Response to referee #1 (our answers in blue):

General:

I think this manuscript would benefit from some more proofreading by the more experienced authors. It could use improvement on the structure and the writing, to improve the flow and make it more condensed. Please also pay attention to the switching between different tenses, and to improve the clarity of the methods section. Many different experiments have been performed in this study, which is wonderful. It makes it, however, difficult for the reader to keep an overview. Please structure the manuscript in a way that provides the necessary overview and clarity. Present the results in a structured way in the methods section, and don't be tempted to already interpret them – this belongs to the discussion. Also prevent the use of language that is either too strong (This means..), or is not specific enough (warm, very few etc.) Overall, I think the experiments are cool and valuable, but improvement is needed to bring this across to the reader.

We would like to thank this reviewer for the positive and constructive review. We have carefully responded to each comment/suggestion and did our best to improve the manuscript accordingly. We clarified and simplified the paper all along: we re-wrote the methods section to make it easier for the reader to follow, we also added experimental protocols to the supplementary material. We moved discussion parts from the methods and the results to the discussion section. The microbial data was discussed more thoroughly and a principal component analysis biplot was added. All co-authors edited the letter and the manuscript, with additional English editing by a native speaker collaborator. We believe that the paper flows better now, making it easier for the reader.

Abstract

Introduction about sediments is too long. Could skip most of it, one or two sentences is enough. Instead, tell us more about the two stages of incubations and 13C additions, multiple TEA and inhibitors. What did you use, what were the aims? If you don't want to stress these, give less detail, now it creates more questions than answers.

We shortened the introduction and added more details on the experimental design, the different treatments (electron acceptors and inhibitors) and their aims.

25-27. This sentence is a bit clunky, with the two words for the same process (oxidation and AOM). Also, here you name it methanic sediments while these were the incubations/reactors right?

Thank you for this comment, we adjusted the sentence. The word "oxidation" was changed to "AOM" and "methanic sediments" to "incubations".

The abstract could use re-structuring, please have in mind what are the most important messages you want to convey, stress those and don't give too much details about other things. It could also be nice to give one or two sentences at the end that place your results into a broader context.

We accept this comment. Unnecessary information has been removed and a sentence has been added to emphasize our results in a broader context.

Keywords: I would add mcr and methanotrophs

Thank you, we have added these words.

General textual: Methanic is not a word that is commonly used I think. Methanogenic is the more general term, at least, I think that is what you mean? But this is personal preference, to choose what you want to use.

We switched to the term to "methanogenic" as the reviewer suggested. It should be noted that some methane researchers use the term "methanic" as more general term that refers to an environment where methane is present but not necessarily produced locally. As here we are certain that methane is produced *in situ*, the term "methanogenic" indeed is more appropriate.

Methods

98. If you want to say it's warm, give a temperature. The name "warm monomictic lake" is well established in limnology and refers to lakes that never freeze, so we kept this use.
99. Similar to what? Similar to previous studies that were mentioned in the text. The text has been modified accordingly.
100. Are there methane profiles? Yes, and the relevant information has been added.
101. You have not mentioned the central lake or station A yet. The reviewer is correct, and this information has been added.
102. which leaves = leaving. Corrected
103. Did they receive new methane after that? Methane was added after N_2 flushing.
104. This sentence is weird, 'in case of' is not fitting. We have rephrased the sentence.
105. This seems more like discussion or results, not methods ('the variations…). This sentence was moved to the discussion.
106. The black coffee comes out of nowhere and the explanation about why only 1 replicate is not fitting. The black coffee treatment was removed from the manuscript.

This whole paragraph is chaotic, try to restructure to make it a bit more schematic and easier to follow, to help the reader understand. We changed the methods section to be clearer. We describe the sediment collection, then the set-up of the pre-incubation slurries and then the two-stage incubation experiments in general. The experiments table was moved to the main text, and protocols for the experiments were added to the supplementary material.

Do you mean real porewater every time you write porewater, or an artificial substitute? It seems like a lot of porewater to extract, which is possible I guess, but I'm just not sure and curious!

Indeed, we used real porewater for preparing the slurries in the experiments (a lot of work….). We collected many sediment cores in each campaign and extracted porewater from the bottom sediments (>20 cm) to mimic *in situ* conditions. We further clarified this point in the revised text.

192. Don't switch between past and present tense within a paragraph. The tenses were corrected.

249 I don't think this paragraph is necessary. We cut part of it and added a short overview of the results, as was suggested by another reviewer.

255. Can you start with simply describing your results? You dive in deeply directly, it would be nice as a reader to get a bit of a gentle overview first, of what you measured and

what that showed, to start with. We accept this comment. In the revised version, we start with an overview of the concept and what we measured.

256. No need to note that here. The sentence was moved to the methods section.

257. This was not subsequent but different experiments, right? The word first suggests otherwise. We meant that metals were the first type of electron acceptors tested. The word “first” was changed.

258. Discussion, not results. Stick to just listing the results, so the values that you measured and their patterns, here. We removed all discussion from results. We only kept the indication for AOM by using the transformation of ^{13}C methane to ^{13}C-DIC.

Fig. 2. What is the difference between the colors of the pre-incubated experiment? The legend calls them the same.

The legend of figure 2 has been modified to be clearer regarding the experiments. It now includes numbering of the experiments which correspond to the numbering in the experiments detail table. Each color is an experiment, and all of them have the similar treatments of “only methane” and “hematite”. In this graph we wanted to show that as opposed to what was shown previously with freshly collected sediments, we do not see a clear difference between the two mentioned treatments in the two-stage experiments.

Fig. 3. The text is too small and therefore hard to read. Why don’t you merge the replicates of each treatment into one line with error bars? They seem to nicely follow the same trends. Also, it would be nice to have the same y-axis and x-axis for easy comparison between the treatments.

We merged the replicates as suggested and changed the y and the x axis.

Fig. 4. Similar to Fig 3: please merge the lines of the replicates.

Lines were merged.

Table 1. The names of the treatments could be improved. What is a typical fresh sediment bottle?

The names have been changed. The fresh sediment bottle is the result from the freshly collected sediment slurry experiment, and its title was changed as well.

I’d be happy to provide more comments on a next version of the manuscript.

Thank you!