We would like to thank all reviewers for their critical comments, which we think helped to improve the quality and clarity of this manuscript. We hope our responses and adaptations are adequate to accept this manuscript for publication in Biogeosciences. Please find our detailed responses below.

Ronald Oremland, Referee #1

Received and published: 15 September 2015

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 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.

Authors Reply: We agree with the reviewer and decided to delete this sentence to avoid confusion.

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).

Authors Reply: We thank the reviewer for this comment and added this information in the text.

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.

Authors Reply: The focus of the paper was to determine methanogenesis activity within the sulfate reduction zone, i.e., in the presence of sulfate. Within the investigated sediment (0-30 cmbsf) sulfate was always above 9 mM in situ. We are therefore confident that the detected methanogenis activity reflects its potential under the given environmental conditions.

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?

Authors Reply: We expect that close to 100 % of the methanol was converted to CH4 (plus CO2). We did similar experiments in another study where we followed the conversion of methanol by 13C-Labeling. However, as we did not conduct these experiments in the current study, we rather do not want to make any assumptions.

Minor corrections:
page 14870, line 1: co-occurrence (concurrence implies an agreement)

Authors Reply: Done

page 14870, line 10: multiple cores (not multicorer cores)

Authors Reply: Done

page 14870, line 23: decrease (not decline)

Authors Reply: Done

page 14873, line 15: ...an environment where both...(no comma)

Authors Reply: Done

page 14875, line 11: a 5 m steel barrel (not "steal" unless the authors actually pilfered the corer from another lab)

Authors Reply: Done. We would never steal from our colleagues ;-)

page 14877, line 24 - 25: sliced into 5 cm

Authors Reply: Done

page 14878, line 28: molybdate

Authors Reply: Done

page 14882, line 2: a grey color

Authors Reply: Done

page 14887, line 19: co-occurred

Authors Reply: Done

page 14889, line 23: were (not "where")

Authors Reply: Done

page 14895, line 10: were (not "was")

Authors Reply: Done