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Biogeosciences Discussions

Interactive comment on "Anaerobic oxidation of methane: an underappreciated aspect of methane cycling in peatland ecosystems?" *by* K. A. Smemo and J. B. Yavitt

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The authors would like to thank the referees for three positive and helpful reviews of our manuscript. If accepted for publication, the input provided will greatly improve the quality and readability of the manuscript. Despite overall positive reviews, a common criticism relates to the structure of the manuscript and the use of further references (particularly in regard Fe oxidation/reduction). We agree with the referees and will happily restructure the manuscript to bring the biogeochemistry section to the front of the manuscript. We also agree that this will allow us to reduce redundancy and make particular points without setting up "straw" hypotheses, while at the same time allow us

to address methodological shortcomings in more detail and use them to discuss future research directions.

Referee #3 was highly concerned with the thermodynamics and electron acceptor discussion. The referee is justifiably concerned. The free energy yield for AOM given concentrations of know electron acceptors in freshwater environments has been a source of debate and skepticism for a considerable amount of time. We tried to address this in depth, but we clearly did not do a sufficient job. We will try to correct this and enhance this section using the advice of the referee and create a new table as suggested. New evidence for organic matter electron transfer mechanisms will receive particular attention. Nevertheless, it will be interesting to see where this discussion goes. The referee seems excited about the potential for nitrate to serve as an electron acceptor for AOM in peatlands (per Ettwig et al 2009), but we argue convincingly in the manuscript the nitrate does not make sense in peatlands due to low availability under predominantly anoxic conditions. As we make revisions, this topic deserves some careful thought.

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