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Biogeosciences
Discussions

Interactive comment on "Methane paradox in tropical lakes? Sedimentary fluxes rather than water column production in oxic waters sustain methanotrophy and emissions to the atmosphere" *by* Cédric Morana et al.

Anonymous Referee #2

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In their paper, the authors undertake and extremely comprehensive set of measurements to assess the methane paradox in freshwater lakes. The authors are to be commended for such a comprehensive set of experiments, in what must have been difficult environments to work in.

Overall I found the manuscript well written, and the data supported the conclusions raised. I would suggest that some parts be toned down however, due to the (understandable) lack of replication spatially and temporally. For example, the mass balance calculations are derived from short term experiments/measurements with restricted

spatial replication. While this in itself is not a terminal flaw, I think a more nuanced assessment of the results is required. I certainly appreciate the trade-off with doing a large number of experiments and measurements over a range of systems, versus long term intensive experiments on a single system.

I would also suggest separating results and discussion to simplify the narrative,this would improve the readability of the paper, and also prevent some of the interesting findings being lost in a sea of descriptive text.

Specific comments: Line 18 Dissolution flux was modeled rather than measured right?

Line 46 "Among others", reword to clarify

Section 2.5 I appreciate that measuring benthic fluxes of CH4 are difficult, but I wonder how represenattive these core experiments are to insitu rates. The cores had water drained, what affect might this have on the microbial community (i.e. introducing O2 into sediments). Further, the shallow sediment depth may also introduce artifacts. Is there any information on sediment characteristics that may help the reader to intepret the potential issues associated with this (e.g. porosity etc.). Further, are bottom waters anoxic in the lakes (as the water used for incubations was anoxic).

Line 186 Would the method used for d13C-DIC measurement also pick up any labeled 13C-CH4? I would expect that the EA-IRMS method would oxidize CH$ to CO2 and that this may introduce an artifact, but maybe I missed something with the method description.

Line 200 Was ambient concentrations of ambient acetate and methionine measured or just estimated?

Line 313 "which was"

Line 357 "of the vast tropical region"

Once again - congratulations to the authors on a very nice study.