Earth Syst. Sci. Data Discuss., 2, C61–C64, 2009
www.earth-syst-sci-data-discuss.net/2/C61/2009/

Earth System Science Data Discussions

Interactive comment on "CARINA: nutrient data in the Atlantic Ocean" *by* T. Tanhua et al.

T. Tanhua et al.

ttanhua@ifm-geomar.de

Received and published: 15 October 2009

Response to Reviwer #1 (David Hyedes) comments to the paper "CARINA Nutrient data in the Atlantic Ocean" by T. Tanhua, P.J. Brown, and R.M. Key.

The relation between the CARINA and GLODAP databases is very nicely discussed in the CARINA overview paper by Key et al, 2009. However, this paper was not available to the reviewer at the time. We added two sentences to the beginning of the introduction to this theme: The CARINA database includes cruise that are included in the GLODAP (Key et al., 2004), which mainly consists of WOCE/JGOFS cruise. The two databases are thus complementary to each other, and while both databases cover historical cruises, CARINA includes post-WOCE cruises, up to about year 2005.

We added some information on the differences between the adjustments applied to the nutrient data in GLODAP and CARINA: The adjustments for nutrients data in the GLODAP data set (Gouretski and Jancke 2001) are different from those in CARINA in that adjustments in GLODAP are; (i) additive as opposed to multiplicative, (ii) are objectively applied based on inversion results, whereas CARINA had a somewhat "subjective" component (Tanhua et al., 2009), and (iii) based on comparisons with a completely different set of cruises. The adjustments suggested by CARINA to the six GLODAP reference cruises will therefore also be included as reference in this report, although they are formally not part of the CARINA data set.

We added a sentence to the nitrate/nitrite reporting issue: We encourage investigators to report nitrate and nitrite values separately in the future to avoid this problem. This is also addressed in the CARINA overview paper (Key et al, 2009).

We acknowledge the work of Dr. Aoyama as very important, and we had added a short section in the paper regarding the use of CRMs for nutrients. This is also discussed in the CARINA overview paper (Key et al., 2009): The analysis of the CARINA data make it abundantly clear that there is an urgent need to adopt practices of using certified reference materials (CRMs) for nutrients. Also for GLODAP, Key et al. (2004) noted that the need for nutrient standards similar to the carbon CRMs. Progress has been made (Aoyama et al., 2008; Aminot and Kirkwood, 1995), but so far, the use of nutrient "CRMs" has not been generally adopted. The community must adopt a set of CRMs and those "standards" should be used on every cruise. This change in methodology is absolutely critical if we are ever to understand subtle changes in nutrient distributions and stoichiometric ratios in a changing ocean environment.

Page 69, line 13: We added a small discussion on the 2% cut-off limit for adjustments: Based on an error analysis of the crossover analysis, Tanhua et al.(2009b) reports on the RMSE of the differences between offsets calculated with two slightly different crossover methods. They found that the RMSE is large for silicate (7%) and phosphate (4.2%) but slightly smaller for nitrate (2.9%). Tanhua et al. (2009) suggests that adjust-

ments smaller that the RMSE between the two methods might be to optimistic, i.e. that analytical precision and/or natural variability prevents unambiguous adjustments to be made. It thus seems that the 2% cut-off limit was somewhat optimistic for phosphate and silicate, but realistic for nitrate. Page 70, line 15: The information can now be found on this web address. We apology for the delay in getting the “crossover website” on-line at CDIAC.

Page 71, line 16: Changed.

Page 71: We added the information regarding EXPOCODES: Each cruise in the collection was assigned an EXPOCODE (Swift, 2008). These codes provide an unique identifier and are composed of NODC (National Ocean Data Center) platform code for the research vessel (http://www.nodc.noaa.gov/General/NODC-Archive/platformlist.txt) followed by the date when the cruise left port. The NODC code is composed of a 2 digit country code and a 2 character (number or letter) ship code. For example a cruise that started on October 3, 1999 aboard the Norwegian vessel Hakon Mosby would have EXPOCODE 58AA19991003.

Regarding the OMEX1NA cruise; the reviewer is correct that this represents more than one cruise. This is also the case for OMEX1NS, OMEX2, Irminger Time Series and Iceland Time Series entries to CARINA. All of these entries can potentially have internal bias in all measurements. The reasons these are treated as one entry (as opposed to several individual cruises) is twofold: 1. The amount of data/cruise was so small that it didn’t justify the effort. 2. Since the data were in very small region(s) and aimed at a specific set of issues particular to that region(s), we felt that the data would be more useful to end-users if combined into a single unit. If anyone wants to segregate by cruise, the necessary information is available in the file header. We thank the reviewer to point out the biases present in the OMEX1NA nutrient data. This information is now included in the paper. OMEX1NA, cruise #187 This entry represents a number of field campaigns with nutrients measured by 3 main groups. Significant offsets between these measurements have been reported (Hydes et al., 2001).

Interactive comment on Earth Syst. Sci. Data Discuss., 2, 63, 2009.