

Interactive comment on “Projected climate change impacts on North Sea and Baltic Sea: CMIP3 and CMIP5 model based scenarios” by D. Pushpadas et al.

Anonymous Referee #2

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This manuscript assesses climate change impacts to the North Sea and Baltic Sea using the regional bio-physical model ECOSMO forced by output from three CMIP3/A1B and three CMIP5/RCP4.5 global Earth System Models (ESMs). The main findings of the manuscript are similar to those of previous studies. However, the paper is poorly organized and not all the necessary information is presented. It is not clear what is new in this paper. The way the manuscript has been presented and organized is far below the standard expected in Biogeosciences, and thus, I don't recommend publication.

General comments:

The authors mention that multi-model ensemble estimates of climate change simula-

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tions based on CMIP3 and CMIP5 scenarios were carried out with the objective to provide more reliable and robust regional information on climate change response to the North Sea and Baltic Sea (p. 12234, top lines). However, they do not elaborate on why these projections are more reliable and robust than previous ones. Since, similar to previous downscaling studies, they use the “delta method” and no new technique or analysis seem to be applied, it is not clear why their projections should be better. In addition, results from previous studies are similar to the one presented here and, apart from using projections from CMIP5 models as well as from CMIP3 models, it is not clear what is new here. The authors should clearly state the main goal of the study and include an explicit description of the novelty and value of this work relative to previous work

Not enough information is given on the coupled bio-physical model ECOSMO and the selected ESM models. This information is necessary to ensure reproduction of results by other scientists and to compare these results with those from other studies. For example, information is not provided on the resolution (horizontal and vertical) of the global and regional models, biogeochemical components (biological variables and parameter values), and initial and boundary conditions. In particular, given the importance of changes in oceanic nutrient input to the projected changes in North Sea primary production, the authors should describe how the boundary conditions for the future scenario simulations were downscaled from the coarse resolution Global Earth System Models (ESMs).

In general, the results are poorly presented and some important results are not shown. For example:

– It is not clear if changes in North Sea primary production are due to decrease in nutrient concentration in the surface layer or deep layer (results not shown). Based on nitrate changes in the surface layer (Fig. 3), one would expect a larger reduction of primary production in IPSL-CM5.

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- Why was January chosen to show projected nitrate changes in winter (Fig. 10)? Changes in open ocean boundary are quite small in January compared to February (Fig. 3).
- The color scale of Fig. 7 is not contrasting enough to show changes in the variable.
- Since Fig. 12 shows the ensemble mean of projected changes in primary production but not the ensemble spread, it is not clear if there is a consistent response among the models or if the reduced change in future primary production is the results of contrasting responses among them.
- There is not enough information given in the text or caption of Fig. 13 for the readers to know what is being presented and discussed in this section. What is trophic amplification? How were bottom-up versus top-down controlled responses evaluated?
- The bottom half of the summary and conclusions section is misplaced since it is mostly a discussion of the technique used in the downscaling.

Interactive comment on Biogeosciences Discuss., 12, 12229, 2015.