

## ***Interactive comment on “Living (Rose Bengal stained) benthic foraminiferal faunas along a strong bottom-water oxygen gradient on the Indian margin (Arabian Sea)” by C. Caulle et al.***

### **Anonymous Referee #1**

Received and published: 1 March 2015

This is a well-constructed, detailed and articulate piece of research into the living foraminifera in the Arabian Sea - across a major OMZ gradient. The authors investigated living fauna in upper 1-cm of sediment across five sites. The identification of the fauna in this work is done exceedingly carefully, and the biotic snapshot of community structure and species occurrences is really interesting. I found this a very interesting documentation of foraminiferal community ecology. Additionally, the manuscript is well written, organized and referenced. I agree with the principle finding: the community shows primary affinity to hypoxia, and calls into question the importance of primary productivity in shaping subsurface community composition.

I am curious with the authors position on the community structure data. While I find

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the conclusion regarding BWO and surface productivity to be compelling, I also am interested in the community-scale patterns of diversity, evenness and marker species abundance/dominance (a term I think should probably be incorporated into the discussion). Some of the diversity patterns do not reflect the existing paradigm of low O<sub>2</sub>/low diversity and high O<sub>2</sub>/high diversity. This is interesting - and worthwhile of a broader integration into the conclusions of the manuscript. The authors do discuss these findings, and they mention two particularly appropriate rationales for this diversity question. One is the influence of high-frequency climate and oceanographic variability. The other is endemism and, essentially, the unique community structure of Arabian Sea foraminifera. Ultimately, there may be a need to reframe the ecological interpretation of foraminiferal community diversity across gradients of hypoxia - the existing paradigm may be too simple or not well-suited to the collection methods we have at hand.

There are clear interpretations to paleocommunities from this research. However, I found the discussion of this facet of the research to be slightly disorganized. I would recommend considering the toolkits commonly used in paleocommunity ecology, and directly addressing each: marker species, community-scale parameters (diversity, evenness), density.

This may be beyond the scope of this investigation, however it would be really interesting to see this data analyzed using a multivariate statistical software (such as Primer). It would be interesting to see the 2-D projections of community similarity - and this kind of analysis would provide very defensible descriptive statistics with which to make statements and conclusions from.

I think a more fleshed-out conversation about community density is also needed....not much, but because it's so critical in paleocommunity interpretation, it's worth some discussion.

in the methods section there needs to be a sentence clearly stating the sampling depths for each station through the OMZ.

Line-edit critique:

Consistency in sentence structure should be evaluated across the manuscript. In particular, there are many instances of independent clauses joined by simply a comma. Also known as a comma splice (admittedly a common error in science writing). Look up the acronym FANBOYS - and use these coordinating conjunctions.

Consistency in reference formatting needs attention. I noted the following references that need reformatting, on lines: 580, 609, 626, 630, 634, 655, 658, 661, 664, 701, 716, 730, 733, 818, 838.

I am not familiar with bio-volume (line 375). This term either needs a clear explanation (with units) or to be omitted for a more general term entirely.

Line 484: potentially change to: "It is not clear how these indices describe..."

Paragraph starting on line 488: I would consider using the term "marker species" to describe fauna associated with a narrow and paleoceanographically-relevant environmental variable.

Line 540: the sentence starting on this line is awkward - it could be rewritten for clarity.

Additional line edits to be addressed: Line 23, 34, 287, 304.

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Interactive comment on Biogeosciences Discuss., 12, 3245, 2015.