

Interactive comment on “NW European shelf under climate warming: implications for open ocean – shelf exchange, primary production, and carbon absorption” by M. Gröger et al.

Anonymous Referee #1

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The authors present results from a GCM-ESM whose setup and grid-resolution allows regional studies on the NW European shelf. The aim of the study was to identify changes in ecosystem productivity and potential causes under climate change conditions and the quantification of the potential influence of the shelf sea region to open ocean carbon storage. The study is an interesting contribution to the modelling on the NWE shelf and potentially provides an alternative approach to regional ocean models that requires the prescription of boundary conditions. Nonetheless, I have two major points concerning the representation of the model that need to be thoroughly addressed before publication. First, the validation of the model is inadequate for both the global and the regional performance, but especially for the latter. This needs to be

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conducted and discussed thoroughly. Second, the manuscript lacks generally discussion of the results, the model performance and model uncertainties. There is a general need to assign references to the processes discussed in case those cannot be derived from the figures presented. The model results need to be discussed with respect to the available literature on SoA modelling of the NWE shelf including especially studies with regional models. Additionally model uncertainties need to be addresses. Some of those were already mentioned in the comment posted by Jason Holt. Others concern the use of only one atmospheric model and one specific scenario. Thus all results drawn from the future scenarios need to be discussed with respective reservations. What is the potential of the model to perform multi-model/multi-scenario ensembles? What are the computational requirements? It seems to be drawback that the full global model has to be spun-up over several thousand years before making the actual simulations. I think these aspects have to be included to provide a comprehensive picture of the method. Although the authors could not convince me that the model performs better on the NWE shelf than a regional North Sea model, I am certain that the model is a useful tool to study specifically processes related to the in/outflow at the shelf break and to link larger scale circulation to the regional scale. Thus, I consider this to be an important contribution to the regional modelling on the NWE shelf that should be published after the two major points and some minor comments (see Supplement) has been sufficiently addressed.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/9/C7415/2013/bgd-9-C7415-2013-supplement.pdf>

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