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Climate of the Past Discussions

Interactive comment on "A regional ocean circulation model for the mid-Cretaceous North Atlantic Basin: implications for black shale formation" *by* R. P. M. Topper et al.

Anonymous Referee #2

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This is an interesting an enjoyable paper to read which makes important methodological steps forward in the modelling and understanding of regional oceanographic conditions during deep time and also for the genesis of OAEs.

The paper is generally very well written and presented and the modelling framework is well considered and the sensitivity experiments are sensible and appropriate.

Overall I recommend publication subject to only minor revision.

I have a few suggestions for calcification and modification:

1) The authors could discuss in a little more detail what some of the potential pitfalls of

the regional modelling being driven by conditions from CCSM3 at the interface could be. How good was this simulation in predicting global and regional climates for the Cretaceous and what biases could be introduced within the regional model?

2) The brief description of the Muller et al. (2008) reconstructions is interesting although it's intriguing how a 0.1 degrees resolution product can be produced for a time period so far back as this. Some discussion of discrepancies between the CCSM3 bathymetry and the Muller reconstructions is provided as well as the challenges of blending the two products in the regional model. Ultimately not much can be done about this other than performing more sensitivity experiments but it would be nice to know how much of the reconstruction can really be supported by the geology and how much is a product of the processing or interpolation to the high resolution.

3) I agree with reviewer 1 that a more detailed description and discussion of what the sponges are and represent would be useful. It is not a term that I am particularly familiar with.

4) Could more information be provided on the spin up of the model in each case? It would be good to have a figure showing that the oceanographic properties are in equilibrium in the regional model.

Interactive comment on Clim. Past Discuss., 6, 2371, 2010.