

## ***Interactive comment on “Modelling potential production and environmental effects of macroalgae farms in UK and Dutch coastal waters” by Johan van der Molen et al.***

### **Anonymous Referee #3**

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I am the 3rd reviewer of this manuscript and, having read the other reviews, I agree with most of the comments made by the reviewers so I am not going to repeat those, although I will highlight specific ones I find more relevant, and I will concentrate on a general evaluation.

Overall, I found the article interesting and eventually deserving publication. The article is well written but I agree with Fabian Grosse's comments 1 and 2 about structuring and organisation. I have a number of general comments, below, that I think should be considered before the manuscript is acceptable for publication.

It has been highlighted by both the authors and the reviewers that this is largely a "proof

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of concept" study and I agree with this. In that sense, I am not particularly surprised that the environmental effects of the macroalgae farms were found to be negligible, taking into account the experimental and small scale nature of all of these farms, with the exception of the "hypothetical" one off the Norfolk coast. Incidentally, the suggestion by Referee #1 of using a "comparison to the phytoplankton usually used in the model" may be an interesting way of putting their environmental effect into context. Another consideration is that ERSEM does not seem to do such a good job of matching observational data. This does not surprise me because I fully acknowledge the difficulties involved (e.g. due to lack of a sufficiently comprehensive forcing dataset, etc.) but it does detract somewhat from the "real-life" applicability of the present study. Therefore, I would be tempted to suggest a lesser emphasis on how the model replicates observational data (if you have those data, by all means present the comparisons but maybe just present a subset of these in the main body of the text and move the rest to supplementary material) and to dedicate more space to: 1) the technical description of the new aspects of the model (the implementation of macroalgae farms, as suggested by Fabian Grosse's comment no. 6), probably by a combination of providing a bit more detail in the main text, in addition to supplementary material; and 2) the potential large-scale development of macroalgae farming and its environmental effects. In that sense, I found the combination of a number of "real" small scale farms and a large "hypothetical" one a bit unsatisfactory; maybe the real farms should be used to illustrate how well the model fits observations (but taking into account my comments above) and a number (>1) of larger ("commercial") scale hypothetical farms could be used on a separate simulation exercise to illustrate the harvest potential (in terms of quantity and quality) of a macroalgae farming industry. This relates to the comment made by Referee #1 about "more general consideration that go beyond the individual site description". This may also help address the issue of potential environmental effects, which in the present version (as identified by both reviewers) receives insufficient attention to deserve an explicit reference in the title. Finally, the model limitations (Fabian Grosse's comment no. 12) should also be discussed, in particular scale and resolution aspects, as well as

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what aspects of the model should be developed and how.

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