**Reply to Referee 2**

We thank referee 2 for his/her helpful comments. Below is our point-to-point response to the reviewers suggestions (reviewers comments in italic blue).

*General Comments*

*My background is a marine ecologist and marine ecosystem modeller focussing not only on the plankton community, but also investigate higher trophic levels. I am familiar with the outputs of biogeochemical models, which can be used as inputs for marine ecosystem models that include higher trophic levels and larger size classes. I agree with the first reviewer that this exercise is valuable to reduce run times for biogeochemical models. Unfortunately, much of this manuscript was beyond my knowledge, and I am not able to evaluate it for its technical aspects. I agree with the first reviewer that the introduction needs to be overhauled and would also caution against a high rate of self-citation. I suggest that this manuscript be sent out to another reviewer more closely aligned with this field to review the details of the approach.*

*Minor Comments*

*Abstract - The last line of the abstract does not communicate the key result, were you able to improve a model fit for the Baltic? Do you expect that this will extend to other regions?*

We agree with the reviewer that the real world example needs some better explanation. We thus will extend Figure 6 and will include also the fit of the original NPZD-model version. Additionally, we will substantially revise the text in the new version of the manuscript.

*page 1 line 7 - trapped in local minima* - changed correspondingly

*pages 1 line 24 to page 2 line 3 - it would be better if this list was incorporated into the body of the paragraph. Could always write a list in a sentence using first, second, third, etc.* - changed correspondingly

*page 2 line 25 - suggest removing Anyway* - corrected

*The last two sentences of the introduction are unnecessary and can be deleted* - changed correspondingly

*page 4 - I agree with the other reviewer that it would be good to have descriptions of these model fitting metrics as well as indicating the strengths and weaknesses of each - also why are they not numbered while the following equations are?*

Yes, we will better explain the logic behind the choice of model properties (cf. reply to point 1b of reviewer 1), their strengths and weaknesses, and how these properties can be justified in practice.

*page 4 lines 17-18 - this is now the third time this statement has been made, unnecessary*

We agree. We will reduce the number of repetitions of this statement.

*Figures - many of the figures are missing axis labels* - changed correspondingly

*page 15 line 1 - satisfactorily* - corrected

*page 15 line 3 - until the obtained lower bound does hardly increase anymore to until the obtained lower bound hardly increases anymore.* - corrected