

Interactive comment on “Impact of small-scale disturbances on geochemical conditions, biogeochemical processes and element fluxes in surface sediments of the eastern Clarion-Clipperton Zone, Pacific Ocean” by Jessica B. Volz et al.

Anonymous Referee #1

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The work constitutes one of the first of its kind, documenting the sedimentary biogeochemical impact of simulated disturbances that are likely to arise from deep-sea mining. Overall the study is very well designed, scientifically sound and well executed. The report is well written and contributes to an international framework of projects dealing with the deep-sea impacts of mining. Looking from a purely scientific/geochemical angle, the results are not surprising from a sediment diagenesis point of view, but I find it very important that the early diagenetic framework is able to explain and guide (to

some extent) these type of impact assessments.

There is a couple, relatively moderate shortcomings which can be addressed in the final version:

- It would be great to see more of the undisturbed/baseline sediment geochemical profiles. I understand there will be a companion manuscript on this, but reproducing more of those results here maybe can be possible. Especially undisturbed OPD - TOC profiles would be interesting to see in this paper as well.

- I find the discussion very substantial and objective. However I was wondering if more input to policy/blue economy can be given with a few more sentences. As it stands the message is that the uppermost organic-rich part is removed and a lot more oxygen seeps into the sediment. What will the policy side make of this, may sounds like a positive result? What is really the impact here? The fact that the system comes back to original steady state is one thing, but deep-seafloor can be disturbed naturally, through different means.

Several line-by-line suggestions:

L46 and many more places: Please consider the repeated use of (re)equilibration of the study system. Rather than chemical equilibrium, I think what is meant here the system becomes steady-state over the course of the study's simulation timeline.

L115 A more specific verb can replace 'influencing' here, maybe 'increasing'?

L396 This can be confusing if not elaborated a little more, as it rapidly switches the discussion to glacial-timescales. First, how sure are we on the lower bottom O₂ levels in the LGM, when the seawater was somewhat colder with increasing mixing? If O₂ was still lower, I do not think it would be to a hypoxic extent that it is going to compress all the redox zones. But then how was Mn delivery to LGM deep waters, given Mn is the tracer used in this study?

Please elaborate or I would recommend removal of this sentence.

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Figure 8 - the timescale is missing, was this deliberately omitted?

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