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Biogeosciences Discussions

Interactive comment on "Regulation of anaerobic methane oxidation in sediments of the Black Sea" *by* N. J. Knab et al.

Anonymous Referee #2

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General comments:

The study of Knab et al. reports on the methane turnover in Black Sea sediments. Three gravity cores obtained from the north-western Black Sea in 2004 were investigated. Pore waters were analyzed for concentrations of methane, sulfate, hydrogen sulfide, and dissolved inorganic carbon (DIC). Rates of anaerobic oxidation of methane (AOM), sulfate reduction (SRR), and methanogenesis were deduced from radiotracer experiments, carbon stable isotope ratios, and pore water profiles. Additionally, aridine orange direct cell counts (AODC) were accomplished. The paper presents a comprehensive data set proper to significantly contribute to a better understanding of methane cycling in marine sediments. Thus, the study is of high interest for microbiologists and earth scientists dedicated to the marine environment.

However, there are a number of inconsistencies needing improvement.

Specific comments

Methods: Almost generally (2.2.1 to 2.2.9, 2.3.1 to 2.3.4, and 2.4.1), no information on the data quality is provided (standardization, precision). E. g., talking about "measurable AOM rates" is not informative if the detection limit is not provided.

No detailed information are given on the lithology of the cores investigated. A figure substituting table 1 and illustrating the distribution of lithological units in the three cores would be desirable. This especially as the stratigraphy with sulfate prone lacustrine overlain by marine horizons is identified as a main factor regulating AOM in the Black Sea. Additionally, background data on porosity, total organic carbon, carbonate and TOC/N ratios would be helpful to understand the obtained data, also as TOC data are mentioned in the discussion but are not shown.

Scales chosen in figs. 3 to 6 are erratic. For example scale for bic.MTG in fig 4 is 0 to 5 leaving all data uniformly at 0, while bic.MTG in fig 5 is scaled 0 to 0.08 showing some variances which would not been visible using a scale 0 to 5. Generally, scales are neither optimized to recognize depth related variations nor to compare between the cores. This weird scaling might, at least for the core P806GC, be related to the publication of AOM and SRR data of the identical core elsewhere (Knab N. J., Dale A. W., Lettmann K., Fossing H., and Jørgensen B. B. Thermodynamic and kinetic control on anaerobic oxidation of methane in marine sediments. Geochimica et Cosmochimica Acta In Press, Corrected Proof.). However, actually irritating and unacceptable is the fact of disagreement between the two data sets.

The ambitious title (Regulation of anaerobic methane oxidation in sediments of the Black Sea) is well met by taking into account both, the approach of this study and that of the above mentioned GCA paper. This might be taken as an example of splitting results on one objective into distinct parts leaving the interested community with the task to gather the information from distinct sources, somehow a way to enhance entropy in

BGD

5, S1051–S1053, 2008

science.

Interactive comment on Biogeosciences Discuss., 5, 2305, 2008.