

## ***Interactive comment on “Hydrothermal activity lowers trophic diversity in Antarctic sedimented hydrothermal vents” by James B. Bell et al.***

### **Anonymous Referee #1**

Received and published: 4 October 2016

Review of Bell et al. ‘Hydrothermal activity lowers trophic diversity in Antarctic sedimented hydrothermal vents.’

General comments This is an interesting paper and is within the remit of Biogeosciences journal. This paper presents new data on the trophic ecology of Southern Ocean macrofaunal communities in sedimentary environments where hydrothermal activity is present. The manuscript gives a very thorough description of the trophic ecology, encompassing bacteria and the fauna spanning a range of analytical and statistical techniques. The manuscript is well written. I have listed more specific and technical comments below.

Specific comments Throughout the manuscript you refer to vent and non-vent sites and there are a few sampling sites within each of these descriptors. I would suggest

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that each time before you mention a specific site e.g. Hook 1 you state whether it is a vent or non-vent site. You have done this most of the time but not all of the time and it will provide further clarity for a reader not familiar with this area. Introduction Line 89 you suggest that SIA is a powerful tool to assess spatial and temporal trends in faunal behaviour, I think this should be clarified e.g. with the word 'feeding' before behaviour. Line 91-93: you suggest that stable isotopes can be used to distinguish between methane or dissolved organic matter as a food source for macrofauna. Has this been done for natural abundance isotopes? If so could you provide a reference? I would like to see further explanation of the use of stable isotopes in trophic ecology e.g. how different fixation pathways influence the isotopes you use (CNS: see Levin et al. 2002). Some inclusion of natural sources of OM would also be good e.g. if there is data for CN isotopes of ice algae, POM or phytodetritus in the area. It would also be good to explain how this changes with trophic position. I realise that this is repeated often in the literature however, not all of your readers will be experts in isotope ecology. The hypotheses section is good. However, you do not refer to them in the same order in the discussion. I would suggest changing the order of the hypotheses in the introduction to reflect the order in which they are referred to in the discussion. Methods Line 143: you state you summarise the PLFA method of Main et al. (2015) method, yet the methodology you give is lengthy. Is there a way to shorten it? Lines 198-200: This is too much detail. If you do not include these data in the paper you do not need to state why here. You give precision data for the reference materials I presume this is from the laboratory and international standards. What was the precision for the Antimora? You calculate Layman metrics for C and N isotopes. Could you also have done this with S and N isotopes, I realise you have fewer data points for S. It would be interesting to compare the trophic niches for different isotopes. Results General comment, where you state a numerical result e.g. 84% or -15‰ always give the unit after the figure/number, even when you state a range e.g. 64% - 95%. You have done this some of the time so just remember to be consistent. Line 272: Is it necessary to state 0.85% of the reads to two decimal places? And also for the figures stated in the next paragraph. Line 289:

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I could not find the supplementary figures. I had the supplementary tables but not the figures. Line 328: how were the samples contaminated with marine carbonate? Line 335: I can not review the supplementary figures. Line 337: rejection of hypothesis 1, I would leave this for the discussion. Discussion

You mention in the methods that the two Hook sites had variable hydrothermal activity. It would be nice to have a short description of this e.g. temperatures, methane concentrations etc. I found this paper below, which could help with this.

G. Bohrmann ' C. Chin ' S. Petersen ' H. Sahling U. Schwarz-Schampera ' J. Greinert ' S. Lammers G. Rehder ' A. Daehlmann ' K. Wallmann S. Dijkstra ' H.-W. Schenke  
Hydrothermal activity at Hook Ridge in the Central Bransfield Basin, Antarctica. *Geo-Marine Letters* (1999) 18 : 277-284

Line 378: could you state whether this is high or low hydrogen sulphide flux. Line 383: I would state 'basal carbon source e.g. DIC Line 390-391: Is this in your study? If so start with in this study or we have shown. . ., if this has been shown elsewhere as well give a supporting reference. Line 393: do you mean isotopic signatures, when you refer to signatures here? Or do you mean distributions of PLFAs? I am guessing the former. Line 396: Macko and Estep 1984 demonstrate nicely the high variability associated with bacterial remineralisation of organic matter. It might be a useful reference to include here and to think about for this section of your discussion. Organic geochemistry 6: 787-790 Line 401: There must be an earlier paper describing the carbon isotope signatures associated with the rTCA cycle. Line 424: You suggest that PLFAs with large ranges  $\delta^{13}\text{C}$  ranges are indicative of methane and sulphur cycling, however small ranges around e.g. -50 per mil could also be indicative of methane cycling. . . Line 433: you discuss the isotopes of Sclerolinum and Siboglinum and refer to figure 2 here, however it is not possible to easily pick out which points on the plot are in fact these two species. Lines 625: You mention sea-ice algae here. Perhaps you could mention this in the introduction.

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I think you are well aware of the patchiness of deep-sea soft sediments. Although you have processed a considerable number of cores for this study, due to the nature of the high heterogeneity in the deep-sea this made it unlikely you would hit a bacterial mat or an area that may be more heavily dominated by chemosynthetically driven food webs. Perhaps this should be taken into account in the conclusion section.

Technical comments Line 19: change to 'Sedimented hydrothermal vents are those in which hydrothermal fluid is discharged through sediments and...' Line 30: remove 'the' after 'suggesting that' Line 64: change 'but also accelerates' to 'whilst accelerating' Line 68: change 'but active communities...' to 'however, active communities are also...' Line 81: place the reference Bell et al. 2016 at the end of the sentence. Line 114: I would move the three sites in brackets to the line below before the 'Aquilina et al' reference. Line 117: change to 'With the exception of salps,' Line 183: I do not think you need to provide an acronym for East Kilbride and I would remove it from line 187 so it should read 'Samples were analysed by continuous flow...' Line 217: you can remove EK here. Line 290: change to (4.8% - 16.9%, Table 2). Line 315: in brackets I would change to (non-vent sites) Line 320: change to (means x to x, respectively, Fig. 2). Line 347: replace 'but' with 'however' Line 359: change to 'between any of the non-vent sites.' Line 363: replace 'but' with 'however' Line 375: replace 'but' with 'and' Line 385: insert 'the' after 'but' Line 387: remove 'for' after notable Line 408: remove a bracket Line 413: refer to as non-vent sites Line 446: need a space between 'around10' Line 455-457: missing units here. Line 461: too many brackets around reference Line 463: suggest dropping some references here Line 465: insert 'abundance of Methylohalomonas, constituting 2.1 to 4.3% of sequences...' Line 495-496: place reference at end of sentence. Line 529 and 530: too many brackets around reference Line 534: This is the first time you mention 'AOM' can you spell out the abbreviation at first mention please Line 552: replace but with and Line 558: missing bracket. Line 575: replace 'was' with 'were' Line 579: too many brackets around reference Line 599: change to 'suggested for deep-sea ecosystems...' Line 603: too many brackets Line 613: replace 'was' with 'were' Line 617: insert 'heavily' before 'influenced' Figure 2 and

4: could you be consistent with figure 4 and use triangles and circles to represent vent and non-vent sites? Figure 4: what are the error bars? Line 955: too many brackets around reference.

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