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Interactive comment on “Short-term changes in anaerobic oxidation of methane in response to varying methane and sulfate fluxes” by G. Wegener and A. Boetius

Anonymous Referee #2

Received and published: 2 October 2008

The paper "short term changes in anaerobic oxidation of methane..." by Wegener and Boetius used an experimental column system filled with cold seep sediments to test the response of these communities to short-term variations in methane and sulfate fluxes. All in all, this is a well-written and simple (in the best sense of the word) paper that focuses on how two key parameters influence methane oxidation rate. I do not have any major concerns about the paper, so I will offer up some minor critiques that -when addressed- should clarify a few essential points.

page 3071 line 7. aerobic methane oxidation is certainly better understood, but I don't know that it's well understood. There is increasing evidence that aerobic methan-

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otrophs are better described as hypoxic methanotrophs.

page 3071, line 15-18. You should include methane oxidation rates from other seeps as well, to indicate to the reader that there is variation in AOM and SR rates among seeps. For example, AOM rates from the GoM or Monterey Bay would be appropriate (Joye lab work, or the Girguis papers you've already cited).

Page 3076, line 22. You implicate other electron acceptors as the explanation for the differences in stoichiometry. I would seriously look into having your gasses analyzed. It's not expensive or time consuming. Even if it's a different bottle (since I presume you've expended the bottles used in this project), it will give you some quantitative sense of how much contamination is in your gas. Also, don't forget that your sediments may contain organics that can fuel sulfate reduction independent of AOM.

Page 32077, line 25-28. It's OK to show just one dataset (since showing all of them may lead the reader to question natural variation in treatments). However, you need to use non-parametric statistics to insure the reader that your treatments are in fact comparable.

Page 3080. It's good to calculate $K(m)$, but please put some effort into outlining the potential limitations of this approach using the data you have in hand

Figure 2. Your Y-axis is labelled AOM/SR. Is this correct? That symbol implies division, which makes me think that your data are ratios (though your figure legend clarifies this point). Just say "AOM and SR rates".

All in all, this is nice descriptive paper that improves upon our understanding of how BOTH Sulfate and methane influence the process of AOM. I think this paper achieves what it set out to do, and as such represents a nice addition to the growing body of literature on the relation between geochemistry and RATES of AOM and SR.

Interactive comment on Biogeosciences Discuss., 5, 3069, 2008.

BGD

5, S1865–S1866, 2008

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