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Interactive comment on "A new global interior ocean mapped climatology: the $1^\circ \times 1^\circ$ GLODAP version 2" *by* Siv K. Lauvset et al.

Anonymous Referee #2

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The study presented by S.K. Lauvset & al. is a valuable description of the global interior ocean carbon mapped climatology, obtained from the new GLODAPv2. It combines information from new data, with those of the first version of GLODAP (the GLODAPv 1.1). The data set is detailed in the companion paper by Olsen et al., while this paper focuses on the method used to create the mapped climatologies, presenting examples of the results, together with recommendations. This paper is a massive task and a great support to the ocean carbon community, however, I have some general comments and also some minor comments and suggestions below to be considered before I can recommend publication of the manuscript in Earth System Science Data.

General comments

The major concern in reading the paper was the absence of a detail analysis or

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explanation justifying the time periods (1986-1999 vs. 2000-2013) and reference depth (1000 dbar) for the time-dependent parameter and for the selection of the time-dependent parameters itselves (only pH, TCO2 and saturation state of aragonite and calcite). Have you effectively checked whether a time trend exists? At present both the choices are only based on assumptions (CLIVAR vs. WOCE period and negligible changes below that pressure).

Concerning the data, it may be helpful to clearly and briefly refer to the quality control process needed for the mapped climatology. I suggest adding few sentences about it, even if it is clear that is out of the scope of the present paper but covered by the companion paper (by Olsen et al).

More information about seasonal coverage of the data across the database could be useful to understand how/if seasonal bias could impact the results. The temporal distribution of data could be represented on seasonal and geographical basis as schematics on introduction synthetic figure (at least for TC02).

Except these irregularities, I found the paper really clear and well conducted in its form up to the conclusion.

Minor comments

p2 l36 "...based on data from all ocean basins up to and including 2013" The starting year of the database is not clear from the abstract. Please specify.

p2 l65 Add reference to WOCE

p3 l71 Ambiguity of expression "In response of the shortcoming of GLODAPv1.1..." One of the shortcomings of GLODAPv1.1 was the absence of data in the Mediterranean Sea as stated at p2 l67, but considering the map provided, it looks like that GLODAPv2 data do not cover it either for the 1986-1999 mapped climatologies. Values masked in data-poor regions or mapping error exceeding one standard deviation? Please explain and add details about real final coverage of the mapped climatology.

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p3 l81 " . . .adjustments have been applied to minimize measurement biases and several calculated data have been added to complete the data coverage" not clear enough. Add details to the calculation method. Interpolation? Calculation for the third inorganic carbon parameter if absent in the data files?

p4 l117 "All bias-corrected data were vertically interpolated. . ."

p5 l135-143 More details needed about the assumed pressure and time frames selected to provide different mapped climatologies. Please comment more or add analysis/figures justifying both choices.

p5 l143-144 Please comment more (here and later) about how seasonal bias of the data may impact the results. The temporal distribution of data could be represented on seasonal and geographical basis as schematics on introduction synthetic figure (at least for CO2).

p6 l170 ". . .this was defined a priori as 7°, except for the time-dependent parameters (TCO2, pH, ΩC and ΩA)"

p6 l174-175 Would it be possible to use an optimized spatially varying CL where the data density is high and use CL equal to 7-10° values elsewhere? But this is a hard job and maybe should take place in a new future release.

p8 l243 Replace netcdf with netCDF (same for p9 l280 and Table 2 caption)

p8 l252-253 Add few rows describing these expected spatial patterns.

p9 l256-264 I think you could move these sentences to the next section where you discuss the error fields. Instead add here more details and critical description about results adding reference to each figure in the text.

p9 l264-266 I would not stress this here as in the previous sentence you state the Mediterranean Sea is covered only from 2000-2013 and has masked values in the mapping error.

p9 l276-278 Please add some examples of masked area (e.g. Caribbean, Mediterranean for the 1986-1999 period or Northwest Indian Ocean for the 2000-2013 period).

p9 l281-288 Consider to add these values in a synthetic table + units

p11 l322 Add reference to the WOA and difference between WOA09 and WOA13.

p11 l333-336 A synthetic figure in the input data Section, representing geographically the seasonal coverage of data could help here.

p11 l345 Add vertical resolutions.

p11 l321-345 Considering the higher density of data of the WOA, one could argue what is the necessity of a new GLODAP v2? Please add arguments to support your climatologies.

Table 1 Add units information for the Maximum distance allowed (i.e. dbar).

Table 2 Remove any dots at the end of a sentence in the Description column.

Figures General suggestion: Always label the axes in the form "quantity (unit)"

Figure 1 Data density is not easy to see. Please consider to use bold colours to represent data (distinction between seasons could be done as well).

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