

## ***Interactive comment on “MAREDAT: towards a World Ocean Atlas of MARine Ecosystem DATa” by E. T. Buitenhuis et al.***

### **Anonymous Referee #2**

Received and published: 21 January 2013

#### General comments

This manuscript explains the context of the MAREDAT special issue, the characteristics of the 11 Plankton Functional Types (PFT), and provides details of the quality control and statistical treatment/analysis that was performed systematically across all papers of the MAREDAT special issue. It is therefore an important reference paper for the 12 datasets (11 PFTs + 1 HPLC pigments datasets) that were compiled for the special issue. Additionally, the authors provide a summary of the 11 PFT datasets, showing statistics for biomasses and their vertical and horizontal distributions in oceans. Results from the 12 datasets and from the World Ocean Atlas are compared, addressing the coherence as well as inconsistencies among autotrophic and heterotrophic PFTs, and briefly discussing ecological implications of the results for these two trophic groups.

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Finally, the authors address the usefulness and limitations of the 12 data compilations, identify specific needs for additional data, and acknowledge recent global sampling initiatives that could help fill these gaps.

I find it confusing that the manuscript serves two purposes: 1. Overview of the special issue, and 2. Presentation the microzooplankton dataset. In my opinion, the microzooplankton dataset should remain the data supplement of Buitenhuis et al. (2010), rather than be included as a supplement to the present manuscript. The revised version of the microzooplankton dataset has been submitted to PANGAEA and should be shown there as the supplement to Buitenhuis et al. (2010). The microzooplankton dataset can still be considered as a contribution to MAREDAT without being re-published in ESSD. I provide specific comments below to modify the manuscript accordingly.

The manuscript consistently refers to 12 MAREDAT “databases”. This is only semantics, but the term “database” is very dependent on the structure and functions of its management system. I recommend referring to them as 12 “datasets” that are archived and incorporated in the PANGAEA relational database. I realize that the separate papers published in the MAREDAT special issue often use the word database (even in their titles) and that my comment is probably impossible to implement across the special issue, but I suggest to follow my recommendation at least for the present manuscript. Doing so implies many corrections in the text, which I do not report here. The authors can search all occurrences of the word “database” and edit the text as appropriate.

Overall this is an important contribution to the MAREDAT special issue. It brings an original interpretation that complements the results presented separately in more details in the 11 other papers of the special issue.

#### Specific comments

Page 1079, line 20. Consistently with my general comment about the microzooplankton dataset, I suggest to replace “Microzooplank-

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ton database: doi:10.1594/PANGAEA.779970” by “MAREDAT datasets: http://www.pangaea.de/search?&q=maredat”

Page 1080, lines 4-7. The reference for this sentence is probably Le Quéré and Pesant (2009). That reference can then be removed from the previous sentence.

Page 1080, line 9. I suggest replacing “describing a database of” by “on HPLC-based”. Similarly, on Line 13, I suggest replacing “the HPLC-based phytoplankton pigment database paper” by “HPLC-based phytoplankton pigments”.

Page 1080, lines 15-16. Consistently with my general comment about the microzooplankton dataset, I suggest to replace “(here, we briefly... published by Buitenhuis et al., 2010)” by (Buitenhuis et al., 2010)”

Page 1081, line 20. Consider replacing “cycling of alkalinity...” by “cycling of calcium carbonate, and thus alkalinity and atmospheric CO<sub>2</sub>”.

Page 1081, line 22. Consider replacing “are useful to evaluate...” by “are also useful to parameterize carbon and nitrogen cycling in ecological models”

Page 1082, line 2. Instead of saying “like MAREDAT”, please provide the name and references of these initiatives. This would be a useful information for the reader.

Page 1082, line 8. “We accept that... datasets. Hence, we” Is a very tortuous sentence. I suggest to simply say “Because data are often too scarce to provide global coverage, we”

Page 1082, line 15-18. I suggest adding after the first sentence of the paragraph: “Each of the 12 datasets can be cited with the DOIs reported in Table 2.”

Page 1082, line 16. Please replace “from the PANGAEA World Data Centre” by “at PANGAEA Data Publisher for Earth and Environmental Science”

Page 1083, lines 11-15. Consistently with my general comment about the microzooplankton dataset, I suggest to move these lines to Section 3.2.4 Heterotrophs.

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Discussion Paper



Page 1083, line 26 to Page 1084, line 8. It is unclear to me how Zero values were collected and then transformed. The authors should clarify if all zero values in the raw datasets are absence and NOT “lack of measurement”. I do not understand why zero values “are usually underrepresented, especially in the deep sea”? Do the authors wish to say that true zero abundances are sometimes substituted by no value (e.g. NaN, n/a, nil, or just a blank), so that the information about a true absence is lost. Or do they wish to say that information about a true absence is lost due to log transformation. Finally, I gather that the authors have generated two types of datasets: 1. “Non-zero observations” were log transformed and QC’d with a 2-sided Chauvenet’s criterion; 2. “Total observations” were not logtransformed and were QC’d with a 1-sided Chauvenet’s criterion. In any case, this should be explained more clearly.

Page 1084, line 1. Replace “abundance/biomass” by “abundance or biomass”

Page 1085, lines 1-14. Consistently with my general comment about the microzooplankton dataset, I suggest to move these lines to Section 3.2.4 Heterotrophs.

Page 1086, line 2. I suggest rewording “(Fig. 4), though (. . .). This increase in patchiness” to “(Fig. 4). Although (. . .), the increased patchiness in both groups”.

Page 1086, line 8. Replace “zooplankton” by “macrozooplankton and pteropods”?

Page 1086, line 20. I am puzzled by the sampling bias proposed by the authors for a peak in diatom biomass at 125m (Fig. 2A). This is also reflected in Fig. 2D for the sum of phytoplankton. . . and it seems to match an absence of observations OR true zero abundances of forams and pteropods at 125m. . . I’m sure the authors have looked at the actual availability of observations at 125m. Is the bias towards diatoms due to only one of a few observations? It is probably impractical to run the QC for high values “per depth layer”, but this might have removed this bias. In any case, I suggest to explain in more details this possible bias because this is “the feature” that strikes the eye in Figure 2.

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Page 1087, line 20. It is unclear why the presence of zeaxanthin is consistent with the lack of diazotrophs.

Page 1087. The comparison of the Total phytoplankton from MAREDAT (with and without Phaeocystis) with those from HPLC and WOA should be discussed in more details in Section 3.2.5, notably the surface (or coastal) maxima shown in MAREDAT (with and without Phaeocystis) and HPLC that is not shown in WOA. I suggest showing the four total phytoplankton profiles in a separate pane, i.e. Fig. 2E, which would also point to differences in the magnitude of the average profiles. It would be useful for the discussion to compute average profiles (totals only) for coastal and open ocean separately.

Page 1088, line 25. Although I do not object to the idea that a peak at 20m might be “real”, the authors should explain how vertical migrations could result in this peak. It could be argued that organisms aggregate near the surface to feed at night (peak) and disperse in the water column during the day. . . This behavior would however mean that the vertical integration of biomass for these organisms would be overestimated by up to 2x. . .

Page 1091, line 19. I fail to see an inverted pyramid in Figure 5. Perhaps it would be worth doing this figure for coastal (0-100m), open ocean (0-100) and open ocean (>100m) separately.

Page 1093, line 4. The Tara-Oceans expedition collected samples during 2009-2012 and will complete its sampling of the world ocean with a circumpolar expedition in 2013. Please correct the text accordingly.

#### Tables and Figures

Table 1. Two decimal places are probably not necessary for most PFT biomasses reported in Table 1

Table 2. Please write the full doi reference, e.g. doi:10.1594/PANGAEA.777385, for

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each line of the table. Please add characteristics of the HPLC dataset as well. The DOI of that dataset must be easy to find along the others.

Figure 1. Consistently with my general comment about the microzooplankton dataset, I suggest to remove Figure 1 from this overview paper. It is unfortunate that the revised microzooplankton dataset is not presented as a separate paper in the MAREDAT special issue, but the original dataset is nevertheless described in Buitenhuis et al. (2010). The reader should be referred to that publication and to the dataset at PANGAEA if he wished to examine it in more details. Moreover, the vertical distribution of microzooplankton is already shown in Figure 2.

Figure 2. I suggest showing the four total phytoplankton profiles in a separate pane, i.e. Fig. 2E, which would also point to differences in the magnitude of the average profiles. It might be useful for the discussion to compute average profiles (totals only) for coastal and open ocean separately. Make sure that each pane is much larger.

Figure 3. The authors should reorganize and add panes on that figure. A stack of five panes for autotrophs on the left, a stack of five heterotrophs in the middle and a stack of five panes on the right showing: zonal averages from WOA, HPLC, sum of autotrophs (Fig. 3A-E), sum of heterotrophs (Fig. 3G-L) and zonal values of H:A ratios. The latter could help the discussion in Section 3.2.6. Make sure that each pane is large enough to read.

Figure 4. needs substantial improvement of the format

Figure 5. Perhaps it would be worth doing this figure for coastal (0-100m), open ocean (0-100) and open ocean (>100m) separately.

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Interactive comment on Earth Syst. Sci. Data Discuss., 5, 1077, 2012.

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