

Interactive comment on “Bacterial carbon sources in coastal sediments: a review based on stable isotope data of biomarkers” by S. Bouillon and H. T. S. Boschker

S. Bouillon and H. T. S. Boschker

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We're grateful to Referee #2 for her thoughtful comments. Overall, this referee is positive about the manuscript and we mostly followed her suggestions. Below, we will briefly discuss the issues raised, with the original referee comments preceding each response.

REF : This manuscript provides a review of the $\delta^{13}\text{C}$ content of bacterial iso and anteiso C15 PLFA ($\delta^{13}\text{C}_{\text{C15:0}}$ and $\delta^{13}\text{C}_{\text{CTOC}}$) in sediments from a range of coastal systems. The goal of the study was to characterize the variance in $\delta^{13}\text{C}_{\text{C15:0}}$ across coastal environments. An additional goal was to examine the relationship between $\delta^{13}\text{C}_{\text{C15:0}}$ and $\delta^{13}\text{C}_{\text{CTOC}}$ in order to evaluate the sources of carbon supporting sediment bacterial production. Overall, this manuscript is a solid contribution and ultimately it is worthy of publication. However, there are several places where additional informa-

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tion is needed. For example, there is no description of the methods used for data analysis and in general, data (statistical) analysis is lacking. On page 1622 (line 5), the authors describe their study as a “meta-analysis”, yet it is unclear whether an actual meta analysis was done. A meta-analysis is the statistical analysis of a collection of individual studies. In its present form, no description of any statistical analyses is presented. In addition, if a meta-analysis was conducted, information about the software used, how data were weighted, what metrics were used for the weighting, etc. should be provided.

RESPONSE: We have changed the term ‘meta-analysis’ to ‘cross-system analysis’, which as the reviewer correctly points out, more closely represents the approach we followed in the manuscript. The title has also been changed accordingly. We basically collected data available for a variety of typical coastal ecosystems, and a full meta-analysis would indeed involve a more thorough statistical analysis. However, we do believe that our data set does not allow this; for instance, it would be difficult to develop criteria to weigh the data in a representative way. We therefore mostly treat the data as individual observations. We have added a brief description of the data analysis to the methods section.

REF : There are other examples where data analysis is needed to support the interpretations. For example, the authors note “a good overall relationship between d13CTOC and sediment TOC levels” for mangrove and saltmarsh systems (Page 1625, Line 6-7). Later (page 1626, line 6), the authors noted that “clear relationships between %TOC and d13CTOC were not evident for seagrass and unvegetated systems. However, in both cases, neither r^2 values nor correlation coefficients were presented to support these statements. To clarify the evidence the authors are using as the basis for such statements, I recommend that a table be added where the r^2 values or correlation coefficients for the relationship between d13CTOC and sediment TOC levels are presented for each of the sub-habitats studied.

RESPONSE: We agree that the way we formulate these relationships is too vague in

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the original version. In our revised version, we added the results of a Spearman Rank Correlation analysis in the text for the data of the systems considered (note that the relationships are not linear), which confirm our previous statements: r values are high and significant for the C3 based systems (mangroves, C3 marshes) and for *Spartina* marshes, but close to zero and the relationship not significant for the data from sea-grass beds.

REF : A second concern I have is that $C_{i+a15:0}$ FA is not present in all bacteria, and tends to be more abundant in sulfate reducing bacteria (see Kaneda, 1991, Microbiological Reviews, p.288-302). However, not all sulfate reducing bacteria synthesize this fatty acid. Thus, at best, these compounds represent a subset of the sediment microbial community. It is important that the authors clarify this to the readers because this could contribute to the wide range of isotopic values. It would also be interesting to know whether the isotopic signature of $C_{i+a15:0}$ FA was similar to other PLFA and if so, what compounds. This could provide insights about whether the $C_{i+a15:0}$ FA results represent the larger sediment bacterial community.

RESPONSE: The $C_{i+a15:0}$ FA is indeed only found in certain groups of bacteria, but its distribution is much wider than suggested by the referee and includes also other important bacterial groups in sediments such as the CFB-bacteria and various groups in the Gram-positive bacteria (Actinobacteria and Firmiculites). In addition, several of the studies that we have used in our data compilation have shown good or excellent correlations in the stable isotope composition between $i+a15:0$ and other PLFA in bulk sediment - although we agree that this may not always be the case, it does appear to be general in the data we have compiled. We have added this information in the introduction (page 6, line 14 in new manuscript).

REF : Page 1630. Line 28. While microphytobenthos is often isotopically enriched, it can have a wide range of stable isotope values (see Currin et al., 1995, Marine Ecol. Prog. Ser., V 121, pp 99-116). RESPONSE: This is correct, and we have added this reference to the discussion.

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REF : Minor Edits Page 1618. Line 2. Revise to read, “ and receive organic matter.”

RESPONSE: This has been corrected.

REF : Page 1626. Line 15. Revise to read, “If macrophyte material dominates the TOC

pool” RESPONSE: This has been changed.

Interactive comment on Biogeosciences Discussions, 2, 1617, 2005.

BGD

2, S879–S882, 2005

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