

Interactive comment on “Sorption and transformation of the reactive tracers resazurin and resorufin in natural river sediments” by D. Lemke et al.

Anonymous Referee #1

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The manuscript “Sorption and transformation of the reactive tracers resazurin and resorufin in natural river sediments” is about the popular tracers resazurin and resorufin. Although they are increasingly used a lot of basic questions about their environmental fate and characteristics are still unclear. Thus, interpretation of resazurin and resorufin tracer tests is difficult and based on speculations and inappropriate simplifications. Having said this, the present manuscript could be a valuable contribution to clarify some basics such as sorption behavior in aquatic sediments.

However, I have one major concern regarding the present manuscript. The dataset on which the manuscript and all interpretations are based is extremely small (1 exper-

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iment with 4 columns and 1 experiment with 72 batches). Experiments, manuscript, conceptual model, writing and everything else are really good. But with such an insufficient dataset Lemke and coworkers cannot make the required step forward. With only two different pH values, the interpretation of pH effects remains pure speculation. With only two sediment types it is not plausible to draw conclusions about the impact of the sediment type on the sorption characteristics. I suppose that the experiments could easily and without much effort be repeated with other sediments and other pH values. According to the material and methods section this would require one or two weeks with additional experiments. If the results confirm the previous results no rewriting of the manuscript would be necessary. Simply adding those data to the manuscript will significantly increase the worth of the interpretations and make the manuscript a relevant contribution to the scientific discussion. However, if the experiments won't confirm the previous interpretation a rewriting of the manuscript will need some additional effort but with that an incorrect paper would have been avoided. I know that scientists are forced to publish their results in smaller and smaller pieces but with the present manuscript the border of usefulness is not reached at all.

Some minor comments

As far as I understand the biogeochemistry of resazurin the redox potential is an important variable. It might have been good to measure oxygen or redox at the beginning and the end of the columns and at the start and end of the batch experiments.

Furthermore, you mention that the sorption of resazurin onto natural, metabolic active sediments is difficult to determine due to the rapid transformation of resazurin to resorufin in metabolic active sediments. Having said that, is it really necessary to know the desorption characteristics of resazurin? Or is most of the sorbed resazurin transformed to resorufin. Then desorption characteristics of resorufin would be sufficient.

P12192 L6: I would assume that discarding the finest fraction (< 0.08 mm) causes severe artifacts since that small fraction has probably a large highly reactive surface

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area.

P12197L8: Raz or Rru?

P12198L23: ratios

P12199L27: The sediment was dried prior to the experiments? Why is that not mentioned in the material and methods section. There you note that experiments were conducted 5 h after sampling. Please explain this discrepancy.

P12200L8: I do not really agree that a pH change of 0.8 is fairly small. That is nearly one order of magnitude. It might have been better to use higher buffer concentrations in the experiments. However, I would not argue to repeat the experiments.

P12200L20: I think all Raz fits are bad (see insets) and not the one mentioned here in the manuscript! I wonder whether a much more simple fitting would not result in similar poor fittings and cannot see the advantage of the highly sophisticated fitting applied by you.

P12201L12: charged, too.

Fig.2: According to the description of the experiment (m&m) there should be six different concentrations in each batch experiment. However, the figure shows only results of 4 or 5 different concentrations. Furthermore, you have conducted three replicates. It might be a good idea to present the results of the three replicates.

Fig. 3: Correct the spelling of Resazurin. For some insets the modelled curves do not cover the whole length of the inset? Why are the modelled data missing?

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