Biogeosciences Discuss., 7, C133–C135, 2010
www.biogeosciences-discuss.net/7/C133/2010/
© Author(s) 2010. This work is distributed under
the Creative Commons Attribute 3.0 License.

Biogeosciences Discussions

Interactive comment on "Technical Note: Determining the size-normalised weight of planktic foraminifera" *by* C. J. Beer et al.

J. Bijma (Referee)

jbijma@awi-bremerhaven.de

Received and published: 27 February 2010

The paper is informative, well written and can be published as it is. Below, I'm providing my "quick review" provided to the handling editor and the authors before publication in BGD. It would still be useful to provide carbonate chemistry data... However, since most issues have already been taken into account, I have no further comments but provide the original "quick review" for information below.

The paper is interesting in that it stresses the natural (individual) weight variability for a given size (test area) and it is well written. Unfortunately shells were not weighed individually, otherwise the individual size measurement could be shown in combination with individual weight measurements, demonstrating individual variability and hence the importance of individual size AND weight determination. But that was not the

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

purpose of this paper. Here, only the impact of individual size measurement was the focus.

The weight ranges shown are pretty spectacular and one wonders where they originate from? Was the carbonate chemistry so different between the stations or is the difference related to shallow vs. deep tows? One issue that could affect the weight of samples taken from the water column is the presence or absence of gametogenic calcite or crusts. This does hardly influence shell size but does change shell weight. However, also this is not the focus of the paper but the authors could mention this.

For a "technical note", the method section does not contain enough information, which is critical if you want to compare post sampling data acquisition. Tows from the water column contain more than just foraminifera. How where the samples treated and how was the picking and sieving done? Did organic matter influence sieving? What about the spines of spinose species? Where the samples dried before sieving? Did they wet sieve? Where the samples dry when they went into the environmentally controlled room 12 hours before weighing?

The methods are critical for how good sieving constrains the target sieve-size fraction. For that matter, a table with the average, median and min./max size for each (or at least for representative samples) of the aliquots should be added. This would provide an indication of how well the sieving of those samples worked. Except for perfectly round specimens, such as O. universa, actual measured size is always larger than sieve size. For instance, the shell architecture of G. sacculifer is such that the sieve size fraction corresponds approx. to the actual sizes minus the last chamber. Hence, a sieve size fraction of 200 to 250μm would correspond to real sizes between ca. 300 to 366μm.

A direct comparison is not easy with the plots provided. Since the weights were determined as an average for the whole aliquot for both SBW and MBW, it all boils down to comparing the variability (variance, median,..) between the size estimates. I would ap-

BGD

7, C133–C135, 2010

CC BY

preciate a simple plot of average and median size of the individual size measurements for each aliquot plus a line in the plot indicating the midclass size (225μm).

I went through the whole size and size range issue myself but never published it. Lohmann originally used the size fraction 355-425μm, Barker and Elderfield used 250-300μm and 300-350μm (depending on the species) and Broecker and Clarck used 300-350μm. I choose to use both a larger and a narrower size fraction (425-450μm). Using a larger size reduces the impact of debris that remains in the shell and the narrower range reduces the natural weight variability that exists between shells of similar size. Based on a shell growth curve (Bijma and Hemleben, 1994) and on a size-weight relationship (Anderson and Faber, 1984) for G. sacculifer, I determined that by using the size interval 425-450μm the natural variation in weight can be drastically reduced in comparison to the size fractions used previously:

size fraction (weight variation): 315-355 (23%); 355-425 (30%); 425-450 (12%)

I am willing to provide this information to the authors, if they wish. Basically, what you would like to do is to sieve an infinite large sample size over an infinitely small size range.....

An important paper (Russel et al., 2004; GCA, v. 68, no. 21, p. 4354, fig. 3) that deals with comparing SNW with shell thickness for O. universa, is missing and should definitely be considered....

The bottom line is that the authors should expand the method section, provide an addition table and incorporate the the Russel et al. Paper.

Interactive comment on Biogeosciences Discuss., 7, 905, 2010.