

# ***Interactive comment on “ARIOS: An acidification ocean database for the Iberian Upwelling Ecosystem (1976–2018)” by Xosé Antonio Padin et al.***

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The data of pH and total alkalinity, dissolved oxygen, nutrients and chlorophyll together with the main physical variables is impressive as it is based on measurement on 17653 water samples, comprising more than 4 decades, from 1976 to 2018. Notwithstanding the methods changed over the decades, most of the information is sufficient to evaluate the QA/QC of the measurements. The vertical distribution, seasonal variability and of the temporal trends of the CO<sub>2</sub> system are presented and help to evaluate the quality and the usefulness of these measurements. The data set surely will be relevant also for the future understanding of the interactive effects on acidification in the

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Iberian Upwelling System of coastal processes and global changes. However there is a need of a careful revision of the data set and of improvements in the ms. In the abstract the author give acidification rates ranging from  $-0.0016$  to  $-0.0032$  pH units/yr whereas in the ms (L. 566) they give a  $-0.0039$  ph units/yr for the inner waters. This discrepancy should be resolved. As the estimated acidification rate is higher than the average ocean acidification it would be important to discuss the potential effects of the gaps in the times series some spanning also 7 consecutive years. It would be relevant to compare the trends on periods without long gaps of data which could strongly affect the slope of the trend. A comparison with other articles reporting ranges for coastal acidification trends could be interesting for improving the discussion of results. In the section "Cruises in the 2000s and recent years" (L. 261- 265), the information about each cruise is given but not always the months and years are given. I strongly suggest to provide similar information for each cruise or to refer to a more specific table where the time span of each cruise is given. In particular regarding the last ARIOS project it is not clear in which months was carried out. It would be important if the authors could be the precision for the temperature and salinity measurements in the period 1976-1984. For chlorophyll measurements, as different filters were used, could the authors provide an estimation of the pore size given and of potential effects of the change. The indication of the volume filtered (range) could be also important if available. Regarding the adopted Quality control procedure (L.370-L.382) it would be useful if the authors could provide a synthetic information on the first and second level of the quality control cited in this section. Regarding the presented ARIOS data set there are some corrections to the data that the authors should consider as there are many negative concentrations for nitrites ( $n=4$ ), nitrates ( $n=16$ ), ammonia ( $n=13$ ), and chlorophyll a ( $n=2$ ). There are concentrations for nutrients and chlorophyll a in the range of  $10^{-3}$  to  $<10^{-7}$  that should be correctly reported, presumably, as less than the detection limits given in the methods, and properly flagged with  $QF = 6$ . For all nutrients there are many values equal to 0 with  $QF= 2$ , these values presumably are below the detection limits and should be flagged with  $QF=6$ . There are three in situ pH values in the range

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7-7.6 that should be checked to evaluate if they can be considered reliable or doubtful. Below some minor comments are given: L.52 I suggest to correct as follows: to help a sustainable management of the . . . L. 290 I think that “as well“ should be omitted and I suggest to substitute “to create” with “to record”. L. 306 “pH value to do so”: unclear. L325-327 it is unclear if for the titration the HCl concentration was 0.1 or 0.13 M. L.338, L.341 change the conjugation of verb to the past. L.351 “Cl<sub>2</sub>Mn” should be written as “MnCl<sub>2</sub>”. L.352 change the conjugation of verb to the past. L. 382 check the year in the reference list is 2010. L. 506 “large seasonable variability“ change with “ large seasonal variability”. L. 523 “and so it would” I suggest changing as: “and therefore it would”. I suggest changing the yellow colour in Figure 1, as on the printed version is not clearly visible. To enhance the readability of Figure 2, I suggest to enlarge them or to split the figure in two. In Figures 3 and 4, for Salinity, I suggest omitting “psu” as it is not a real measurement unit, but a conductivity ratio. I suggest to indicate the pH is on the total scale similarly to figure 5. There is the need to correct the units of oxygen in micromole kg<sup>-1</sup> in figure 4. The subscript of pHT in the Figure 5 is not well readable and should be explained in the caption. I suggest, all over the figures, to indicate the pH as pHT for clarifying that is expressed on the total scale, moreover, to increase the readability, I suggest to enlarge or split the two graphs. TABLE 1. According to the data set, the ARIOS cruises were carried out during different months of 2018 and not in one month of 2017. As some cruises/projects could span over more month perhaps it would be better to provide the period of the study instead of a single date.

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