collection/bb0488375t
    - GOBAI-O2 oxygen product (NOAA) https://www.pmel.noaa.gov/gobai/
- Publicly available software tools to access
    - BGC-Argo data access tools developed and supported by GO-BGC are available here: https://github.com/go-bgc

4. GDAC Functions

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

N/A. MBARI does not participate in any operational GDAC functions.

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

5. Regional Centre Functions

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

The Southern Ocean Argo Regional Center has been inactive all year (2024) and had limited activity last year (2023). SOARC lacks centralized focus/management (and, primarily, resources/funding to support that).

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.

1. The recent instances of duplicate WMO assignments by the OceanOPS system occurred across multiple DACs and is very concerning. Our understanding is that this was a result of temporary hiccups related to their system migration, but it would be great to emphasize to DACs the importance of continuing to report on such occurrences, should they continue to arise in the coming year.
2. We view OceanOPS role in fleetwide performance monitoring of BGC-sensor data as a high priority. We hope this development continues to mature through 2025 and are happy to assist with and support this effort, as needed, both at MBARI and through the TTT/ADMT.