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Biogeosciences Discussions

Interactive comment on "Temperature characteristics of bacterial sulfate reduction in continental shelf and slope sediments" *by* J. E. Sawicka et al.

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We thank the referee for careful reading and commenting on the manuscript. We appreciate the generally positive evaluation of the manuscript and acknowledge the constructive critical comments. For convenience, original referee comments are also included and our responses are provided after each comment.

1."My main criticism is the suggestion that temperature response profiles can be used to fingerprint the origin of sulfate reducing bacteria populations from different origins. The authors should decrease the tone of this affirmation as it generates a lot of speculation in the discussion. If the main goal of this survey in different sediments would have

been to have a quick assessment of microbial fingerprinting, these analyses should have been complemented by molecular-based analyses based on specific 16S rRNA of SRB or specific genes (e.g. dsrA) (in fact, something so simple as DGGE analysis on RNA with well-known primers for SRB would have greatly support the conclusions derived from this study). “

Response: We can see the concern of the reviewer about using the term “fingerprint“ for other studies then molecular based analyses. This term can be misleading as it has been used frequently when studying microbial community composition. Our study aims to explain temperature adaptation pattern of SRB in different geographical locations in dependence of temperature pressure and dispersal mechanisms. The microbial community fingerprinting by applying molecular analysis would likely not contribute to explain the temperature pattern of SRB in different sediments, because difference could not uniquely be attributed to temperature, but would require accounting for differences in organic matter availability as well. Instead, extensive proteomic studies would be required, which was beyond the scope of this work. The sulfate reduction rate method is unique in its capability to resolve temperature adaptation, and at this point, the best method available. The analysis of SRB temperature profiles determined by us and also other colleagues showed that temperature curves in the closely located arctic fjord sediments indicate a significant small-scale heterogeneity. We think that the different temperature groups of microorganisms in individual sediment can generate a unique temperature profile what we might refer to as a fingerprint. To avoid any misunderstanding and misinterpretation we have replaced the term fingerprint with the term “community temperature characteristic”.

2.“In addition, if the idea of the authors was to survey temperature responses in sediments from different locations I would have expected more samples taken in the same sampling points and even a seasonal sampling. Despite of these comments the manuscript is well written, the methodology is correct and I am certain that the topic is of interest for the scope of the journal. But again, I would recommend reducing the

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tone of the “fingerprinting” assessment (or provide another method to support those conclusion if possible) and a discussion of why not more samples were analyzed.”

Response: We did not expand our studies by repeated measurements of the same sampling points, but instead we have referred to several previous measurements performed in the Svalbard fjords and studied other locations off the coast of Svalbard that have not been sampled yet (Fig. 1 g,h). We measured one of the sediments from the South Atlantic deep seafloor twice (Fig. 1e) since the temperature response of this one was particularly unusual. We have added the duplicate temperature curve to the Figure 1 e. The standard deviation of these two measurements was about 5%. Thus, we trust the reproducibility of our results. Secondly, the temperature difference between each measurement interval is 1.5°C. On an absolute temperature scale this temperature difference is small with regard to the temperature dependence of enzymatic responses. The degree of scatter of neighbouring data points therefore gives a measure of the precision of the method. We do not provide a standard error for each measurement, the interpolated trend for each temperature response experiment is both statistically substantiated as the temperature trend integrates the analytical uncertainty. We have incorporated this explanation in the results section. A seasonal study would be beneficial for the intertidal flat sediment that temperature differs in summer and in winter season. The access to this sediment is difficult as it freezes during winter (Sawicka et al., 2010). The temperatures of other studied by us sediments do not change seasonally. The manuscript has been amended with this paragraph.

Interactive comment on Biogeosciences Discuss., 9, 673, 2012.