

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

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RE: Author Comments: Technical Note: Determining the Size-normalised Weight of Planktic Foraminifera (manuscript number: bg-2009-302)

Dear Prof. Kitazato-san,

Firstly, we would like to thank the three reviewers/commentators for their thorough and useful contributions. We consider that there is scope for agreement on many of the points raised, which we list and respond to individually below. We would also like to point out that the aim of this study is simply to compare two often-employed methods for the establishment of SNW. Our main point is that the problems associated with confining test size using sieves are transferred to the SNW measurement. The aim is not

C845

to provide an alternative ‘ironclad’ method, but rather to present a preferred approach while highlighting some of the potential pitfalls of the orthodox methods. It should also be emphasised that no method is perfect, especially when having to consider the rate of sample throughput.

Main Points

1) Individual test weights required: We agree that individual test weight measurements would provide useful information regarding the within-aliquot variability of test weight, and hence the SNW proxy. Unfortunately, the precision of the equipment available did not allow for such investigations. Hence, the focus of this study is variability in test size.

2) Test size measurements: Again, we agree with the reviewers that measuring test size is non-trivial and that our approach, namely the silhouette area method, is imperfect. Ideally, the volume of the test calcite would be measured in the construction of a SNW value. However, making such a measurement is extremely time consuming. Moreover, because laboratories with suitable facilities are so few, demanding the use of volume-normalised weights, while admittedly being more robust, would necessarily exclude the majority of researchers from making an otherwise inexpensive and relatively simple measurement. Those laboratories with 3D imaging facilities may be able to test whether the assumption in our work, namely that test silhouette area provides an adequate measure of test size, is valid.

3) Gametogenic calcite influence: Gametogenic crusts and secondary calcification can alter the relationship between size and weight. Such crusts are often variable, both between and within species. Hence, as reviewer 3 correctly asserts, the correlation between test weight and size would be weaker for aliquots of tests that have gametogenic crusts. Nonetheless, our data (Fig. 1) demonstrate that correlations between weight and size exist, despite incorporation of tests regardless of their ‘gametogenic state’, but that such correlations can be reduced if MBW is used in exchange of SBW.

4) Use of 200-250 μ m fraction: We entirely agree that it would be preferable to consider

C846

multiple sieve fraction ranges rather than simply focussing on the 200-250 μ m fraction. However, as we note in the text, the use of multinet samples precludes such sampling because so few specimens are found in the large size fractions. The use of sediment material may provide an alternative source of abundant foraminiferal tests from larger size fractions, but accounting for preservation and ensuring that the specimens are clean may be difficult.

5) Comparison to other studies: Relating to point 4, we acknowledge that the errors we calculate for our data cannot simply be transferred to other studies that use different sieve size fraction ranges. We attempted to make this clear in the manuscript and, furthermore, demonstrated that increasing the size of the foraminifera employed relative to the sieve fraction reduced the associated error.

Minor Points

6) Sample collection and methods: We understand that the reviewers require additional information regarding sample collection, initial preservation and methodology. We agree that this may prove useful to those wishing to consider the SNW proxy and will provide it in a revised manuscript.

7) Environmental Data: While we agree that an assessment of SNW versus environmental conditions provides highly valuable information regarding the SNW proxy, it lies outside the aims of this study. Moreover, we have already published such an assessment elsewhere (Beer et al., 2010, *Geology* 38 (2) 103-106).

8) Graph Error: We thank the reviewer for pointing out the two 'typos' in the graphs and will amend the figures appropriately.

9) Test diameter versus length: We agree with Dr Metcalfe that the use of the term diameter is perhaps misleading, as it gives the impression of girth, and should be replaced by the term 'length'.

10) Error bars: We can certainly add error bars to revised plots, if required. We have

C847

not done so previously because we could not incorporate a within-aliquot test weight error to the error bar, which may have promoted confusion given that the error bar is scaled against a SNW axis.

We hope that we have satisfactorily answered any queries.

Yours Sincerely,

Christopher Beer

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

C848