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Interactive comment on "Acetate turnover and methanogenic pathways in Amazonian lake sediments" *by* Ralf Conrad et al.

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We are grateful for the helpful comments of the referee, which we address in the following and in a revised version of the manuscript:

1) The referee criticizes that the comparison between different methods is confusing. The comment is similar to one of referee #1. In the revision we will try to better compare the different methods and rate analyses and better report which incubations gave which results.

2) The referee questions whether sulfate, which was initially present in the sediments, could have contributed to acetate oxidation. Indeed, acetate can also be oxidized with inorganic compounds such as nitrate, ferric iron, sulfate. As long as this happens,

aceticlastic methanogenesis (also hydrogenotrophic methanogenesis) is usually suppressed resulting in a lag phase of CH4 production. To avoid such processes, we preincubated the sediments, so that the CH4 production started without initial lag phase. From previous experiments with various other anoxic environmental samples, in which ferric iron and sulfate were analyzed repeatedly during incubation, we concluded that the inorganic electron acceptors, which were present in the original sediment sample, had all be reduced during the preincubation. This is stated in the manuscript.

3) Acetate oxidation and hydrogenotrophic methanogenesis are indeed two independent processes, that are coupled syntrophically via H2 (or perhaps other electron carriers). The turnover rate of radioactive acetate comprises also such syntrophic acetate oxidation. However, syntrophic acetate oxidation results in stoichiometric amounts of hydrogenotrophically formed CH4. If turnover of radioactive acetate is larger than CH4 production (as was the case for several sediments), the surplus cannot be due to syntrophically produced CH4. Hence this amount of acetate oxidation must be caused by other oxidants, i.e., organic compounds if inorganic ones are not available. The conclusion is summarized in Fig.5, to which we will make better reference in the revision. The oxidation of acetate can either be directly coupled to reduction orgC (reaction 4 in Fig.5) or acetate is oxidized to CO2 plus H2 followed by the oxidation of H2 with orgC (reactions 2 plus 5 in Fig. 5). However, acetate oxidation coupled to hydrogenotrophic methanogenesis (reactions 2 plus 3 in Fig. 5) cannot be larger than CH4 production.

Specific comments: Line 4: we will correct the text using only aceticlastic methanogenesis. Line 107-108: We will add the equations describing how the parameters were calculated. Line 135: Thank you, we will correct

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