

Journal: BG

Title: Remobilisation of uranium from contaminated freshwater sediments by bioturbation

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REVIEW

GENERAL COMMENTS

→ This article is interesting, and original. It presents a well-designed experiment.

I recommend accepting this article after some major corrections. The required corrections are listed below:

- The English needs to be reread by a fluent English speaker.
- The results of some experimental conditions (mainly the conditions C-12 and CT-12) are sometimes missing on the figures and tables. All the studied conditions need to be presented on the figures and table. The authors need to correct that.
- In the material and methods section, the authors need to specify which analyses were really made for each experimental condition. The reader thinks that all the analyses were made for each of the six experimental conditions, but in the results section and on the figures and tables, it does not appear any more....This is confusing. The reader needs to know what was exactly made as measurements.

ABSTRACT

→ L9: the sentence is not correct.

INTRODUCTION

MATERIAL AND METHODS

- Please, specify which analyses were really made for each experimental condition. In the material and methods section, the reader thinks that all the analyses were made for each of the six experimental conditions, but in the results section and on the figures and tables, it does not appear any more....This is confusing. The reader needs to know what was exactly made as measurements.
- P17007-L10: How many exactly?
- P17008-L8: What is the volume of water which is sampled in each experimental unit?
- P17008-L16: Why not to have measured also the dissolved uranium in the overlying water?
- P17008-L19: When were the DGT probes inserted into the sediment? Before or after tubificids introduction?
- Regarding DGT insertion, do the authors have double-checked that the two probes/aquarium do not disturb the worms' activity? Do the authors have performed some tests to verify this?

- ➔ P17009-L6: What is the effect of the removal of probes on the sediment surface and depth? I guess this is not negligible, especially because the sediment core has been sliced afterward....?
- ➔ P17011-L4: please add "overlying" water
- ➔ P17011-L7-9: Please, could you add one bibliographic reference about the mineralization method?
- ➔ P17011-L3: What about the uncontaminated aquaria at day 12 (C-12 and CT-12)? Weren't the vertical profiles of uranium in the solid phase of the sediment made? It is necessary to also have the vertical profiles of the control conditions.
- ➔ P17011-L11: It would have been interesting to measure also the uranium dissolved in the pore-water of the sediment....
- ➔ P17011-L14: What about the condition CT-12? I think it is essential to have also a measurement of the bioaccumulation of uranium by tubificids from the uncontaminated condition CT-12.
- ➔ What about worms condition after 12 days in uranium contaminated environment? Have the authors performed some microscopic or binocular observations? Observed some autotomy? What about the biomass growth? And what about bioturbation? And what was the height of the fecal pellet layer?
- ➔ P17011-L14: I don't think that *T. tubifex* do come out the sediment after just four hours of hypoxia or anoxia! *T. tubifex* worms are very resistant to anoxia. They have been very well studied for that. Then, maybe that the authors did not well identify their worms, and that they used another species of oligochaetes? Or maybe that some other details about the method are lacking here... Please, can you correct that?
Here are a few references about *T. tubifex* and hypoxia:

-Seuß, Hipp, Hoffmann. 1983. Oxygen consumption, glycogen content and the accumulation of metabolites in *Tubifex* during aerobic-anaerobic shift and under progressing anoxia. Comparative Biochemistry and Physiology Part A: Physiology. Volume 75, Issue 4, Pages 557–562

-Hipp, Sedlmeier, Hoffmann. 1984. Aerobic metabolic trends after anoxia in the freshwater oligochaete *Tubifex*. Comparative Biochemistry and Physiology Part B: Comparative Biochemistry. Volume 78, Issue 1, Pages 125–129

-Famme, Knudsen. 1985. Anoxic survival, growth and reproduction by the freshwater annelid, *Tubifex* sp., demonstrated using a new simple anoxic chemostat. Comparative Biochemistry and Physiology Part A: Physiology. Volume 81, Issue 2, Pages 251–253

- ➔ P17011-L16: Did the authors verify that there was no more sediment in the digestive tract of tubificids after only two hours in clean water?
- ➔ P17011: At the end of the experiment, and before sediment slicing for uranium determination in the solid phase of the sediment, air bubbling was stopped during 4h. This progressive hypoxia wasn't it a disruptive factor for the geochemistry of the uranium in the sediment (at least in the superficial layers)?

RESULTS

- ➔ P17017-L8: As already mentioned in the comments about the material and methods section, the authors need to give the bioaccumulation of uranium by tubificids from the time zero (C-0) and from the uncontaminated condition CT-12.
- ➔ P17035: On the Figure 1, please, plot the conditions C-12 and CT-12. This is necessary to prove that you had no cross-contaminations in your aquaria.
- ➔ P17035: Could the authors add a figure 1.B presenting the concentration of uranium in filtered water samples?
- ➔ P17036: The figure 2 is really difficult to read. The authors need to improve the size and quality of this figure.
- ➔ P17036: Do they have data about the concentration of particulate uranium inside the sediment? Could they add the vertical profiles here, as a figure 2.B?

- ➔ Have the authors done any profiling of dissolved oxygen inside the sediment?
- ➔ A figure (or a table) presenting uranium bioaccumulation by tubificids is lacking in this paper. Could the authors add it (C-0, CT-12 and UT-12)?

DISCUSSION

- ➔ P17018- L12: Does it mean that the sediment depth is not sufficient for these tubificids worms?