**Earth System
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Interactive comment on "Arctic Ocean data in CARINA" *by* S. Jutterström et al.

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On behalf of myself and the co-authors I would like to thank both reviewers for reading the manuscript carefully and for their helpful comments. As the second reviewer did not suggest additional changes from those of the first reviewer, the final response will consist of the aswers given to reviewer 1 as a short comment.

Regarding the errors in the Table: The locations of the cruises were initially stated as Arctic/Storfjorden/Barents and one cruise as being a North Water Polynya cruise, so the cruises in the Canadian Arctic Archipelago were listed as "Arctic Ocean". For 18RD19990827 there were also three stations much further south so it went under the general description. To avoid confusion, the group Canadian Arctic Archipelago has been added (18SN19970831 and 18SN19970803 are also included in that group) and 18RD19990827 is stated as located in the NWP. The data itself is correct so there has

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not been any mix-up with the actual location of the cruises in the data-set.

18RD19990827 was not included in the secondary QC for the reason the reviewer mentions. The confusion is likely related to figure 3 where it will be clarified that the red dots depict the stations for secondary QC. With regards to Table 1, it states that the cruises marked with an a was not involved in repeated primary QC or secondary QC. This does not mean that all the others were involved in secondary QC.

The Country/Institutions and PI names that were in the tables have been removed and instead the web address to the Carina data table at CDIAC was inserted in the text. This is due to discrepancies in different versions of readme files and cruise summary tables, so it is better if the reader collects this information from CDIAC directly where the readme files can be updated if necessary and also contains more information than a table. One comment is that the readme file for 18RD19980404 at CDIAC does not list D. Wallace as responsible for the carbon parameters (who the reviewer suggested was responsible) and this is being checked so that the correct names are in the readme file at CDIAC.

The 06AQ19930806 cruise has both TCO2 data and oxygen data (which are included in the analysis and are also discussed in the paper). The tables have been rechecked so no other cruises were missing parameters. The number of samples for each parameter are those that are flagged 2 so there might be discrepancies compared to the CDIAC Carina-table.

Comments regarding MLRs: The description that the reviewer decided on was fully correct and an extended description was added to the paper for clarity, as well as the statement that the α-coefficients are of course individual for each regression. I am not familiar with the use of MLRs where you would assign "optimum" values beforehand so this has not been added to the paper. Regarding collinearity among the predictive variables, this is not a problem if you simply want to express a parameter as a function of other parameters; problems arise if you want to investigate the importance of each

individual predictive variable (which we don't do in this paper).

Several MLRs with different predictive variables were run for each parameter and also with different sets of cruises contributing to the regression (the latter was not mentioned in the first draft and a few comments have now been added of the results from changing predictive cruises). This is to make sure that there is not a predictive parameter that is in itself offset and will carry this over to other calculations and the same goes for the cruises involved in setting the regression function. As for determining what is the best MLR, one can look at the adjusted R2-value together with a scatterplot of the fit, the rms and the residuals. One point that is worth mentioning is that there is no adjustment made for the data included in the Arctic Ocean synthesis based on only the MLRs, in every case there is a clear offset in the deep water averages. The MLRs are simply used as a tool to see if the difference found in the deep-water averages can be explained by e.g. differences in salt, temp, nutrients etc. A description and explanation of the box-and-whiskers plots is added as well as an explanation for the function in the MLR-plots and the additional numbers.

Answers to additional comments:

The link to the dataset has been corrected.

The choice was not to include a listing of the parameters since there will be only one paper describing the Arctic Ocean data set and there could be some confusion over whether or not to include all the parameters that are actually in the dataset or only the ones in the synthesis. This does not have to be the best alternative and parameters can be added.

The longitude description will be changed to circumpolar (0-360$°$)

I am guessing that the Atlantic paper referred to is the Velo et al paper? It is in the reference list with the authors stated at the time when the manuscript was written. Any changes will be updated.

It is a very good suggestion to check the nitrate offset for 06AQ19930806 after adjusting the oxygen data, the result is that an offset in nitrate is found and this will be added to the paper.

Best regards, Sara Jutterström

Interactive comment on Earth Syst. Sci. Data Discuss., 2, 281, 2009.

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