Comment on essd-2022-323
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General Comments:

I believe this work to be very important. The Argo literature can sometimes be a bit scattered and overwhelming in volume. A manuscript summarizing the state of the Argo salinity database, and its limitations is a welcome contribution as it can guide new, and experienced, users on how to best use the data, and most importantly understand its limits.

The findings presented in this study are almost undersold: this is a valuable stepping stone towards improving the delayed-mode approach by recognizing the requirements and current limitations.

Specific comments:

P1L27: I particularly appreciate this sentence "These results reinforce the need for continual re-evaluation of this global dataset." As I believe to be a crucial component of the Argo program.

P3L68-69: The manufacturer's specs are misleading in salinity unit. As the CTD is calibrated in conductivity space, the conductive spec should only be stated. Does that salinity spec include the uncertainty on T and P propagated through the equation of state? Is it at Standard Temperature and Pressure (STP)? I think this might be better formulated in the way it is done in the conclusion: that the 0.01 accuracy is not from a metrological standpoint, but rather based on decades of data analysis.
P5L146: As a setup for the next paragraph (i.e., only using >600 dbar data), I would maybe add a sentence here saying that because floats park at depth before profiling upward, they start their profiling phase mostly thermally equilibrated and thus only near-surface large temperature gradients are likely to affect the data quality, only propagating into the surface layer as the float is profiling upward.

Fig3: I’m slightly confused by what that figure shows. Is it the average, median, or maximum DM salinity adjustment per box? That stat might be biased by the number of float in the box. I am also noticing that the distribution of the salty drift match the density map of available reference profile. In other words, the more reference data we have available, the larger the drift is. If that is true, it could mean that some of the drift is missed due to a lack of available reference data.

P10L219-219: This sentence sounds odd to me. Maybe something like "The raw data (DATA_MODE = 'R') can sometime be evaluated/adjusted in real-time (DATA_MODE = 'A', if available) before being evaluated/adjusted in delayed-mode (DATA_MODE = 'D'; See Fig 4)."

I would also suggest maybe including an example of real-time adjustment? It might not be obvious to the reader, as the text is especially focused on sensor drift and that would never be a real-time adjustment.

P10L231-232. The point that BGC data is a whole different beast is actually quite important, and I would recommend including the Bittig et al (2019) reference and emphasizing that point in the introduction.

Table 1: QC flag 'S' is a bit enigmatic to me. What could "value changed" mean? Maybe include an "e.g." in the box, or extra information in the table caption?

P12L239: typo; should be "mean" and not "means"

P12L240-241: Is inactivity the only reason why floats are removed from the grey list - or can they be removed on the operator's decision that the float is -after evaluation- not malfunctioning? If the latter, then I suggest to rephrase the sentence as it might be misleading as is.

P14L308: The third and fourth moment of a PDF are not necessarily intuitive metrics, I think it would be helpful to remind the reader what they mean (positive skewness meaning longer tail on the positive ââS, and kurtosis>3 meaning heavy tails with large outliers.
P14L309: I am surprised by the large number of datapoints still lying outside the ±0.015 after delayed-mode adjustment (>18%). I think a discussion should be included on how to improve this number. The authors highlight a series of limitations to the method, but I think it would benefit from suggestions on how to improve the robustness of this very helpful analysis, which is a crucial point in monitoring the quality of the Argo fleet.

P17L375-378: I believe this is a very important point and am glad to see it explicitly laid-out in this study!