

PARAMETER_DATA_MODE designations for BGC-Argo Data

ADMT 20

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Definitions of “Delayed Mode” for Core-Argo

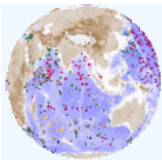


ARGO USER'S MANUAL

Version 3.1

November 7th, 2014

Delayed mode operators “...apply other procedures to check data quality and **the target** is for these data to be returned to the global data centres **within 6 to 12 months**. These constitute the delayed mode data (DM). The adjustments applied to delayed-data may also be applied to real-time data, to correct sensor drifts for real-time users. However, these real-time adjustments will be recalculated by the delayed mode quality control.”



Argo

part of the integrated global observation strategy

Argo data and how to get it



Home

A beginner's guide to accessing Argo data

“Delayed mode data profiles have been **subjected to detailed scrutiny** by oceanographic experts and the adjusted salinity has been estimated by comparison with high quality ship-based CTD data and climatologies using the process described by OW¹, WJO, or Böhme and Send. This process is carried out on a one year long data window and so **no Delayed Mode observations can be less than one year old.** ”

Difference between Core- and BGC-Argo

“Delayed Mode” requirements

- BGC data in its raw form is not fit for scientific use
- Even preliminary adjustments (ie assessment after the first ~5-6 cycles) can increase data accuracy by up to 20% for some floats/variables (namely, DOXY)

Should these ‘preliminary adjustments’ for BGC data still be defined as “delayed mode”?

YES

- They are subject to “detailed scrutiny” by the DM operator at time of assessment
- Comparisons to high-quality ship-based measurements and climatologies are used
- DM-adjusted measurements represent the highest data quality at time of assessment

NO

- Initial adjustments by DM operator usually represent analysis over less than three months of data
- Reassessment using one year of data will provide a more accurate adjustment

How will the definition of “delayed mode” for BGC data affect the user?

Argument: Premature delayed-mode designation (ie after only 5 cycles) gives false sense of data quality to user

- User may think that all D-mode files are of the same quality (whether assessed at 5 cycles versus 250 cycles)

But...

- It is accepted by BGC community that initial adjustments make BGC-data fit for scientific use
- Delayed mode data is accompanied by uncertainty estimates accessible to user
- User should be aware that the number of cycles designated by “D” for a particular parameter represents number of cycles reviewed in the last delayed-mode assessment
- Improvement to data accuracy between initial and subsequent DM assessments is much smaller than the accuracy gained from the initial assessment
- For Core-data that has been D-moded, it is already understood that subsequent DM assessments have potential to provide improved accuracy (DM assessments always improving as float ages and more data comes in)
- Designating `PARAMETER_DATA_MODE` as “A” for data that underwent an ‘initial’ correction would be inaccurate (not the same as real-time adjusted)

How will the definition of “delayed mode” for BGC data affect the user?

Argument: Initial delayed-mode designation (ie after 5 cycles, and beyond) gives reassurance to user

- With a “D” designator early on, user knows the float has been looked at by a trained operator (as opposed to an automated adjustment with more questionable accuracy)
- User should know that the more cycles with “D”, the better (longer time series has been assessed), and consider this within analysis
- For Core-data that has been D-moded, it is already understood that subsequent DM assessments have potential to provide improved accuracy (DM assessments always improving as float ages and more data comes in)
- Sticking with ‘R,A,D’ designators, as in Core-Argo, maintains consistency; creation of an additional data-mode (ie “P” for “prelim DM adjustment”) could create confusion (and at what state would designator move from “P” to “D”? 6months? 1 year? End-of-life?)

Proposition:

- Stick with traditional “R,A,D” PARAMETER_DATA_MODE designators
- Include uncertainty estimates with D-mode (and A-mode) data!
- PARAMETER_DATA_MODE will be:
 - “D” if a delayed-mode operator has included it in a D-mode assessment (regardless of timing at which this occurs, although recommended that this be at least 5 or more cycles)
 - “A” if an adjustment (typically stemming from the last DM-assessment) is applied in RT. Data is assumed fit for scientific use, but because it is automated there are no guarantees (ie processing / sensor errors could occur).
 - “R” if subjected to real-time processing and QC, but no adjustments of any sort have been applied.
- B-file data mode will reflect the highest level of PARAMETER_DATA_MODE

REAL-TIME (R-mode)

- Data has been decoded and converted to meaningful values
- Real-time quality control tests applied
- Data is received at the GDACs within 24 h of float surfacing
- Data is assumed acceptable for operational use
- Processing is automatic and does not require human intervention
- Data is not acceptable for direct usage in scientific applications

REAL-TIME ADJUSTED (A-mode)

- Data has been decoded and converted to meaningful values
- Real-time quality control tests applied
- Data is received at the GDACs within 24 h of float surfacing
- Data is assumed acceptable for operational use
- Processing is automatic and does not require human intervention
- Data adjustments (gain, offset, and/or drift) are applied in real-time

DELAYED-MODE (D-mode)

- Data has been visually inspected by the delayed mode operator
- Data has been compared against relevant reference datasets and necessary adjustments have been applied
- QC flag assignments have been thoroughly checked
- Data suitable for direct usage in scientific applications

*From Bittig et al.,
2019, A BGC-Argo
guide: Planning,
deployment, data
handling and usage,
Front. Mar. Sci.*

<https://doi.org/10.3389/fmars.2019.00502>

Proposition:

- State clearly in the documentation (ie Argo User Manual, website, etc) the meaning of delayed mode for BGC data (right), emphasizing differences in timing of initial DM assessment between core and bgc.

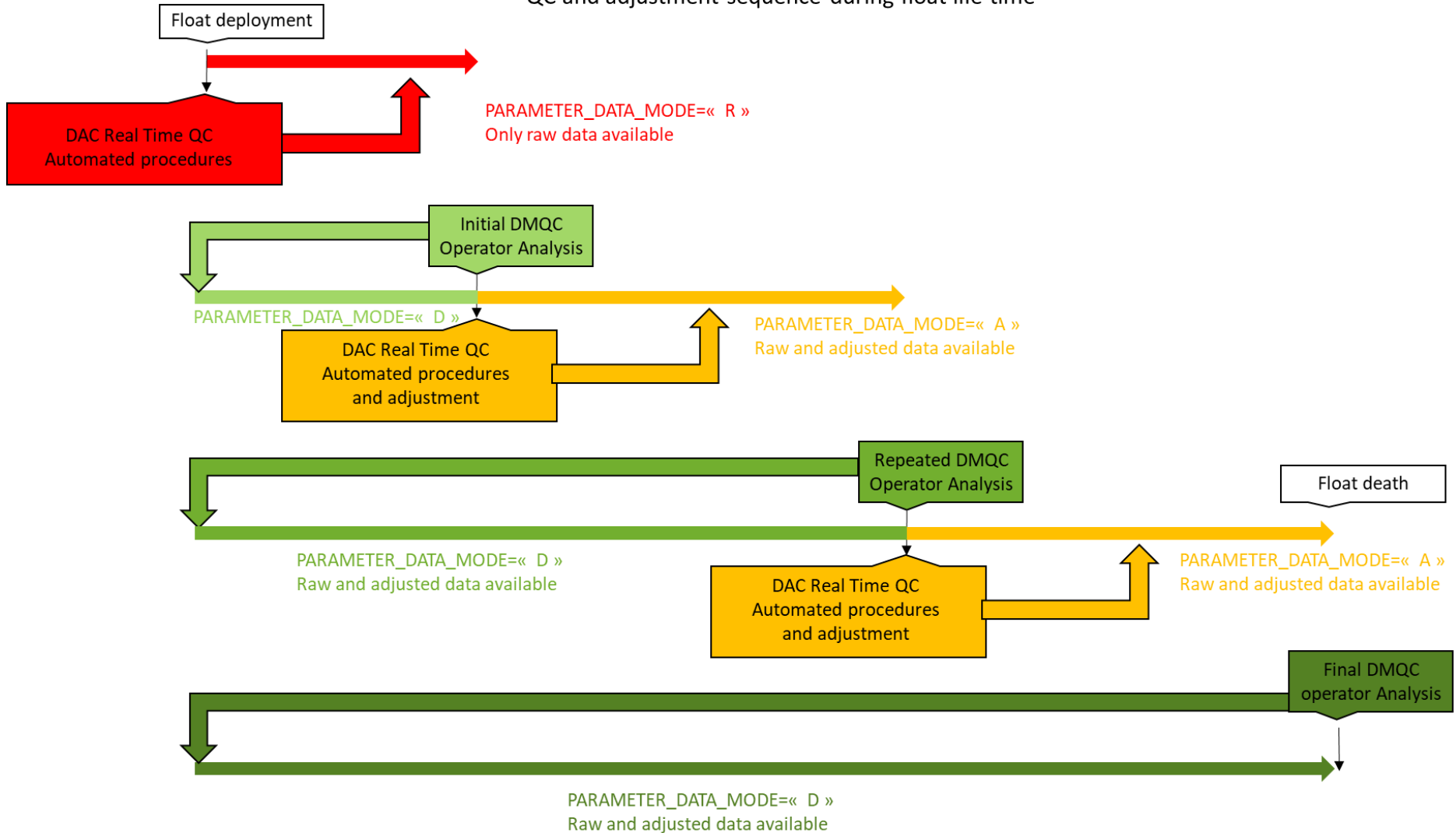
“Note that for BGC data, the definition of ‘delayed mode’ says nothing about the required timing of the initial DM assessment. In contrast to core data, the initial quality of unadjusted BGC data is typically unfit for scientific use (due to the existence of pre-deployment sensor drifts and offsets), so it is suggested that an initial visual assessment be performed early on (5th or 6th cycle) and associated adjustments applied. User must note that while the data resulting from the initial DM adjustment is of superior quality to data in its raw form and is generally thought of as acceptable for scientific applications, it should be understood that refinement of the adjustments in subsequent DM assessments (over longer time periods) will result in decreased uncertainty and improved data quality. ”

DELAYED-MODE (D-mode)

- Data has been visually inspected by the delayed mode operator
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Proposition:

QC and adjustment sequence during float life time



From Bittig et al., 2019, A BGC-Argo guide: Planning, deployment, data handling and usage, Front. Mar. Sci. <https://doi.org/10.3389/fmars.2019.00502>