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Interactive comment on “Measurements of total alkalinity and inorganic dissolved carbon in the Atlantic Ocean and adjacent Southern Ocean between 2008 and 2010” by U. Schuster et al.

U. Schuster et al.

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We thank the reviewer for the careful assessment of our manuscript and their comments that improve it. Below we give the reviewer's comments in italics after Comment, and our response below each one after Response.

Comment: Section 4.2; 2nd level QC: I cannot see anywhere what the result of this analysis is presented. 2nd level QC is generally an useful way of establishing the accuracy of the data, and the authors have done so by both comparing to CRMs and by carrying out a cross-over analysis. Please state the results of the crossover analysis

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Discussion Paper



in the form of potential biases in any of the measured parameters. It would also be useful to establish the connection to GLODAPv2 here and make sure the GLODAPv2 team have the same suggested adjustments as the authors of this study. Response: Concerning dissolved inorganic carbon (DIC) and total alkalinity (TA): during the 2nd level QC we performed, we had not been able to identify any corrections (they were below 4 $\mu\text{mol} / \text{kg}$ for DIC and 6 $\mu\text{mol} / \text{kg}$ for TA (Wanninkhof et al., 2003), so that the data that we submitted to BODC, CCHDO, and CDIAC did not contain any corrections. GLODAP 2, now coming in the final stages, recommends one correction during JC031, where TA was found to be too high by approx. 10 $\mu\text{mol kg}^{-1}$. This has now been described in greater detail in section 4.2, and a Table 5 has been added, outlining the GLODAP 2 recommended corrections. Concerning temperature, salinity, and nutrient measurements: these are not the emphasis of this paper, yet in answer to reviewer 2, the standard operating procedures have been given, as well as the GLODAP 2 recommendations for adjustments.

Comment: Technical comments: It is usual to use the name of a cruise in the form of ship and cruise number; i.e. DI364 etc. However it is also a practice to use the so called expocodes for unambiguous identification of a specific cruise. The expocodes are listed in Table 1, but I would suggest referring to the expocode also in the initial table “Data coverage and parameter measured”. Response: We thank the reviewer for highlighting the naming confusion. In the abstract, we now refer to the cruises by latitudes and “Drake Passage” only, as they give the geographic regions. We then, in the initial table and Table 1, repeat these latitudes and “Drake Passage” and give the EXPO codes. The cruise names are introduced in Table 1, and these are used throughout the rest of the manuscript.

Comment: Figure legend 1: Please be consequent in referring to the various sections. Now it is a mix of references to latitude, project name or WOCE section-name. Response: Following on from the previous comment, we now use cruise names in Figure 1, i.e. DI332, DI346, JC032, and JC031.

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Comment: Table 1: The names Arctic Gateway and Drakes Passage are not really “nominal latitudes”. Response: It is correct that Arctic Gateway and Drake Passage are not nominal latitudes, and the term has been changed to “geographical region”.

Comment: It is not spelled out (clearly) in the manuscript, but I assume that the values in table 3 are the adjustments applied to the data in the 1st level QC. Please make this clear. Response: Accuracies are now listed in Table 4, as the precisions (now Table 3) have been moved up into section 4.1 (1st level QC). We are sorry for not being clear enough, as the accuracies listed in the (now) Table 4 are without any adjustments; as the comparison with the CARINA data set had not identified any offset, the accuracies in Table 4 are defined for TA measurements as the standard deviation of CRMs per acid batch, and for DIC measurements as the standard deviation of all CRMs per cruise ((Dickson et al., 2007), SOP 23). In section 4.2 and the Table 4 title, we now added further details about this.

Comment: Page 631: The sentence “Corrective adjustments are only considered when offsets are greater than 4 $\mu\text{mol kg}^{-1}$ for DIC and 6 $\mu\text{mol kg}^{-1}$ for TA (Wanninkhof et al., 2003) and the mean offsets for the DIC and TA data were below these thresholds” is a bit out of place since the authors do not apply any adjustments, but can possibly suggest that there is a bias in the data. As I understand this, the data products like CARINA can apply adjustments to the data whereas the data reported here are not subject to any crossover based adjustments (but adjustments based on CRM measurements). Also, those lower limits of adjustments were used in CARINA, but might not apply to GLODAPv2. Response: we have added details outlining that the comparison with the CARINA data set did not identify any offset within the given limits. A comparison with a more comprehensive data set used in the GLODAP 2 initiative, containing other cruises not in CARINA, showed a recommended adjustment for TA during JC031 of 10 $\mu\text{mol kg}^{-1}$. Details about this have been added to section 4.2, Table 4 title, and the additional Table 5.

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