

Interactive comment on “A description of the FAMOUS (version XDBUA) climate model and control run” by R. S. Smith et al.

Anonymous Referee #1

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Review on the manuscript entitled “ A description of the FAMOUS (version XDBUA) Climate model and control run” by R. S. Smith, J. M. Gregory, and A. Osprey

This paper is devoted to a description of major improvements in the new version of FAMOUS so called XDBUA in comparison with previous one ADTAN, and an analysis of XDBUA climatology

The paper is clearly written and the goals to improve FAMOUS are also addressed Whereas the challenge of performing long simulation (several kyr) and its implication in terms of model performance should be stressed. The manuscript clearly depicts the improvement obtained since the ADTAN version (Jones et al 2005). Moreover, even if ASTAN version compares well with the climate provided by its parent;

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(HadCM3), this version had biases that make it inappropriate for long term runs. The goal of this paper is therefore to demonstrate XBDUA version enables to perform such simulations. My general opinion is rather positive. Nevertheless I developed some comments that could help the authors to improve their manuscript. The most important one concerns the actual possibility to use FAMOUS XBDUA for paleoclimatic studies because of the remaining cold bias and sea ice extent in winter.

Analytic comments Abstract What means or how much is \sim well in excess 100years \sim ? Please quantify The authors should add a sentence to clarify the scientific issue such a model will allow addressing in paleoclimate.

Introduction Sometimes I get the feeling that the ultimate goal for FAMOUS XBDUA is to mimic HadCM3, but the comparison is first with climatologic data because HadCM3 itself may have biases. The authors should at least add one or two sentences on the existing fast GCM so that the reader may realise what is the international context in this field.

Section 2 FAMOUS descriptions no comment

Section 3 Changes 3.1 p152 - l2 What means \sim a different solution to the original instability \sim ? 3.2 Calving Whereas it is clear that salinity has to be conserved, is the way the calving is tuned really consistent with paleo transient runs? 3.3 Tracer concentration no comment 3.4 Sea Ice The Figure 4 is unclear to me the legend and the right panel. Could we see a 2D seasonal plot of sea ice compared with climatology? We need to be convinced that the cold bias is reduced. 3.5 Ozone no comment 3.6 Orbital variations I was just wondering if the \sim orbital acceleration \sim ; was consistent with the time of response of AOGCM and moreover if there is a coupling with an ISM. Could the authors clarify this point: are the results similar with and without this acceleration?

Control run In the perspective of a 10ky run a $5.6 \cdot 10^{-4}$ is it sufficiently low or it is not a problem because of the orbital acceleration? Finally a cold bias has been replaced

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by a warm bias in temperature. Is it much better? The discussion on Precipitation and major oscillations of the Earth System are convincing?

Figure 6 Cool temperature remains over North Atlantic which is a very sensitive region for Climate instability. The authors should comment on the impact of this bias on future study on Heinrich, Younger Dryas; Abrupt events. Fig 11 It would be great to also have ADTAN Energy transport.

In conclusion: This paper is certainly an interesting contribution and fits well with the aim of GMD. I recommend that, after the authors accounted for my remarks/comments, the paper should be published.

Interactive comment on Geosci. Model Dev. Discuss., 1, 147, 2008.

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