

Interactive comment on “Spatiotemporal variability and long-term trends of ocean acidification in the California Current System” by C. Hauri et al.

C. Hauri et al.

chauri@alaska.edu

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Thank you very much for taking the time to review our manuscript. Your comments and corrections have helped to improve this article. Please find replies to your comments below. The manuscript has been edited accordingly.

Best regards, Claudine Hauri and co-authors

Report of Revisions

Referee: "I would appreciate a little discussion on the validity of the NPZD model under low $\Omega(\text{ar})$. To what degree can we trust the fixed 7% calcium carbonate formation? See

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for example Figure 2 in Ilyina et al. [2009, GBC]. Of course we do not know how this ratio will change with $\Omega(\text{ar})$. However, it should be stated in the manuscript that great uncertainty is introduced by this unknown relationship."

- We added an additional caveat discussion point in order to discuss the reviewer's main concern in the discussion: Page 10394/Line 2: 6) ocean acidification induced changes to important biological processes, such as calcification, photosynthesis and nitrification are not considered by the NPZD2 ecosystem model.

We also added the following paragraph in the text: Page 10396/Line19: Ocean acidification may trigger several physiological responses in organisms, some of which may lead to significant changes in the DIC and Alk concentrations. However, none of these potential responses are represented in our simple NPZD2 ecosystem model. Ongoing research suggests that several biological processes can be affected by ocean acidification (reviewed in e.g., Doney et al. 2009) with calcification likely being the most relevant. Coccolithophores as the dominant calcifiers show a wide range of responses in their calcification rates to ocean acidification (e.g. Riebesell et al. 2000, Langer et al. 2006 and Iglesias-Rodriguez et al. 2008), with possible effects on the vertical distribution of Alk (Ilyina et al. 2009). Here, calcium carbonate formation was kept at a fixed rate, introducing additional uncertainty to the study. But given the limited importance of calcification in controlling pH and Ω_{arag} in the CCS, we consider the potential impact of changes in calcification on our results to be relatively limited.

Additional corrections:

- Page 10394/line 8: "O₂ and S" is changed to "O₂ and T"
- Table A2: the numbers of the norm. STD and Correlation coefficient were mistakenly switched in the last two rows of the table. It now reads: Norm. STD Correlation Coefficient 0.88 0.71 1.08 0.90
- Figure 2 and 3: "PSD" in the figures axis labels are changed to "PDS".

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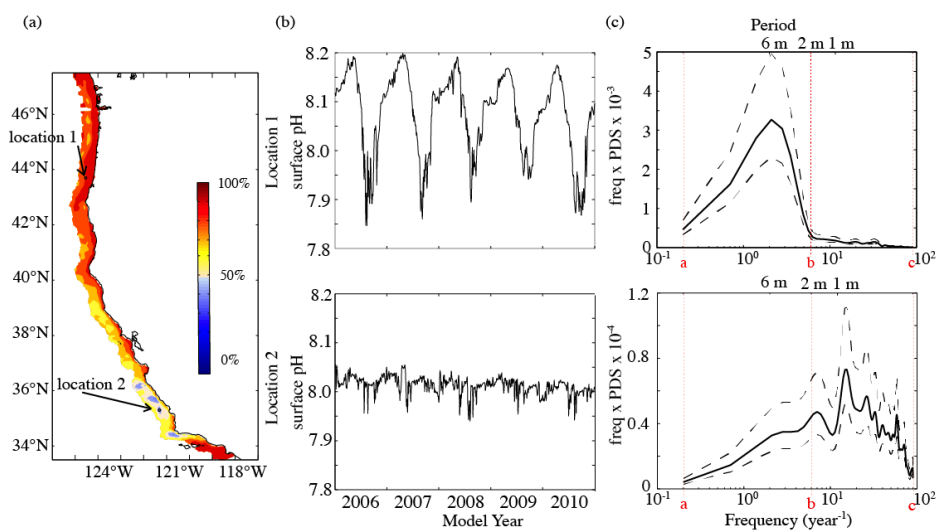


Fig. 1. Figure 2

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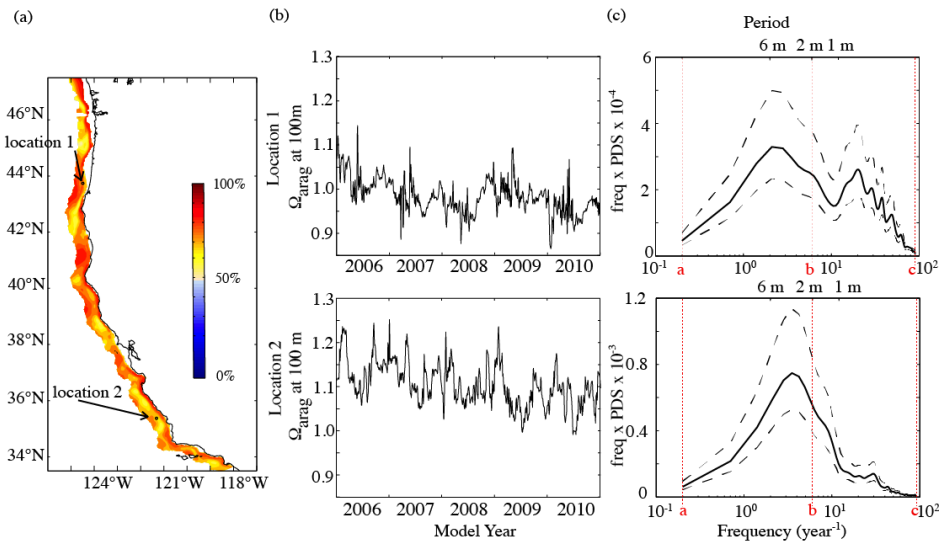


Fig. 2. Figure 3