

Interactive comment on “Climate model boundary conditions for four Cretaceous time slices” by J. O. Sewall et al.

Anonymous Referee #3

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The paper 'Climate model boundary conditions for four Cretaceous time slices' by Sewall et al. submitted to Climate of the Past represents a very interesting attempt to supply common boundary conditions for climate model experiments.

The authors supply and describe climate model boundary conditions (topography, vegetation) for four Cretaceous time slices (120Ma, 110Ma, 90Ma and 70Ma).

This undertaking might - as intended by the authors - indeed save climate modellers without geological background quite some time and help to ease model intercomparisons. This requires, however, that the generation of these boundary conditions is transparent and represents the state of knowledge. At least the first point is not in all aspects fulfilled.

This is especially true for the reconstruction of the vegetation. It does not become clear from the paper, where data points are available and where the data sets basically represent interpolation/guessing from the authors. There is no discussion at all about uncertainties with respect to these quantities.

I believe that the general idea is good and that the data have the potential to become widely used, but after my opinion the construction of the data set needs to become more transparent and uncertainties need to be discussed more thoroughly. This paper might become a valuable contribution to Climate of the Past, but major revisions are required before this paper might become acceptable for publication.

Specific comments:

1) If the original data base is 1x1, I guess the only reason to go to 2.8x2.8 is that this is the intended model resolution. However, some climate modellers might want to use a higher resolution, thus a topography on 1x1 with a few modifications from the original topography might be much more useful.

This is especially true for narrow throughflows. Just from the fact that a throughflow is narrow and shallow one cannot conclude that it is unimportant (e.g. Gibraltar, Bering, Faroe-Shetland). The minimum representation of the throughflow - even with similar resolution - is grid dependent. In C-grid models 1 open grid point is required, in some other grids 2 or 3. Thus the enlargement/opening of the throughflows should be done in each model separately.

2) p. 793, 23 Are dynamic meteorology and atmospheric dynamics really different disciplines??

3) p. 794, 5 What is the motivation for particularly choosing these time slices?

4) p. 795, 25... These paragraphs should be merged with the description (and plots) of the topographies starting in p.799,line 15.

5) p796 For ocean modellers sill depths might be of interest.

6) p798 The vegetation reconstruction seems to be somewhat subjective. At least on the plots should be marked, where data are available and which parts are intrapola-tion/extrapolation. As a person not specialized in land vegetation, a plot of the prein-dustrial biome vegetation with these biomes would have been helpful. For me it is impossible to judge the uncertainties in this process. A formulation like

'The completed paleovegetation distributions were then distributed to members of the paleobotanical community for consultation and presented at an international confer-ence for comment ... Expert commentary was then integrated into the final paleovege-tation distribution.' (p. 799)

is highly unspecific and does not help me at all.

7) Fig. 6 Some structures of the reconstructed vegetation are somewhat surprising. The equatorial belt seems to dominated in A,B and D by dry vegetation (dry shrubland and savanna). Is this a robust finding or just the consequence of having only data points in the subtropics and subsequent interpolation???

8) Fig. 6 Land ice is surrounded by high latitude mixed forest. Is this reliable? Even if the ice seems to rest in higher altitude?

9) p.796 3 Islands are not computationally expensive per se in ocean models! In many models they don't cause problems other than being difficult to resolve. In some solvers for the barotropic stream function/ barotropic velocities, however, they are expensive. This should be made clear in the text.

Interactive comment on Clim. Past Discuss., 3, 791, 2007.

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