

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

**F. Baltar et al.**

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We thank the reviewer for the constructive comments on this manuscript. We have taken them on board and our responses to reviewer comments, including potential modifications to the manuscript, are detailed in the following:

REVIEWER COMMENT 1 by Referee #1: 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.

C1

Author response: We appreciate the positive comments of the reviewer

REVIEWER COMMENT 2 by Referee #1: My only concern regards the length 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 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).

Author response: We will include other factors than temperature and light (e.g. nutrients, salinity, bacterial abundance, bacterial production) to the analysis and text in the revised manuscript. We appreciate the title suggested by the reviewer, and will use it in the revised version.

REVIEWER COMMENT 3 by Referee #1: Specific comments: Page 1 line 27-29: This conclusive sentence is very strong: although potentially true it would deserve further investigations (see General comment)

Author response: We will rewrite this sentence to make it less strong and to include a suggestion for the need for further investigations in the revised version.

REVIEWER COMMENT 4 by Referee #1: 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

C2

15: extra ')

Author response: We will modify this in the revised version.

REVIEWER COMMENT 5 by Referee #1: 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.

Author response: Water was collected with Ruttner sampler equipped with a thermometer inside. Temperature was measured on site, through thermometer placed in the sampler. We will include this information in the revised version.

REVIEWER COMMENT 6 by Referee #1: 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 than 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.

Author response: As mentioned in the response to the reviewer comment 2 we will include other parameters as well, however we did not measure pH. Nevertheless, the strongest variations in pH would be caused by autotrophic and heterotrophic activity, and we are including phytoplankton biomass (chlorophyll-a) and will include bacterial heterotrophic activity, which will be indicative of fluctuations in pH.

REVIEWER COMMENT 7 by Referee #1: Page 10 line 30: heterotrophic MARINE flagellates

Author response: We will correct this in the revised version of the ms.

C3

REVIEWER COMMENT 8 by Referee #1: Figure 2, upper panel: error bars should be shown

Author response: We will add the error bars to Figure 2 in the revised version.

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