Biogeosciences Discussions

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Reply on RC2

Ralf Conrad et al.

Author comment on "Fractionation of stable carbon isotopes during acetate consumption by methanogenic and sulfidogenic microbial communities in rice paddy soils and lake sediments" by Ralf Conrad et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-203-AC2, 2021

Thank you for the positive evaluation and helpful comments. The response to the comments will be answered in the following:

Materials and methods:

Line 81: This was a misspelling and will be replaced (20016 by 2016.

Line 119: Again a misspelling, which will be replaced (CH3 by CH3F).

Line 135-146: The primers are briefly described in the text, which reference to a previous publication, in which primers and references are listed in detail in a table. We think that repeating here all the relevant references for primers would make the presentation too bulky. Therefore, we suggest to explicitly refer to the table in the previous publication, in which all the details can be seen.

Microbial composition analysis:

One replicate was used for each paddy soil and each lake sediment both with and without preincubation with sulfate. We propose to mention this fact more explicitly in a revised manuscript. Because of only one replication we did not attempt any statistical analyses concerning microbial data.

In principle, we have determined the microbial composition at the beginning of the incubation, for which we determined the fractionation factor. This was after preincubation of rice field soil with and without sulfate. Since the rice field soils were stored in dry state, preincubation was necessary to activate the soil becoming methanogenic. The preincubation is comparable with the process of flooding of paddy soil in the field. In case of the lake sediments, such flooding was not necessary, since the sediments were flooded and methanogenesis was active anyway. Therefore, we discriminated in this case between fresh lake sediment and lake sediments preincubated with sulfate. We propose to emphasize this difference in a revised ms.

The average in situ temperatures of paddy soils and lake sediments are different and

justify using 25 and 10C, respectively. We propose to emphasize this difference in a revised ms.

Results and discussion:

Line 234: The experimental data are all shown in Fig.3. Note, however, that for lake sediments one set of incubation conditions (the grey and the yellow bars) were not performed.

Line 335: We appreciate the reviewer´s comment on the trends in the composition of the methanogenic communities upon sulfate addition. However, we still think that these trends were only marginal (as stated in the manuscript) and in addition, they were not verified by statistical analysis. We decided that just for allowing statistical analysis it was not worthwhile to create additional experimental replicates of community analysis, since reports of sulfate effects on methanogenic community composition (statistically supported) already exist in the literature. Instead, we were more interested in effects of the microbial community composition on isotopic enrichment factors. However, such effects were hardly seen, even when comparing flooded soil and lake sediments, which had completely different microbial community compositions but similar fractionation factors. The differences in microbial community composition between soils and lake sediments were such obvious, that statistical support was to our opinion not necessary. Therefore, we did not attempt to replicate community compositions and stayed with one replicate for each incubation.