

Interactive comment on “Manganese and iron reduction dominate organic carbon oxidation in deep continental margin sediments of the Ulleung Basin, East Sea” by Jung-Ho Hyun et al.

Anonymous Referee #1

Received and published: 10 July 2016

General comments

This paper proposes a method for quantifying the rates of organic C oxidation pathways in two deep continental margin sediment cores from the Ulleung Basin. It is one of the very few studies highlighting the role of Mn and Fe reduction as dominant organic C oxidation process in marine sediments. The study presents an excellent geochemical dataset on the sediment and sediment pore-water and on anoxic incubations of sediments. I really appreciated many aspects of the modeling such as the effort made to evaluate distinctly the O₂ consumption for the organic matter oxidation and for the reoxidation of reduced species, as well as to assess the adsorption of Mn⁺² on Mn oxides. The manuscript is well written and judiciously refers the reader to previous

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works in the field. It assuredly deserves publication and will be of interest for a wide audience of aquatic geochemists.

Specific comments

Line 195: In addition to FeS and H₂S, AVS also includes minute amounts of other metal sulfides. Isn't it?

Line 209: I presume that the modeling of the O₂ micro-profiles with PROFILE was done assuming negligible bioirrigation and bioturbation but this is not specified. My deduction relies on the fact that a bioirrigation coefficient is not reported. However, these processes should not be insignificant since the authors state later in the MS that bioturbation realistically drives the Mn cycling in Ulleung sediments. I suggest clarifying this point.

Lines 246-249: It is not quite clear how the “abiotic Fe reduction coupled to H₂S oxidation” was estimated with reaction (5)? Some clarification should be provided. Do the authors assume that AVS mainly equals FeS?

Line 606: The statement about the probable importance of bioturbation seems to be in contradiction with the well-defined utilization of the electron acceptors according to the order of decreasing energy yield for organic C oxidation that has been underscored in lines 412-417? Again, I suggest clarifying this point.

Minor technical corrections

Line 218: Provide the value of Do with a reference. . Line 221: Place in parentheses (see results section 3.2) after “...bimodal depth distribution”.

Line 262: Madison et al. (2013) does not appear in the list of references.

Line 276: I suspect that the units (ml/g) are erroneous?

Lines 542-544: This sentence should be supported by references.

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Please also note the supplement to this comment:
<http://www.biogeosciences-discuss.net/bg-2016-222/bg-2016-222-RC1-supplement.pdf>

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-222, 2016.