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Biogeosciences Discussions

Interactive comment on "Changes in polychaete standing stock and diversity on the northern side of Senghor Seamount (NE Atlantic)" *by* A. J. Chivers et al.

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The authors would like to thank the reviewer for their positive comments. Suggested changes and comments have been taken into account and relevant changes and improvements made to the manuscript.

COMMENTS:

Comment 1: The reviewer highlights a number of issues relating to the manuscript, these include: 1. A limited data set 2. A lack of environmental data 3. Speculative conclusions

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Interactive Discussion

Discussion Paper

Response: During the review process additional environmental data has become available and has now been included within the manuscript (oxygen concentrations, temperature, salinity, sediment grain size and mud content). These data have been included within Table 2. The results section now has an additional sub-section: 3.1 Environmental parameters and the discussion now altered to enable consideration of the environmental data.

Additional parameters are now available to help explain observed faunal patterns, an updated discussion highlights this. Modelling of the flow field in the vicinity of Senghor Seamount is still on-going and the data is currently unavailable for inclusion into the manuscript. TOC and TN are being analysed for a studentship and are unavailable at present for inclusion in the manuscript.

Limited environmental data was collected during the cruise M79/3 as a result of sampling and technological constraints. We have included the environmental data within the manuscript (Table 2) and the authors feel that the addition of the environmental data goes some way to supporting the discussion and conclusions (Section 4 Discussion, Sub-sections 4.1: Changes in polychaete standing stock with depth; 4.2: Changes in polychaete family diversity and composition; 4.3: Changes in polychaete species diversity and composition).

Comment 2: "... the authors many times prefer to follow an almost journalistic approach, i.e. by just providing the facts, without trying to deepen into possible and meaningful ecological explanations."

Response: Due to the unavailability of the environmental data before manuscript submission, the authors through necessity followed a more speculative approach to the discussion of results. The addition of environmental data has resulted in the discussion being updated; as a result it is more informative and provides the reader discussion and conclusions which are supported as opposed to speculative (Section 4 Discussion, Sub-sections 4.1: Changes in polychaete standing stock with depth; 4.2:

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Changes in polychaete family diversity and composition; 4.3: Changes in polychaete species diversity and composition).

Comment 3: Large differences between the base and reference station are attributed to two different dominant polychaete species. This is an extraordinary result as these two stations have almost identical depths approx. 3300 m. The authors being polychaete specialists, despite the absence of any other environmental knowledge, should be able to provide some explanations for the observed pattern based on their morphology, behaviour, functional traits etc.

Response: We have looked at both species in more detail to determine suggested differences of morphology or functional traits etc. Both species are of the polychaete family Spionidae, both also appear to be the same genus, Prionospio; however a number of minor morphological differences appear to separate the species. Both species are very similar in terms of morphology with limited but key differences: Sp.970 (reference station) has small frontal horns on the prostomium, the shape of the notopodial lamellae are different (notable differences occur on the first nine chaetigers). Neuropodial hooks begin at chaetiger 12 for Sp.981 but chaetiger 15 for Sp.970. In conclusion the authors recognise this is an extraordinary result, however as both species are very similar they are likely to have similar functional traits and potentially behaviour and may also occupy a similar ecological niche within the environment.

The addition of environmental data to the analysis has enabled the authors to look at differences between the base and reference station, this data is included in Table 2 and discussed in the discussion section. However, an issue with the functioning of the CTD meant that no results for temperature, salinity and oxygen were collected from the base station; results from sediment related environmental parameters have been included and show that there was little difference in terms of sediment grain size and mud content.

Comment 4: It is not clear if the authors applied any statistics to support their conclu-

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sions. A fair amount of discussion deals with the fact that the abundance, biomass or diversity peaks at mid-slope depths but are these conclusions supported, for example, by ANOVA or any other test?

Response: This comment has been taken on board and the results of these tests are included within the results section: 3.2 Standing stock, also section: 3.4 Polychaete species diversity. The results of the ANOVA test are discussed within Section 4 Discussion, Sub-sections 4.1: Changes in polychaete standing stock with depth; 4.3: Changes in polychaete species diversity and composition).

In addition an ANOSIM test was conducted for each of the environmental parameters (mud content, sediment grain size, oxygen and temperature). This was to assess which environmental parameter may be driving community composition. Unfortunately as environmental parameters are unavailable from some stations the authors feel the inclusion of the ANOSIM results within the results section would be inappropriate and potentially misleading. The ANOSIM test resulted in a significance level of ($p < 0.001$) for all environmental variables (the same as depth) but this occurs without the inclusion of the species data sets from each station where environmental variables are missing. Each variable co-varies with depth and as this is the only parameter we have for each station, it is the only one which we use within the cluster and MDS ordinations. This has been discussed within the discussion section (Section 4 Discussion, Sub-sections 4.1: Changes in polychaete standing stock with depth; 4.3: Changes in polychaete species diversity and composition).

TECHNICAL COMMENTS:

Technical comment 1: (Title and M&M). It is not clear why only the northern side of the seamount was sampled. Or did you sample all sides but analyzed for the purpose of this MS only the northern samples?

Response: The manuscript is only based upon polychaete data from a northern transect of Senghor Seamount. As already highlighted in the Introduction (pg 18450: L2-4),

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polychaetes are usually the dominant macrofauna of soft sediment communities and as a result they are frequently used as a proxy for the entire macrofaunal community e.g. see

a) Gillet, P., and Dauvin, J. C.: Polychaetes from the Atlantic Seamounts of the Southern Azores: biogeographical distribution and reproductive patterns, J. Mar. Biol. Assoc. UK, 80, 1019-1029, 2000

b) Gillet, P., and Dauvin, J. C.: Polychaetes from the Irving, Meteor and Plato Seamounts, North Atlantic Ocean: origin and geographical relationships, J. Mar. Biol. Assoc. UK, 83, 49-53, 2003.

c) Narayanaswamy, B. E., Bett, B. J., and Gage, J. D.: Ecology of bathyal polychaete fauna at an Arctic-Atlantic boundary (Faroe-Shetland Channel, Northeast Atlantic). Mar. Biol. Res., 1, 20-32, 2005.

d) Narayanaswamy, B. E., Bett, B. J., and Hughes, D. J.: Deep-water macrofaunal diversity in the Faroe-Shetland region (NE Atlantic): a margin subject to an unusual thermal regime, Mar. Ecol-Prog. Ser., 31, 237-246, 2010a.

e) Surugiu, V., Dauvin, J. C., Gillet, P., and Ruellet, T.: Can seamounts provide a good habitat for polychaete annelids? Example of the Northeastern Atlantic Seamounts. Deep-Sea Res. Pt. I, 55, 1515-1531, 2008.

Other transects on the seamount were sampled, however the northern transect is the only transect which covers a full depth range and thus is deemed ‘complete’ (with a representative depth range and sufficient number of replicates (3) and pseudo-replicate cores per station (9)). Hence we felt that the results we have were still interesting and worthy of publication and as Referee 2 states, “this infauna data set (is) quite unique”. It was felt that the northern transect polychaete data set was interesting, unique and useful as a stand-alone data set. Explanation of the use of only the northern transect polychaete data set has now been added to section 2.1 Sampling methods.

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Technical comment 2: As it is not clear how many replicates or cores per replicate deployment were taken I suggest to include in Table 1 a column with this information.

Response: Table 1 now includes the number of deployments per station (replicates) and number of cores per deployment (pseudo-replicates). This information is also provided within the text, section 2.1 Sampling Methods.

Technical comment 3: It is not clear if the cluster analysis was done on the species or the family data set. Please indicate both in the results and the figure's caption. I assume that it is for the species data in which case however I do not see why it is needed as it provides almost identical results with the MDS graph (Fig. 5)

Response: An explanation that the Fig. 4 cluster analysis relates to the species data set has now been included in section 3.5 Multivariate analysis. The figure caption has also been altered to reflect this.

The authors feel that the inclusion of the species data cluster analysis (Fig.4) in addition to the species data MDS ordination (Fig. 5) was justified as the cluster analysis should be viewed in conjunction with the MDS ordination to provide balanced and reliable conclusions to be reached. We feel it is important to not use these techniques independently, where possible using the cluster analysis to identify any significant groupings and to then use the MDS ordination to support those conclusions. The use of cluster analysis on its own may also be misleading in some circumstances, particularly when a high stress level is observed for the MDS ordination, so again the cluster analysis supports the MDS and vice versa. As Clarke & Warwick (2001) observed, 'The agreement of the two representations strengthens the belief in the adequacy of both'. For further information please refer to: Clarke, K.R., and Warwick, R.M.: Change in marine communities: An approach to statistical analysis and interpretation. 1st edition: Plymouth Marine Laboratory, Plymouth, UK, 144. 2nd edition: PRIMER-E, Plymouth, UK, 2001. This is further corroborated with personal communication from Roger Bamber (ARTOO Marine Biology Consultants, UK) and Gordon Paterson (NHM, UK).

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Technical comment 4: (Page 18459, line 10). The statement that the base and reference station have no difference in diversity is not exactly true as it is valid for some of the indexes measured (e.g. true for Shannon but not true for J' and d').

Response: The text has been altered to reflect this, Section 4.3: Changes in polychaete species diversity and composition.

Technical comment 5: (Table 3). Table caption indicates that dominant families are highlighted but I couldn't see any highlights in my pdf.

Response: The highlights had been previously removed, the Table caption has now been changed to reflect this.

Technical comment 6: (Table 3). Lumbrineridae is not present in any of the 5 stations, so why is it in the list?

Response: The Lumbrineridae family is represented by one species and three individuals, this was an accidental omission and Table 3 has been altered to reflect this.

Interactive comment on Biogeosciences Discuss., 9, 18447, 2012.