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Biogeosciences Discussions

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Interactive Comment

Interactive comment on "Comparative study of vent and seep macrofaunal communities in the Guaymas Basin" *by* M. Portail et al.

M. Portail et al.

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Dear Referee #2,

We would like to thank you for the constructive comments and suggestions you made. We strove to address all of your comments, as shown in the detailed reply below.

We hope that the improvements now make this manuscript suitable for publication.

Sincerely,

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Referee comments #2 General comments

The Guaymas basin has very unique geological setting for deep-sea chemosynthetic ecosystem study. It means vent and seep communities exist in very close in this basin. Focusing on this advantage, the authors describe chemosynthetic communities features in comparison with both vent and seep. This manuscript is well written based on polite analysis. However, there is a tendency lengthy (too much sentences) report. The authors should pay attention to write more concise sentences. This is the original article, is not a text book and a phD thesis. We have tried to reduce the text as much as possible for the final manuscript version (from 71 063 to 62 114 characters (-13%) based on your detailed comments, and also in the different sections (Introduction, Methods, Results and Discussion).

The present study analyzed and discussed community structure and composition by the family taxon level. However, it seems that those analysis is not for suitable. Especially, connectivity have to be find based on species level with genetic data. We agree that genetic data are needed to specifically address connectivity at the population level. Nevertheless, this paper focuses on the comparison between and within seep and vent assemblages, in order to highlight global macrofaunal community structure patterns in relation to environmental conditions. While the species level was not systematically reached, ecological studies, within deep sea ecosystems and especially within sedimentary areas, are most of the time realized at the family level. We are aware of the limitations of this approach, as enounced in the discussion (p.31 line 6-14): "Furthermore, comparison of seep and vent communities at the family level may affect the assessment of community structure patterns (Gauthier et al., 2010). Nevertheless, shallow water studies have shown that in terms of macrofauna taxonomic richness, the family and species levels are strongly correlated (e.g. Jameson et al., 1995;Olsgard et al., 2003). Similar conclusions have been drawn in deep-sea chemosynthetic communities (Doerries and Van Dover, 2003). However, Pearson & Rosenberg (1978) suggest that increasing environmental changes are manifest at decreasing taxonomic

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resolutions and thus suggest that some information may still be lost in a lower range of environmental changes." Within our study, environmental changes among assemblages are high and thus the family level approach may not introduce a too large bias within our comparisons. Furthermore, we reinforced the outcome of our family level comparative approach thanks to the identification of a high proportion of seep and vent common species among the dominant taxa. All together, these results suggest strong faunal similarity between Guaymas seep and vent ecosystems. We wanted to clarify that we are discussing about seep and vent macrofaunal community similarity and not genetic exchange. As the term connectivity is confusing we replaced "The vent and seep connectivity" (p.30 line 12) by: "The vent and seep similarity", "connectivity" (p 32 line 15) by "faunal similarity", "connectivity" (p.32 line 24) by "faunal exchange". Why present study analyzed dissolved metals (Fe, Mn and Cu)? If these are important chemical tolerance for organisms, there are more important chemicals such as cadmium, arsenic etc. Within our study, Fe, Mn and Cu are used as proxy of the hydrothermal fluid. As it was suggested, it may be pertinent to measure other metals but many methodological biases in their assessment remain due to their low concentrations and the high potential for sample contamination. Overall, it seems too much references papers. The authors should select suitable papers. We removed as much as possible the number of references, from 165 to 150 references.

Specific comments Introduction

Overall, authors should write focusing sentences for this study. It seems that there are some not so important sentences. For example, P2 L1 – L8: Unnecessary sentences, "Therefore, seeps - in both ecosystems." We agree that this section was too long. However a part of these sentences are important for the overall study context, especially for readers not specialists of deep-sea or chemosynthetic environments. We replaced the sentences p.2 line 30 to p.3 line 8 by (from 835 to 644 characters, -20%) : "Although seeps and vents belong to two different geological contexts, both ecosystems are characterised by fluid emissions that present unusual properties, such as the presence of

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high concentrations of toxic compounds, steep physico-chemical gradients and significant temporal variation at small spatial scales (Tunnicliffe et al., 2003). Furthermore, they both generate energy-rich fluids that sustain high local microbial chemosynthetic production in deep-sea ecosystems, which are usually food-limited (Smith et al., 2008). There, bacteria and archaea rely mainly on the oxidation of methane and hydrogen sulphide, which are the two most common reduced compounds in vents and seeps (McCollom and Shock, 1997;Dubilier et al., 2008;Fisher, 1990)."

P2 L16 – L20: Unnecessary sentences, "These species, - Govenar, 2010)." :P3 L16 – L20 We replaced the section p.3 line 11 to 20 by (from 671 to 196 characters, -70%) ; "These foundation species include dense microbial mats dominated by Beggiatoa, siboglinid polychaetes, vesicomyid and bathymodiolid bivalves, alvinellid tube-dwelling worms, and several gastropod families (Govenar, 2010).".

P4 L14 – L15: "in the Japan Sea" ! "around Japan" We modified the text, as suggested.

Materials and methods

P6 L7 – L12: Unnecessary words and sentences, "(Lonsdale et al., 1980; - Calvert,1966)." We have significantly reduced the paragraph, going from 433 characters in the original version to 156 characters now (-60%). We changed the sentences into: "(. . .)Trough depression (27.36°N, 111.25°W) at 1900 m depth and (3) an off-axis reference site located at 1500 m depth. The Guaymas basin, due to the high biological productivity of surface water, is lined with a 1-2 km layer of organic-rich, diatomaceous sediments (Schrader, 1982;Calvert, 1966)."

P7 L30: A. gigas ! spell out genus name. At this point, Archivesica gigas name has already been entirely spelled out (p 7. line 18).

P10 L2: ROV arm! HOV arm. We changed " ROV arm" into "submersible arm".

P11 L9: Table 5. ! If you want to put Table "5" in here, change table No. from 5 to 2. Within this sentence, we changed Table 5 into Table 1 as we also find the information in it.

Results P12 L27-28: Delete “Thus, - vents.” We deleted the text, as suggested. We also deleted in the sentence before “neither on hard substrata, nor within the sediments.”

P 13 L1-30: These sentences are merely described the Tables. To be shown in more concise. As suggested by the reviewer, we have significantly reduced the paragraph, going from 2100 characters in the original version to 1395 characters now (-30%).We changed the sentences into: “Maximum methane concentrations at G_Ref were low (ïĄ¿1 μM). At seeps, maximum methane concentrations ranged from ïĄ¿ 1 μM to 800 μM, separating assemblages into two groups, one showing low concentrations (S_VesA, S_Sib_P, S_VesP and S_Sib) and the other high concentrations (S_Gast and S_Mat). At vents, methane concentrations were highly correlated to temperature (R: 0.9, $p < 0.05$). Maximum methane concentrations ranged from ïĄ¿ 50 μM to ïĄ¿ 900 μM, with low concentrations found at V_VesA, high concentrations at V_Sib, V_Alv and the highest concentrations at V_Mat. While CALMAR measurements of fluid fluxes were not systematic, methane flux was null at G_Ref and increased in vesicomyid assemblages from seeps to vents (Table 2b). Soft sediment assemblages- In soft-sediment assemblages, hydrogen sulphide, sulphates and ammonium concentrations were also compared (Table 2a). Again, interface and maximum values were always correlated ($R > 0.7$, $p < 0.05$). Thus, only maximal values are presented herein. As expected, hydrogen sulphide concentrations were positively correlated with methane concentrations ($R > 0.8$, $p < 0.01$) while sulphate concentrations were negatively correlated with both hydrogen sulphide and methane concentrations ($R > 0.7$, $p < 0.05$). Hydrogen sulphide was not detected at G_ref. At seeps, maximum hydrogen sulphide concentrations ranged from undetected to ïĄ¿30,000 μM. At vents, maximum hydrogen sulphide concentrations in the two soft-sediment assemblages ranged from ïĄ¿1700 to ïĄ¿9000 μm. Maximum ammonium concentrations were positively correlated to temperature, being higher at vents than seeps ($R > 0.8$, $p < 0.05$). “

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P15 L2-12. These sentences are merely described the Tables. To be shown in more concise. As suggested by the reviewer, we have significantly reduced the paragraph, going from 964 characters in the original version to 435 characters now (-55%). We changed the sentences into: “At seeps, E. spicata and L. barhami siboglinids showed the maximum size (368 mm) and biomass (457 g.m-2) while the highest density was related to the small Hyalogyrina sp. gastropods (10,200 ind.m-2) (Table 4). At vents, R. pachyptila siboglinids had the maximum size (431 mm), biomass (6630 g.m-2) and density (1280 ind.m-2). Siboglinid width, density and biomass were much higher at vents than at seeps while among the three vesicomyid assemblages, size, density and biomass were not statistically different.”

P15 L18-25. These sentences are merely described the Tables. To be shown in more concise. As suggested by the reviewer, we have significantly reduced the paragraph, going from 539 characters in the original version to 199 characters now (-60%). We changed the sentences into: “At seeps, macrofaunal densities ranged from 880 ind.m-2 in S_Mat to ∼25,000 ind.m-2 in S_Gast (Table 5). At vents, densities ranged from 710 ind.m-2 in V_Mat to 94,400 ind.m-2 in V_Sib. The density at G_ref was the lowest with 570 ind.m-2.”

P17 L25: “Polychaeta” is invalid taxon. Annelida is better. Polychaeta is a valid taxon according to the world register of marine species.

P17 L25-P18 L27: These sentences are merely described the Fig. To be shown in more concise. As suggested by the reviewer, we have significantly reduced the section 3.2.3, with the p. 17 line 25 to p.19 line 10 reduced from 3481 to 1450 (-60%). We changed the sentences into: “Macrofaunal community composition varied both within and between ecosystems. The relative abundances of macrofaunal taxa within assemblages are presented in Figure 7 and their inter-assemblage variability in Figure 8. All macrofaunal communities were dominated by Polychaeta at the reference (90.2%), at seeps (from 57.3% to 99.8%) with the exception of S_VesP where Bivalvia dominated (53.9%) and at vents (from 56.7% to 99.9%). At the family level, a strong inter-assemblage variability was observed. The three first axes of the between-group PCA, a particular case of RDA that tests and maximises the variance between assemblages, accounted for 51% of the total variance in community composition. The intra-assemblage heterogeneity was relatively high, but lower than the inter-assemblage variability, with the exception of S_VesA and V_VesA in which there was a slight overlap. The first axis of the PCA accounted for 27% of the variability in community composition, mostly separating the G_ref and S_Sib_P assemblages dominated by Cirratulidae, Paraonidae and Spionidae polychaetes from the V_Sib, V_Mat, V_Alv, S_Gast and S_Mat assemblages, characterised by higher frequencies of Dorvilleidae and Ampharetidae polychaetes. Intermediate compositions were found at S_Sib_P, S_VesP, S_VesA and V_VesA. The second axis accounted for 14% of the variance in macrofaunal community composition. It was mainly influenced by the dominance of the Bathyspinulidae bivalves at S_VesP. The third axis accounted for 10% of the variance, differentiating in particular the S_Sib assemblage, characterised by the presence of Polynoidae, Lepetodrilidae, Neolepetopsidae, Serpulidae and Nereididae."

Discussion P20 L28-P21 L4: It seems that comparison by the Family level is not significant. See the answer to general comments about the family level significance.

P21 L17-20: Unnecessary sentences, "Guaymas seeps - environmental conditions." We deleted the text, as suggested.

P21 L28-P22 9: Unnecessary sentences, "Substratum - (Jørgensen et al., 1990)." We have significantly reduced the paragraph, going from 969 characters in the original version to 369 characters now (-60%): "Substratum- Both Guaymas chemosynthetic ecosystems showed typical faunal assemblages colonizing hard (seep: siboglinid, vent: siboglinid, alvinellid) and soft substrata (seep: vesicomyid, gastropod and microbial mat, vent: vesicomyid and microbial mat). The nature of hard substratum differed among ecosystems with authigenic carbonates at seeps (Paull et al., 2007) and sulphide edifices at vents (Jørgensen et al., 1990)."

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P23 L13-22: See general comments. See the answer to general comments about metals studied.

P30 L12-P31 L23: See general comments. See the answer to general comments about the term connectivity.

Table Table 4 Why need “Length (L), Diameter (D) (mm)”? Siboglinid species from seeps and vents do not differ by their lengths but by their diameters, offering different colonization surface for associated communities.

Table 5 Why need “Total density”? As suggested, we may not need the line “Total density” in Table 5 as we have already the “Mean density” per assemblages. We thus deleted this line.

Table 6 Please confirm Phreagena soyoae “X” of “HV”. We confirme that Audzijonyte et al (2012) found Phreagena soyoae within Guaymas vents, the identifications were also confirmed by genetic analyses (see tables in Supplementary materials of (Audzijonyte et al., 2012) http://doi.pangaea.de/10.1594/PANGAEA.806482?format=html), with data specific to Guaymas vent in the attached file.

Table 6 “Sirsoe grasslei”, change to italic.“aff. “ of “Amphisamytha aff. fauchaldi” and “(spinny)” of “Provanna sp.(spinny)” change to not italic. We modified the text, as suggested.

Figure Fig. 1. “O” of longitude! ”W” We modified the figure, as suggested.

Fig. 2. According to text, change the order photos “G” and “H”. We changed the sentence’s order within the text.

Fig. 2. In caption, “kilmeri” ! “soyoae”. We modified the text, as suggested.

Interactive comment on Biogeosciences Discuss., 12, 8497, 2015.

Taxa	Sampling date	Habitat	Expedition	Sample code/label	Area	(Locality)	Latitude	Longitude	Elevation [m a.s.l.]	No COI seq
soyoae (syn. kilmeri)	2000	vent	Alvin	A 3522	Guaymas Basin	Gulf of California	27.01	-111.41	-2000	3
soyoae (syn. kilmeri)	2003	vent	Tiburon	T 548	Guaymas Basin	Gulf of California	27.58	-111.45	-1780	3
soyoae (syn. kilmeri)	2003	vent	Tiburon	T 576	Guaymas Basin	Gulf of California	27.59	-111.48	-1583	1

Fig. 1. Table from Audzijonyte et al., 2012 refering to Guaymas vent

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