Biogeosciences
Discussions

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Interactive comment on "Zooplankton mortality effects on the plankton community of the Northern Humboldt Current System: Sensitivity of a regional biogeochemical model" *by* Mariana Hill Cruz et al.

Anonymous Referee #1

Received and published: 2 January 2021

Dear authors,

General comments

The manuscript describes the responses of the ETSP region in terms of model experiments by changing mortality rates of the two zooplankton compartments that the model includes. It is an interesting study and it is related to the scope of the journal.

Overall, I find the model does not match very well the observations at surface level (approx. 20m depth). This is indeed discussed in the manuscript and special attention

should be put in these differences, more details should be provided about the sources for these differences. The main strength of this manuscript is represented by the analysis of the experimental design and the responses of the different compartments in the model and how they relate to the region chosen in the domain. I think this manuscript is within the standards of excellence of this journal in terms of scientific quality and significance.

Specific comments

Abstract

My main comment from the abstract and throughout the manuscript is to be consistent with the names you use for the compartments of the model: either use 'large' and 'small' zooplankton or use 'meso' and 'micro' zooplankton. The same comment goes for the compartments of phytoplankton: nano- and micro-phytoplankton or large and small phytoplankton. If they do not mean the same, you should state this, but if they do, you must be consistent with the use of those names.

Introduction

L29 'presumably due to sensitivity to environmental variability' – can you specify what environmental variability you refer to?

L32-38 This paragraph should be rephrased or use a connector when you explain the two species.

L50-51 The last sentence in the paragraph should be rephrased for better clarity as it is difficult to understand.

L58 Can you specify what is the definition of linear and quadratic mortality?

Methods

Figure 1 – in the introduction you mention that anchovy spans from northern Peru to Talcahuano. Can you add landmarks in the map to show where is Peru and Chile? And

why did you choose that domain for each region (O, C, F)?

L108 – 126 When you define the compartments for phytoplankton and zooplankton, it would be good to give a quantitative definition for each compartment. For example, in terms of size class: does microzooplankton include all species that are < 200 μm? And the same for the other compartments.

L139 – 146 Do you consider temperature dependence in zooplankton processes? How can this affect your results if you would include it? Or justify/discuss why not having it and the effect this could have in your results if it is relevant.

L205 It might be worth briefly describing the way the model calculates the nitrogen and state variables fluxes or at least reference a paper that describes those processes.

Results

L258-259 P_S shows an important difference in deep water for the A_high and B_low experiments, are those differences negligible? It might be good to at least mention or have a brief explanation about those differences

Discussion

L321 Please give some examples about the non-linear processes you refer to in this sentence.

L333-334 Consider not only sampling issues in the differences in Figure 2. What about assumptions in the model? Or bad parameterisation (not only in terms of zooplankton mortality)? Also, you should mention if using a quadratic mortality rate instead of a linear one could produce differences in your results.

L340 It is not clear to me if you just assumed the values given by Hirst & Kiorboe (2002) for you experimental design. Could the values given by Hirst and Kiorboe (2002) be affected by temperature? Is 25degC a realistic value for your domains (see Fig.1). How much change could be expected in terms of zooplankton mortality rates for 2degC

difference? Or is that negligible ?

Conclusions

L497 You mention some effects from ENSO but there is not much discussion associated to this in section 4.

Technical corrections

L28 The name of that city is Talcahuano, not Telcahuano.

L119 correct 'dissolved'

L130 correct the symbol for the exudation fraction for eqs. 2, 3 as they do not match both equations.

L157 – 158 correct the typo of the terms PmathrmS, PmathrmL.

L167 missing a parenthesis ending after Gorsky et al. 2010.