

## ***Interactive comment on “Changes in the partial pressure of carbon dioxide in the Mauritanian-Cape Verde upwelling region between 2005 and 2012” by Melchor González-Dávila et al.***

**Anonymous Referee #1**

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Overall evaluation: The authors present many years of Carbon-VOS data from an important upwelling region of the Atlantic. They consider changes in the upwelling index in the surface waters along the route and consequent changes in carbon uptake (and changes in pH). They make some important observations of a decrease in SST and trends in seawater  $f\text{CO}_2$  that can only be explained by an increased upwelling. They consider both inter-annual variability (and the influence of the NAO) and spatial (latitudinal) variability in the data.

Specific Comments: The figures are clear although I would suggest some minor changes to improve on this. For example in discussion of Figure 2 there is reference to the months (eg: March to September) which cannot really be distinguished in the

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figure (that only shows a tick mark for January). This could be improved. Figure 3 is missing the Y-axis label (the X-axis label could also be improved by moving the units into the legend and keeping the x-axis label as 'change per year' for example). The legend should also specify the years shown. In Figure 4 the colours used are not explained in the legend (the shift in season discussed is reliant on knowing what the colours represent). There is a clear typo in the legend suggesting 'pannels' rather than 'panels'. Figure 5 shows normalised  $f\text{CO}_2$  which I hadn't seen in the method section. The legends in Figure 4 and 5 refer to 'Experimental' series rather than 'in situ' data which may be a person preference but I think 'experimental' is misleading. Figure 7 is in  $\text{mmol m}^{-3}$  unit when the text discusses  $\text{mol m}^{-3}$ .

The text is generally well written and I would suggest that just a few inconsistencies are addressed. For example in the Abstract line 28 refers to an increase in outgassing then in line 30 the authors refer to 'this increase in  $\text{CO}_2$  intake'. Throughout there is reference to 'opportunity ships', which are more easily recognised to the community as Ships of opportunity (or Carbon-VOS). When  $f\text{CO}_2$  first appears (line 91) it is referred to as partial pressure rather than fugacity. The oxygen optode is mentioned on line 123 but the location of this sensor is not indicated (at intake or point of  $\text{CO}_2$  measurements?)

Line 220 suggests a shift from high to strong upwelling, that could be quantified. Line 250 suggests that SACW is nutrient rich, which needs a reference. Claims in line 263 re: the position of the ITCZ in winter also require a reference. Line 449 refers to the EA (in the conclusions but not discussed elsewhere). Anomaly fields for temperature and salinity are mentioned and discussed (line 291) but the data are not shown, perhaps they should be shown/referred to in the supplementary section if they warrant discussion?

Technical corrections: Line 73 correct to wind databases Line 111 Correct to: On its northbound route the ship follows the same track in reverse. Line 125: change among ships to between ships. Line 224: change to annual basis followed that shown by...

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Line 272: change arriving to arrival Line 358: Are the authors referring to annual bias or annual based (as stated)? Also change 'upwell' to 'upwelling'. Line 395: change the sentence to read that the pH rate 'is determined'.

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