

Interactive comment on “Stable carbon isotope discrimination and microbiology of methane formation in tropical anoxic lake sediments” by R. Conrad et al.

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We thank referee #4 for the helpful comments, which we will consecutively address below including suggestions how to change the manuscript.

1. We think that the results concerning the fingerprints of bacterial and archaeal ribosomal RNA genes and methanogenic *mcrA* genes were unambiguous. However, they did not show a significant correlation with activity or ¹³C-isotopic data as seen from the CCA analysis in Fig. 8. In this sense the results were “negative”, and there is hardly any other way to express it. In other words, if our primary hypothesis was that there were correlations between microbial and activity or isotopic data, the hypothesis was proven

wrong on the basis of our data set. We try to make this clearer in a revised Discussion and Conclusions. We also agree that the possible correlation between microbes and ecosystem function should be better emphasized in the Introduction.

2. The assumption of no-fractionation during conversion of acetate-methyl to acetoclastically produced CH₄ will be discussed in more detail in a revised version, as already outlined in our response to referee #1. In general, we will expand the discussion on isotope fractionation during acetate turnover.

3. We overlooked having used occasionally fH₂ instead of fCO₂,CH₄, and will correct it. The same applies for using epsilon instead of alpha as measure of isotope fractionation in Table 2.

4. P.8635, L.25-27: We assume it must be P.8636 instead of P.8635. There, we indeed refer to the isotopic difference between acetate-methyl and acetate-carboxyl. It may be confusing that we used total acetate instead of acetate-carboxyl for our argument, but it is basically synonymous, since delta¹³C of acetate-carboxyl is calculated from the delta ¹³C of total acetate and acetate-methyl. We will rephrase the statements to avoid confusion.

5. It is indeed possible to consider delta¹³C_{org} of soil as indication for contribution of C₃ versus C₄ plants, and this has been done numerous times in the literature on soil. In profundal lake sediments it is more complicate, since sediment organic matter is influenced not only by deposition of autochthonous algal material but often also by deposition of allochthonous material, such as plant litter introduced into the lake. However, we did not study the origin of sediment organic matter in the Brazilian lakes.

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