

Interactive comment on “CO₂-driven compromises to marine life along the Chilean coast” by E. Mayol et al.

Anonymous Referee #3

Received and published: 24 March 2011

1. General: The topic of this paper is very relevant in the context of the Climatic Change and the impact of greenhouse gases in the marine biota. The study area, Humboldt Upwelling System off Chile also is relevant, because appear as a natural laboratory in order to test potential implications of elevated pCO₂ plus the natural oxygen deficient conditions.

However, I consider the data set presented here explain more the along-shore patterns of this chemical conditions and discuss potential consequences for some planktonic organisms, based in the RI index, but not show any results associated with how this conditions affect in the area the fish distribution for example, or the phytoplankton community etc in order to evaluate the compromises to marine life. I think the general approach is good but it is necessary focus the title and the goal of the paper, for exam-

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ple analyze the co-variation between CO₂ pCO₂, with oxygen and pH (acidification). It is necessary also to explain more the thermodynamic model used and the comparison between the effect of pCO₂ and Oxygen changes in the RI index.

The goal to delineate water masses in the system by these parameters it is also relevant, but I feel is diluted in the manuscript. I suggest discuss more this point and when you present the last figure (Fig. 9) to resume the implications of PCO₂, Oxygen and pH you can discuss this in terms of latitudinal changes but also water masses distribution and influences. In addition, in the revised version, I suggest try to characterize better the different areas in order to show more clear the along-shore patterns (The cruise track and sampling stations cover different conditions associated with different water masses influence and upwelling patterns (seasonal-permanent). Also I considerer you need to discuss more about water masses and the chemical parameters (pCO₂, O₂ and PH).

I recommended the authors perform a major revision and resubmit this manuscript.

2. Specific comments: Relate with the oxygen conditions, could be important discuss the position of the oxycline and the upper and lower boundary of the oxygen deficient waters in each region in order to compare this conditions with the pCO₂ and pH (Fig. 2). Probably could be better show the upper 500 m separated, and include the pH.

I' like to see a better comparison between the thresholds proposed by Brewer and Peltzer (RI) and the oxygen thresholds proposed for marine biota see Keeling et al (2010, Rev Mar Sci 2, 199-229) an excellent review about deoxygenation and discuss this in the local marine biota of each region that could be affected, or could take and advantage of this condition. I would like to see the oxygen levels at the different respiration index.

I suggest improve in general the figures, and try to resume the information.

Fig. 1. Some stations are in the continent, could be useful a table with the station

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position, distance to the coast and water column depth.

Fig. 2 I suggest includes pH vertical distribution.

Fig.3 Water masses names could be included in the T_S diagram.

Fig. 5 and 6 probably could be presented together? It is necessary figure 6 in the context of the discussion ? I don't understand the point.

Fig. 9, why the first station that present the lower respiration index at 200 m present only biocalcification compromised ? I suggest rethinking this figure.

Interactive comment on Biogeosciences Discuss., 7, 8895, 2010.