

Interactive comment on “Responses of an abyssal meiobenthic community to short-term burial with crushed nodule particles in the South-East Pacific” by Lisa Mevenkamp et al.

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Journal: Biogeosciences (BG) Title: Responses of an abyssal meiobenthic community to short-term burial with crushed nodule particles in the South-East Pacific Author(s): Lisa Mevenkamp, Katja Guillini, Antje Boetius, Johan De Grave, Brecht Laforce, Dimitri Vandenberghe, Laszlo Vincze, and Ann Vanreusel MS No.: bg-2018-489 MS Type: Research article Special Issue: Assessing environmental impacts of deep-sea mining – revisiting decade-old benthic disturbances in Pacific nodule areas

General comments:

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The study by Lisa Mavenkamp et al. on response of abyssal meiobenthic community to burial with nodule particles adds a new dimension to the understanding of possible responses of deep-sea faunal groups on mining of seabed minerals. The methodology adopted by the authors is unique with interesting results and deserves to be published. However, the authors need to take into consideration the following:

1. Describe in 'Introduction' as to what is the likely source of the crushed nodules during a mining operation and what is the expected concentration and size of the nodule particles that are will be introduced on the seafloor based on which this experiment is planned. Also mention what is the size and concentration of the crushed nodules used in the experiment.

2. The study makes certain comparisons with the results of previous benthic impact experiments (BIEs) that were not at all similar either in spatial terms or time scales or volume and nature of resedimentation, This study is based on effects of concentrated crushed nodules on meiobenthos over eleven days in a restricted area, whereas the BIEs were studies of impacts of distribution of resuspended sediments (and not crushed nodules) over large areas and longer periods of time (1 year or more). So, it is not correct to compare the results of these two.

3. It is interesting to see that many of the results of this experiment have shown positive response of meiofauna as well as other groups (upward migration into the re-sedimented layer, no additional accumulation of copper, and no extreme changes in community structure) that should be highlighted. When the understanding of likely impacts of deep-sea mining is limited and mostly negative impacts are being projected by the environmental groups based on little or no data, it is important to bring out positive impacts as well so as to have a balanced approach towards sustainable mining. Also researchers need to appreciate that it is not necessary that all responses to any man-made activity will always be negative, but could be positive as well as shown in this study and this is an important contribution from the marine biologists to this subject.

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Specific comments:

1. Page 1, line 23 - Abstract - change ‘...in covered and undisturbed sediments.’ to ‘...in covered and uncovered sediments.’ (because there is no other disturbance on the seafloor but covering of sediments by crushed nodules).
2. Page 2, line 6 – Introduction – change ‘extraction in’ to ‘exploitation from’ – as ‘extraction’ means ‘removal of metals from ore’, whereas ‘exploitation’ means ‘removal of ore from its original source’.
3. Page 2, line 14 – change ‘such as’ to ‘due to’- as these are causes not impacts.
4. Page 4, line 8 – Correct ‘Fig S1’ to ‘Fig 1’,
5. Page 4, line 8 – change ‘substrate distribution device’ to ‘crushed nodule distribution device’ – see below for explanation.
6. Page 4, line 8 – According to Cambridge dictionary, the word ‘substrate’ means something lying below or base or bed and cannot be used for crushed nodules being deposited artificially from top. So change ‘crushed nodule substrate’ to ‘crushed nodule particles’ and ‘substrate’ to ‘nodule particles’ in the entire manuscript..
7. Page 4, line 10-11 – Add mean size of crushed nodules ‘...substrate of ### micron / mm size that was filled inside the tubes of the device.’
8. Fig. 1 caption – change ‘Impressions’ to ‘Images’ or ‘Photographs’
9. Page 7, line 14 – Please mention the ‘values for sediment characteristics, metal values, and meiofauna composition’ before the experiment and compare the values after the experiment to evaluate the impact of burial of seafloor sediment by crushed nodule particles.
10. Page 7, line 25 - change ‘burial treatment’ to ‘burial treatment sediment sample’.
11. Page 9, line 3 – add units ‘cm’ after ‘0-1’ and ‘1-2’.

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12. Page 10, line 7 – change ‘Table S1’ to ‘Table 1’
13. Page 10, line 10 – change ‘control’ to ‘control samples’ and ‘burial treatment’ to ‘burial treatment samples’.
14. Page 10, line 15 – change ‘Figure S4’ to ‘Figure 4’.
15. Page 13, line 14-15 – After ‘Changes in oxygen could be one of the factor’ it would help to give either layer-wise oxygen values before and after the experiment or at least give general values for oxygen content in sediment layers from other publications (eg. Rzeznik-Orignac et al, 2004) to support the hypothesis.
16. Page 15, line 9-10 – ‘Interestingly, all dominant nematode genera responded with upward migration. ...’ is a positive response further supported by section heading 4.3 ‘Increased copper concentrations in added substrate are not reflected in nematode body copper content’ - these need to be highlighted as mentioned in #3 of general comments.
17. Page 15, line 18-19 – ‘The results of our experiment did not indicate that these nematodes were more successful to inhabit added substrate’ contradicts the above statements, unless it refers specifically to monhysterids. So please specify or remove this sentence.
18. Page 15, line 30-34 – Effects of resedimentation of sediment over large open area and that of crushed nodules over small enclosed area cannot be compared as the material deposited and the process and concentrations are entirely different. The discussion needs to be modified.
19. As the experiment of depositing crushed nodules has shown positive response of nematodes by upward migration and maintaining similar community structure, the sentence on page 16 (line 1-2) ‘...Changes in nematode composition. ... may be long lasting and positively irreversible. ...’ need to be revised.
20. Page 16 – Conclusions – needs to be revised according to the above discussions.

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Recommendation: It is recommended that major revision is required before accepting the paper.

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