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Interactive comment on "Bioavailability of riverine dissolved organic matter in three Baltic Sea estuaries and the effect of catchment land-use" *by* E. Asmala et al.

Anonymous Referee #2

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General comments

In this manuscript, the authors determined several quantitative and qualitative parameters of DOM in addition to the bacterial growth parameters during incubation experiments using rivereine and seawaters of Baltic Sea estuaries with the different land-use characteristics. From these experiments, the authors found that DOM qualities that might be controlled by the watershed's characteristics affect the DOM degradability and bacterial growth efficiency. The results described in this manuscript, especially combination of chemical and biological parameters during the microbial degradation experiments, are novel and very interesting. Thus, I believe this manuscript would be great interest of readers in Biogeosicences. Even that said, there are a couple of

unclear issues in the present manuscript.

1) Regarding with DOM parameters, it seemed that the authors basically used average values including every seasons and every water types for discussion (Table 3, Figs 3, 4, 6 and 8). However, there is no justification why the authors decided to use average values. In Table 2, the authors only compared the DOM parameters of "initial condition" among seasons and between river and estuary end members, but delta values (changes during incubations) were only compared among estuaries or among seasons. The use of average values is key part of data analysis for this manuscript, thus, the authors should justify why the authors decided to average every "water types".

2) The authors collected samples several times (typically, d=0, 3, 6,10, and 14) during the incubation experiments for DOM analyses. However, it seemed that the authors used only differences in DOM parameters between initial (d=0) and end (d=14) of experiments for data analysis. Did the authors use data of d=3, 6, and 10 for data analysis, e.g., calculation of DOM degradation rate? Please clarify this issue in the revised manuscript. In addition, it is not clear which data were used for Tables and Figures. For example, were all of experimental data, i.e., d=0, 3, 6,10, and 14, used for Figure 4a? Why were number of plots different between Figure 4a and Figure 4b? Please clarify what kind of data was used for Figures 4, 6, and 8 (it seemed that the authors used all data collecting throughout the experiments, i.e., d=0, 3, 6, 10, and 14, for some figures, but used only one data, i.e., differences between d=0 and d=14 for other figures).

3) The authors determined bacterial production using three methods, i.e., 14C-leucine, 3H-thymidine, and bacterial numbers. Did the authors use average bacterial production (and bacterial growth efficiency) determined by the three methods? Please clarify it.

Specific comments

Page 9822, lines 23-25: Absorbance and fluorescence analysis can evaluate a part of DOM, i.e., CDOM, but not whole DOM.

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Page 9825, lines 1-4: What is the meaning of sea samples (corresponding salinity was 6.3±0.5, 2.7±1.1, and 2.3±0.1)? It seemed river end-member samples, because the authors mentioned in the next sentence (lines 5-9) that salinity of seawater samples were close to the open-sea salinity values.

Page 9826, lines 23-27: The authors mentioned that GF/F filtrate were kept at 4°C within two weeks for fluorescence and absorbance analysis. Even though the authors mentioned that nominal pore size of combusted GF/F became smaller, 4°C was the same temperature with incubation temperature of spring experiments. Is this preservation acceptable for removing bacterial activity?

Page 9827, line 8: NO3 should be NO3-.

Page 9830: SEC chromatogram might be affected by differences in salinity of samples loaded. Did the authors check this effect?

Page 9831, lines 10-12: How can the authors assess the differences between the "source" and the "sink" of DOM from Table 2? Please explain it.

Page 9832, line 8 and elsewhere: I thinks it's better to use "delta(%) value" rather than "delta value" throughout the manuscript.

Page 9832, lines 11-12: How DON degradation were different among water type? Please describe it in detail.

Page 9833, Figure 3: If the authors used average data of all water types for Figure 3, relationships between BDOM and lake percentage confused me. The estuarine samples occupied more than half of average data, if the authors averaged all of water types. The authors claimed that longer retention time expressed by the lake percentage affected the degradability of DOM. However, if the riverine DOM enter the estuary, it is hard to compare the residence time among estuaries.

Page 9836, lines 8-10 and elsewhere The authors compared their results among seasons and discussed seasonality of DOM quantity/quality and biodegradability. The

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quantity/quality of DOM are strongly affected by hydrological conditions. For example, quantity/quality of DOM in rivers are controlled by snowmelt events or rain events like storm (e.g., Neff et al., 2006, GRL, 33, L23401; Hood et al., 2006, JGR 111, G01007). So, if the authors discuss differences in seasonality, the authors should show the discharge data for justifying their discussion.

Page 9836, lines 12-16: Again, please show the results regarding with differences in DOM degradability among water types.

Page 9837, lines 21-23: It seemed that relationship between BDOC and BDON was also significant for Kajaanjoki. Please check it again.

Page 9840, line 29-page 9841, line 2: From Table 3 and Fig.7, it seemed that BGE did NOT covary with degradation rates of DOC and DON. For example, highest DOM degradation rates were found for Kyronjoki, but highest BGE was found for Karjaanjoki.

Page 9841, lines 7-9: Did the authors find any autochthonous signature in DOM quality for estuarine samples?

Page 9843: I think the authors can evaluate C:N of bacterial biomass more preciously, if the authors used changes in inorganic nitrogen concentration during incubation experiments.

Table 4: How did the authors estimate refractory DOC and DON? Also, what is the meaning of the unit of these, e.g., kg C d-1?

Figure 4b: In Kyronjoki plot, were spring samples included? If so, please mark spring samples as red triangle like Figure 4a.

Interactive comment on Biogeosciences Discuss., 10, 9819, 2013.