

Interactive comment on “Modeling geologically abrupt climate changes in the Miocene” by B. J. Haupt and D. Seidov

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This paper caught my eye: the authors are known and respected; the title is interesting.

There are, however, two major problems, at least in my opinion. I document these below. I hope the authors consider and address these, because ensuing changes would improve the manuscript measurably.

I have zero conflicts of interest with the authors. This is, simply, straightforward commentary from an interested reader.

Sincerely,

Gerald (Jerry) Dickens

The two major problems:

1/ The underlying issue is not presented appropriately. The authors set the stage with: “The geological and glaciological reconstructions of early and middle Miocene expose prominent warm spikes and sea level rises around 22, 16, 14, and 12 Ma, coincident with strong excursions of $\delta^{18}\text{O}$, e.g., Abreu and Anderson, 1998; Bush and Philander, 1997.”

By almost any standard, this is unacceptable. The first reference pertains to a “smoothed” record using old data in an effort to link sea level and stratigraphy; this record does not resemble those generated with considerable detail, care and effort (e.g., Zachos et al., 2001, 2008). The second reference does not pertain to the time interval of interest.

The basic questions as a reader or reviewer are: where is the evidence for abrupt warming events in the Miocene? When exactly did these occur (and on which time-scale)? What is the magnitude and duration of these events? (I do not disagree with the authors that significant changes MAY have happened; however, much better evidence for this should be presented). The framework for the paper (as presently written) is very weak.

Figure 1 (new) should be a time record showing what they want to model. Without this (and accompanying text), there is no context.

2/ The model results are not framed, evaluated, or discussed within the context of available data.

For example, let’s look at Figures 2 and 3. These show changes in ocean temperature with depth. This is great! However, there are clear tests and expectations of such results. Most obvious: benthic foraminifera $\delta^{18}\text{O}$ records between sites should change differently with respect to time and location. So, is this correct? (Less obvious, but nonetheless interesting, there should have been changes in dissolved oxygen – is this

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correct?)

The missing components here are twofold: - Are the model results consistent with available data? - How could the model results be tested with new data?

I have no issue with the modeling, but this manuscript needs much better grounding and discussion of results.

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