SYMPOSIUM OP24 ADVANCING OCEAN PREDICTION SCIENCE FOR SOCIETAL BENEFITS

Accessing and using the evolving OneArgo data stream

Introduction

As the implementation of OneArgo continues, the data stream is evolving to accommodate the BioGeoChemical (BGC) Argo and Deep Argo Missions, which include new BGC sensors as well as temperature, salinity, and oxygen profiles to full ocean depth, respectively. It is critical for Argo to share with the ocean prediction community how to access, understand and interpret these data in order to make optimal use of the new data stream.

Argo Data Mode

Argo data are generally available via the GTS in BUFR format and the Argo GDACs in netCDF format within 12 hours. These real time data files include raw data from the float sensors **(« PARAM », « DATA_MODE » = R)** and may include adjusted data **(« PARAM_ADJUSTED », « DATA_MODE »= A)** if the sensor has previously been assessed and a known adjustment can be made.

Delayed mode data are available later after scientific evaluation by an expert **(« PARAM_ADJUSTED », « DATA_MODE » = D)**. Evaluation time frames vary depending on the Argo mission and evaluation methods vary depending on the parameter being measured and the sensor.

All Argo data come with QC flags and errors to help users decide how to best use the data **(« PARAM_ADJUSTED_QC », « PARAM_ADJUSTED_ERROR »)**.

BioGeoChemical Data

Unlike CTDs, **BGC sensors require initial adjustments to the data *before* being used for scientific purposes**. After this adjustment, typically 6 - 8 weeks after deployment, it is possible to access good quality dissolved oxygen, nitrate, pH, chlorophyll, backscatter and incoming solar radiation data and their uncertainties in near-real time (often less than 12 hours). Remember to use **« PARAM_ADJUSTED »** and **« PARAM_DATA_MODE »= A)**.

To facilitate use, BGC parameters measured by different sensors at different pressure levels are merged into 'synthetic' profiles (Sprofs) on Argo GDACs. In addition, the Monthly DOI Tarball includes a BGC-Argo Sprof snapshot.

Quality-controlled dissolved oxygen data are already on the GTS, and nitrate, pH, chlorophyll and 700-nm backscattering data will soon be added in newly approved BUFR sequences.

Deep Data

Deep Argo floats deliver profiles of temperature, salinity, and about ⅓ collect oxygen in the range of 4000-6000 dbar (or the seafloor if shallower) depending on float model. For technical reasons, one Deep Argo model records data to maximum profiling depth during descent, which results in a 10-day delay of profile delivery. Firmware to collect near-real time data upon ascent, as well as the 10-day old profile, is under field testing and will be implemented in the future.

The CTD on Deep Argo floats is in '**pilot**' mode meaning that real time data below 2000db carry a **QC flag of '2' or '3'**. Once an adjustment is done, **the QC flag can be changed to a '1' or a '2'** depending on **DATA_MODE**..

Profiles measured upon descent are named with a 'D' at the end (**<R/D><FloatWmoID>_<XXX><D>.nc**). Deep floats are identified using **WMO_INST_TYPE** described in the Argo R08 reference table. A Deep float index list is coming which will include all Deep Argo floats based on WMO_INST_TYPE, the deepest pressure level reached during each profile and the parameters measured, including oxygen, if available.

Links to access & cite Argo data

Via ftp at the GDACs:
- ftp://ftp.ifremer.fr/ifremer/argo

Via HTTPS at the GDACs:
- https://data-argo.ifremer.fr
- https://usgodae.org/pub/outgoing/argo

Via S3 at the GDACs:
- https://registry.opendata.aws/argo-gdac-marinedata

Via Monthly DOI Tarball based on GDAC holdings
- http://www.argodatamgt.org/Access-to-data/Argo-DOI-Digital-Object-Identifier

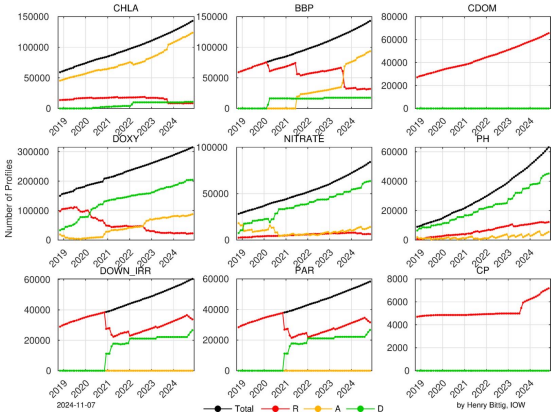
Via GDAC sychronization services:
- http://www.argodatamgt.org/Access-to-data/Argo-GDAC-synchronization-service

Via GDAC data selection tool:
- https://dataselection.euro-argo.eu/

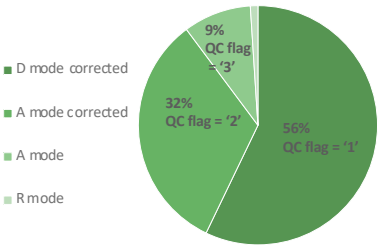
How to cite Argo data:

Argo (2000). Argo float data and metadata from Global Data Assembly Centre (Argo GDAC). SEANOE. https://doi.org/10.17882/42182

BGC Adjusted data holdings (data modes A and D) continue to increase



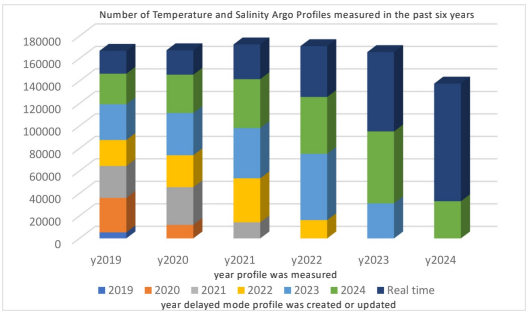
Deep Argo adjustments & QC flags



QC Flag	Meaning
1	Good data. All real time QC tests passed and data is found to be good or adjusted to be statistically consistent with good quality reference data.
2	Probably good data. Use with caution. An error estimate is supplied in D mode.
3	Probably bad data. Do not use without scientific adjustment

How often should you access Argo data?

It is important to recognize that **the OneArgo dataset is a living and dynamic dataset that changes over time**. Argo recommends regularly refreshing Argo data to take advantage of improvements from additional quality control.



* Includes profiles as of 1 November 2024

- For temperature and salinity data, a **yearly** refresh of Argo data holdings is recommended due to delayed mode quality control occuring roughly one year after measurement
- For BGC data, a refresh of BGC Argo data holdings every **6 – 8 months** is recommended due to delayed mode quality control occurring every few months to reflect the need for adjustment prior to scientific usage.
- For temperature and salinity, **raw data and real time adjusted data with qc flags** are sent onto the GTS.
- For BGC data, only **adjusted data with qc flags** are sent onto the GTS.
- When using historical Argo data, it should be accessed from the Argo GDACs and not from internal archived GTS data which will not include the most up to date and best version of the data.

Conclusions

The expansion of Argo into BGC parameters and full ocean depth in near real time has the potential to vastly improve ocean prediction as Core Argo data have done over the past 20 years. The first step is understanding how to access and properly use the OneArgo datastream. For further inquiries, email argo@ucsd.edu.

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