

Interactive comment on “Effects of fluctuating hypoxia on benthic oxygen consumption in the Black Sea (Crimean Shelf)” by A. Lichtschlag et al.

Anonymous Referee #3

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This very interesting manuscript describes spatial and temporal variations in oxygen concentrations along the outer Western Crimean Shelf and the consequences for biota and a number of key biogeochemical processes. Using a wide range of state of the art measurement techniques that include in-situ methods, the authors show that, in this region of the Black Sea, substantial variations in oxygen concentrations in bottom waters occur over time scales of hours. Other conclusions are that oxidation of upward diffusing reduced compounds from porewaters play only a minor role in the diffusive uptake of oxygen by the sediment and that fauna, when present, contribute significantly to oxygen uptake.

This is a well-written paper and I have only very few comments:

- (1) It would be great if the authors could add organic C profiles to their geochemical
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data set. This could be used in their discussion of the fate of the organic matter reaching the sediment in the various redox zones in section 4.1. A more detailed discussion of the NH₄ profiles and production rates also would fit in this section.

- (2) The paper would benefit from the addition of a short conclusion and/or implication section at the end. It is not strictly necessary, but it would likely increase its impact.

Minor comments:

- (1) page 6454. Porosity is missing in this equation. (2) page 6454, line 26. Change “was” to “were” (3) page 6455. It can be tricky to take pore water samples with rhizons at 1 cm resolution because of the risk of sampling from depths above and below the sampling depth targeted. It would be useful if the authors describe how this was avoided, e.g. by including how long the rhizons were deployed, what volume was extracted, etc. (4) Page 6458. Section 3. Here the authors are describing the results of Fig. 6 before those of Fig. 3, 4 and 5. I would suggest to change the sequence of the figures to that in the text (Fig 6 => Fig. 3, Fig. 3 => Fig 4. etc.) (5) Page 6461: line 22. In figure 5 only rates are presented, not fluxes. (6) Page 6463. ²¹⁰Pb data: refer to the figures in the supplementary data file. It would be good if more information was provided on the calculation of the sedimentation rate from the ²¹⁰Pb data. How did the authors account for the bioturbation at site 462? (7) Page 6464. Line 22. Change to “macrofauna play” (8) Page 6466. Line 11. Rephrase “in relation to bottom water oxygen concentration”.

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