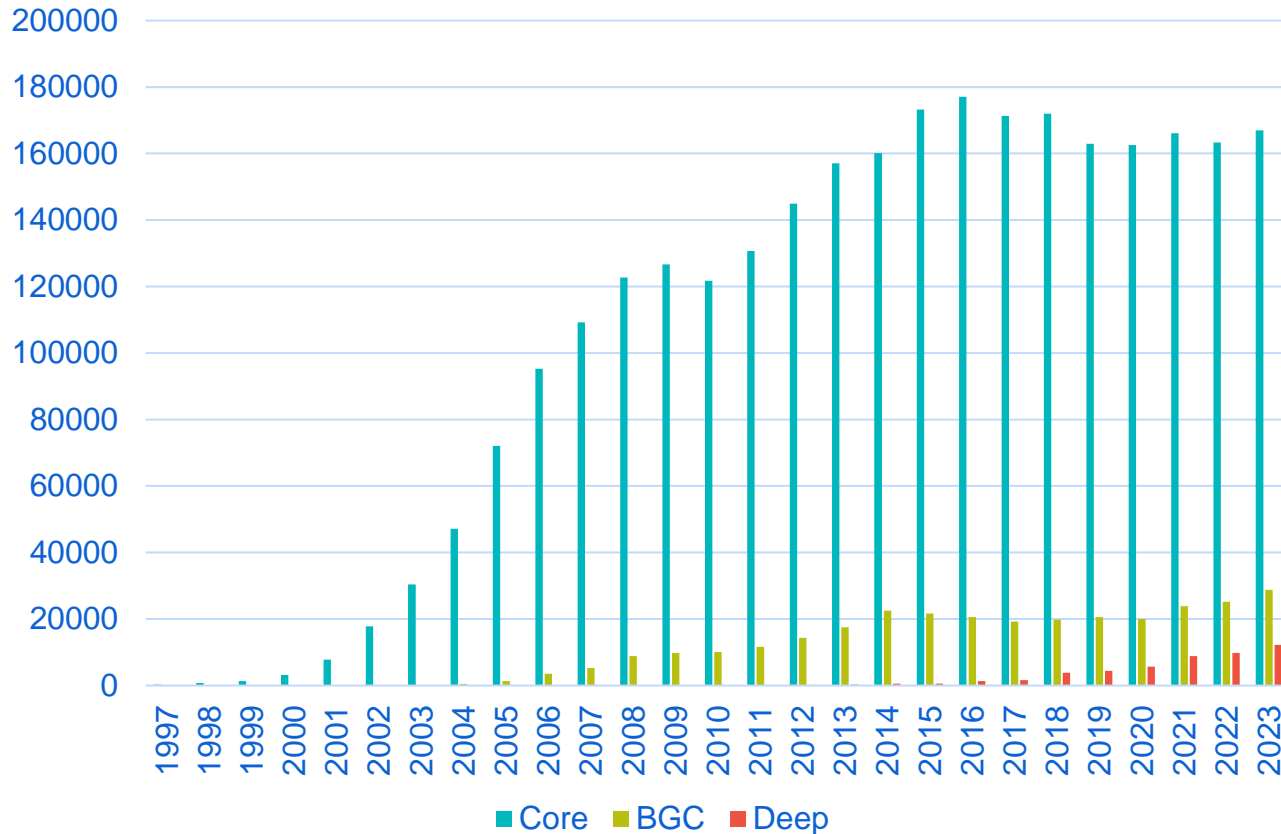


What's new with Argo data?

2022-2023

Claire Gourcuff, Megan Scanderbeg ADMT co-chairs
Tanya Maurer, Catherine Schmechtig BGC ADMT co-chairs
Fiona Carse, UK Met Office

Number of Argo profiles measured per year

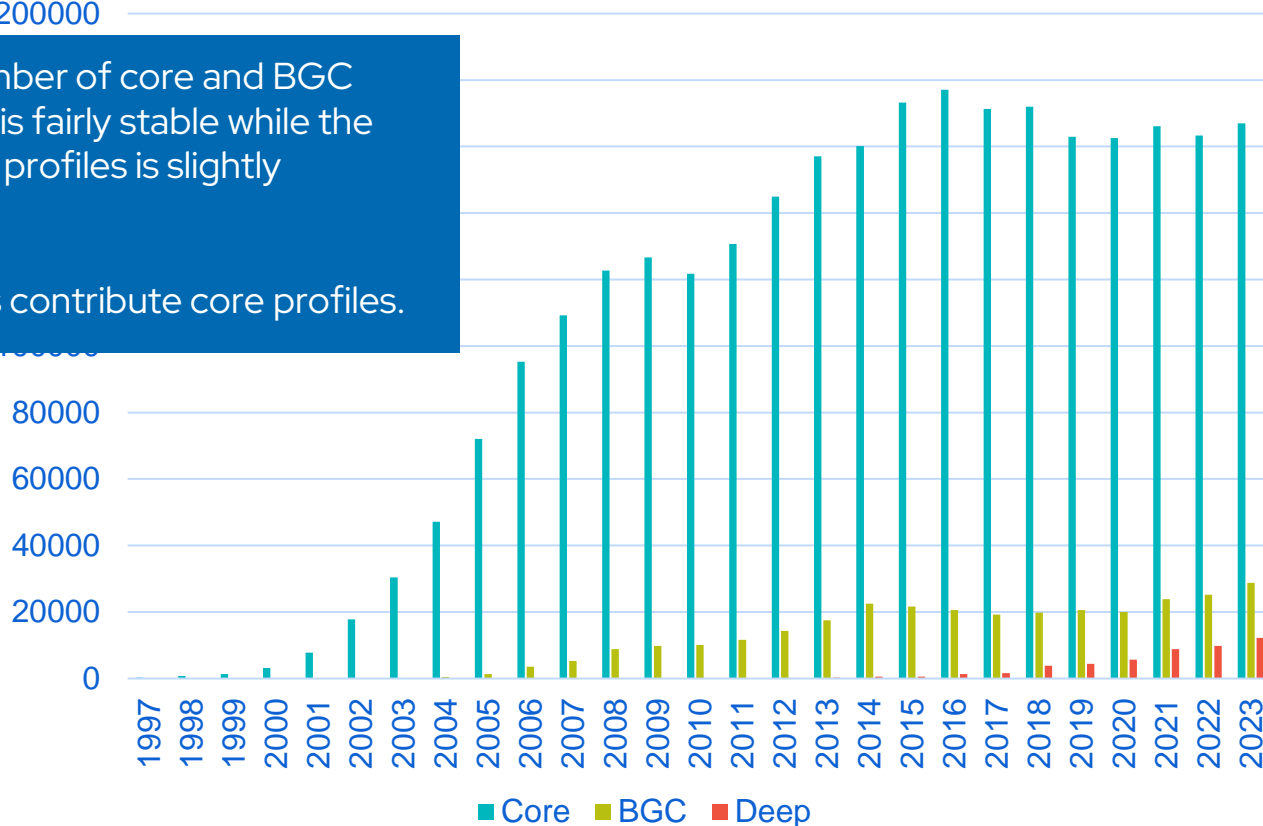


Number of Argo profiles measured per year

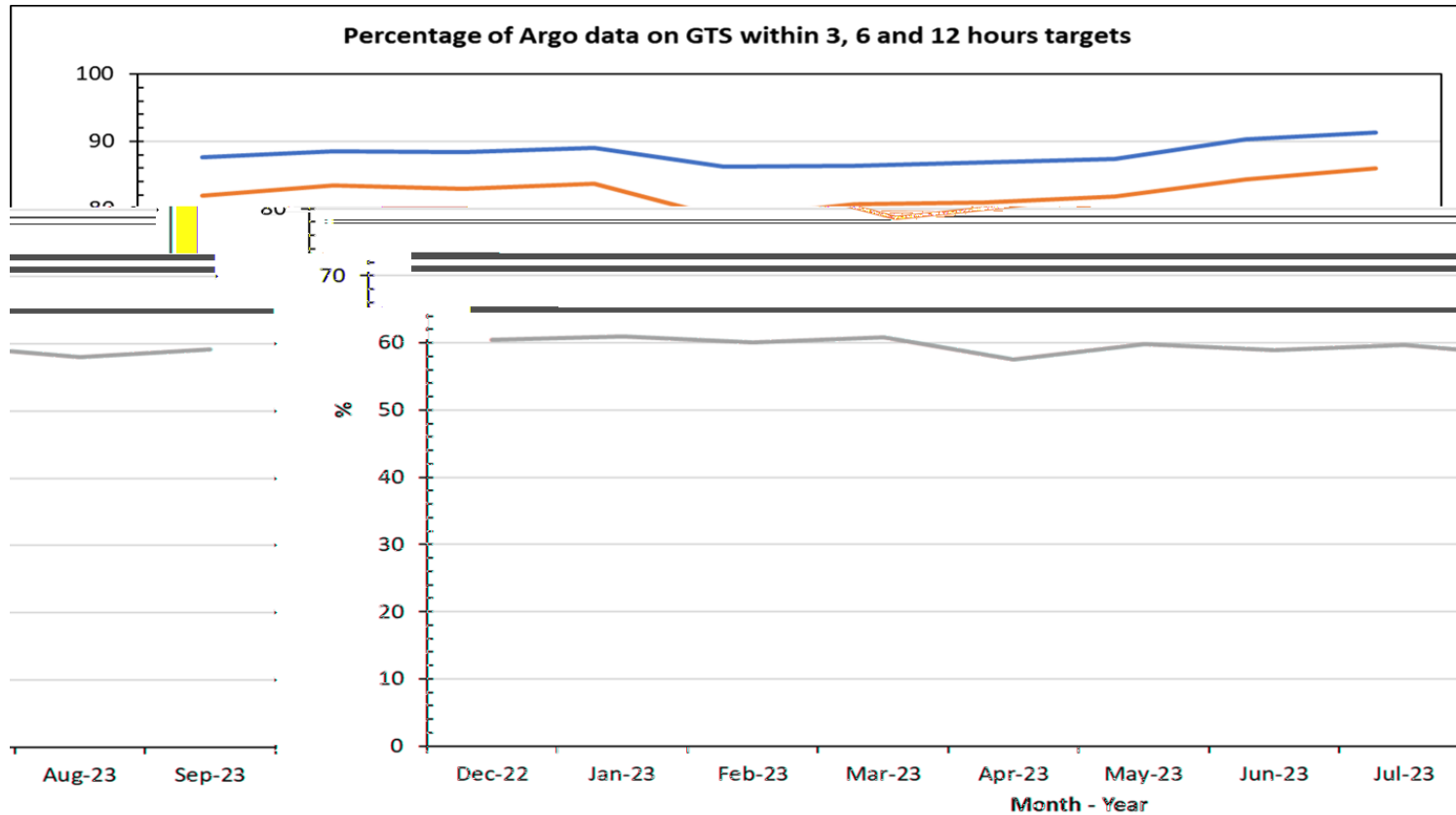
200000

For now, the number of core and BGC profiles per year is fairly stable while the number of Deep profiles is slightly increasing.

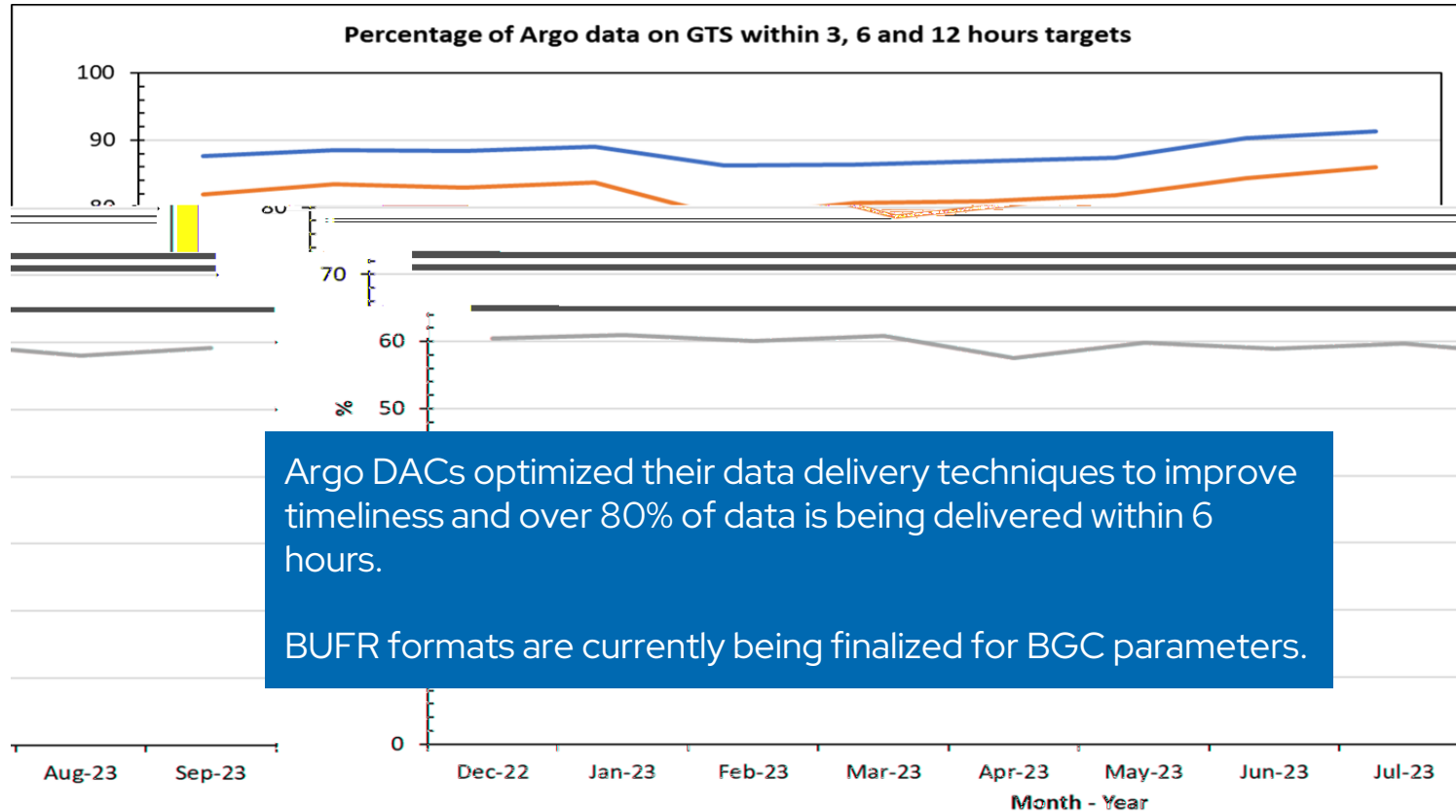
All Argo missions contribute core profiles.



80% of core Argo data are now delivered in 6 hours



80% of core Argo data are now delivered in 6 hours



Argo DACs optimized their data delivery techniques to improve timeliness and over 80% of data is being delivered within 6 hours.

BUFR formats are currently being finalized for BGC parameters.



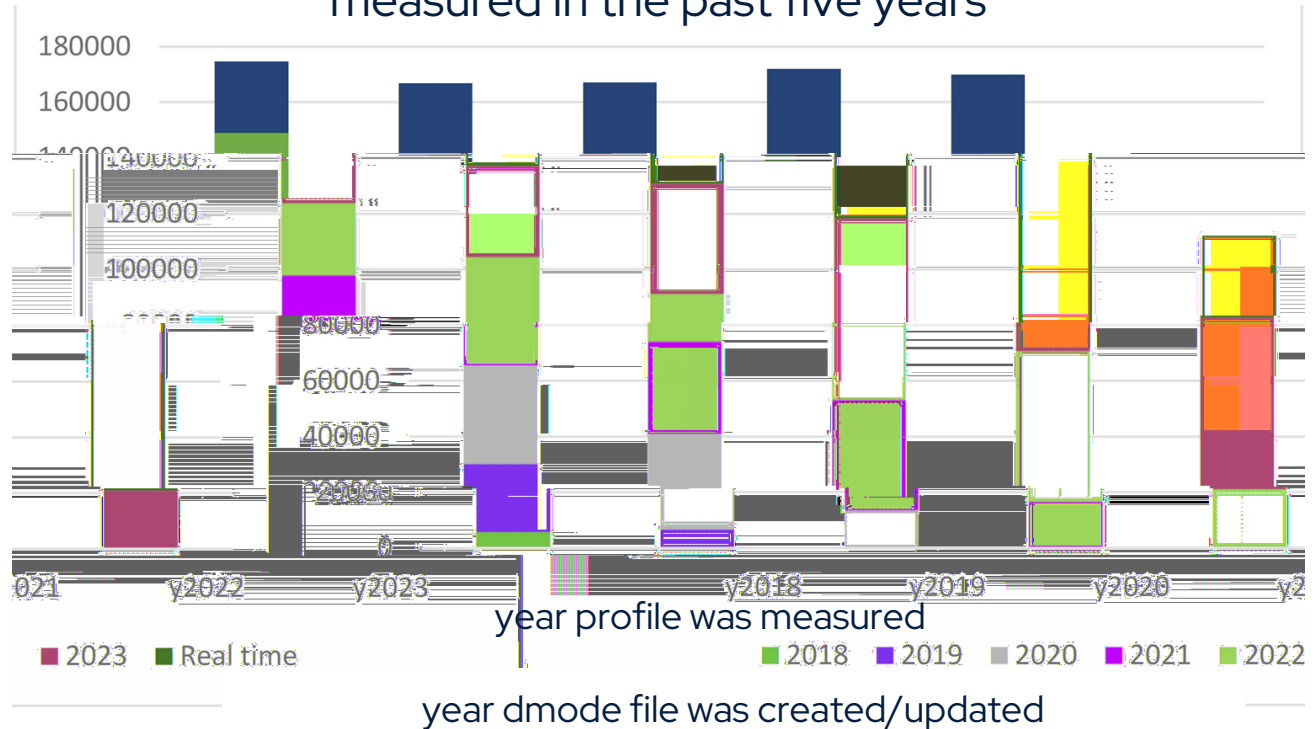
Argo is a living dataset

How often should I refresh the Argo data I use for research?

We recommend to refresh your Argo data *yearly* to take advantage of delayed mode quality control (DMQC).

DMQC is performed when enough information is available to make a thorough assessment of parameter accuracy and adjustment requirements (usually 12 - 24 months after measurement *unless known sensor problems exist*).

Number of Temperature and Salinity Argo Profiles measured in the past five years



* Does not include all measured profiles in 2023



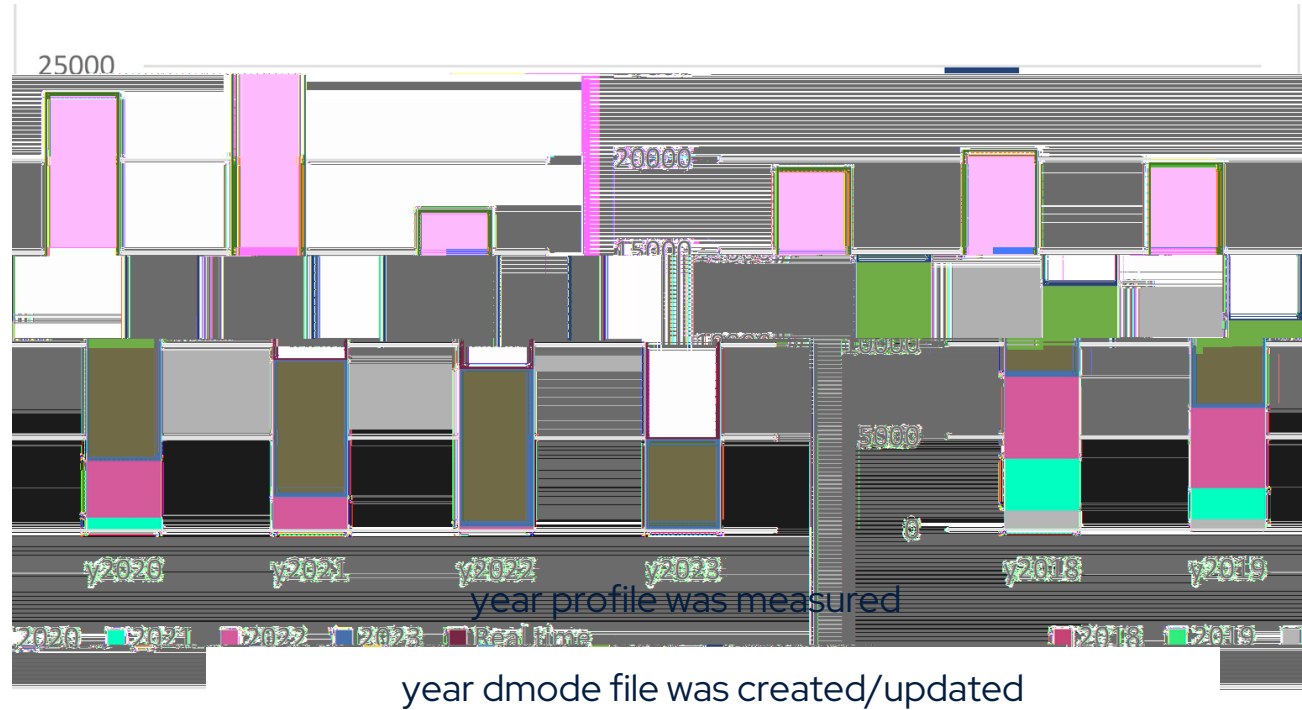
Argo is a living dataset

BGC Argo profiles are *reprocessed more often* than core profiles. Suggested to refresh *every six months*.

This is due to:

- Updated decoding algorithms
- Updated QC processing algorithms as methods continue to improve
- Updated metadata information
- Updated understanding of how sensors perform

Number of BGC Argo Profiles measured in past five years



* Does not include all measured profiles in 2023



Argo is a living dataset

Refresh your Argo dataset prior to analysis

If you use Argo profiles from the GDACs, you can do the following to stay up to date:

- Download a recent monthly DOI tarball: [10.17882/42182 \(doi.org\)](https://doi.org/10.17882/42182)
- User rsync to keep your local mirror up to date: [Argo GDAC synchronization service - Argo Data Management \(argodatamgt.org\)](https://argo.gdac.org/management/)
- Make a selection on the Argo data selection tool: <https://dataselection.euro-argo.eu>
- Select Argo data via ERRDAP: www.ifremer.fr/erddap/index.html

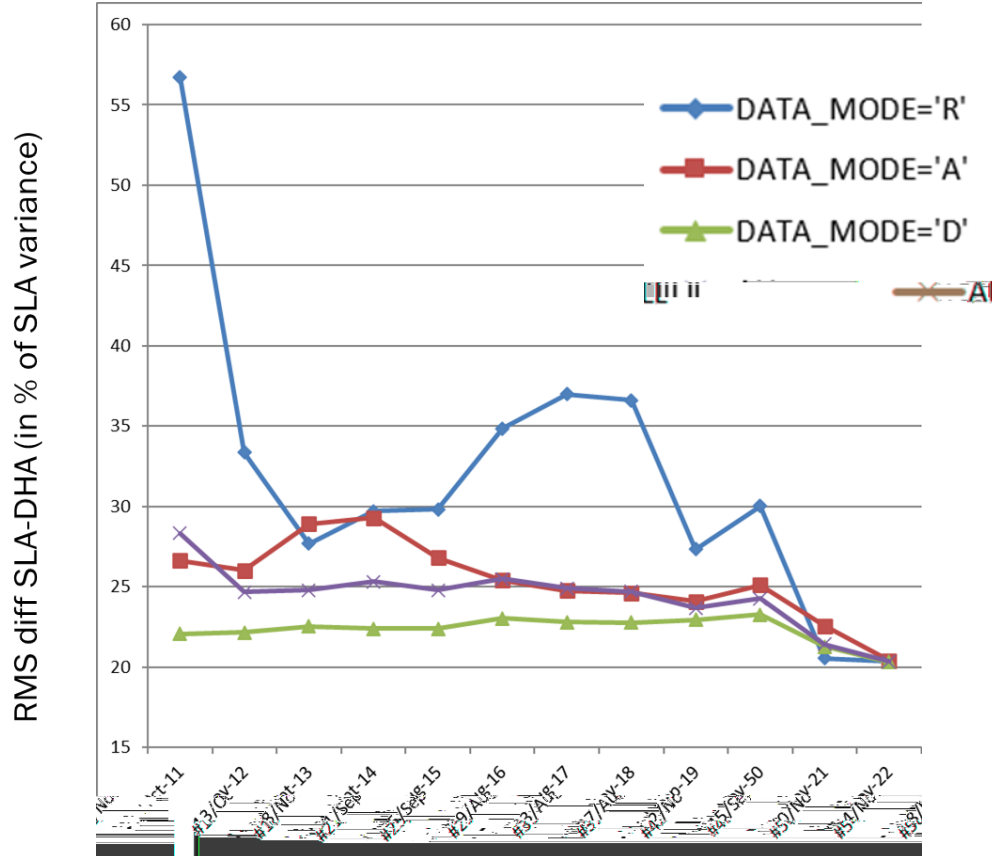
If you use an Argo product created by a third party and listed on this webpage <https://argo.ucsd.edu/data/argo-data-products/>, be aware that the Argo data in that product may not be up to date. Contact the producers for more information.



A validation example using altimetry

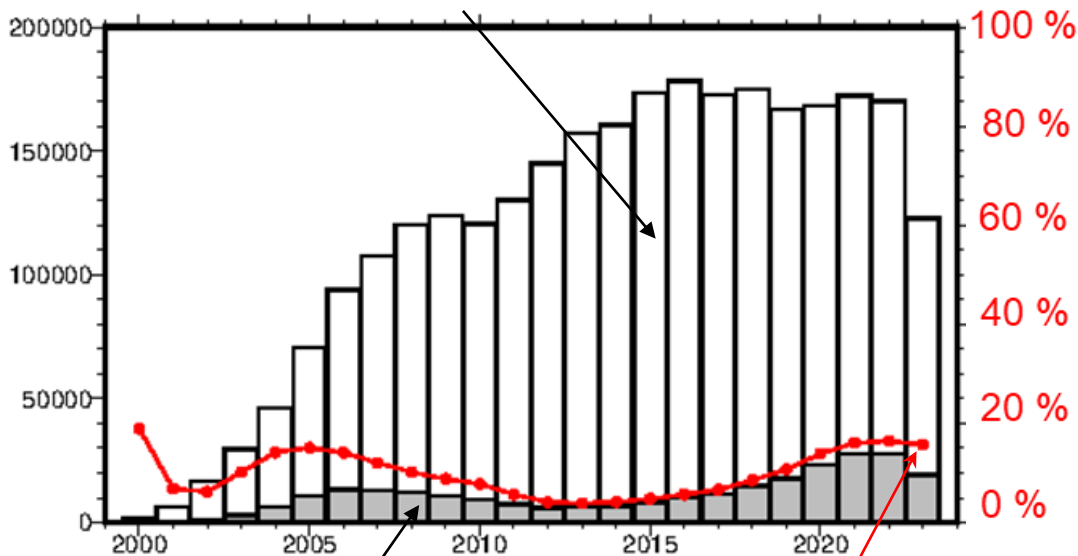
Comparison of Sea Level Anomaly (SLA) from altimetry and Dynamic Height Anomaly (DHA) from Argo shows that

1. Delayed mode data is more accurate
2. Real time errors are being removed from the data system via quality control flags



What is Abrupt Salty Drift? How often does it occur?

Total number of salinity profiles



Number of bad salinity profiles (all measures are QC3 or 4)

Percentage of bad salinity profiles (all measures are QC3 or 4)

- Abrupt Salinity Drift (ASD), or Fast Salinity Drift, affects the salinity in certain batches of serial numbers on SeaBird CTD sensors.
- This issue results in earlier and more rapid salinity drift than what is normally expected. Floats that may suffer ASD are reviewed more frequently in delayed mode.
- ASD concerns floats that were deployed between 2015 and 2019, mostly affecting salinity profiles measured between 2018 and now (see graph).
- In 2018, the manufacturing process was changed and the problem seems to be resolved, although the status will continue to be closely monitored by the ADMT community.



What is the status BGC Argo data quality?

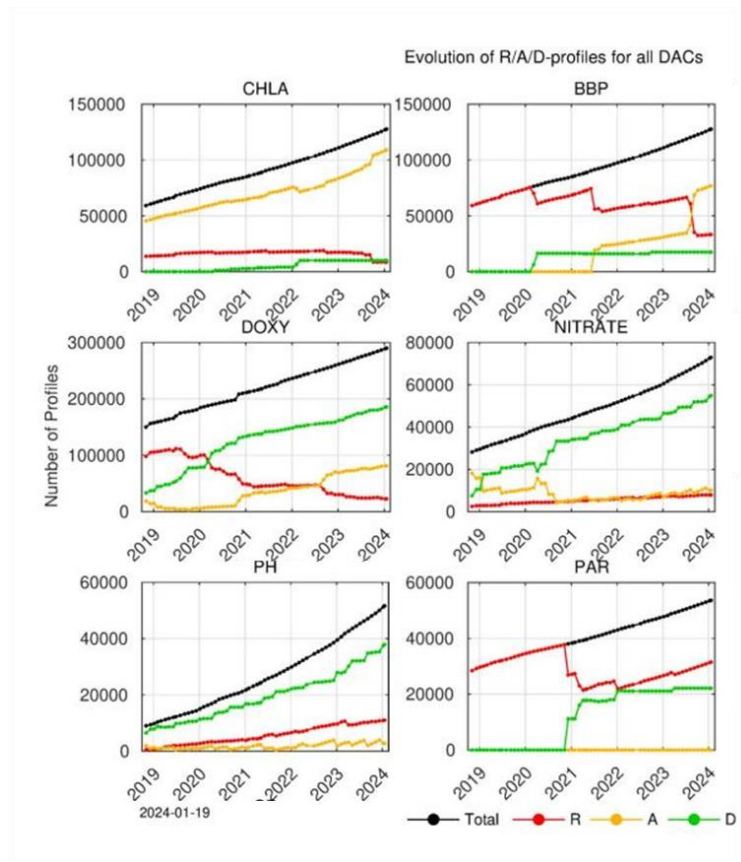
Henry Bittig's audit of BGC parameters from 2024/01/19

(<https://biogeochemical-argo.org/cloud/document/implementation-status/>) illustrates the status of the PARAMETER_DATA_MODE of the six principal BGC variables

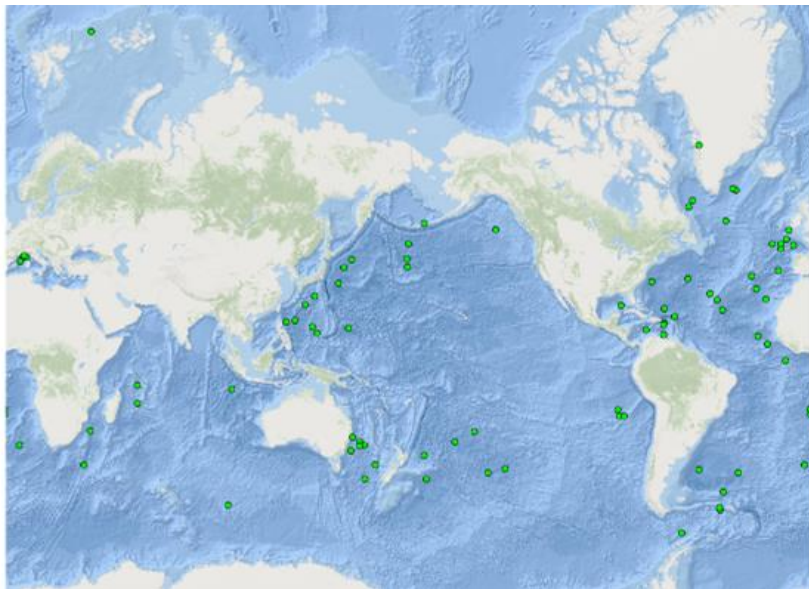
In 2023, several Quality Control documents were updated:

- QC document for BBP (<https://doi.org/10.13155/60262>)
- QC document for CHLA (<https://doi.org/10.13155/35385>)
- QC document for pH (<https://doi.org/10.13155/97828>)

The application of the DM procedures and Adjustment in Real Time is an ongoing effort in the BGC-Argo community but the proportion of qualified data continues to increase.

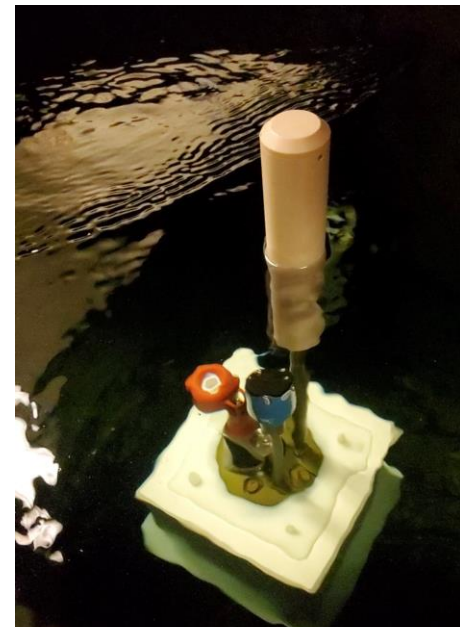


What is happening with the new RBR CTD?



More floats equipped with RBR CTDs (SENSOR_MODEL = RBR_ARGO, RBR_ARGO3) are being deployed and their data is being distributed in real time with the appropriate QC flags.

Delayed mode quality control methods are being established for RBR CTDs and implemented by DMQC experts, bringing accuracies to the expected level of other CTD models used in Argo.



Operational Timeline



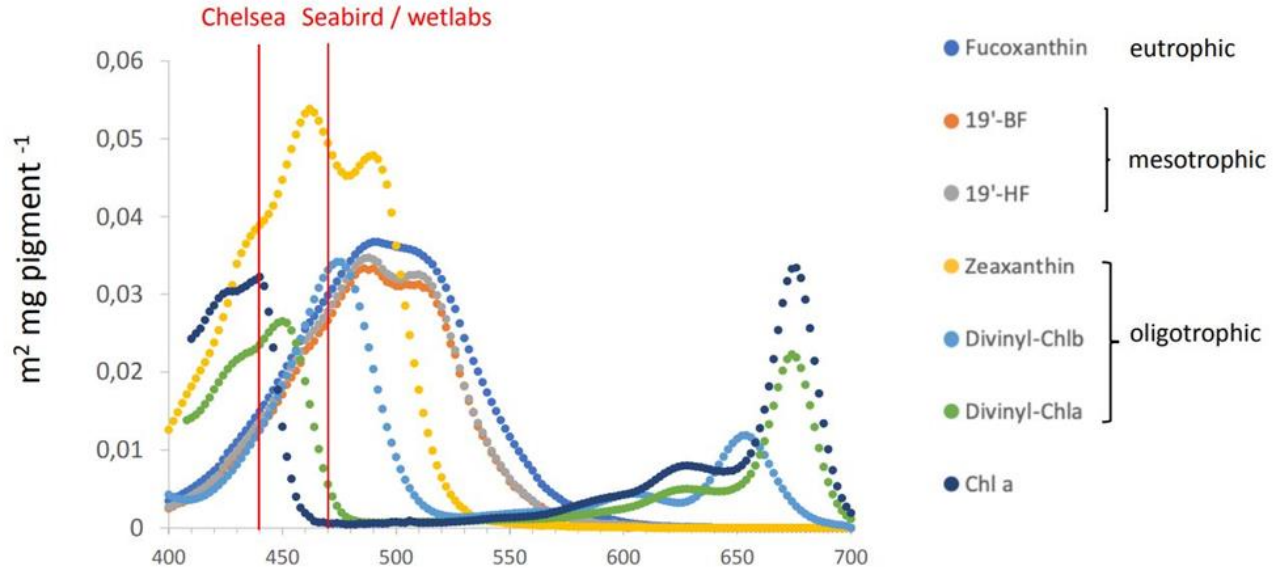
What sensors are new in BGC-Argo?

ECO_FLBBFLB

3-channel bio-optical sensor

- Chl a fluorescence (@470nm)
- Chl a fluorescence (@435nm)
- Optical backscatter (@700nm)

In vivo pigment-specific absorption of main pigments



- Several FLBBFLB sensors (Double Chl a channels 435, 470) have been deployed in 2022, 2023
- Data are available at the GDAC in the aux directory (14 floats at the Coriolis DAC, 2 floats at the aoml DAC)
- Excitation at 435 nm target photosynthetic absorption (especially Chl a)
- FLUORESCENCE_CHLA435 is expected to be less variable with respect to CHLA than FLUORESCENCE_CHLA (excited at 470 nm)



What sensors are new in BGC-Argo?

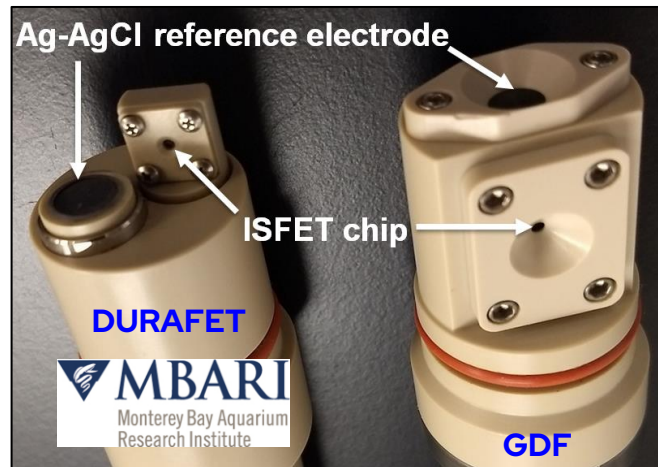


SBE83_OPTODE oxygen sensor

- The new SBE oxygen optode capable of in-air sampling is now available and proliferating within the BGC-Argo system
- Currently >10 AOML floats deployed with SBE83_OPTODE, data available at the GDAC
- These sensors are pumped, allowing for faster response times than un-pumped optodes and thus reduced bias in the thermocline
- In-air sampling allows for more accurate in-situ calibration

GDF (Gasket DuraFET) pH sensor

- Newest pH sensor design in Argo, developed at MBARI
- Same sensor elements & principle as the MBARI DURAFET, with a repackaged housing
- Over 20 GDF sensors are currently in the Argo system and performing well; deployments planned to increase in 2024



What new BGC sensors might be coming in the future?

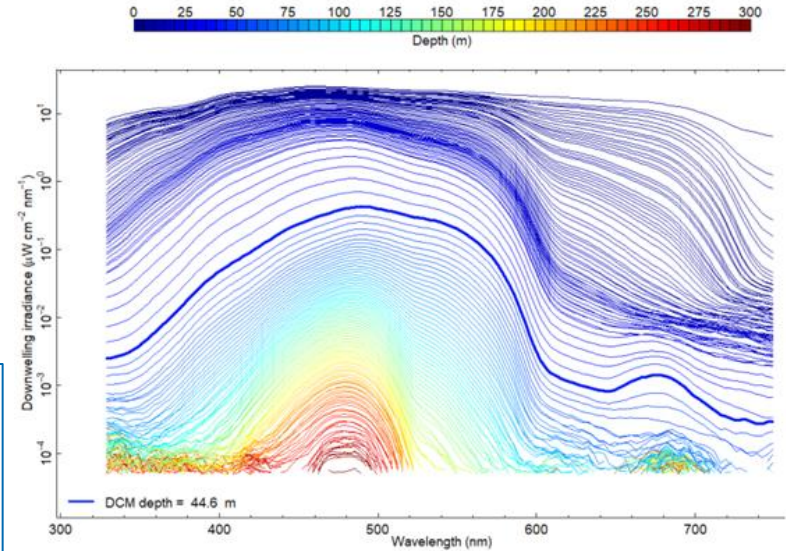
Ramses sensors (Radiometry Hyperspectral)

- Ed, Lu
- Validation for the PACE mission



RBR tridente

- Fluorescence and BBP
- Diversify the sensor market



What new data is in Argo files?

v3.2 trajectory files

The trajectory files have been combined to include both core and BGC data in v3.2 trajectory files. This includes in-air oxygen measurements made at the surface and any BGC measurements made during drift. Expect more DACs to produce these files over the next year.

Profile files

Errors in position can be stored in the profile files using the following *optional* variables “POSITION_ERROR_REPORTED”, “POSITION_ERROR_ESTIMATED” and “POSITION_ERROR_COMMENT”.

NB_SAMPLE_CTD, NB_SAMPLE_<PARAMETER_SENSOR_NAME>, TEMP_CNDC, CNDC, MTIME added or moved to ‘intermediate core’ or ‘intermediate b’ category in physical parameters list. http://www.argodatamgt.org/content/download/30910/209488/file/argo-parameters-list-core-and-b_20230612.xlsx

More sophisticated methods of determining positions of under-ice profiles are being used in delayed mode to improve estimated positions. These estimated positions can be stored in both the profile files and the trajectory files.




Updates on accessing Argo data

Interested only in BGC data? Look no further than the monthly DOI snapshot which now includes a separate zip file containing all available *Sprof.nc files. <http://doi.org/10.17882/42182>



The screenshot shows the SEANOE website interface. At the top left is the SEANOE logo with the text "SEA SCIENTIFIC OPEN DATA PUBLICATION". To the right are navigation icons for Search, Dataset, and Bookmarks. Below the navigation bar, there is a breadcrumb trail "DOI 10.17882/42182" and a bookmark icon. The main title of the page is "Argo float data and metadata from Global Data Assembly Centre (Argo GDAC) - Snapshot of BGC Sprof data files of August 09st 2023". Below the title, there is a metadata table with the following information:

| | |
|--------------|---|
| DATE | 2023-06-09 |
| AUTHORS | Argo |
| DOI | 10.17882/42182 |
| PUBLISHER | SEANOE |
| CONTRIBUTORS | Akazawa Fumihiko , Alradddadi Turki , Ananda Pascual , Andre Xavier  , Arhan Michel , Atmadipoera Agus , Babin Marcel , Balan Sorin , Ballestero Daniel , Boringer Moly  , Barre Nicolas , Beebeejaun M. , Belbeoch Mathieu , Belchi Pedro Velez , Bellingham Clare  , Bernard Vincent  , Bittig Henry  , Blain Stephane , Boebel Olaf , Boetius Antje ●●● |

Below the table, there is a paragraph of text: "Argo is a global array of 3,000 free-drifting profiling floats that measures the temperature and salinity of the upper 2000 m of the ocean. This allows, for the first time, continuous monitoring of the temperature, salinity, and velocity of the upper ocean, with all data being relayed and made publicly available within hours after collection. The array provides 100,000 temperature/salinity profiles and velocity measurements per year distributed over the global". To the right of the text is a blue-bordered box containing a "DOWNLOAD DATA" button with a downward arrow and a photograph of an Argo float on the ocean surface.



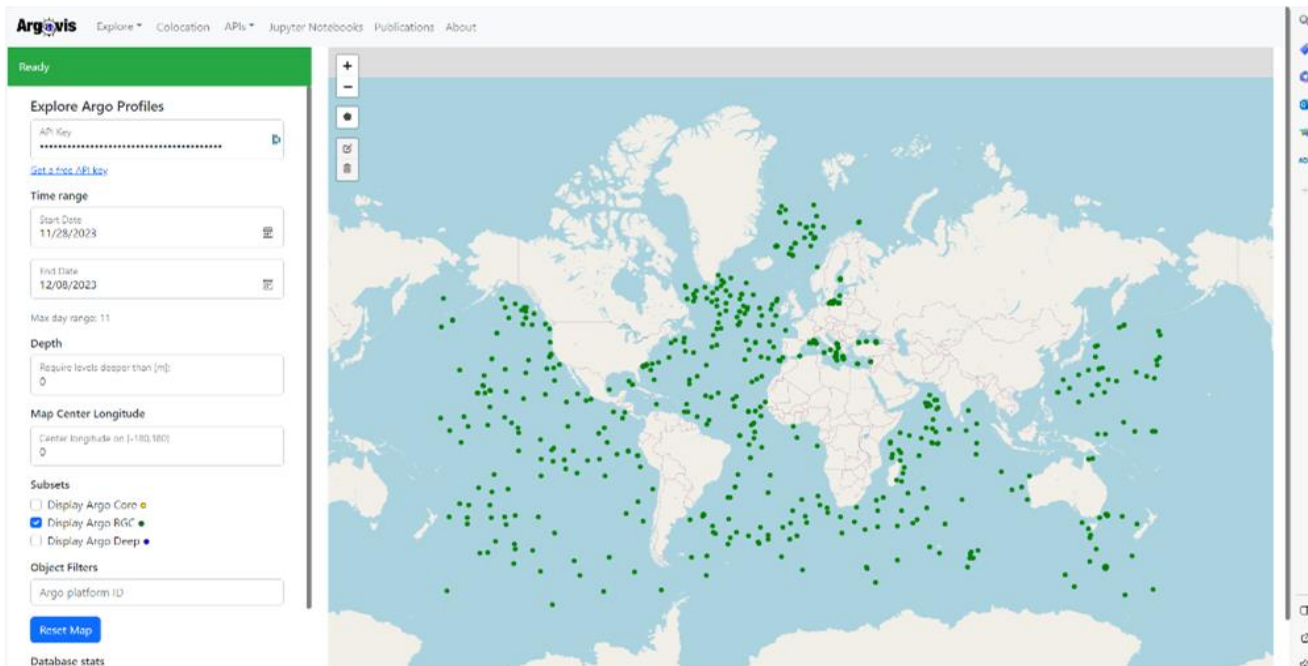
Updates on accessing Argo GDAC data

Want to select profiles with certain parameter(s) in time and space? Try the EuroArgo Selection tool: <https://dataselection.euro-argo.eu/>



Updates on accessing Argo data via database

Argovis (<https://argovis.colorado.edu/>) is a web app and RESTful API database allowing you to select and co-locate ocean datasets (including Argo, GO-SHIP, drifters and more) and bring them into your own computing environment. Jupyter notebooks are available to help you get started (https://github.com/argovis/demo_notebooks).



The screenshot displays the Argovis web application interface. The top navigation bar includes links for Explore, Colocation, APIs, Jupyter Notebooks, Publications, and About. The main content area is divided into a left sidebar and a central map.

Left Sidebar (Filters):

- Ready** (status indicator)
- Explore Argo Profiles**
 - API Key: [Input field]
 - [Get a free API key](#)
- Time range**
 - Start Date: 11/28/2023
 - End Date: 12/08/2023
 - Max day range: 11
- Depth**
 - Require levels deeper than (m): 0
- Map Center Longitude**
 - Center longitude on [-180,180]: 0
- Subsets**
 - Display Argo Core
 - Display Argo RGC
 - Display Argo Deep
- Object Filters**
 - Argo platform ID: [Input field]
 - [Reset Map](#)
- Database stats

Central Map: A world map showing the distribution of Argo profiles, represented by numerous green dots scattered across the global ocean surface.



Need help using Argo data? Try these tools!

These tools allow you to select Argo netCDF files and bring them into your programming language of choice for further analysis. They remove the difficulty of understanding the Argo netCDF format and helps you choose the best data quality for your research.

Argo Online School (<https://euroargodev.github.io/argoonlineschool/intro.html>) which has Jupyter notebooks in **Python** and introduces how to access data by float, file type and date

Argopy: an Argo data **Python** library to access, manipulate and visualize data (<https://github.com/euroargodev/argopy>)

argoFloats: an **R** package to download and analyze Argo data (<https://github.com/ArgoCanada/argoFloats>)

OneArgo float toolboxes in **Matlab** (<https://github.com/NOAA-PMEL/OneArgo-Mat>) and **R** (<https://github.com/NOAA-PMEL/OneArgo-R>)

Argovis Jupyter notebooks in **Python**: (https://github.com/argovis/demo_notebooks)

See all tools here: <https://argo.ucsd.edu/data/argo-software-tools/>



Have more questions or want to stay up to date?

Email us at argo@ucsd.edu with your questions or feedback.

Find the latest announcements via the Argo email lists: <https://argo.ucsd.edu/stay-connected/>

Technical updates on the Argo data stream are posted here:
<https://argo.ucsd.edu/category/status/>

Visit our Data FAQ for all things Argo data related: <https://argo.ucsd.edu/data/data-faq/>

How to cite Argo data: <https://argo.ucsd.edu/data/acknowledging-argo/>

Thank you for using Argo data and please let us know if we can help.

