**Biogeosciences
Discussions**

# *Interactive comment on* "Spatial variability of particle-attached and free-living bacterial diversity in surface waters from the Mackenzie River to the Beaufort Sea (Canadian Arctic)" *by* E. Ortega-Retuerta et al.

**Anonymous Referee #2**

Received and published: 1 March 2013

Review of the manuscript "Spatial variability of particle-attached and free-living bacterial diversity in surface waters from the Mackenzie River to the Beaufort Sea (Canadian Arctic)" by Ortega-Retuerta et al. submitted for consideration in Biogeosciences.

I have examined the manuscript submitted by Ortega-Retuerta et al. and my overall assessment is that the paper would be publishable after minor revisions. The authors present novel data and interpretation on the structure and diversity of surface waters bacterial community from river to offshore waters of the Beaufort Sea. The paper is generally well organized but I strongly suggest that the authors ask an English-speaker

to read through the MS and correct the grammar. This manuscript presents a unique data set that many readers will surely find interesting. I have however a number of questions and comments which I would like the authors to address before the paper can be accepted for publication in Biogeosciences.

Specific comments:

Abstract

1) Page 17403 lines 10-11: please be more precise concerning the differences/similarities observed between the particle-attached and free-living bacterial communities.

2) Page 17403 lines13-14: Define the acronyms DOC and CDOM.

3) Page 17403 lines 14-18: This phrase is too long, rephrase it in two sentences and clarify which type of significant differences you are talking about.

Introduction

1) Page 17404 line 2: Replace the reference (ACIA 2005) by a more recent one.

2) Page 17404 line 4: I don't understand why the authors focus on the influence of climate-related changes in UV radiation on primary producers more than on the influence of irradiance availability.

3) Page 17404 lines 16-18: "POM inputs are also high in this area", please moderate this statement as the occurrence of phytoplankton blooms in the Beaufort Sea area is indeed often associated with sea-ice retreat and also with upwelling processes; but on an annual basis the primary productivity of this area stays generally low compared to other Arctic Seas.

4) Page 17404 line 23: Please standardise the spelling of Mevel or Mével throughout the manuscript.

5) Page 17406 line 2: I think that authors must clarify the meaning of community structure, diversity and activity, and clearly explain which method was used to determine each of these three characteristics of the bacterial community.

Material methods

1) Page 17406 line 17: More than 15 stations appear on Fig. 1 and in Suppl Table 1, please clarify.

Results

1) Page 17410 line 6: According to Table 1 the average temperature for riverine stations is 10.2 not 10.7, please correct the text or the table.

2) Page 17410 line 10: To clearly distinguish coastal stations from open sea stations, I suggest replacing "surface temperature higher than 4" by "surface temperature higher than 4.5".

3) Page 17410 line 11: Please replace "open sea stations had salinity higher than" by "open sea stations showed a salinity higher than". Please remove the salinity unit used here as it was not used before in the text or in Table 1.

4) Page 17410 lines 15-19: Please mention the statistical tests used to discriminate statistical differences in bacterial production from various studied regions.

5) Page 17411 lines 18-19: Please at least show the correlation coefficients in the text.

6) Page 17411 line 27: Standardize the number of digits throughout the text.

7) Page 17412 lines 10 and 13: How many samples did the authors analyze/select 3 or 6, please standardize.

8) Pages 17412-17413: Please present Figures 4 and 5 in the text in the same order than their numbering.

9) Pages 17412-17413 lines 27-3: Please reformulate these sentences.

10) Page 17413 line 11: Please add Fig.6 at the end of the sentence after "taxonomic compositions".

Discussion

1) Page 17414 lines 2-8: This sentence is way too long, please reformulate it.

2) Pages 17414-17415 lines 25-4: This sentence is too long, reformulate it in two sentences.

3) Page 17415 line 22: Please replace by "contrasting with our expectations".

4) Page 17415 lines 12-16: Be more specific about the factors you are talking about, which factors and from which study.

5) Page 17416 lines 4-6: Please replace by "During the MALINA cruise, particles from river and coastal samples showed POC:SPM ratios of 2.2% (i.e. mineral-rich particles) while particles in the open sea showed POC:SPM ratios of 12.2% (i.e. organic-rich)."

6) Page 17416 lines 9-16: This paragraph is really confusing, surely because of translation misunderstanding, please reformulate.

7) Page 17416 line 29: Please replace by "Previous studies have also found higher diversity in the PA fraction."

Tables and figures

Table 1: Please define the acronyms and delete parameters that are not used in the text (e.g., nutrients).

Table 3: Please define acronyms PA and FL in the caption as in the caption of Fig 2.

Figure 1: The map of the world is too small.

Figure 2: Please explain the use of the different colors (blue, green, brown) as in Fig. 1. Also explain the use of the black and red for stations. In the right panel B, the name of the fifth station from the top is wrong (E4-E-A).

Figure 3: Please define acronyms PA and FL in the caption as in the caption of Fig 2. Define PO4.

Figure 4: Please use the same acronyms for particle-attached and free-living bacteria than in previous figures. Mention in the caption that this figure showed only the results obtained for the western transect.

Figure 6: Please define acronyms PA and FL in the caption as in the caption of Fig 2. Suppl. Figure 1: Please mention in the caption that river samples are from western transect only.

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Interactive comment on Biogeosciences Discuss., 9, 17401, 2012.

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