Geoscientific
Model Development
Discussions

Interactive comment on "Towards End-2-End modelling in a consistent NPZD-F modelling framework (ECOSMOE2E_vs1.0): Application to the North Sea and Baltic Sea" *by* Ute Daewel et al.

Anonymous Referee #2

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Overall, this is a well written and interesting study linking a classic NPZD model to a single fish compartment. As a fisheries modeller and ecosystem modeller familiar with OSMOSE and Atlantic frameworks, I found the approach useful, however as the authors acknowledge, simplistic in its treatment of fish and fisheries. There is no mention of the impact that fisheries have on the ecosystem until the results section. There should be some introductory material about this as they are the biggest impact on fish populations, as many fisheries reduce more than half of fish biomass as a goal. I would also like to see a more quantitative approach to calibrating the model to observed

biomass of fish and fisheries catches. This data is spatially available, and a difference plot or map showing how well predicted vs observed fish biomasses compare in a spatially explicit analysis would be useful. I'm also a bit concerned about the huge seasonality in biomass of the macrobenthos, much of which I presume is dominated by macroinvertebrates which don't vary in biomass as much as plankton communities do seasonally. It's not clear to me why the Baltic and North Seas were combined into one model, as they exhibit very different environmental and fish production regimes. I think the closure terms where a lot of fish migration could be happening would be more important to focus on than connecting the two domains. I would also like to see a more detailed treatment of fisheries mortality in the model, as this data is readily available and will be a huge driver of fish biomass given the very long exploitation history of the North Sea.

Intro - You don't describe how this component contributes to the model and how the macrobenthos communities vary in the North and Baltic Seas. Suggest using 'macrobenthos' instead of 'MB' throughout. Generally, think less acronyms could be used throughout as it makes it harder to follow.

Results and Discussion - I suggest separating out your results first and then comparing to other studies. The way the two sections are intertwined makes it difficult to follow.

Specific comments

page 2, lines 6-8 - the most common ecosystem models are Ecopath with Ecosim models which organize fish based on a combination of functional groups, species groups, and age-structured of species groups (see Tittensor et al. 2018 GMD).

page 3, lines 16-18 - How can questions about food webs be tested when there is only one fish functional group? There are different trophic levels of fish that are harvested which exert different controls on the macro food web. For example, forage fish have been shown to be important prey for many higher trophic levels and their exploitation has different effects than harvesting top predators (see Smith et al. 2010 Science).

page 4, line 1 - Awkward start to the sentence, suggest restructuring.

page 4, lines 16-17 - Awkward sentence, suggest combining with previous sentence in parentheses.

page 6, line 25 - What are the constraints for vertical fish movement based on oxygen and temperature limitations? This is one constraint of using only one fish group as there is a lot of variability among fish species in sensitivity to environmental conditions.

page 7, lines 17-18 - This sentence can be combined with the previous sentence.

page 8, lines 1-12 - What about fisheries mortality on the fish compartment? Was this not included in the model? For the North Sea, this would comprise a significant proportion of total mortality.

page 10, lines 11-16 - This is the first mention of fisheries, if they are a component of the model, then they should have been included much earlier in the manuscript. How was the loss rate calculated? Much greater detail about the fisheries data that was used and how this was applied need to be included.

page 10, lines 18-23 - How was this value of 20% less loss rate derived? Any empirical data that supports this value?

page 12, lines 24-26 - This is a reason why it is important to consider functional groups/species/age classes/size classes when including fish in ecosystem models.

page 12, line 28 - page 13, line 9 - How do the fish biomass estimates compare to reported fisheries landings from the regions? Is there enough biomass to support known landings?

page 13, line 11 - Is it reasonable for macrobenthos to vary that much annually? I would have expected there to be a much more constant standing stock similarly to fish. I'm thinking about the macro invertebrate community which doesn't vary that much through time. page 14, line 13 - You haven't introduced this analysis in the methods section to

describe what it is.