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Comment

Interactive comment on “Macrofaunal assemblages from mud volcanoes in the Gulf of Cadiz: abundance, biodiversity and diversity partitioning across spatial scales” by M. R. Cunha et al.

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The authors wish to thank the thorough revision and suggestions of the anonymous referee.

REV: General comments This concerns a key paper on the macrofaunal communities of the mud volcanoes in the Gulf of Cadiz. It provides some crucial insights in the diversity of the area, considering the influence of geological activity, and water depth. It is well written, though a bit descriptive. Through relatively minor changes in formulating

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the research questions and focus of introduction and discussion, the readability of the paper will be significantly improved. Specific comments I believe there is more in the paper than only 'to describe patterns'. By stating that you expect a difference between shallow and deep mud volcanoes for different reasons would already make the paper less descriptive and probably a key paper in cold seep ecology. Some of figures could indeed be used in handbooks when presented in the context of this hypothesis. The analysis and presentation of data are in general correct, relevant and informative.

AUT: Changes have been made in the introduction to broaden the stated objectives of the ms.

REV: Technical comments Mud volcanoes is sometimes abbreviated, other times not.

AUT: The abbreviation is used in the following cases: when part of a name (e.g. Porto MV); group name for data analysis (e.g. Shallow MVs or in beta-diversity groups such as WDMV) or in the case of referring to an individual MV. The manuscript was checked for consistency.

REV: Deep sea or deep-sea environment

AUT: There was only one case of incorrect use (p. 18347 line 18) which was corrected.

REV: Page 2: line 14 change to: the samples yielded modest abundances but the (local or regional???) species richness was among the highest ever recorded

AUT: Changed to “. . .but the local and regional number of species are among the highest ever reported for cold seeps.”

REV: Page 5 from line 13. Reformulate objectives in a more hypothesis driven context focusing on differences between shallow and deep MVs

AUT: We reformulated the objectives: “Here we analyse quantitative samples taken during the cruises TTR14 and TTR15 onboard the RV Prof. Logachev (Kenyon et al. 2006; Akhmetzhanov et al. 2007), and MSM01-03 onboard the RV Maria S Merian,

and describe patterns in biodiversity, abundance and community structure of the benthic macrofaunal assemblages in seven mud volcanoes along a bathymetric gradient in the Gulf of Cadiz. This unique set of mud volcanoes spanning shelf and abyssal depths within a single region of the continental margin, provides an ideal framework to investigate: a) the spatial scales of variability in α - and β -diversity; b) the influence of the changing environment conditions with increasing water depth in the macrofaunal assemblages; c) the role of chemosymbiotic and heterotrophic species in the composition and structure of the seep assemblages.”

REV: Page 6 line 19 remove ‘and’ just before ‘often’

AUT: Not changed – phrasing is correct.

REV: P2? Line 20 Change to: the deep MV’s showed in general a more heterogeneous macrofauna

AUT: Changed to “The Deep MVs assemblages showed, in general, contrasting features but were more heterogeneous”

REV: P2? Line 24 replace approximation by similarity

AUT: Changed to “convergence”

REV: Page 8 line 1: Explain Hermes and Hermione or remove from text (acknowledgements)

AUT: The manuscript will be integrated in a special issue of the project HERMIONE – do we need to spell out the acronyms? The authors will follow the Editors’ recommendations about this.

REV: Page 9 line 1: rather than associating this as a consequence of lack of replicates I would justify this scientifically. However in that case explain a bit better with evidence why 1200 m is transition.

AUT: The text was changed to: “Based on the characteristics of the study area men-

tioned above, the 1200m water depth was used as the transition between two very different sets of oceanographic and geochemical conditions and therefore the samples were grouped into the following three categories: R – reference sites in the vicinity of Mercator and Kidd; SMVs – Shallow MVs including Mercator, Kidd and Meknès; DMVs – Deep MVs including Captain Arutyunov, Carlos Ribeiro, Bonjardim and Porto. The lack of replication did not allow for testing differences between individual MVs.” - Unfortunately the lack of replication is a methodological flaw that unavoidably limits statistical choices. In this case the scientific choice was to group the MVs into two bathymetric zones. The transition between these was decided (a priori) based on the characteristics of the study area which were already described in detail in section 2.1 and also in the introduction.

REV: Page 10 line 14 phyla and not phylla

AUT: Corrected!

REV: Pag 10 line 19. The last sentence should go to material and methods

AUT: The authors feel that this is relevant information that could go unnoticed if integrated in Material and Methods.

REV: Page 11 line 4 I guess this is fig 3 and not fig 2a

AUT: The order of the figures is not correct – Fig 2 should be fig 3 and vice versa – this is now corrected.

REV: Line 9. Here it should be Fig 2a Better to be consistent in expressing densities per m² or per 0.25 m² and not mixed (figures per 0.25 m², text m²)

AUT: Order of figures is now corrected. In the figure we show the abundance in each individual boxcore – as each boxcore represents less than 1m² the values are not extrapolated to densities (ind.m⁻²). In the text we refer to average densities with an associated standard error and in this case we chose to use ind.m⁻² as this unit can be more easily used for comparison with other studies.

REV: Pag 12 line 13 Fig 3b not 2b

AUT: As above

REV: Pag12 Line 23 Normally an MDS is not interpreted along the axis , since position can be changed by rotating the figure

AUT: The authors are aware of this – reference to axis is used because there is no other simple way to guide the reader through the figure.

REV: Page 13 line 6 reformulate sentence since not clear what is meant by contrasting features (see also abstract) Line 9 distinct in which way?

AUT: “features”was changed to the respective synonym “characteristics” abut we maintained “distinct” (synonyms are distinctive or unique, different).

REV: Line 28 Simper results are characterized rather than determined?

AUT: Not changed - the high variability in the composition of the assemblages is decisive for the SIMPER results (high within-group dissimilarity values) and not a characteristic of the SIMPER results

REV: Pag 15 line 3 change to weight in explaining

AUT: Changed!

REV: Line 23 remove certainly

AUT: “certainly” is used in the sense that the number of species is “unquestionably” among the highest ever reported– not changed (if there are seeps with higher species richness they have not been reported yet)

REV: Line 23 Add However, there are very few cold seeps. . .

AUT: Not changed for agreement with the previous point.

REV: Pag 19 line 20 What is the evidence for the lower seepage. Can you add refer-

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ences

AUT: References were added

REV: Page 22 line 9 reformulate these two sentences since grammatically not correct

AUT: Changed to: “abiotic sources of heterogeneity, such as variability in fluid flow, geochemistry, and substrate type, give rise to different sets of microbial communities, microbial symbiont-hosting foundation species, and attendant heterotrophic assemblages; biotic sources of heterogeneity derive from the biogenic habitats subsequently created by these species “

REV: Page 22 line 17 what are the outstanding characteristics of the GoC. Here I expected a conclusive overview of the macrofauna features which makes the area different. However some of the paragraphs characterize rather the environmental settings of the area. So some aspects are not conclusions from the paper but provide rather the context and should be incorporated earlier in the discussion (even at the beginning)

AUT: There are here very different opinions from the two Reviewers – referring to the same part of the manuscript L. Levin says “I think the final synthesis on p. 18352-3 is excellent!” In view of this enthusiastic comment the authors choose to leave the text as is.

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