

Interactive comment on “The trophic and metabolic pathways of foraminifera in the Arabian Sea: evidence from cellular stable isotopes” by R. M. Jeffreys et al.

Anonymous Referee #2

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This paper is describing the feeding habits of foraminifera in the Arabian Sea, comparing two different locations, namely the Pakistan and the Oman margins, along a depth gradient inside and outside the influence of the oxygen minimum zone. The isotopic composition of foraminifera is measured at species level and is compared to that of possible food sources (POM, SOM, bacteria and jellyfish) to discern dietary items and foraging modes of foraminifera. Based on these results, the authors discuss feeding type classifications of foraminifera in the Arabian Sea. The authors also compared the isotopic signatures of foraminifera at different depths and between species within the same margin and also examined differences in isotopic composition between the two margins. Main conclusions are: a) foraminifera in the Pakistan margin depended

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heavily on fresh phytodetritus as a food source based on their depleted $d^{13}C$ closely matching that of sinking POM, b) enriched $d^{15}N$ of foraminifera in the Pakistan margin suggest intracellular nitrate collection/respiration, which was not apparent in the Oman margin, c) depleted $d^{15}N$ signatures of foraminifera in the Oman margin could be a result of feeding on bacteria associated with jellyfish detritus which was observed across the Oman margin at the time of sampling.

General comments

This is a well-written paper providing a full analysis of the trophic ecology of foraminifera in the Arabian Sea. It provides a lot of detail for benthic ecologists particularly interested in foram ecology but is also of wider interest as foraminifera is an important trophic link to higher organisms. It is thus suitable for publication in Biogeoscience. I have one general comment; going through the results section is quite tiring for the reader. It almost felt like every possible test was done in order to find out something significant but I would urge the authors to pick only what is an ecologically meaningful or interesting comparison and then use statistics to test for that. I am giving some examples in the detailed comments below.

Detailed comments

1. I would suggest the inclusion of a sentence in the abstract explaining why we see these differences in the sediment properties between the two margins, e.g. differences in upwelling, productivity etc. This information comes only later in the discussion but it's important to know from the start why the two margins are compared.
2. Page 18148, line 7: do you mean “and population growth”?
3. Page 18151, line 3: please briefly explain how HI is calculated and why it can be used here as OM quality index.
4. Page 18154, line 6: the hydrogen index abbreviation has been defined previously
5. Page 18154, lines 14-17: I think you may be referring to the Pakistan margin since

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there are no such depth stations in Oman. In any case, since this information is already in a Table, I'd just omit this sentence as it is not hugely important for the interpretation of the results to know every single difference in SOM $\delta^{13}\text{C}$ between depths.

6. Page 18155, lines 2-10: I am a bit confused here, the calcareous species at 140 and 300 m are compared separately but for the textulariids these two depths are combined. It would be better to decide beforehand whether or not to combine 140 and 300 m and keep it the same for all groups.

7. Page 18155, lines 14-23: this paragraph is exactly what I meant in my general comment. Why do we need to know specifically about *Uvigerina* when a few lines before the same result is mentioned for all calcareous species, including *Uvigerina*? Why specific mention to *Reophax* when nothing significant is reported? All this information could be in the supporting document for those interested but here it's just making reading difficult.

8. Page 18156, lines 5-10: same here. Not sure that a p value of 0.048 is worth mentioning as significant. Also why mention that there was no difference in isotopic composition between *Uvigerina* and *Reophax* at 300 m?

9. Page 18161, lines 17-20: it's not clear to me how you draw this conclusion; it doesn't follow from what is mentioned previously in the paragraph.

10. Page 18162, lines 17-22: this sentence gives exactly the same information as the one before (lines 12-17), the only difference being that it refers specifically to depths below the OMZ instead of the whole transect. Is it necessary?

11. Page 18165, line 1: does OM here mean Oman margin?

12. Page 18170, lines: 20-22: why do you think this is happening? Could the lower O_2 concentrations in the Pakistan margin play a role?

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