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Biogeosciences Discussions

Interactive comment on "Temporal variations in microbial activities and carbon turnover in subtidal sandy sediments" *by* S. I. Böer et al.

S. I. Böer et al.

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This ms contains an excellently executed work on microbial processes from the little investigated sandy coastal ecosystem. The outcome of this detailed work bears an impact on our efforts of budgeting the carbon in marine ecosystems. Admirably this research has come up with many insights that are essential for a fuller appreciation of the carbon fluxes, turnover and inventories from the thus-far understudied ecosystem. The results are succinctly described and discussed rather in a great detail. The ms is well written and, reads very smooth.

This ms containing a comprehensive and very relevant study of the microbial ecological processes in the shelf region can be accepted for publication in Biogeosciences.

The following suggestions are for the authors to address.

We thank you for this very positive review of our manuscript and appreciate that you share our opinion that this study is relevant for a better understanding of carbon fluxes in subtidal sands which are so far poorly studied. The manuscript was revised following your comments as indicated below. In cases where we disagreed with you opinion, we give a short explanation:

Specific Comments

Page 2, Line 6: CHANGE. . . change, but also to changes . . . to . . . change and to Changes

Changed.

Page 2, Line 7: CHANGE . . . patterns in activity. . . to . . . patterns in enzymatic activity

Changed.

Page 2, Line 13: CHANGE . . . bacterial abundances, bacterial carbon production. . . to. . . bacterial abundances, carbon production

Changed.

Page 3, Line 8: CHANGE . . . biological, geological, and economic perspectives . . . to . . . biological and geological perspectives.

Changed.

Page 3, Lines 23-26: This sentence unclear. Separate the EPS production event from its flux.

The passage was modified accordingly.

Page 4, Lines 8-12: This needs to be stated in the form of a hypothesis. The main focus of this work being quantification of bacterial biomass and activities, a question posed is to be reflected at this stage in the ms.

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Interactive Comment

The passage was modified accordingly.

Page 5, Line 1-3: This statement needs to undergo modification. As photoautotrophic processes are the fundamental controls on the consequent biological processes in all of the global ecosystems, this is too general to be a hypothesis for this interesting study.

The passage was modified accordingly.

Page 5, Lines 2-5: Pl move this part to the end of this paragraph where the experimental steps for laminarin incubations are described. Also a mention be made as to why laminarin was a preferred substrate for this study. . .

The part dealing with sampling of cores for laminarin incubation was moved to the end of the paragraph. A short note was added in the methods part (potential endoenzymatic activity) in order to explain why laminarin was used in this study.

Page 5, Lines 6-7: CHANGE cores only included the . . . to. . . cores included only the. . .

Changed.

Page 8, Line 10: Pl consider rephrasing cell-specific *to* per cell *and through the ms*

We believe that *cell-specific* is a commonly used term in microbial ecology, indicating that enzymatic activities are expressed as activities per cell, and that the phrasing thus does not need modification. In our opinion, using the term *per cell* would prevent a fluent reading of the text.

Page 8, Line 16-17: Pl rephrase this sentence for clarity. For eg., FLA is time consuming technique but can help restrict the number of analyses that need to be performed to measure endoenzyme activities.

The sentence was rephrased.

Page 10, Line 3-5: Revise this sentence. samples *repeated twice in it. . . does not*

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sound accurate

This was corrected.

Page 12, Line 16: CHANGE . . . principle component. . . to. . . principal component

Changed.

Page 12, Line 24: What is the weight equivalent for this?? And, for other expressions throughout the ms??

1 mmol of carbon refers to 12 mg of carbon, thus the weight equivalent for this expression is 34-58 mg C L^{-1}. To our knowledge in situ carbon turnover rates are commonly expressed as mmol per m^2, thus should not be expressed in weight equivalents for better comparison with previous studies. If the editor thinks it is necessary to change these expressions, we can do so.

Page 13, Line 19: CHANGE . . . chitobiase and lipase activity. . . to. . . chitobiase and lipase activities

Changed.

Page 18, line 5: . . . Even assuming. . . to . . . Assuming even. . .

Changed.

Page 19, Lines 12-14: Why do you link the higher fluxes of DIC to anaerobic respiration? It could well be due to temperature controlled or lowered turnover by the bacteria in the top 5 cm. . . Pl examine. Also it does not go well with the rapid turn over rate you are discussing in 4.2 lines 22-26.

We agree that the magnitude of DIC flux is presumably not directly related to whether the processes are anaerobic or aerobic, but rather to the nature of the organic matter or other factors such as temperature. This was a misinterpretation and the respective passage was removed.

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Page 24, line 12: CHANGE . . . Investigating apparent temperature to. . . Apparent temperature

Changed.

Page 25, Line 6: CHANGE . . . the nano- and meiofauna plays to. . . the nano- and meiofauna play

Changed.

Table 4: What is this growth about?? Also, bold fonts not seen in the Table. Pl underline the values that you want to show differently.

Growth stands for bacterial carbon production. This was clarified. Significant coefficients were underlined.

Fig 2: Why are the units of benthic respiration shown negative?

The units are shown negative in order to express that energy is used and not gained.

Fig 3: D not labeled on the graph

Corrected.

Fig. 4: CHANGE . . . Depth-related and temporal changes in (A) benthic chlorophyll-a concentrations; (B) total carbohydrate concentrations and (C) EDTA-extractable carbohydrate concentrations. . . to. . . Depth-related and temporal changes in (A) benthic chlorophyll-a; (B) total carbohydrate and (C) EDTA-extractable carbohydrate concentrations.

Changed.

Fig 6: CHANGE. . . transformation method that transforms a number of potentially correlated variables into a smaller number of independent variables, the so-called principal components. . . . *to. . .* transformation method. *The deleted portion appears in*

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the main body of the ms.

Changed.

Your comments and the comments by all other referees have been taken into consideration for a revised version of our manuscript that we are going to submit within a couple of days.

Interactive comment on Biogeosciences Discuss., 5, 4271, 2008.