

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 #1

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The latest version of the ocean carbon climatology incorporates significantly more data than the original, at least in the North Atlantic and North Pacific, and thus should provide a more robust climatology. The data set is explained in a separate paper, but this manuscript documents how the climatology was made. The climatology does illustrate some of the shortcomings of the data. In particular, the 100 $\mu\text{mol/kg}$ uncertainties in the Eastern Tropical Pacific are very disturbing. Are there no data in that critical part of the ocean? The gap in the Arabian Sea is understandable with the inability to work in the area because of the pirates.

GLODAPv1.1 was gridded to match the World Ocean Atlas so users could pair the carbon climatology with the WOA climatologies that have much higher data density. The authors chose not to do that this time, but I did not see a clear explanation of why they chose to produce their own gridded version of the physical and nutrient fields

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rather than the existing fields with much higher data density. They should address this better in the text.

The authors chose to provide two time frames for the upper 1000 dbar, but provided no justification for why they broke it there other than an assumption that changes were “negligible” below that depth. That assumption may very well be true, but I would like to see some analysis that justifies that decision. I also note that they decided not to calculate the time difference for Talk or temperature or salinity. The choices of which parameters and depth ranges to split seem too arbitrary.

The authors acknowledge several times in the manuscript that some of the parameters clearly have a time varying component, yet they make no attempt to correct for this. If the authors would like to generate two different decade assessments, why wouldn't they try to normalize the data to a common year? By just picking a dividing line of January 1, 2000 they could have two cruises only a month apart with one cruise contributing to the 1990s decade and the second contributing to the 2000s. I understand that there are uncertainties associated with any time correction, but are these uncertainties larger than the known errors of doing no correction at all? The same issue exists with the seasonal cycle in shallow waters and potential biases in the timing of the cruises (primarily in the summer months). At the very least, the authors should better explain their reasoning for the decisions they made.

Do the Error fields include uncertainties in the calculations for derived variables like saturation state? Please clarify in the text. The authors state, “The difference between the climatologies for the two time periods in no way represents an estimate of decadal change in global ocean CO₂.” The authors go on to point out that uncertainties approaching 100 $\mu\text{mol/kg}$ are much larger than any expected trend. While I agree with this statement, it seems to beg the question of why do the time separations at all. The section is titled “best practices”, but all it says is what not to do. It would be good to give examples of how the climatologies should be used.

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