

***Interactive comment on* “Sensitivity of Future Ocean Acidification to Carbon Climate Feedbacks” by Richard J. Matear and Andrew Lenton**

Anonymous Referee #1

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“Sensitivity of future ocean acidification to carbon climate feedbacks” by Matear and Lenton discusses how much the rate of ocean acidification can be accelerated by the carbon-climate feedbacks. In general, this problem is very complex however the authors have chosen to discuss one of its most straightforward angles: what is the difference between ocean acidification characteristics in a given model which is run with and without carbon-climate feedbacks.

For the conclusions to be meaningful for the wider community (outside of the circle of developers of this particular model) and before going into the details of the actual numbers with implications to e.g. corals and potential significance to global carbon policy, two aspects need to be clarified:

1. Carbon-Climate feedbacks are one of the key uncertainties in future climate projec-

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tions (the authors comment on this fact a few times across the manuscript). How does the strength of the carbon-climate feedbacks in this particular model compare with that of the other CMIP5 models? EP vs CP is a standard protocol, so data is available. To which part of the model spread do you belong to?

2. Not taking into account carbon-climate feedbacks in acidification projections introduces some uncertainty as was demonstrated by the authors. How does this uncertainty compare to other sources of uncertainty in projections of ocean acidification? Shall we (in extreme case) dismiss a study of e.g. Bopp et al 2013 or any concentration-forced ocean model projections which might be superior in some other aspects of parameterising ocean acidification?

I would strongly encourage the authors to address the issues above before resubmitting the manuscript.

Some other comments:

Zaehle et al, 2010 is referred to for the carbon-climate feedback significance; however this paper is dedicated to the terrestrial nitrogen feedbacks. Is this a good reference? More generally, the manuscript will benefit from more detailed review of the literature on the significance on carbon-climate feedbacks.

l.38-42: you describe only one of the climate-carbon feedbacks but then refer to it in plural. Could you give description of other climate-carbon feedbacks? See also my previous comment.

l.145: actually the figure shows a systematic overestimate of carbonate ion. A more realistic assessment of model skill is needed.

Abstract and throughout the text re: More substantial significance of the carbon-climate feedbacks in lower emission scenarios. I would encourage the authors to use more careful language and to alert the reader that this relates to the relative impact rather than absolute impact. I am afraid this message might be taken out of the context and

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subsequently misinterpreted.

Abstract: the last sentence does not make sense. Please rephrase more accurately.

Throughout the paper: Could you please proofread the manuscript? I noticed a lot of misspelled words, missing prepositions, and excessive use of “this” (occasionally 3-4 times in a single sentence). Not being a native English speaker myself, I will not go into listing all the occurrences of poor grammar I have spotted, but I would like to bring this to the editor’s attention.

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