

Interactive comment on “Microbial methanogenesis in the sulfate-reducing zone of surface sediments traversing the Peruvian margin” by J. Maltby et al.

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The manuscript by Maltby et al. examines the processes of methanogenesis and sulfate-reduction along a transect of seafloor transiting a near-shore depositional-rich region to an offshore, deeper sediment locale. The work was done on the Peruvian shelf, a region of high productivity and oxygen-minimum zone/anoxic bottom waters. The work also acquired a number of relevant parameters along with the bioassays. The main finding was that the shallow sediments nearest shore had high rates of methanogenesis at the sediment surface, implying a contribution of non-competitive substrate precursors (e.g., methylated amines and methylated sulfides) as precursors

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of methane. Methanol was added as a proxy non-competitive substrate while molybdate was employed to detect use of competitive substrates to underscore this point. Although considerable work has been done along these lines in salt-marsh sediments and hypersaline systems, very little has been done in open marine systems like the one described here.

I do not have substantive technical criticisms, but offer the following points to strengthen and clarify the manuscript:

page 14871, lines 26-27: the logic here is not obvious that H₂/acetate increase with depth as organic matter becomes more recalcitrant. page 14872, lines 27 - 28: some statement should be made about probable sources of non-competitive substrate precursors, such as degradation of organic osmolytes (e.g., DMSP, betaine). page 14878, lines 2-3: since the sediments were mixed with bottom water, which contained abundant sulfate, these rates may underestimate the potential of deeper sediment regions where sulfate is low. page 14879, line 1 (and elsewhere, page 14885 bottom): what percentage of the added 10 mM methanol went to CH₄ (plus CO₂) in the incubations?

Minor corrections:

page 14870, line 1: co-occurrence (concurrency implies an agreement) page 14870, line 10: multiple cores (not multicorer cores) page 14870, line 23: decrease (not decline) page 14873, line 15: ...an environment where both...(no comma) line 14875, line 11: a 5 m steel barrel (not "steal" unless the authors actually pilfered the corer from another lab). page 14877, line 24 - 25: sliced into 5 cm.... page 14878, line 28: molybdate page 14882, line 2: a grey color page 14887, line 19: co-occurred page 14889, line 23: were (not "where") page 14895, line 10: were (not "was")

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