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Interactive comment on "Spring bloom community change modifies carbon pathways and C : N : P : Chl a stoichiometry of coastal material fluxes" *by* K. Spilling et al.

Anonymous Referee #2

Received and published: 25 September 2014

This is an interesting manuscript, describing the carbon flow and community stoichiometry over the full duration of natural, mixed community Baltic Sea spring bloom events. The authors performed several mesocosm experiments with different seed communities and nutrient enrichments and followed changes in community composition, biomass production and nutrient fractions for several weeks. Data are mostly novel and interesting and the subject area is clearly appropriate for publication in Biogeosciences. The experiments were correctly planned, described and carried out. The manuscript is straightforward and clear and the discussion section covers all relevant aspects. For these reasons I think that the manuscript deserves publication in Biogeosciences.

In addition to comments of Referee #1, there are a couple of points of relatively minor nature – especially in the materials & methods and results section - that the authors should take into account and add in a revised version of the manuscript:

p.11866 l.1 Please be more precise. How are thermal stratification patters und fresh-water runoff connected to phytoplankton community changes? Which groups appear under which conditions?

p.11866 l.2-3 This references to the Arctic environment is confusing here as your study deals with temperate coastal waters of the Baltic Sea and not the marine Arctic region. I suggest removing this sentence.

p. 11866 l.15 Please be more precise. Which functional aspects do you refer to?

p.11867 l.5ff Decomposition does not only occur in the sediment but also in the water column. Please include pelagic bacterial degradation here.

p. 11868 l.17-19 Can you briefly discuss potential effects of the culturing vessel? I imagine that there was more light available for photosynthesis in the transparent vessels compared to the white plastic barrels. Did you measure light intensities in the water?

Can you estimate the amount of wall growth in your experimental units (or did you determine wall growth)? Did you clean the walls regularly?

p.11868 l.25 Did you sample surface waters or at a certain depth?

p.11869 l.11 Light intensities of 90 μmol photons m-2 s-1 seem quite low to me. What are mean light intensities in this area during this time of the year at the sea surface?

p.11869 l.18 What was the sampling volume? How much volume did you remove over the whole experimental period?

p. 11869 l.21 Add reference to Table 1 here.

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p. 11870 l.11 How much volume did you filter for POC/PON analysis?

p. 11871 l. 17 Give typical background concentrations for refractory DOC in the Baltic Sea.

p. 11871 l.20-23 Usually growth phases are defines according to cell numbers or growth rate. Does your phase definition agree with your calculated growth rates (μPOC, μChla)?

p. 11873 l.21 I found the definition for "mixed community" in the legend of figure 7. Please add this information to the method section or early in the results section.

p. 11874 l.5-7 Figure 3b shows CAE (the ratio between μPOC and TGP) plotted against μPOC but the correlation is quite low (R^2 = 0.12 and p=0.04) indicating a high variation in TGP. Even if the correlation can be argued as statistically significant, due to high variation in the data, I don't agree with the authors' conclusion of lower loss rates with increasing growth rates. I recommend interpreting this data more carefully.

p. 11875 l.11 Please give R^2 and p-values for the significant change in C:Chla ratio in the dinoflagellate dominated group.

p. 11877 l.8 Please include heterotrophic remineralization in the water column here.

p.11877 l.16 Did you check for grazers and bacterial/viral abundances? Can you please discuss the role they might have played in the development of the phytoplankton bloom during your studies?

p. 11878 l.24 Bacterial or grazer biomass may have contributed significantly to total biomass masking differences due to phytoplankton community composition.

p. 11880 l.5 Later on (p. 11881) you discuss also the aspect of aggregation of dissolved organic matter to larger particles such as TEP and a coating of phytoplankton cells by mucus layer. These carbon compounds contribute to the POC pool influencing C:Chla ratios and μPOC. Please include this aspect also here into the discussion.

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p.11897 Figure 2 Please add here information about your division into the three categories (in the legend and in the figure). “The phytoplankton community was divided into three categories: diatom dominance (>80 %), mixed community (20–70% dinoflagellates) and dinoflagellate dominance (>70 %). The rationale behind setting the group boundaries was from the apparent difference in species evenness between these groups.”

It is not clear to me, why you chose 70% dinoflagellate dominance as a threshold. Please explain in more detail.

p. 11899 Figure 4 You refer to Fig. 1 for species evenness but I guess it is Fig. 2?

p. 11902 Figure 7 You refer to Fig. 1 for species evenness but I guess it is Fig. 2?

Interactive comment on Biogeosciences Discuss., 11, 11863, 2014.