Biogeosciences
Discussions

Interactive comment on "Megafauna community assessment of polymetallic nodule fields with cameras: Platform and methodology comparison" by Timm Schoening et al.

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General comments The paper tackles an important issue – whether cost effective methods of measuring species presence and abundance can be developed for nodule locations where mining may begin in a few years. Can this be achieved by examining photographs and videos of megafauna and if so, what are the best methods? The paper needs an explanation of the megafauna of nodule locations. This is critical because each survey could return very different results due to the sparse nature of the animals. The individual surveys are located in the same area but are not necessarily overlapping so could be expected to show different results. I do not understand why there

are conflicting statements about how well the observers did at recognising categories of animals – there are conflicting statements about them doing well and poorly. The gold standard process, that is not described, seems to improve their performance. The conclusions are that the method is highly dependent on equipment, methodology and observer, which may not be very helpful for the industry but indicates caution in adopting new monitoring practices. The English of the manuscript is not always very good even though there are English speaking authors. I have picked out some instances but there are many more.

Specific comments Line 1 It is not "again" as they have never been commercially viable The point of this paper is to help provide baseline information and then to show how monitoring can be carried out cost-effectively with a reasonable degree of accuracy. Line 13 Mention minimum standards here e.g. When and if commercial exploitation of these marine resources commences, minimum standards should be set in the regulations on how camera-based monitoring surveys should be conducted, and with what equipment so as to ensure a high standard and unambiguous results. Line 19 The increasing interest has driven the technological development Line 20 Contracts are awarded by the ISA – not licences. Lines 19-25 This sentence is too long – split after MIDAS Line 27 It is density of nodules and their mineral grade. No contracts have been awarded in the Peru Basin. Line 39 The fauna on the nodules was destroyed as well Line 39 The soft-bottom community. . .. Start a new paragraph here and explain that the site has been monitored subsequently. Line 43 The ploughing activities also. . . Line 44 Change not directly to indirectly Line 46 Change is still to date. . . to remains. . . Line 49 I suggest remove between regions sampled differently. . . Line 87 In this paragraph you explain the results of the previous disturbances but you are aiming the document at helping monitoring post mining. It would therefore be better to describe the post mining surface that is likely to be planed flat with track marks and then overlain by plume deposits – described in Weaver and Billett 2019 in: Deep-sea mining and Environment– issues, consequences and management Edited by Rahul Sharma. Springer International Line 98 As we approach . . .. This is an odd statement when you are discussing

monitoring nodule mining that will impact 100's of km2 per year per mining activity – to be concerned about a few box cores or trawls, both of which scientists do all the time. I suggest removing these two sentences. The importance of the technique is that it is inexpensive and can cover much larger areas than seabed sampling. The paper will have more impact if it follows this line. Line 104 This is a better argument about data availability. If used commercially could you verify the image data is genuinely from a given location at a given time? Line 129 loss of information at the image extremities . . . . . . Presumably the best option is only to look at the central portion of the image, ignoring the periphery? Lines 142-145 The English needs attention here Line 150 The illumination system is though in direct relation with the target altitude of survey above the seabed. Not sure what this means? Line 182 The suggestions should be targeted at the CCZ or Peru Basin which have unique and peculiar faunas – low numbers of individuals and very high species diversity with many unknown species. A brief review would be useful – there are a growing number of papers including some referenced here - Simon-LledoÌĄ et al 2019, Vanreusel et al, 2016 etc. This review would then point to the need for extensive baseline surveys including repeat surveys to capture the spatial and temporal variation. I'm not sure of the value for surveys during the mining activity when the area would be covered by plumes that would hide the seabed. Maybe these could be targeted to find the edge of the plume or to examine effects in the far field when the plume has settled. Line 196 (ca. 600 x 150 m2) Is this per survey or total? Line 198 SO106 and SO242/1 Is this a cruise? If so what ship and when? Line 200 Describe the faunal catalogue – what is a category (family level?). Why 20? Do these cover all the megafaunal groups in the Peru Basin. Are some categories more common than others? Does each cover many species and are these similar to each other? How difficult is it to recognise each category? Is there a size cut-off? Did you test to get the best categories? Etc Line 212 coupled with their moderate personnel requirements . . . . You have forgotten the ship crew! The difference in cost will be small. Line 276 Figure 4(d) is extremely blurred. I assume you have selected one of the best images – so is this process pushing technology too far? Line 281 fauna individual . . . .

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Animal Line 287 gold standard annotations . . . . What is this? Line 288 Grouping was conducted by fusing overlapping annotations of similar size to one grouped annotation. The location and size of this grouped annotation was computed as the average of the annotation position and radius of the single expert annotations. I do not understand these two sentences Line 293 Cohen's kappa was computed . . . What is this and what was the result of the computation? Line 314 (see also 2). What does this refer to? Line 314 It further highlights that the observer agreement drops with increasing image resolution reflecting the results in (c). This is a curious fact – the observers were worse at categorising better images! This seems to undermine the whole process. The rest of the paragraph seems to say the opposite. I am confused, and clearly more explanation is needed here. Line 315 (c). Does this mean Figure 7c? Line 335 the same area of seafloor According to Figure 1 this was not exactly the same area of seafloor, but areas of seafloor near to each other. Given the huge variability of faunal distributions in the Peru Basin would you expect the results to be similar? I am not sure I agree with your conclusion in line 344-345. Line 381 annotators with little or no experience can identify fauna within an image set with a degree of confidence This is in contradiction to lines 313-315. I am confused – there seems to be a step related to gold standard, that is not explained, but takes poor observer agreement to good observer agreement. Line 387 more traditional monitoring approaches – such as? Do you mean human recognition of photos/videos or box coring and other sampling?

Figure 3 Better caption needed. Add indications of scale and other parameters. Table 3 what do the column heads H, N, df and p mean. Improve the caption Figure 5 Better caption needed. What do multiple circles mean – multiple organisms or multiple operators? Figure 6 Caption needs more explanation What do the colour circles mean? List what each figure represents. Does this tie to table 3? L and m look to be very poor images – explain.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2019-363/bg-2019-363-RC1-
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supplement.pdf

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