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Comment

Interactive comment on “Microzooplankton grazing and phytoplankton growth in marine mesocosms with increased CO₂ levels” by K. Suffrian et al.

Anonymous Referee #1

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The manuscript by Suffrian et al. describes the influence of increased pCO₂ and related seawater acidification on microzooplankton grazing during a mesocosm experiment (PeECE III). The grazing experiments were performed by using an established dilution technique. Changes in phytoplankton abundance due to growth and grazing were derived from pigment data, whereas microzooplankton abundance was determined by microscopy. Overall, the experiments show no significant effect of the CO₂ treatment on instantaneous phytoplankton growth rates and grazing. The manuscript is well written, and the results are presented clearly. Given the sparse information on microzooplankton grazing rates on natural communities in general and on potential pH effects in particular, this manuscript can be a valuable contribution to the PeECE study.

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However, I have some specific comments that should be considered by the authors prior to publication.

Methods:

Did the authors forget to include the equations on how to calculate grazing and growth rates for the dilution approach? They describe the variables but do not show the equations. Please add , or -even better- plot an example.

By looking at the results, I realized that the bottle incubations for the different CO₂ treatments were not performed at the same day, but within a time span of 3 days. This needs to be stated more clearly in the method section. Moreover, the authors should comment on the potential variability of other parameters within the 3-days time span, e.g. irradiance.

Initial nutrient addition to the mesocosms was performed using a DIN to DIP ratio of 25, likely resulting in P-limitation of the system. During the grazing experiments nutrients were added in a ratio of N:P of 10. Why? Wouldn't this affect phytoplankton community composition in a different way than in the mesocosms?

Results & Discussion:

The authors chose to quantify phytoplankton standing stock and community composition by pigment analysis. However, zooplankton graze on cells rather than on pigments. Can the authors give an estimate for the size range of cells within each phytoplankton taxa, and how it changed during the experiment? This would be important to get an idea on the predator to prey size ratio within each group. Also, what was the contribution of the specified phytoplankton groups to the total community (give at least % Chl a)?

I think that the authors can potentially valorise their study by analyzing the size distribution of microzooplankton during the experiments. Since they made the effort to count and seize the cells of the microzooplankton community, they should present and

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discuss this information. Information on the microzooplankton biomass in carbon units would be more interesting when related to other carbon based data of the study, i.e. macrozooplankton and POC (Schulz et al.).

I suggest that the authors discuss the results of their study in more detail. Some findings are not easy to understand, e.g. for some incubations growth as well as grazing rates are negative, or close to zero. How reliable is such a result? Does this indicate that the assumptions for estimating g and k with the dilution technique were not fulfilled?

Minor comments:

I don't think that the arrows in figure 2 help to understand the dynamics of growth versus grazing, especially since the values are heavily fluctuating between dates. I suggest removing the arrows as well as the labelling of dates.

Table 1: 1×10^{13} , PO_4 concentration correct?

Page 413: line 2: change to '.. increased ocean acidity with a pH drop of 0.1 in the surface ocean since...' Page 413: line 24: change to '..and its potential feedback effects on carbon cycle.'

Interactive comment on Biogeosciences Discuss., 5, 411, 2008.

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