Biogeosciences Discuss., 11, C1160–C1167, 2014
www.biogeosciences-discuss.net/11/C1160/2014/

Biogeosciences Discussions
Open Access

Interactive comment on "Seasonal contribution of terrestrial organic matter and biological oxygen demand to the Baltic Sea from three contrasting river catchments" *by* H. E. Reader et al.

H. E. Reader et al.

heather.reader@biol.lu.se

Received and published: 17 April 2014

We would like to thank the reviewer for their thoughtful and detailed comments. We have responded to all of the comments below:

Reviewer #2. General Comments The present work of Reader et al. shows several interesting ideas, both the conceptual topic (biogeochemistry and future climate scenarios), how in the methodological issue (use of index BOD), which make it a suitable work for this journal. The work focuses on the characterization of inputs from dissolved organic matter (DOM) in three basins of three rivers flowing into the Baltic Sea. The Introduction of the paper clearly shows the problems that previous studies have shown,

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

on increasing inputs from DOM and specifically coloured or chromophoric organic matter (CDOM), these increases have important effects throughout the marine ecosystem and espe- cially in ecosystems seas inland as the Baltic Sea, where the processes of autotrophy and heterotrophy share a delicate balance. In the last part of the work, an interesting reflection on the influence of DOM and CDOM contributions in future scenarios of climate change in the Baltic Sea and Scandinavia is included. One of the interesting points of work by Reader et al., is the use of a simple and widely used methods. The characterization of the DOM are performed based on spectropho- tometric measurements and particularly the use of BOD index or "biological oxygen demand", as an indicator of the degree of reactivity of the organic matter (labile or reactive) and thus its possible use by the biological community (microbial). The BOD is widely used by government services how indicator of water quality (surface and groundwater). However, its use is not widespread in biogeochemical or oceanographic studies. One of the aspects that complicate the job, in my opinion, is the disparity of charac- teristics of the three selected rivers, area, climate, vegetation, hydrology, ... make that almost every one of the rivers as a special case.

Specific comments:âĂĺ 1. Introduction: good. Many citations see References. 2. Methods 2.1. Sampling and measurements

Comment: Fig 1. Put the name of the rivers on the map

Response: We have added the names of rivers and basins to the map.

Comment: Table 1. To complete characteristics watershed, would be interesting to put flow means and range for the study period would suffice.

Response: We have added flow data added to table 1.

Comment: I think it would be easier to divide the dialects studied methods for each parameter: DOC, CDOM, BOD, . . .

Response: We are unclear as to what the reviewer means here, and would like the

BGD
11, C1160–C1167, 2014

editor to help us if the point is not already covered in the other edits.

Comment: P1360 L13-19, would have to go along with the other information on the watersheds P1359 L14-24

Response: Section P1359 L14-24 moved up to follow P1360 L13-16 directly. (moved to lines 148-155, revised manuscript).

3. Results

Comment: The description of the results could be more specific. No discharge data are given and extrapolate from figures is difficult. The same results for DOC and CDOM (3.2) and DOM quality (3.3). Only in 3.4 DOM loadings, a comprehensive description of the results is made.

Response: Discharge and DOC added to Tables 1 and 2. Quality indicators are in Table 2. Loadings are in Table 3.

Comment: A graph that relating the discharge to DOC, discharge to CDOM and-BOD discharge for each river, give much information about the behaviour of these parameters with respect to the flow.

Response: We opted to show these relationships by plotting the data and the hydrograph on the same figures (Figures 2 and 3). Additionally, correlations between these parameters are presented in Table 3. As robust relationships were not found (see section on load calculations), additional figures of discharge vs DOC would not be informative.

Comment: In Figures 2 and 3, the red dots are difficult to place in time, possibly to connect the dots with lines help to better visualize the temporal variations.

Response: Size of dots has been increased. As stated in the methods, samples were taken mid-month, starting in March 2012. We have not added lines because we are concerned that this may decrease the clarity of the figure. This can however be easily

BGD
11, C1160–C1167, 2014

done should the editor deem it necessary.

4. Discussion

Comment: P1364-L5. Change the past by previous works.

Response: We have changed “past” to “previously”. (Line 304, revised manuscript)

Comment: P1365-L11, L15,.... In this section behind the names of the rivers "älv" is set, previously not done. Uniform.

Response: Älv changed to river throughout the manuscript.

Comment: P1365-L16. “annual” or “mean annual”?

Response: The words mean were added where they were missing.. (Line 341-343), revised manuscript). “The mean annual temperature ($\sim$1°C, Table 1), and significantly, the mean winter temperature (-10°C) in Ume river are lower than in the southern two catchments ($\sim$7°C mean annual and $\sim$0°C mean winter, Table 1).”

Comment: P1366-L10. “flow on” or “flow of”?

Response: Lines 374-375, revised manuscript, sentence changed to: Generally, loadings of DOC in the studied rivers are driven by river flow,

Comment: P1367The process of autotrophy vs heterotrophy, is one of the important discussions of work. Changing autotrophic to heterotrophic communities is due to changes in the community or the appearance of opportunistic heterotrophic communities, may need more?

Response: We do not follow what the reviewer is requesting. If the editor would like the section on autotrophy vs heterotrophy expanded please let us know. At the moment no changes have been made.

Comment: Section 4.3, I think is very interesting, but a little disconnected from the rest of the work. For example, to connect this section of climate change with the

BGD

11, C1160–C1167, 2014

earlier discussion on autotrophy and heterotrophy. In the objectives of work, hypoxia is mentioned, which then does not appear in all the work. I think this would be a good opportunity to take up the subject.

Response: The influence of increased DOM inputs on hypoxic conditions has now been explicitly taken up in section 4.3 (lines 462-470, revised manuscript): “Increased loadings and more even patterns of organic matter input into the Baltic Sea in the future are likely to increase the oxygen-stress on the environment. Over the past 100 years, hypoxic and anoxic conditions in the Baltic Sea have been increasing both in the coastal zone and the open regions (Carstensen et al., 2014;Conley et al., 2011). Though inputs of nitrogen and phosphorus based nutrients have been regulated throughout much of the region, the increased and more constant input of DOC (and BOD) from rivers has the potential to counteract these reductions (Carstensen et al., 2014), and contribute to increasing hypoxic conditions in the Baltic Sea in the future.”

Comment: References. Perdue, 1998 not in references

Response: The Purdue reference has been added to references.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/11/C1160/2014/bgd-11-C1160-2014-supplement.pdf

---

Interactive comment on Biogeosciences Discuss., 11, 1355, 2014.

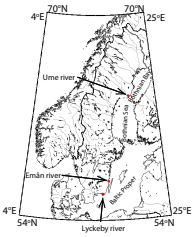

Figure 1

Fig. 1.

BGD
11, C1160–C1167, 2014

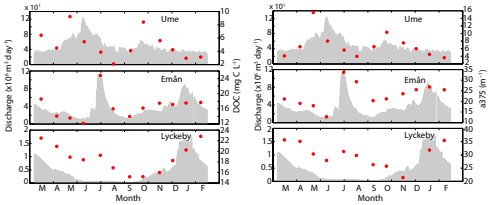

Figure 2

Fig. 2.

BGD
11, C1160–C1167, 2014

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

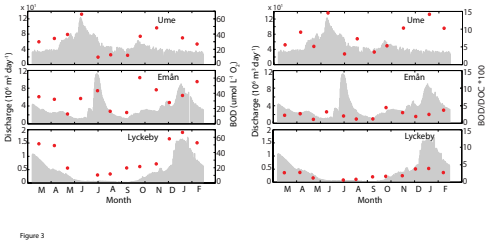

Figure 3

Fig. 3.

BGD
11, C1160–C1167, 2014