

Interactive comment on “Biogeochemical Impact of Cable Bacteria on Coastal Black Sea Sediment” by Martijn Hermans et al.

Anonymous Referee #2

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The manuscript represents a very comprehensive study of potential processes and effects of cable bacteria in sediments. Investigations on cable bacteria and their influence on biogeochemical processes are still in the beginning, but more and more studies show their importance for the element cycling; importance of cable bacteria activity on the oxygen demand in coastal sediments. In the present study, the authors used sediment cores from the coastal area of the Black Sea, which they homogenized and freed from macrofauna. This probably increased the availability of labile organic material and its distribution in deeper sediment layers. Furthermore, the sediment was anoxically stored until the experiment, during the experiment the overlying bottom water was saturated with oxygen so that a steady state must be established at the beginning of the incubations. This fact does not reduce the results of the experiment or the quality

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of the manuscript. However, the authors should consider the study presented here as potential processes and not directly related to a coastal region (in this case the Black Sea). Therefore, I would strongly suggest to rewrite the manuscript and change the focus of the manuscript by concentrating on the "potential processes and biogeochemical impacts" rather than to directly relate it to coastal sediments of the Black Sea. The difference between the natural distribution of cable bacteria and the experiment is also evident when looking at Fig. 1c. The authors can use their main results as shown here, but the focus should be on the conditions used in their experiment, which are rather artificial, but very nicely show the potential of cable bacteria in the biogeochemical cycling. In a second step the transfer to coastal sediments and their biogeochemical conditions can be done. Here the manuscript lacks the coherence (hypoxia and oxygen depletion as mentioned in the Introduction). In a final paragraph the transfer of the laboratory experiment to natural sediments and possible variations in biogeochemical processes as well as the influence of macrofauna (bioturbation and bioirrigation) can be discussed.

- Is there any information about the organic carbon content of the sediment and how this changes over the incubation period ? I would assume that this is the major driver for the development of biogeochemical zonation.

- How does the development of the oxic zone, as shown in the experiment, relate to natural variations in coastal sediments ? - How does the experiment relate to the development of hypoxia and depletion of oxygen in coastal areas ? The experiment shows the opposite reaction (from anoxic surface layer to an oxygenated layer).

- line2 121/122: ... with overlying water ... Was this bottom water taken from the site or artificial water, as used for the aquarium?

- line 153: core was place outside the aquarium Why was the core taken out ? was the incubation temperature maintained?

- Was the overlying water during the 24-hour incubation for the solute flux measure-

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ments stirred to avoid stratification? This could have influenced the flux across the sediment-water interface because stagnant waters lead to an increase of the Diffusive Boundary Layer, which controls the solute exchange.

- Pore water profiles (specially Fig 1a, Fig 2) are very small and it is difficult to recognize the different profiles (O₂, pH, H₂S) different; graphs should be enlarged.

Please also note the supplement to this comment:

<https://bg.copernicus.org/preprints/bg-2020-292/bg-2020-292-RC2-supplement.pdf>

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-292>, 2020.

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