Biogeosciences

Discussions

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Interactive comment on "Influence of oceanic conditions in the energy transfer efficiency estimation of a micronekton model" *by* Audrey Delpech et al.

Anonymous Referee #2

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general comments

Unfortunately, it is very difficult to follow parts of the manuscript because of quality of the English language. Normally I would add this to the end of my comments but in this instance, language is the main issue that I have with the manuscript – and a reason why it took me considerably longer to read through it. Many sentences are clumsily or sometimes incorrectly formulated and in certain paragraphs I had to guess the ideas the authors were trying to express. I have included a lot of corrections and questions about language in the specific comments below but I would recommend that the authors go through the manuscript carefully with the help of a native English

speaker to make the manuscript more readable and easier to understand.

What I found missing in the methods section is a good description of the underlying physical model: Neither its vertical nor horizontal resolution is mentioned, it is also not clear how deep the resulting layers z_1, z_2 and z_3 are. In general, it would help to explicitly mention that SEAPODYM-MTL currents, temperature etc are based on an underlying global physical model (at least I assume so, based on l 91). At the moment this is not done and many readers may be confused how the physical transport and stratification are simulated in a model with only 3 layers.

The author manage to identify certain prevalent ocean conditions (regimes) which are more suitable for parameter estimation in their twin experiment setup. Then they take a leap and state in multiple places throughout the manuscript that these regimes would therefore be better suited for parameter estimation outside the context of twin experiments. I am a bit skeptical about this claim, because the model's ability to simulate the ocean conditions may also be regime-dependent. There may be regimes where the model does not do a good job at simulating the ocean and model parameters do not reflect the actual energy transfer efficiency, while the model may be better suited for other regimes. This strikes me especially true for the relatively simple 3-layer model that is used in the study. Without knowledge of model error it seems difficult to make the claim that certain regions are better suited for parameter estimation than others.

specific comments

l 5: "migrant and non-migrant micronekton": Does the "migrant" refer to DMV? It would be good to be explicit here.

l 15: The "all" is too general.

l 16: "Migrations" -> "Migration"

l 16: It would be good to briefly summarize DMV.

l 17: Mesopelagic already implies "inhabiting the twilight zone (200-1000 m)", I would

rephrase to "the mesopelagic (inhabiting the twilight zone from 200m to 1000m depth) component of micronekton"

l 25: Does "develop the datasets" mean to collect observations?

l 33: "making this component strongly underestimated" -> "leading to an underestimation bias for this group of micronekton"

l 34: "acoustic frequencies associated to traditional net sampling": I am not sure what this means.

l 35: "More accurate biomass estimates should benefit from" -> "The accuracy of biomass estimates is predicted to benefit from"

l 40: What are "target fish", I would suggest to remove "target" or rephrase.

l 41: Does "the functional groups" refer to the micronekton? If so, please include this information.

l 42: "The spatial dynamics of biomass in each group...": Add "In addition to DMV"

l 43: Which processes are included in "The time of development"?

l 57: Make sure to include information here about what is new in this study compared to Lehodey et al. (2015).

l 58: "Therefore, it is useful ...": This sentence is confusing, please rephrase.

l 78: So more information about the physical model would be useful here. Is it truly a 3-layer model or are these subdivided into more layers? How is the model divided in the horizontal?

l 83: Why is "migrant-umeso" not abbreviated as "mumeso" and why is "meso" part of the name when they also migrate to the epipelagic? I think it would be beneficial to the reader to rethink the names. For example, given that the layers have just been introduced as z_1, z_2 and z_3, the names could include the indices of the layers they

inhabit (the use of "nekton" is just a suggestion here): (1) epi -> nekton_1 (2) umeso -> nekton_2 (3) ummeso -> nekton_12 (4) lmeso -> nekton_3 (5) lmmeso -> nekton_23 (6) lhmmeso -> nekton_13

l 90: Is this equivalent to reduction in the model resolution? Is the horizontal resolution that is used 1 degree?

l 107: It would be useful to know the height of each layer here. What if layer 1 is well stratified but deep enough that its average temperature does not differ much from T_2?

Eq 6: '[1,N]' denotes an interval that contain real numbers, '{1,...,N}' would be the correct way to denote integers (see my comment about '[[' below). Furthermore, shouldn't the intersect of any two Gamma_k be empty? The current equation only states the weaker condition that the intersect of all Gamma_k is empty.

l 124: It would not be difficult to express the results of a k-means clustering in words. I would recommend that the authors do that, so that some one without good knowledge of mathematical notation can understand the results.

l 126: I don't think the double-bracket notation '[[ ]]' for integer ranges is very common (I have found it on the French wikipedia page but not the English, compare https://en.wikipedia.org/wiki/List_of_mathematical_symbols to https://fr.wikipedia.org/wiki/Table_de_symboles_math%C3%A9matiques.) I would suggest to either change it or briefly explain it.

l 124: "we explicit this dependence" -> "we make this dependence explicit"

l 132: "the inverse model": What is the inverse model, this is the first time it is mentioned? Better explanation is required.

Eq 8: If alpha is constant here, I would suggest to abandon it and and let gamma be uniformly distributed in '[-0.1,0.1]'.

Eq 8: For a particularly small F, this could become negative.

l 230: "The temperature shows the presence of a strong bias is". Bias with regard to what? I would suggest to change to something like: "Temperatures are different between the two configurations."

l 233: "Therefore, it seems here that the difference observed in the temperature values of the two datasets has a stronger impact on the parameter estimation than the regime of currents." So far it has been demonstrated that both temperature and velocity differ between the two experiments/configurations. What is the evidence that differences in temperature have a stronger impact?

l 237: It would be good to get a feel for the numbers, do significant cross-correlations occur often, what is their proportion w.r.t. the total number of experiments?

l 242: Fig 5 is referenced before Fig 4.

l 258: "if the mean error on the estimated parameters were higher in average, the result does not change". I am not sure what is meant here, is the mean error higher on average? Please rephrase.

l 267: Do you mean "Exp. 1a and 1b" here or 4a and 4b?

l 270: "Indeed, not only the temperature is higher but also the vertical gradient of temperature.": It is not fully clear what this sentence is referring to.

Eq 10: What is E_pp?

Table 3: It would be nice to add the number of samples/observable points for each configuration.

Fig 1: Reference Table 2 in caption.

Fig 1: I understand the intent of using transparency to indicate uncertainty but I doubt it is done correctly here. It appears like the colors are plotted on top each other in a predefined order, so even light orange colors in (b) will appear more orange than blue because the orange is plotted on top of the blue.

Fig 2,4,6,7 can be combined into one which would allow a nice comparison between the different configurations.