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Interactive comment on "Effects of ocean acidification on pelagic carbon fluxes in a mesocosm experiment" *by* K. Spilling et al.

Anonymous Referee #1

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Spilling et al. have done a very nice effort compiling a wide amount of results from a 44 d mesocosm study in the Baltic Sea and calculating the carbon fluxes under different ocean acidification scenarios. Despite the big amount of data the manuscript is concisely written, easy to read and shows clear conclusions. Among the different results they have determined standing stocks and temporal changes of total particulate carbon, dissolved organic carbon, dissolved inorganic carbon and particulate organic carbon (POC) of specific plankton groups, as well as carbon-CO2 fluxes, sedimentation and biological rates (primary production, bacterial production and total respiration). The main results show that elevated CO2 conditions increased total particulate carbon and the DOC pool due to a decrease in respiration and bacterial production at elevated CO2 concentrations. I think that this is a very interesting result that needs to be discussed more deeply in the manuscript. I refer the authors to Hopkinson et al. 2010

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and Teira et al. 2012 for information about decreases in phyto and bacterial respiration under high CO2 concentrations. Sobrino et al. 2014 can be also used as a reference related to downregulation of phytoplankton metabolism under high CO2, which might be an appropriate topic for the discussion of the manuscript.

Regarding the data analysis, I like the idea of using estimated instead raw data to make comparisons between variables or when observed values are not available. However the authors should also provide more information to complement or justify the usage of estimated vs. measured data. For example when comparing NPP14C and NPPe the authors only say that results "agree reasonably well" which is a very general contention for this paper. In addition, during Phase III, total respiration was not measured and the authors estimated TR based on the NPPe TR-1 and BP TR-1 ratios during Phase II. Information about their correlations during Phase II would be desirable to justify the estimation carried out during Phase III.

Finally, an specific equation for the estimation of bacterial respiration would be nice to see in the Methods.

Minor issues: - Line 234 days - Line 269 correlated to?? - Line 410. Revise sentence " The initial increase in the. . .." - Line 425 during - Fig. 1 filtration - Fig. 2. What about using similar units in the Y axis and legend (i.e. uatm??)

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