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Interactive comment on "Cell-free extracellular enzymatic activity is linked to seasonal temperature changes in the Baltic Sea" *by* F. Baltar et al.

Anonymous Referee #1

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General comment The article by Baltar et al. shows a strong relationship between the proportion of dissolved extracellular enzymatic activities and seasonal variations (temperature) occurring at a coastal site in the Baltic Sea. The topic of the manuscript is very important, and not fully understood yet. It is a clear and straightforward document that describes a valid experimental design. My only concern regards the lenght of the paper. In particular, the authors focus only on one important environmental factor: temperature. In order to make the article's conclusions sound (e.g. the potential effect of global warming on organic matter degradation performed by cell-free enzymes) some experimental manipulations could have been performed. Alternatively, the effect of factors other than temperature could have been considered (and eventually discarded if

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Discussion paper

not significant). For these reasons I suggest to improve the analysis with other environmental factors (if available). Alternatively, the manuscript should be considered for a 'short note' type of paper. Since I'm aware that BG does not include 'short notes' as potential article types, an option could be the 'Ideas and perspectives' type, within which the article could perfectly fit in its current form with a slight modification of the title (just as a suggestion, it could become something like: "temperature affects the activity of cell-free extracellular enzymes: a seasonal case study in the Baltic Sea).

Specific comments:

Page 1 line 27-29: This conclusive sentence is very strong: although potentially true it would deserve further investigations (see General comment) Page 2 line 3: although heterotrophic prokaryotes are much of the story, I would not ascribe only to them the pivotal DOM reworking role, especially when EEA are involved (exoenzymes from cyanobacteria can be even more efficient). I'd be more cautious just saying 'prokaryotes'. Page 2 line 15: extra ')' Page 3 line 25: "Temperature was measured on site" How? Was water collected and temperature measured on a aliquot by means of a thermometer? Anyhow this should be indicated. Page 6 line 8: I am afraid this (temperature and light) is a little restrictive. pH is an important factor in enzyme activity, especially in extracellular ones. What is the pH variability in the 'low-salinity' high-chlorophyll Baltic sea? I suspect that in the sampling area pH variations might be broader that those tested in many ocean acidification experiments for which many references are available. Substrate concentration and composition also affect enzyme activity with or without links to the metabolic state of the source organism (Arnosti 2011) Catalytic elements have also been shown to drive (to some extent) hydrolysis rates of at least LAPase (Fukuda et al., 2000). These aspects (especially pH and substrate) should be mentioned. Page 10 line 30: heterotrophic MARINE flagellates Figure 2, upper panel: error bars should be shown

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