

Interactive comment on “An internally consistent data product for the world ocean: the Global Ocean Data Analysis Project, version 2 (GLODAPv2)” by A. Olsen et al.

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Response to comments from referee 1 on An internally consistent data product for the world ocean: the Global Data Analysis Project, version 2 (GLODAPv2)

We thank the reviewer for setting aside time for this work and providing a set of very useful comments that has helped to improve the paper. Most of the comments have been taken into account, thus shortening the text and improving its structure. We hope the reviewers concur.

Below, we adress the comments of referee 1, one by one. Our responses are in italic, while the reviewer comments are in regular font.

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Cordially

Are Olsen

The paper presents a unique scientist driven data synthesis generating well documented, qualified and internally consistent data products. However the manuscripts appears very long and full of details that compromise its readability. Sometimes the excess of details distracts the reader from the main focus. This happens mainly in the first part of the manuscripts where the structure is confused since mainly driven by temporal progression of facts. A clear schema with all the historical background, the objective and a description of the paper outline in the introduction, would be preferable.

The development of the secondary QC methodology applied to GLODAPv2 product is mixed within the description of the project predecessors, including information that is more appropriate to a project report. Also the description of the production of GLODAPv2 might be shortened and better organized.

I understand the huge work behind the production of GLODAPv2 and the effort to put together all this documentation, however the paper now looks confused.

I recommend the paper for publication after a minor revision. It will follow a series of suggestions that might ameliorate it.

We have significantly shortened the manuscript, in particular the first half. In the word version number of pages for Sects. 1- 4 has been decreased from 18 to 12 pages, and altogether the number of word pages has been reduced from 69 to 56 The historical background has been shortened and moved to the introduction. The objectives have been moved to the introduction, which now ends with the paper outline, as requested. The QC methodology is now part of Section 3, which has been converted into a pure 'methods' section. This methods section describes all methods of GLODAPv2 production, and has also been significantly shortened.

Specific Comments and technical corrections

I suggest including a table with the ACRONYMS.

This has been included.

Introduction Page 4, Line 12: Start a new line "The main goal..."

The introduction has been revised so this cannot be followed on a word by word basis. Nevertheless, the main goals do now indeed appear in a separate paragraph in the introduction.

At the end of the introduction I would insert the outline of the paper.

This has been done

Page 5, Line 22: Start a new line "GLODAPv2 is primarily..."

This has been done

Page 6, Line 16: the phrase "the GLODAPv1.1...(SIO)." is not clear to the reviewer. It is very specific, is it necessary? If yes please rephrase.

This has been removed from the manuscript following the shortening.

Page 7, Line 24: What is Table 1, what's its meaning? I would insert a phrase to introduce it.

Table 1 has been removed from the manuscript following the shortening

Page 8, Line 13-20: Here you describe the CARINA effort, are these details necessary here?

The description of CARINA and also GLODAPv1.1 and PACIFICA has been included in the introduction and significantly reduced.

Page 9, Line 18: is it table 4 necessary? You already refer to the special issue, I believe it is redundant. You provide 13 Tables that are a lot.

Table 4 has been deleted in the revised manuscript.

Page 10, Lines 9-19: Are these details necessary here?

None of these details appear in the revised manuscript.

Page 10, Lines 19: is it table 5 necessary? 13 Tables that are a lot, you might put this in the Supplements.

Table 5 has been removed from the manuscript.

Page 10, last line: the initial minimum adjustment limits of Table 6 are those introduced in CARINA (page 9, line10)? Please specify here and in the table caption.

Details on CARINA has been removed from the MS. The initial minimum adjustment limits are now introduced in Sect 3.2.2, and this is where the table is first referred to. The caption specifies that these are the same as used in CARINA and PACIFICA.

Section 3 I recommend synthesizing the strategy steps, including the references to the sub-sections and leaving all the details to the sub-sections. Example: 1. Identify and ingest data not included in GLODAPv1.1, CARINA, or PACIFICA (GLO DAPv2NEW, Section 3.1) 2. Re-evaluate GLODAPv1.1 using CARINA analysis tools (GLODAPv1.2, Section 3.2) 3. Combine GLODAPv1.2 with CARINA and PACIFICA (Section 3.3) ... A new figure with the schematic of GLODAPv2 production is welcome!

The entire section 3 has been restructured into an easy-to-follow section that describes all of the methods used. We do not believe there is a need for a figure anymore, and hope that the reviewer concurs. This section does not mention all of the 'strategy-steps' so there is not need to 'synthesising' them as suggested by the reviewer.

Page 12, Lines 18-end of page: are these details important? First phrase is a repetition.

This has been moved to Section '2 Data sources' in the revised version'. We believe that it is worthwhile to mention community and organisational support so have kept the passage in the manuscript, though somewhat shortened.

Page 13, First Line: you refer to a Supplement, which one? I looked here

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<http://www.earth-syst-sci-data-discuss.net/essd-2015-42/> and the link does not work, please check.

We have checked and the link <http://www.earth-syst-sci-data-discuss.net/essd-2015-42/essd-2015-42-supplement.pdf> works. We hope that this will be OK in the final version as well.

End of page 15: The 7 distinct scenarios are well summarized in Table 9, why don't you refer to it here and shorten the text? Why don't you insert here the table and the results of the salinity and oxygen pre-calibration (page 27 lines 10-21, page 28 lines 9-19)? It could become section 3.5 Pre-calibration of Salinity and Oxygen Data, 3.5 becomes 3.6 and 3.6 becomes 3.7. Is it pre-calibration part of a primary or secondary QC?

The merging procedures for CTD and bottle data have been put in a separate section in the revised manuscript, Sect 3.2.1, under section 3.2 Secondary Quality Control. It is definitely part of the secondary QC, as the results have not been included in the individual cruise files with original data, but appear only in the data products. Hence the results have been summarised in Sect. 4, secondary QC results and adjustments. Thus, in order to having to refer to a table appearing many sections away, we chose to also list the seven scenarios in sect 3.2.1. This gives better readability we believe.

Page 16, Lines 11-21: Might this fit better in the Lesson Learned section?

Indeed, we agree and have moved this to the Lessons Learned section.

Page 17, Lines 5-15: At the end of section 3.4, after 5 pages of description of your strategy, you concluded to reset the entire database and carry out secondary QC on unadjusted data. Isn't it better to start from this? I would emphasize this since at the beginning thus I suggest revising and shortening Section 3 considering my previous comments.

Section 3 has been revised following this comment. We not not focus on the strategy,

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but rather the essential methods for producing GLODAPv2.

All of the work before the database was reset is now just very briefly mentioned, while we focus on the analyses of the unadjusted data. The subsections are

3. GLODAPv2 methods 3.1 Primary quality control 3.2 Secondary quality control 3.2.1 Merging of sensor and bottle data for salinity and oxygen 3.2.2 Crossover and inversion analyses of salinity, oxygen, nutrients, TCO₂ and TAlk 3.2.3 Quality control of the halogenated transient tracer data 3.2.4 Scale conversion and quality control of the pH data

Page 20 Line 25: "As an example our method..." please correct "As an example of our method..."

This has been corrected.

Page 21, Line 5: "...the bias of these these data." Please take out the repetition.

The repetition has been removed.

Page 22, line 20: I suggest to end the phrase after "...incomprehensible."

This has been done

Page 22, point 1: Why do you assign different values (0 or 1) to good quality data? Moreover this list could be ameliorated taking out unnecessary words and highlighting the flags assigned(-888,-666,-777...). A Table would be preferable.

The values 0 and 1 corresponds mathematically to no adjustment for additive and multiplicative adjustments, respectively. This is why we have used different values for good quality data. This has been more clearly stated in the revised manuscript,

As suggested, this list has been converted to a table.

Page 22, Line 24: I would add here "...in the table. A comment was not always entered when the data appeared unbiased. Some of the comments might also refer to

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workshops where the magnitudes of adjustments were discussed and decided. "The GEOMAR Adjustment Table gives the dataset source of each cruise: CARINA, PACIFICA, GLODAPv1.2, or GLODAPv2 (NEW). When accessing the table be aware of the following: 'c for CARINA cruises 'c for PACIFICA... 'c for GLODAPv1.2.. 'c for GLODAPv2 (NEW)... Comments for CFC and PH parameters are either inherited from CARINA or from the data processing described in sections 3.5 and 3.6." I would take out last item at the beginning of page 24.

Most of this detailed 'user manual' to the adjustment table has been put in an appendix. We have chosen to largely stick to the original wording there, to retain the level of detail and clarity.

Page 22, last line (same at page 23): Why GLODAPv1.2 appears as a dataset source? Shouldn't it be GLODAPv1.1? Here the reader might be confused. Please write specify it at page 23 line 15 instead of referring only to the sections.

This now appears in the appendix. We specify there, whenever mentioned, that GLODAPv1.2 is re-evaluated GLODAPv1.1

Page 23: I would recommend using the work "re-processing" instead of re-analysis, which is usually used for model data.

We now use 're-evaluated', which we believe is most appropriate, the data are evaluated for outliers and bias.

Page 25, line 8: what is sigma-4?

This appears now in the appendix. Sigma-4 has been defined and we use the common notation, lower case greek letter 'sigma'

Section 4 I suggest having only 2 sub-sections: 'c 4.1 The Adjustment Table 'c 4.2 The Secondary QC summary and leave the text at pages 20-21 as introduction to sub-sections.

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We do not agree. Preserved trends and variations is one of the main features of the data product, and we believe that is worthwhile to highlight this in a separate and named section.

I would leave in The Secondary QC summary section only the results of the secondary QC! The salinity and oxygen calibration (page 27 lines 10-21, page 28 lines 9-19) might fit in Section 3, as already written above.

As mentioned above, the salinity and oxygen calibration is part of the secondary QC as it has only been implemented in the product files, not in the individual cruise files. Hence we choose to summarise the outcome here, with the rest of oxygen and salinity secondary QC results.

Figure 5 and Table 10 should be introduced/explained here in the text and cited in the following sub-sections.

This has been done.

I suggest to put only the parameter names in the sub-sections (now inconsistent)

This has been done

Page 32, Line 5: please insert the reference to Table 6.

This has been added, we have tried to better refer to the relevant tables and figures throughout Sect. 4.3

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