

Interactive comment on “Organic matter mineralization and trace element post-depositional redistribution in Western Siberia thermokarst lake sediments” by S. Audry et al.

Anonymous Referee #1

Received and published: 18 October 2011

The authors present a clear, multi-faceted study of sediments of a thermokarst lake located in Western Siberia. This study is somewhat unique due to the comparison of lakes representing different stages of ecosystem development. Overall, the report appears scientifically sound, but the text still needs the author's attention with respect to style and some clarifications (see Specific comments below). In general, you should avoid overstating the significance of your study. First, you base your statements on one time measurements. Secondly, you did not measure processes. You can only draw conclusions from concentration differences in the profiles. This is no direct proof. So, please weaken your strong statements (Page 20: mineralization of OM, shift in pathways, related to heterotrophic activity, etc.) in section 6 (Environmental significance

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and conclusions).

Specific comments:

- 1) Page 10, Porewater: You can shorten the part of the results describing porewater geochemistry, since the data presented in the figures are very easy to understand and self-explaining. Just highlight the main differences between the profiles.
- 2) Page 14, line 416: You did not determine the reductive dissolution of Mn-oxyhydroxides. You only measured increased concentrations of Mn(II) which suggest reductive dissolution. So, please weaken your statement.
- 3) Page 4, line 442: It should read “anaerobic nitrification”. We differentiate between oxic and anoxic conditions, but there are aerobic or anaerobic processes and aerobic or anaerobic microbial populations.
- 4) Page 15, line 450: Please change the order of these processes with respect to the order of the more favorable thermodynamic process.
- 5) Page 15, line 477: You are mentioning here transient redox conditions caused by groundwater inflow. These redox fluctuations could have caused regeneration of the Fe- and Mn-oxyhydroxide pool. However, this regeneration was excluded in the paragraph above. This is contradictory to me. Please clarify.
- 6) Page 17, line 534: Unfortunately, you did not measure AVS concentrations which would include FeS. Please comment.
- 7) Page 18, line 552: The release of As under anoxic conditions could be caused by release or by reduction of As(V) to As(III) which is more soluble under reduced conditions. Please modify your statement.
- 8) Page 19, line 606: I strongly disagree that high-resolution concentration-depth profiles are provided. Your resolution is not higher than from other studies using peeper, dialysis chambers, or sediment cores. Most readers would think in a micrometer- or

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nanoscale if you use this term. Please avoid this misnomer.

9) Please check your list of references for typing errors.

10) Table 1: What does the gap mean? Not determined?

11) Table 2: Do you refer to dry wt of soil? Which depths were sampled?

12) Table 5: Please reformat this table. It should be similar to the others.

13) Figure 8. Where are the other data in a and c? You stop after 15 cm depth.

Interactive comment on Biogeosciences Discuss., 8, 8845, 2011.