

Biogeosciences Discuss., author comment AC1
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Reply on EC1

Marco Reale et al.

Author comment on "Acidification, deoxygenation, and nutrient and biomass declines in a warming Mediterranean Sea" by Marco Reale et al., Biogeosciences Discuss.,
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Author responses to Editor comments for the manuscript:

"Acidification, deoxygenation, nutrient and biomasses decline in a warming Mediterranean Sea"

February, 18th 2022

We thank the Editor for their positive feedback and for providing detailed comments and suggestions, which will be considered to improve the manuscript. Reviewer's comments are in bold, authors' responses are in normal font, italicized where they quote the proposed changes to the manuscript.

I hope this comment does not come too late. I refer to figure 18 panels e-l. It is inappropriate to express changes in pH in percent. It should be percent of the hydrogen ion concentration. Or, perhaps better, show the changes in pH units. See: Fassbender A. J., Orr J. C. & Dickson A. G., 2021. Technical note: interpreting pH changes. Biogeosciences 18:1407-1415.

We thank the Editor for pointing out this error in Figure 18. It will be redrawn following the Editor's suggestion, showing the changes in pH units. Please refer to "Fig_18.png" contained in the zip file "Answers_to_Editor" added as supplement to this comment. The caption of Figure 18 will be modified as follows:

"Fig. 18 -pH in the layers 0-100m and 200-600m in the PRESENT (2005-2020, a,b,c and d), and relative climate change signal (with respect to the PRESENT, in units of pH) in the MID-FUTURE (2040-2059, e,f,g and h) and FAR-FUTURE (2080-2099, i,j,k and l) in the RCP4.5 (left column) and RCP8.5 (right column) scenarios. The Mediterranean average relative climate change signal in each period (with respect to the PRESENT) is displayed by the top-left colored value (blue or dark orange when negative or positive). Values in the green boxes is the average relative climate change in each period and in each sub-basin shown in Figure 1. Domain grid points where the relative climate change signals are not statistically significant according to a Mann-Whitney test with $p < 0.05$ are marked by a dot."

It would be great to have a summary table providing values of key variables with the 2 scenarios at present, mid and far future.

We thank the Editor and Reviewer#1 for the suggestion. A new table will be included in Supplementary materials showing the "unbiased scenario" values (as defined in the Data and Methods section) of Temperature, Salinity, Phosphate, Nitrate, Dissolved Oxygen, Phytoplankton and Zooplankton biomass, Integrated net primary production, Dissolved Inorganic Carbon and pH in the PRESENT, MID-FUTURE and FAR-FUTURE. The two layers of 0-100m and 200-600m are considered. All the values in bold are statistically significant different from the mean value in the PRESENT according to a Mann-Whitney test with $p < 0.05$. The new table is shown in the file "Table_Editor" contained in the zip file "Answers_to_Editor" added as supplement to this comment. Moreover, the table (table SP1) will be introduced in the "Discussion and conclusion" as follows:

"Our projections for the biogeochemical tracers, properties and processes at the end of the 21st century show several signals (the decrease in dissolved nutrients in the euphotic layer of the basin and in the intermediate layer of the central part of the Mediterranean Sea, the increases in the net primary production and respiration, the decline of the stocks of particulate carbon biomass, an uniform surface and subsurface deoxygenation of the water column, acidity of the water column; table SP1) that are mostly in agreement with previous studies (Hermann et al., 2014; Lazzari et al., 2014; Macias et al., 2015; Moullec et al., 2019; Richon et al., 2019; Pagès et al., 2020; Kwiatkowski et al., 2020; Solidoro et al., 2021)."

Please also note the supplement to this comment:

<https://bg.copernicus.org/preprints/bg-2021-301/bg-2021-301-AC1-supplement.zip>