

## ***Interactive comment on “CARINA-Oxygen: a new high-quality oxygen database for the Atlantic Ocean” by I. Stendardo et al.***

### **Anonymous Referee #1**

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#### General Comments:

This paper describes quality-control procedures to a large database of dissolved oxygen from Atlantic Ocean stations and results from that analysis. This is an important service to the community and its careful documentation in this paper is key to its future use. The paper also presents useful discussion concerning what future science could be done with this dataset. The summary and conclusions section is particularly fine. I have a number of comments, which are mainly requests for clarifications that I think will improve reader understanding and future, appropriate use of the database.

#### Specific Comments:

The use of multiplicative offsets rather than additive ones for oxygen is probably war-

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ranted here. However, more discussion of the reasons to choose this method and its implications would improve the paper. Some important points might include the following: Multiplicative offset is essentially an a priori assumption about the data rather than one that can be derived from the QC analysis. Oxygen concentrations deeper than 1500 dbar are relatively constant in the Atlantic, so it is difficult to determine whether the slope, intercept, or both is in need of revision in a crossover analysis. Tanhua et al mention that "problems in standardization are the most likely source of error, hence a multiplicative offset is deemed as appropriate." It would be helpful to reiterate this here, with some further statement about the potential for additive offsets that arise from improper blank determination in oxygen analysis. Finally, some mention of the potential scale of errors that would be introduced by an incorrect assumption of multiplicative offsets for any particular cruise would improve the ability of readers to make appropriate assumptions about errors in their use this dataset.

The authors briefly make the important point in the introduction that the secondary QC procedure described results in a more internally consistent database, but not necessarily in a more accurate one. Given the importance of this point, I would like to see it expanded on some by a brief mention in the abstract and a return to this point in the summary. This is important because some uses of oxygen data, such as air-sea gas exchange calculations, depend on accuracy and users of this database should understand the limitations it is still subject to.

The discussion of errors in the last paragraph of the methods section could be clarified. I usually think of accuracy as a measure of the difference from the "true value", which is unknown in this case. I guess that equation 1 is a measure of the possibility that the analysis has biased the dataset in one direction. For example, if you had one very high cruise with many crossovers, the inversion might bias the offsets in that direction. In any case, it would be helpful to expand on the meaning of this calculation.

A few details made clear in the Tanhua methods paper would be helpful to briefly mention here, such as interpolation of the profiles used in the crossover analysis to

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obtain like-density data and the use of a time factor in weighting.

The meaning of figures 6 f, g, and h is not clear. These parts of figure 6 don't appear to be discussed in the text. Was a second inversion applied after the first round of adjustments was made? Were further adjustments made based on this inversion or was it just a check?

Technical Corrections:

This paper would significantly benefit from a good copy editor to correct some of the English phrasing. The end of section 4.1.9 is a particularly egregious example.

The mention of cruise 29CS19771007 in the first paragraph of section 2.1 has the potential to be misleading. By only highlighting this cruise as one that was not included in the secondary QC, it implies that all other cruises were included. Table 1 shows that this is not the case. It would help the reader to clarify this.

Tanhua reference cited in the second sentence of section 3 should perhaps be 2009b not a.

Second paragraph of the Methods section states that only data deeper than 1500 dbar were used in the crossover analysis, but Table 1 shows that a few stations used data deeper than 1000m.

The second paragraph of the results section lists many cruises with their adjustments. Perhaps this would be better presented in a table.

Table 1 footnotes seem to not to have been fully applied. Label e for "No deep data so not included in the 2nd level QC" seems like it applies to more than just the labeled cruises. 29CS19771007 for example.

Colored bathymetry lines in Figure 1 are distracting. Making them grey or deleting them might help to reduce interference with the colored data points.

Caption to figure 3 could briefly make clearer what is meant by reference cruises.

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Does figure 4 show profiles after adjustments have been made? These are really nice looking graphs. I hope that they appear a lot larger in the final version than in the version I had to review.

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Interactive comment on Earth Syst. Sci. Data Discuss., 2, 103, 2009.

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