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Ocean Science Discussions

Interactive comment on "Factors controlling pCO_2 variability in the eastern Gulf of Cádiz (SW Iberian Península)" *by* Dolores Jiménez-López et al.

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Reviewer 2:

The authors are very grateful for your constructive comments and suggestions on the previous version. We think that the manuscript has been significantly improved thanks to all the contributions made. Below you will find the comments you made and our comments as authors (marked AC) on each point. In response to all the comments the manuscript has been modified, resulting in changes to line numbers. Therefore, we have included the new line numbers (whenever applicable) so that you can refer to either the current or (former) version if you wish.

Thank you very much for your consideration. Sincerely, Dolores Jiménez-López, on

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behalf of all co-authors.

-In general, the manuscript is written with too many very short paragraphs.

AC: An experienced native speaker revised the manuscript again to ensure that paragraph lengths are appropriated to the content and style, and generally to improve the manuscript.

-The topic of the presented research is interesting and pertinent in the actual context of climate change. The title is very appealing and the reader expects to learn about the processes that control the pCO2 variability in the eastern Gulf of Cadiz. Unfortunately, the abstract does not reveal any factor controlling the pCO2 variability. The conclusion indicates that: "temperature and biological activity are the two principal factors that explain the temporal variability of CO2". This is the case everywhere in the ocean. There is nothing new here! Then (line 470), it is indicated that: ": : : the distribution is principally controlled by the temperature". Here again, there is nothing new and this is normal. Therefore, I would suggest the authors to change the title of their manuscript to more accurately reflect its content.

AC: Thank for your suggestion. The title has been modified to "pCO2 variability in surface waters of the eastern Gulf of Cádiz (SW Iberian Peninsula)".

-The authors should also precise (and justify) what kind of linear regression (type I, type II, : : :) they did in order to determine the general trends.

AC: We have added the kind of linear regression in the text (type I, Line 208).

-They should also detail all their calculations (including simple ones such as the mean capture capacity, : : :).

AC: The mean capture capacity is calculated using the total surface of the study area (52.8âĂć102 km2) and the mean annual flux during the 8 cruises (-0.18 mmol m-2 d-1). This detail is now added in the manuscript (Line 466-467). Another calculation not indicated in the text and that may be of interest is the mean benthic flux of CO2 (Line

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342), which is calculated making certain assumptions that are stated in the text (Line 343-346).

-The last sentence should be re-written to me more precise (what means ": : :variability of CO2: : :"; is it TCO2, CO2 flux, pCO2???; what means ": : :capacity of CO2 capture: : :"; surface/depth, on what timescale?). The manuscript will gain in clarity if it were much concise.

AC: This final paragraph has been modified to give more clarity. Line 491-494: "The annual uptake capacity of CO2 by the surface waters in our study area is 14.9 Gg C year-1. The CO2 fluxes present seasonal variation: these waters act as a source of CO2 to the atmosphere in summer and autumn and as a sink in winter and spring. Based on the information available in the zone, there seems to have been a decrease in the capacity for CO2 capture in the zone in recent decades".

-There is a need to remove some of the tables and figures.

AC: Thank you for your suggestion. Fig. 8 and Table 4 have been removed. Table 5 is now Table 4 and only includes studies in the Gulf of Cádiz. Fig. 1 has been improved.

-In summary, this manuscript needs a major revision before publishing.

AC: Agreed. We hope the substantial revisions we have made to the manuscript now make the paper suitable for publication.

References:

Olsen, A., Brown, K. R., Chierici, M., Johannessen, T., Neill, C.: Sea-surface CO2 fugacity in the subpolar North Atlantic, Biogeosciences, 5, 535-547, https://doi.org/10.5194/bg-5-535-2008, 2008.

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2019-6/os-2019-6-AC2-supplement.zip

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