Biogeosciences

Discussions

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Interactive comment on "Deep-sea ecosystem: a world of positive biodiversity – ecosystem functioning relationships?" *by* Elisa Baldrighi et al.

Anonymous Referee #1

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General comments:

The analyses are very complicated and could be more focused. It looks like the authors were trying very hard to find a significant relationship and managed to find a few after trying different ways of quantifying diversity and function. The results of the analyses are not convincing me that there exists a positive relationship, and I find the conclusions much too strong given the few relatively weak correlations that were found. The authors should decide on the most meaningful measures of diversity and function a priory, then stick to them in their analyses. The authors need to include abundance in their analyses. More details are needed in the Methods in order to understand how they conducted their sampling and statistical analyses. the results are difficult to follow and

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Discussion paper

need simplified. Also this preference for using exponential curves rather than linear one (when in most cases they fit about equally well, and AIC values probably are only larger for exponential fits than linear ones by very small margin) just perpetuates this over-complicated view of BEF relationships in the deep sea.

Detailed comments: Line 89: Gagic et al. not an appropriate reference for this statement Line 97: what does the 7-9 refer to? Line 100: it is unclear what you meant by complex systems Line 105: how do the results of experimental and field studies differ, more specifically? Line 111: It is very debatable whether the deep sea is the "most diversified environement"! Remove. Line 112: Ingels & vanreusel is not a relevant reference for this statement. Find better ones. Line 119: mutualistic interactions have by no means been "shown". They have been suggested as a possible mechanism to explain the pattern. Nothing is known about mutualism, competition, etc... Line 121: Danovaro et al. 208 do not demonstrate anything about the effect of species loss. Their correlative study only suggests that species loss may be associated with loss of function. Line 124: what is this (8)? Line 129: all deep-sea studies are correlative. Therefore they do not investigate the role of fauna/microbes in "enhancing" function. One needs to be very careful about how these studies are referred to. Lines 138-140: there is nothing on the Introduction about these last 2 objectives. These topics need to be covered in the Introduction.

Line 174: so to recapitulate, there were 7 areas x 3 depths x 3 stations x 3 replicates = 81 core samples each from independent boxcore deployment? Line 189: explain what you mean by sensu lato. It's an important detail needing to be spelled out here. So the macrofauna includes all the fauna retained on the 300 micron sieve (including nematodes etc..)? Also need to clarify whether macrofauna were sampled from the sediment remaining after meiofauna and sediment subcoring (what was the surface area of the macrofauna samples?). It is not clear in the text as it is now. Lines 194-199: we need to know whether these data are new or have been published already in Baldrighi et al. 2014. Wont total biomass be strongly dominated by bacteria? Lines

Line 206: Did you always have at least 50 individuals? Or were individual boxcores pooled for statistical analyses. We need more details of this for all the analyses, i.e., what is a sample- a boxcore or three boxcores pooled together? 204-205: it is not clear what the difference between species richness and total number of species is! Line 210: what were the feeding groups? need a reference for this. Line 212: need more details of how bioturbation potential was estimated. Line 225: secondary production, not production of renewable resources. Line 241: BEF relationships can be affected by the... Line 258: I dont understand. How were they used to account for environmental effects exactly? Line 260: before testing for the effects of what? diversity? And how do you make non-linear fits in the DistLMs?

You really need to investigate the effects of faunal abundance on your measures of function. I have the feeling that some sites have high species richness simply because they have higher abundance, and therefore have also higher biomass. It seems circular. If abundance is included, I think relationships might well disappear.

There are quite a few measures of function and several measures of diversity (and therefore many potential combinations of predictor and responses) so it is not surprising that some relationships will come out significant.

It would be better to show partial regression plots so as to better reflect the relationship after the covariates have been accounted for.

Table S5: why not just give P values for before and after analyses? I see that none of the relationships are significant after covariates are accounted for (and R2 values are low). Second line of caption: i do not understand second sentence.

Table S4: re-define what you mean by large-scale analysis. Independent, not indipendent. Shouldnt we see the same relationships shown in Table S4 again in table S5a? Why do degrees of freedom vary between the different analyses? Did you check that you covariates or not strong collinear?

I did not comment on the rest of the Discussion because I think there needs to be some major changes made to the Methods and Results sections, which would require some major re-working of the Discussion as well.

Looking at figure 3 and 4, it is clear that a linear relationship would be just as justified as an exponential one! The simplest explanation is always best, even if AIC values might differ by small amounts. This whole mystery about exponential BEF relationship in the deep sea arose because some researchers got slightly better fits by using exponential curves than linear ones, not because the relationships are actually exponential.

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