Anonymous Referee #3

I do not have the much to say regarding this submission to Biogeosciences and agree with many of the points raised by the 2 previous reviews. I do have some minor points that I would like to see addressed before the paper is finally accepted.

Page 9455lines 12-28: Please merge these two paragraphs better as there seems to be a lot of repetition in both paragraphs
The paragraphs have been merged.

Page 9456 Lines 22-23: Do you mean temperature and salinity at the seafloor? Page
I have added *near the seabed.*
9457 Lines 10: I do not think "occupied" is the best word to use.
This now says *Colonization experiments were placed at locations along two cross-margin transects at slightly different latitudes (Fig. 1).*

Page 9459 Lines 5: It would be nice to run the analysis using maximum transformed data (presence/ absence) as well. If the data analysis provides essentially the same results as the untransformed analysis, it would be possible to state that the differences in community structure between the different treatments are related mostly to compositional patterns rather than abundance patterns.
The Anosims were rerun using presence/absence and significance was still obtained for… this is now incorporated into the text.

Multidimensional scaling analysis of tray colonizers revealed a significant difference in community composition between colonizers at the sites with lower oxygen (802/817-m) and those where oxygen was higher (1147-m site). (ANOSIM R = 0.50; P = 0.024) (Fig. 7B). Because the same result is obtained with a presence/absence analysis (ANOSIM R = 0.347; P=0.04), we can attribute this different to composition rather than density effects. There was a significant difference in composition between colonization tray and ambient fauna (Fig. 7A), based on both faunal counts (R= 0.263: P=0.002) and presence absence (R=0.148, P=0.038).

Page 9461 Lines 1: It would be nice to have some description of the size of the different animals found in the different colonizer treatments as this would allow the reader to work out if the animals were migrating into the colonizer trays as larvae or as adults.

Colonizing capitellids were consistently small (juveniles) – this is stated in the paper. Other taxa were a mix of sizes but cannot readily be quantified.

At 1147 m, trays were strongly dominated by juvenile capitellid polychaetes. Other colonizers were of mixed size reflecting both adult and juveniles.

Page 9461 Lines 19-25: I find the text confusing here because in one instance that authors state that 5 polychaetes were present in the 802m colonization trays and 2 of these were cirratulids. In the next sentence, they state that the other 5 polychaetes at the site represented a different family. Does this mean there were 7 polychaetes in the colonization trays? Please confirm or restructure the sentence.

This was a mistake. The 'other 5 polychaetes' should have been 'the other 3

polychaetes'. This has been corrected.

Page 9467 Lines 28-29: Change to "These may have entered trays as planktonic larvae and rapidly grew".

We do not think 4 -8 days is enough time to grow large. We took out the mention of advected individuals as requested.

Again, by having biomass/ size information about the animals, the reader would bebetter able at deciding if the fauna in the trays were larval colonizers or migratory adults. Would elevated sulfide concentrations also be limiting colonization of fauna in the OMZ as well as low O2? Comparing between the Levin et al seep study and this study would be a suitable comparison and may shed some light on the structuring effect of sulfide on colonization dynamics. This has been done to some degree but could be discussed in more detail in the discussion

No sulfide was measured in this study and trays did not appear sulfidic, so we are reluctant to bring more speculation about sulfide into the text.

Page 9472 lines 5-10: I very much like the reasons that
led to the experiments being set up in the first place, but I think realistic disturbance experiments are also needed. It may take far longer for fauna to colonize an area tens of kms in diameter that has been devastated by phosphate mining/ trawling than into a colonization tray where only the surrounding 1m of sediment has been impacted. I think it is important to stress that despite the fact that you see colonization into sediments at 1147m within a week, these results cannot be used as evidence for rapid colonization of seafloor habitats after phosphate mining/ fishing. This is not a criticism of the paper, but it would be good to emphasize this.

This point is now made in the conclusions. We say
Trawling, oil spills, or seabed mining can all create scenarios in OMZs where colonization occurs following disturbance. Phosphate mining is being considered within several OMZs globally. We note that the small scales on which we studied colonization are not likely to paint a true picture of colonization dynamics following large-scale mining or trawling disturbance. Thus despite the fact that we saw rapid colonization at 1150 m off W. India within a week, this cannot be used as evidence for rapid colonization of seafloor habitats. Additional research is needed to address subsequent changes in colonizer assemblages over longer time periods and larger scales, and to further explore spatial variation in colonization trends across hydrographic gradients, as well as the consequences for ecosystem services.

Figure 1: I found this figure worrisome from an eye-sight point of view. I am relatively young (at least I think so) and found the legends and symbols on the figure quite difficult to read. While this has highlighted the fact that I need to go and see an optician, please increase the sizes of the symbols/ text.

We are redrafting Figure 1 and will attempt to make it more readable.

This also applies to figures 7 and 9.
These are being redone with larger font.

Figure 6: I would like to see the total number of fauna found in the colonization trays on this figure or in the text, as I think only 1 polychaete was found at 817m. This would make things clearer to interpret here.

This information has been added.