

Comments on the MS by Moriaty and O'Brien "Distribution of mesozooplankton biomass in the global ocean".

This was a reasonably straightforward report, with little in the way of discussion or interpretation. I have relatively few comments, which need some attention before giving it my endorsement.

### **Abstract**

Page 894. In Lines 4-5. "They (*mesozooplankton*) are also the primary contributor to vertical particle flux in the oceans."

I think this may be a bit of an overstatement, since in temperate and sub-Arctic regions, where spring blooms are intense, senescent un-grazed phytoplankton can contribute significantly to vertical particle flux. So, I would suggest changing the text to something like:

"In many regions they are also the primary contributors etc."

Page 894. In Lines 23-25. "Biomass was highest in the Northern Hemisphere, but the general trend shows a slight decrease from polar oceans to temperate regions with values increasing again in the tropics."

Biomass is higher in the Northern than the Southern Hemisphere, but the second part of this statement is not all true. Table 5 does indeed show a decrease in mesozooplankton biomass from polar to temperate regions in both hemispheres, but only for the Southern Hemisphere is the concentration lower at temperate latitudes than the tropics. So, this should say

"Biomass was highest in the Northern Hemisphere, and there were slight decreases from polar oceans (40-90°) to more temperate regions (15-40°) in both hemispheres. Values in the tropics (15°N-15°S) were intermediate between those at the Northern and Southern temperate latitudes."

### **Introduction**

Page 895. In Lines 8-9. "(*Mesozooplankton*) are the largest contributor to the vertical particle flux in the oceans (Buitenhuis et al., 2006)."

I read the paper by Buitenhuis et al. and I could not find a definitive statement saying that mesozooplankton were the largest contributors to vertical particle flux on a global basis. As I have stated above, in areas where there are intense spring blooms un-grazed dying phytoplankton also contribute significantly to the vertical particle flux. Nevertheless, I recognise that on a "global" basis this statement might be true. So, could the authors please explain what they meant by this statement, probably by re-writing it.

And if mesozooplankton ARE the largest contributors, they are plural!

Page 895. In Lines 24-25, “e.g. Nutrient Plankton Detritus Zooplankton (NPDZ) models.”

The “P” in NPDZ stands for “Phytoplankton”, not “Plankton”.

Page 896. In Line 18 - “and is responsible for this compilation” might be better as “which led to this compilation”

## **Data and Methods**

Page 897. In Line 19 – “common base unit values are calculated into standard units” might be better as “common base unit values are transformed into standard units”

Page 899, Lines 14-20 – “As each mesh size does not offer a complete geographic coverage (333  $\mu\text{m}$  is absent in the mid-Atlantic and Southern Ocean and 200  $\mu\text{m}$  is absent in the equatorial and eastern Pacific) the mesh conversion equations used in O’Brien, 2005”

I think it is better to use brackets than commas - as shown in red.

Page 900, Line 27-28 – “Depth intervals were assigned to representative WOA levels as described above.” Should be - “Depth intervals were assigned to represent WOA levels, as described above.”

Page 901. “Quality control”

I had some difficulty following the “flagging” procedure, so I went to the COPEPOD website, and did not do much better! I understand the main idea (i.e. the flagging of data beyond certain limits), but the details are less clear. For example, are the  $\pm 99\%$ ,  $\pm 99.9\%$ ,  $\pm 99.99\%$  range limits calculated using the actual numbers, or the log transformed numbers?

As well, it is stated on the COPEPOD website that “If 1,000 or more values are available, the tighter 99.9% ranging check can be assigned, etc.” I don’t see how 99.9% provides “tighter” ranging check than 99%, since the acceptable range of values is larger. Maybe this is just a question of semantics, however.

I also have questions about the way in which the global ocean was divided. I am assuming that the authors used the scheme shown on the COPEPOD website (Fig. 6, COPEPOD-2007) to implement their QC (i.e. flagging procedure). I am not sure that these divisions are the most appropriate, since (for example) the North Atlantic region includes both the sub-tropical and sub-polar gyres, which I do not think are comparable in terms of seasonality or average magnitude of mesozooplankton biomass. Thus, one

would expect a very large range of values spatially and among months. Assuming that most of the other regions (Fig. 6, COPEPOD-2007) were equally heterogeneous, it was hardly surprising that virtually no data points were excluded (Page 902, Results of quality control)! One might argue that a better scheme would be one which divides the ocean according to Longhurst (1998), but perhaps I should understand (and perhaps be told!) that this level of QC is only designed to flag “really crazy” outliers.

Page 902, Lines 6-7 “had already undergone underwent rigorous in house quality control” should be “had already undergone rigorous in house quality control”

Page 902, Line 24 “The mesozooplankton database contains 153 163 data points.”  
Should be “The mesozooplankton biomass database contains 153 163 data points.”

Page 904, Lines 3-6. “Biomass was highest in the Northern Hemisphere, in the North Atlantic, North Pacific, and Arctic, but the general trend was a slight decrease from polar oceans to temperate regions with values increasing again in the tropics (Table 5).”

This is more-or-less the same sentence that I took issue with in the Abstract (see above), except that here the authors spell out the different regions of the Northern Hemisphere, although the data are NOT presented this way in Table 5, or anywhere elsewhere. From Table 5, all the authors can say is what they said in the Abstract, including the changes I made. Thus, the sentence should be replaced with:

“Biomass was highest in the Northern Hemisphere, and there were slight decreases from polar oceans (40-90°) to more temperate regions (15-40°) in both hemispheres. Values in the tropics (15°N-15°S) were intermediate between those at the Northern and Southern temperate latitudes.”