

## ***Interactive comment on “First-order estimate of the planktic foraminifer biomass in the modern global oceans” by R. Schiebel and A. Movellan***

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We are grateful to Takashi Toyofuku for his comments and questions, which have helped to improve on our paper on ‘First-order estimate of the planktic foraminifer biomass in the modern global oceans’. We have taken all of the reviewer’s comments into consideration, and reply to them in the following.

According to ter Kuile (1991; in Lee and Anderson, 1991, *Biology of Foraminifers*) there are vast differences in planktic foraminifer feeding rates, carbon pools, and growth rates, and the protein portion in foraminifer soft tissue may vary considerably. However, from own unpublished data we know that the protein-to-carbon (organic C) ratio is about equal and size-dependent (see also Michaels et al., 1995; Zubkov et al., 1999). [P250L2, P255L14]

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To emphasize the average protein / carbon-biomass deduced from our data, we have now presented the value of 0.845  $\mu\text{g}$  in the abstract. [P253L14]

We have eliminated the abbreviation 'BAM' from the manuscript and now use BCA only. The abbreviation PFAB (planktic-foraminifer assemblage-biomass) is mentioned early in the paper (abstract and beginning of the Materials and methods chapter), and we believe that the use of abbreviations is now quite straightforward and comprehensible. [P252L10] [P253L12]

The reviewer rightly asks for species-specific biomass data, which could affect the regional and temporal PFAB due to, for example, seasonal changes in the abundance of different species. However, our data show that the individual planktic foraminifer biomass changes with size (Fig. 5; and which we have accounted for), and data from different regions and water depths do entirely overlap (Figs. 4 and 9). The same overlap is found for different species (no graph shown). Unfortunately, scarcity of biomass data from the same region, water depth, and season so far impedes any statistically significant analyses on most of the 21 species presented here. [P250L26, P255L14]

We have discussed PFAB per ocean area ( $\text{km}^2$ ) rather than volume ( $\text{km}^3$ ) because the surface of different ocean 'habitats' (after Milliman and Droxler, 1996) is much better known (if at all) than volume. In addition, knowledge on depths habitats of planktic foraminifers is rather anecdotal to date, and we hence assume here that species-specific depths-habitats are similar in the different ocean basins and 'habitats'.

Figures 1, 2, 6, 7, 8, and 12 presented in our manuscript are produced according to templates used in the ESSDD special issue on the Marine Ecosystem Data project (MAREDAT), and may not be changed individually even if not being ideally suited to any of the data presented on the different 'plankton functional types' (e.g., planktic foraminifers).

Variability in the seasonal (protein-) biomass is due to differences in standing stocks. [P254L7] The 'curve fit' in figure 4a is meant to indicate near-logarithmic increase of

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biomass with test-size.

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