

Interactive comment on “Effects of global climate change and organic pollution on nutrient cycling in marine sediments” by C. Sanz-Lázaro et al.

Anonymous Referee #1

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The manuscript deals with an experimental study using short sediment cores which were incubated under different temperatures in order to simulate the effects of increasing temperatures and eutrophication on early diagenetic release of nutrients. Incubation was done at three different temperatures representing present conditions as well as those simulated for global change scenarios in 50 and 100 years. A second incubation was done with added ground fish feed in order to simulate the addition of labile organic matter. Part of the study, namely the CO₂ release, oxygen uptake, sulfate release and sulfide enrichment, was published in an earlier paper. The present paper is focused on the mobilization of phosphate and ammonium and uses a regression analyses to determine the efflux of the nutrients with and without organic matter addition. The results are that phosphate release increases linearly with increasing temperatures while ammonium is released according to an exponential fit with an increase

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starting only at temperatures elevated by $>6^{\circ}\text{C}$. Another important finding is that only a very small proportion of added phosphorous is released probably due to binding of phosphates to Fe-oxides while up to two thirds of the added nitrogen is released as ammonium. The paper is well written, well illustrated and findings are sound and supported by the data. A problem is, however, that nitrite and nitrate were not measured. It is very likely that nitrification took place under the oxygenated conditions so that the exponential curve may be an artefact of the lack of nitrite and nitrate data. It is feasible that under slightly elevated temperatures nitrate is released while under higher temperatures as more oxygen has been consumed ammonium is released in larger proportions. The authors mention this and discuss the problem shortly but it needs to be stressed and discussed in more detail.

Specific comments:

Page 22, line 5/6: "especially. . . may just be additive" This statement is rather vague and would need a lot of explanation. I think it is better to delete this as it is beyond the scope of an abstract.

p. 23, l. 21/22: delete "and needs to be fixed again. . ." until the end of the sentence.

p. 27, l. 7: typo "slices to"

p. 29, l. 5ff: this sentence sounds a bit strange to me, may be it is best to end with . . . was calculated.

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