

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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This manuscript represents a highly significant contribution to the literature on continental margin habitats, mud volcanoes and cold seeps. The Gulf of Cadiz displays a wealth of diversity associated with mud volcanoes with different levels of seepage, at different depths, and exposed to different water masses. Bg-2012-571 does an outstanding job of characterizing the macrofaunal diversity patterns and exploring their linkage with the abiotic and biotic settings.

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Several suggestions below are made to strengthen the ms and improve its readability.

Introduction – this should do a better job of covering key topics treated in the paper. (1) The final paragraph of the introduction suggests a highly descriptive study but in fact the authors target a number of fundamental hypotheses throughout the paper concerning the biology of cold seeps. These should be outlined in this introduction of the paper aims. Among these are:

- a) the scales of variability in diversity (within and between mud volcanoes/ across fields)
- b) the influence of water masses interacting with the seepage
- c) depth effects
- d) relationships between chemosynthetic species prevalence and heterotrophic macrofauna

Rather than being brought up for the first time throughout the results, these key topics should be raised in the introductory literature review.

Results paragraph 1. The compilation of all sites (including reference stations?) in the listing of specimen numbers, species numbers, singletons is not especially useful. Could these statistics be split up into shallow MV, deep MV and reference stations? Can the total numbers be evaluated in light of the total surface area sampled?

Results Section 3.3 This will read better if the plots and statistics are not the primary subject (or object) of the sentences. Although this is a matter of style, I recommend the authors write more about the science rather than the plots, axes, and statistical tests.

Section 4.3 Could the discussion be broadened to place the mud volcano diversity in a more general context? How does it compare to diversity on seamounts that do not have seepage? To other isolated or more contiguous settings in the deep sea?

One of the best parts about this paper is that, rather than treating the seeps in isolation, it explores the role of hydrography and water masses. I think the final synthesis on p. 18352-3 is excellent!

Minor edits suggested are:

C7520

- p. 18336 line 10 & 28. What is the isotope signature of methane?
- p. 18341 line 25. Higher abundances than what? p. 18342 line 12 abundance of ophiuroids and sipunculans should be given. . . not useful to say they are relevant.
- p. 18344 Line 15 What does Complementarity mean here? Not clear?
- p. 18346 Line 1-8 Rarefaction data are the best comparisons. . . it is hard to compare species numbers unless they are normalized to sampling area or number of individuals. Line 9-14. Examine the mesh size in various publications and provide this information when drawing density comparisons. Levin papers use 0.3 mm. Also consider whether a microscope was used. Sahling et al. 2002 for example writes . For macrofauna (>0.5 mm, excluding Crustacea, Nematoda) studies, the uppermost 1 cm of the sediment from the TV-MUC cores was left in one piece while the rest was processed through 0.5 mm sieves. The macrofauna were immediately extracted by hand, preserved in 10% buffered formaldehyde, sorted to the lowest taxonomic level possible, and counted. Extraction by hand (without scope) could easily account for lower densities.
- p. 18347 line 12-15. Can you make this statement about the relationship between siboglinids and macrofaunal diversity and evenness quantitative by plotting frenulate abundance vs Es 100?
- p. 18347 line 18. Do not hyphenate deep sea unless it is used as a double adjective
- p. 18347-8/18349 line 14. Do the mud volcanoes bring fluid influence from the mantle? At a subducting seamount off Costa Rica (Jaco Scar) - there were fields of frenulates (Siboglinum sp. in the vicinity of warm, methane-rich, mantle-influenced fluids. Levin, L.A., V.J. Orphan, G.W. Rouse, W. Ussler, A. E. Rathburn, G. S. Cook, S. Goffredi, E. Perez, A. Waren, B. Grupe, G. Chadwick, B. Strickrott. A hydrothermal seep on the Costa Rica margin: Middle ground in a continuum of reducing ecosystems. Proc. Royal Soc. B. doi: 10.1098/rspb.2012.0205 (2012)
- p. 18348 line 27. There are a number of papers that talk about depth effects on

C7521

cold seeps (those on vesicomysids, Levin and Mendoza 2007), and that examine deep seeps. What you may mean is that most papers don't examine a depth gradient within a single margin. Also perhaps describe the difficulties in accessing the deepest seeps - need to use ROVs or Subs.

p. 18350 line 4 - Citation needed after assemblages (the first).

p. 18351 Should you be citing Olu and Menot seep papers for more examples of the role of foundation species.

Fig. 4 legend – Can you write out the volcano names? Or give the abbreviations? It might be useful to write out the color coding. . . are these depth zones?

Interactive comment on Biogeosciences Discuss., 9, 18331, 2012.

C7522