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## ***Interactive comment on “Biogeochemical factors affecting mercury methylation rate in two contaminated floodplain soils” by T. Frohne et al.***

**Anonymous Referee #2**

Received and published: 19 December 2011

General comments: This paper presents data from an experimental study to determine factors driving the methylation of Hg in floodplain soils/sediments. The experimental design uses microcosms where the redox conditions are well controlled and modified during the course of the experiments, whereby changes in total and methylmercury are evaluated in the context of concurrent changes in other biogeochemical parameters. While not always conclusive (interpretation of the data is not straightforward) the experiments appear to be well performed and it is a valuable addition to the literature on this topic. The majority of my comments are textual or style-related, but I do have reservations on the designation of some PLFA as biomarkers for Fe reducing bacteria which does not appear to be appropriate. Specific comments:

Page 1 Line 19: use “mg Hg kg<sup>-1</sup>” instead of “mg kg<sup>-1</sup> Hg” (as done for example on

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page 3 line 31). Check this throughout manuscript (e.g. also on page 8)

Page 1 Line 23: use “Me” rather than “me” in fatty acid notations for methylated FA.

Page 2 Line 16: “transport from the watershed”

Page 3 Line 13: “other microbes”: be more specific.

Page 3 Line 20: “iron”: use Fe as elsewhere in the ms.

Page 4 line 1: “what allows”: replace with “allowing”

Page 5, line 9-10: why were samples for PLFA analyses allowed to thaw and kept at 20°C prior to the extraction ? Probably little harm in this but I do not see any reason to do so?

Page 6 line 6 and elsewhere in the manuscript: ml should be mL, dito for  $\mu$ l (eg page 7 line 3) and l (e.g. page 7 line 9 and elsewhere) :change to  $\mu$ L and L, respectively

Page 7 line 18: “samples were worked off”: ?

Page 7 line 32: “analysis” should be “analyses”

Page 8 line 15: “and to create the figures”: not relevant.

Page 8 line 27: Figure 3 is not mentioned yet so in principle Figures should be renumbered.

Page 9, line 6-7 ‘relatively low concentrated’: awkward, rephrase. Dito on line 9 of the same page.

Page 9, line 7: “The presence of 16:1w7c and 16:0 indicate the occurrence of Fe reducing bacteria”: 16:0 is ubiquitous and the dominant PLFA in most environments as it can be found in virtually all prokaryote and eukaryote microbiota. 16:1w7c is considered to be a general biomarker for Gram- bacteria. Although further on (page 14) you mention that these ‘cannot be found exclusively in Geobacter’, that’s still an understatement and I do not consider it appropriate to use these 2 PLFAs as markers

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of Fe reducing bacteria.

Page 9: “LnHgt values were associated with lnMeHg values”: ?

Page 10, line 31 “according to our results”: rephrase to e.g., “consistent with our results” – or delete this as you mention further on (page 11 line 1-2) that “the results of the current study might indicate to conform [sic] those assumptions”. Re-write the latter to “the results of the current study appear to confirm those assumptions” or something similar.

Page 10 line 5-6: rewrite to e.g., “Literature data on effects of pH on the mobility.. of Hg are contradictory”.

Page 11, line 28: similar results have been obtained by other authors

Page 12, line 12: “food source”: substrate or carbon source would be more appropriate

Page 12, line 25: “microorganism” should be in plural form, or use “microbial communities”. This is an awkward sentence however.

Page 14, line 22-24: it might be good to normalize these PLFA concentrations to organic carbon.

Page 14, lines 24-26: “the total SRB biomass is  $\sim 5000 \text{ pmol g}^{-1}$ ”: you mean the sum of concentrations of PLFA considered to be markers for SRB I assume. If the concentration of “SRB-PFLAs” is similar at both sites but total PLFA concentrations are clearly different, this suggests that SRB are more dominant at site W2, which is the site with highest Hg levels, right ?

Reference list: remove issue numbers for many of the references

Table 1: I would suggest to add the inorganic C concentrations

Table 2: add units for DOC,  $\text{SO}_4^{2-}$ , S, and Fe. Also, check if appropriate number of decimals were used for all parameters.

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Figure 3: See comments above regarding the use of 16:0 and 16:1w7 as biomarkers for Fe reducing bacteria: certainly not valid for 16:0, doubtful at most for 16:1w7

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